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IADIS MULTI CONFERENCE ON COMPUTER SCIENCE AND INFORMATION SYSTEMS

Prague, Czech Republic
22-26 July, 2013

Proceedings of the
IADIS International conference
ICT, Society and Human Beings 2013
and
IADIS International conference
e-Commerce 2013

EDITED BY
Piet Kommers
and Claire Gauzente



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IADIS INTERNATIONAL CONFERENCE

**ICT, SOCIETY AND HUMAN
BEINGS 2013**

and

IADIS INTERNATIONAL CONFERENCE

E-COMMERCE 2013

part of the

**IADIS MULTI CONFERENCE ON COMPUTER SCIENCE AND
INFORMATION SYSTEMS 2013**

SECTION I

**PROCEEDINGS OF THE
IADIS INTERNATIONAL CONFERENCE
ICT, SOCIETY AND HUMAN
BEINGS 2013**

SECTION II

**PROCEEDINGS OF THE
IADIS INTERNATIONAL CONFERENCE
E-COMMERCE 2013**

**Prague, Czech Republic
JULY 24 - 26, 2013**

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SECTION I

IADIS INTERNATIONAL CONFERENCE

**ICT, SOCIETY AND HUMAN
BEINGS 2013**

part of the

IADIS MULTI CONFERENCE ON COMPUTER SCIENCE AND

INFORMATION SYSTEMS 2013

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FOREWORD

These proceedings contain the papers of the IADIS International Conference ICT, Society and Human Beings 2013, which was organised by the International Association for Development of the Information Society and co-organised by The University of Economics in Prague (VŠE), Czech Republic, 24 – 26 July, 2013. This conference is part of the IADIS Multi Conference on Computer Science and Information Systems 2013, 22 - 26 July, which had a total of 948 submissions.

The effects of ICT on human beings as well as the interaction between ICT, individuals, and society are all within the focus of this conference. Both analyses of interactions and effects are important. Changes in behaviour, perspectives, values, competencies, human and psychological aspects and feelings are all of interest. Reflections on past, present, and future challenges – especially planning for handling the latter - are encouraged.

Today, computer science and ICT-related disciplines are working more and more together with various behavioural and social sciences including child psychology and developmental psychology. For this reason, the conference pays attention to societal changes, global and more local organisational and institutional changes, changes in values and in lifestyles, as well as individual cognitive effects and changes, motivational and emotional changes. It also appeals to solution-building in terms of desirable goals and actions for reaching a Good Information Society.

In general all types of research strategies are encouraged, and especially cross-disciplinary and multi-disciplinary studies. Case studies, broader empirical field studies, theoretical analyses, cross-cultural studies, scenarios, ethnographic studies, epistemological analyses may all be presented.

The IADIS ICT, Society and Human Beings conference addresses in detail seven main aspects:

- Globalization and ICT
- Life environment and ICT
- Life role and ICT
- ICT and effects on humans
- Perspectives on ICT
- Desirable goals and ICT
- Actions for reaching the Good Information Society

The IADIS ICT, Society and Human Beings 2013 conference received 83 submissions from more than 27 countries. Each submission has been anonymously reviewed by an average of four independent reviewers, to ensure that accepted submissions were of a high standard. Consequently only 13 full papers were approved which means an acceptance rate of 16 %. A few more papers were accepted as short papers, reflection papers and posters. An extended version of the best papers will be published in the IADIS International Journal on Computer Science and Information Systems (ISSN: 1646-3692) and/or in the IADIS

International Journal on WWW/Internet (ISSN: 1645-7641) and also in other selected journals, including journals from Inderscience. Some of the best papers will be eligible to be extended and enhanced as book chapters for inclusion in a book to be published by IGI Global

Besides the presentation of full papers, short papers, reflection papers and posters, the conference also included two keynote presentations from internationally distinguished researchers. We would therefore like to express our gratitude to Professor Gunilla Bradley, Professor Emerita, Royal Institute of Technology, Sweden and also to Dr. Valeri Souchkov, ICG Training & Consulting Enschede, The Netherlands, for accepting our invitation as keynote speakers.

As we all know, organising a conference requires the effort of many individuals. We would like to thank all members of the Program Committee, for their hard work in reviewing and selecting the papers that appear in the proceedings.

This volume has taken shape as a result of the contributions from a number of individuals. We are grateful to all authors who have submitted their papers to enrich the conference proceedings. We wish to thank all members of the organizing committee, delegates, invitees and guests whose contribution and involvement are crucial for the success of the conference.

Last but not the least, we hope that everybody will have a good time in Prague, and we invite all participants for the next edition that will be held in Lisbon, Portugal.

Piet Kommers, University of Twente, The Netherlands
ICT, Society and Human Beings 2013 Program Chair

Piet Kommers, University of Twente, The Netherlands
Pedro Isaías, Universidade Aberta (Portuguese Open University), Portugal
Eva Kasparova, University of Economics, Faculty of Business Administration, Prague,
Czech Republic
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Prague, Czech Republic
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KEYNOTE LECTURES

WHAT IS QUALITY OF LIFE IN THE ICT SOCIETY?

By **Gunilla Bradley, Professor Emerita**
Royal Institute of Technology, Sweden

ABSTRACT

Some issues that will be addressed are:

- Main changes in people's lives – structures and roles. What changes are going on in the professional, private and citizen's role? How can we balance our various roles at the increasing convergence of them? Important contributing factors to Quality of Life and how to achieve.
- Main changes in the labour market – work force in the so-called flexible companies. New ways to influence our work life conditions as well as to contribute to societal change.
- Impact of network organizations on human behavior, values, motivation and feelings. Our relation to space and time, what kind of stress? Dialectics of values and life styles.
- Some trends in psychosocial communication and ICT, collaboration and global communication patterns. The home as a communication sphere in the network era - new opportunities and risks.
- Convergence and acceleration are main processes at the interplay between technology, societal structure, organizational design, and human roles in the society. I will reflect on the convergence theory and the discourse in Media Technology and Informatics about the present power relations and movements globally. I will present reflections on risks and opportunities in the 21st Century ICT society. Where are the “energy centers” that can activate and create changes towards the “Good Information Society”? Can agreements on Goals and Visions for that society be achieved?

INNOVATIVE PROBLEM SOLVING FOR SOCIAL APPLICATIONS: A STRUCTURED APPROACH

**By Valeri Souchkov,
ICG Training & Consulting Enschede,
The Netherlands**

ABSTRACT

Social arrangements in societal participation like care, education and cultural events often undergo a state of “paralysis by analysis”; no logical way from perceived needs or challenges seems to lead to tasteful-, human- and altruistic solutions. In this keynote the renown expert in the TRIZ methodology for creative problem solving will take your hand and lead you through the arcade landscape of generating-, selecting and implementing ideas for social architecture and the elegant conveyance of societal processes. Often when trying to solve a problem, constraints might not allow us to apply directly or adapt existing solutions. In such cases we need to search beyond known ideas and concepts and come up with an innovative solution. To produce innovative ideas psychological barriers must be broken and solution search space has to be expanded. Without a structured approach it can take a long time and result in numerous costly trials and errors. Long-term studies of the vast amount of creative and innovative solutions resulted in the discovery of a number of universal principles and knowledge-based strategies which can be used to successfully attack difficult problems. The talk will focus on demonstrating in the interactive way how these principles and strategies can be used to facilitate and boost the process of innovative and creative problem solving in the various domains of this IADIS conference like “Web-based Communities”, “Social Media”, “E-Learning”, “Gaming”, “E-health” etc.:

Full Papers

CORPORATE INTELLECTUAL CAPITAL MANAGEMENT: LEARNING ENVIRONMENT METHOD

Alla G. Kravets, Alexandr Gurtjakov and Andrey Kravets
Volgograd State Technical University, Volgograd, Russia

ABSTRACT

For effective functioning of the company a huge amount of knowledge is needed, which is often in itself - in databases, corporate portals, e-mail correspondence and in the memory of employees. Uncontrolled processes leads to growth in the accumulation of information and also growth in the problems associated with its use. The aim of this research is to improve management of the company' intellectual capital by organizing a distant learning environment. Based on the proposed method and mathematical models the prototype of an automated system of intellectual capital management was developed and distance learning environment was implemented.

KEYWORDS

Knowledge growth, intellectual capital, knowledge management, learning environment.

1. INTRODUCTION

Researches in the field of intellectual capital management in general and human capital are widely represented in economics, sociology and management in different countries (Ordóñez de Pablos, 2002; Lennox Henry, 2013).

According to Russian government program "Development Program 2020" one of the main objectives is the innovative people-centered development of science and technology sectors. At the present stage of technological development, technology, economy and education are becoming an urgent problem in intellectual capital management of a company. Accumulated experience creates favorable conditions for multifactor analysis and formalization of the evaluation process of intellectual capital (IC). However, the most promising tasks are the analysis and management of the intellectual capital accumulation process together with the businesses and organizations demands in a certain level of staff competence (Ai Yu, Humphreys, 2013). For effective functioning of the company a huge amount of knowledge is required, which is often in itself - in databases, corporate portals, e-mail correspondence and in the memory of employees. Uncontrolled processes leads to growth in the information accumulation and also growth in the problems associated with its use.

Therefore it's necessary to develop specialized tools for both the internal and external management of information. Accordingly, the current challenge is to create an integrated environment of corporate intellectual capital automated management.

Researchers (Rossignoli, Ferrara & Varriale, 2013, McNeill et al, 2010) propose methods of material assessment, strategies and technologies that enable the learner to embark on a learning process.

Learning platforms are now widely used by educators to enhance the learners' interest in learning, shorten the learning portfolio, and improve the overall learning outcome (Knittl & Pongratz, 2010; Hadjerrouit, 2013; Titova, O.V. and Kravets A.G., 2013).

2. BACKGROUND

2.1 Intellectual Capital: Terms and Evaluation

In various sources there are a number of equivalent terms used depending on the aims of the research' authors: Intellectual Capital \approx Intellectual assets \approx Intangible assets \approx Professional Intelligence.

Currently, there is no single interpretation of the term "intellectual capital", as all who have tried to definite, are generally based on different assumptions and research: economics, sociology, personnel management and others. Researches conducted in recent years give a base for a clarified view of the corporate intellectual capital components, and to consider this phenomenon systematically.

The most appropriate from this point of view is given in (E.N. Seleznev, 2004) definition: "Intellectual capital - is the intellectual wealth of the organization, which predetermines its creative possibilities for the creation and implementation of intellectual and innovative products". According to this definition algorithm of the intellectual knowledge formation and development are defined. And, therefore, demanded by this algorithm, the process of conscious influence on the dynamics of the knowledge creation and usage is described. The intellectual capital essence interpretation actualizes methods that reflect the formation and subsequent movement of corporate knowledge, starting from the creation or update (e.g., through training) stage, and then completing the steps in their capitalization and subsequent commercialization.

In studying of the intellectual capital structure and management it is found that methods (IC Rating, IC Index, Intangible Assets Monitor and Navigator etc.) allocate human capital as a base for the formation of the intellectual capital other components. Similar approaches are presented in several Russian publications (E.N. Seleznev,2004; Gurtyakov A.S. et al., 2012a). For some of the presented methods the authors propose a list of estimated parameters and recommendations for implementation.

For the evaluation and management of the IC, the following groups of methods and approaches are considered: accounting and other accounting methods (ROI , EVA, Tobin’s coefficient etc.); HR methods of management (personnel management); methods of Business Intelligence management; KPI; Balanced scorecard; Information Technology (IT-solutions).

An analysis leads to the following conclusions:

- Human intellectual capital asset is its basic component and is a tool that ensures the creation of intellectual property.
- Learning, including distance, is only considered as a measure and means to improve the quality of human capital.
- Information technology is used only as a tool for recording, storage, and evaluation of intellectual capital.

2.2 Corporate Distance Learning Systems

Among the major trends in the implementation of corporate training systems in Russia and abroad are the following (Harward, 2011):

- 1) The evolution of educational portals.
- 2) The importance of preserving knowledge.
- 3) The formalization of informal learning.
- 4) Social rating as new tool recognition.
- 5) Social learning still requires support.

Thus, most of the trends are associated with the introduction of social networking and other methods WEB 2.X in corporate training system. These trends correspond with the direction of development and generation of distance learning systems (DLS) (Table 1).

Table 1. Generations of DLS

	E-Learning 1.0	E-Learning 1.3	E-Learning 2.0
Main components	LMS courses Development tools(authoring)	Associated LCMS kits Quick development tools	wiki social networks and common bookmarks blogs Add-ins and mash-ups
Rights	From top-bottom, one-directional	From top to bottom, working together	From bottom to top, initiative of students, mutual learning
Development time	long	quick	none
Content size	60 minutes	15 minutes	1 minute

Access time	Before work	During break	During work
Virtual meetings	class	By invitation, during working hours	Among themselves, with experts
Learning process	All at once	In several phases	When needed
Access to content	LMS	Mails, intranet	search, RSS
Initiator	instructor	learner	employee
Content creator	Content designer	Expert on the subject	any

The analysis leads to the following conclusions:

1. Evolution of DLS corresponds with the trends of development and implementation of corporate learning systems.
2. Accumulation, preservation, classification and knowledge management are key aspects of the implementation and the development of learning systems.

3. CORPORATE INTELLECTUAL CAPITAL AUTOMATED MANAGEMENT METHOD DESCRIPRION

3.1 The Basic Concept and Key Effectiveness Indicators

The basic concept of IC management includes the following positions:

1. Learning environment as a tool of corporate intellectual capital management is a set of information, software and organizational structures.
2. The bearer of professional intelligence and creator of all other tangible and intangible components of intellectual capital is the employee of the company.
3. Advanced social network technologies are both media and tools for creating and accumulation of intellectual capital.

On the basis of these positions we propose a the basic concept hypothesis:

Integrating professional intelligence accumulation and training functions within the learning environment based on the advanced social networking technologies will improve the effective management of corporate intellectual capital.

Based on the analysis of IC management, trends and implementation of corporative learning environment goals, management key effectiveness indicators of the proposed method were identified:

- Increasing knowledge base of corporate intellectual capital (CIC);
- Increasing the number of trainees;
- Reduction in training time;
- Reduction in adaptation time of new employees.

In general, the object of study as a socio - economic system solves the problem of management (Fig. 1): S controlling system manages the process $U(t)$ in such a way that, given the external factors $F(R, t)$ to provide the required current state $C(t)$ of the controlled system (P) according to the control action (K), where t - time. In Figure 1, the elements, labeled 1 and 2, were investigated in various Russian and foreign sources. In this research studied the elements 3 and 4, that is, an active influence of the controlled system on the management process.

3.2 The Model of Corporate Intellectual Capital

In the first phase based on the basic concept a set-theoretic model of corporate intellectual capital was developed in the form of:

$$IC = \{KI, QS, TS, TN\}, \quad (1)$$

where: KI—knowledge base of CIC, QS - the number of trainees, TS – training time, TN - new employees adaptation time.

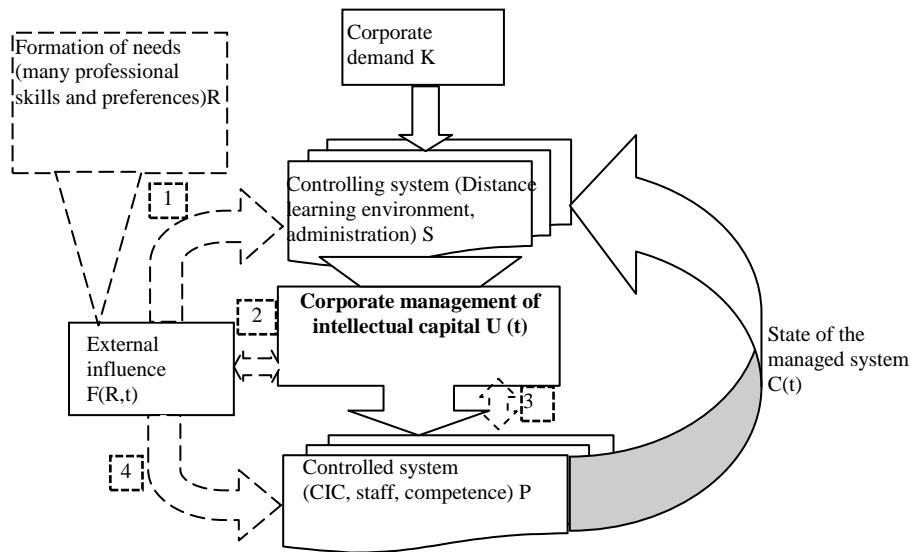






Figure 1. Scheme of corporate intellectual capital management. Legend:

- | | | |
|---|---|---|
|  | - direct control | |
|  | - entry | |
|  | - effect | |
|  | - knowledge bases and organizational structures | |
| | | 1,2- formation and the influence of external effect |
| | | 3-active influence of management system on the management process |
| | | 4-formation of knowledge base CIC and content environment of DL |

In the course of the study an analysis of intentional relations presented in a set-theoretic model was carried out (1). As a result we have the following relationships:

$$\left\{ \begin{array}{l} \max(KI) \rightarrow \min(TS) \\ \max(KI) \rightarrow \min(TN) \end{array} \right. \quad (2)$$

$$\left\{ \begin{array}{l} \min(TS) \rightarrow \max(QS) \\ \max(QS) \rightarrow \min(TN) \end{array} \right. \quad (3)$$

$$\left\{ \begin{array}{l} \min(TS) \rightarrow \max(QS) \\ \max(QS) \rightarrow \min(TN) \end{array} \right. \quad (4)$$

$$\left\{ \begin{array}{l} \max(KI) \rightarrow \min(TS) \\ \max(KI) \rightarrow \min(TN) \end{array} \right. \quad (5)$$

Therefore: according to additivity from (2) and (5):

$$\max(KI, QS) \rightarrow \min(TN) \quad (6)$$

and transitivity from (2) and (4):

$$\max(KI) \rightarrow \max(QS) \quad (7)$$

Building relationships over the closure of the IC set (1), (6), (7) reduces the number of control parameters and allows to formulate a management task as a problem of mutual influence:

$$\max(KI) \leftrightarrow \max(QS) \quad (8)$$

The next step is to model the dynamics of key performance indicators. In general, the mathematical model of management is the following equation:

$$\frac{dC}{dt} = a_1 k_i + a_2 q_i - a_3 s_i - a_4 n_i,$$

where k_i, q_i, s_i, n_i - control variables - the rate of change KI, QS, TS, TN, c_i - the state of variables - growth of intellectual capital IC, a_i - coefficients of significance control variables, $i \in [0, \infty]$ - assess step of CIC.

Thus, from Figure 1 and (1), (8), (9) the optimal control function is:

$$C(t) = \int_{i=0}^{\infty} U(f(K_i, Q_i), t) dt \quad (10)$$

3.3 The Method of Corporate Intellectual Capital Automated Management through the Organization of Learning Environment

To solve the formulated problems based on the basic concept, the method of automated management of corporate intellectual capital through the organization of learning environment is created (Fig. 2) (Gurtyakov A.S. et al., 2012a).

Stages of the method (upper level):

1. Analysis of the initial state of the corporate K_0 and personal P_0 intellectual demands. Prognosis and forming of arrays $\{K\}$ and $\{P\}$ demands as control effects.
2. Integration of $\{K\}$ and $\{P\}$ and formation arrays of implementation tools $\{S\}$ and controls $\{C\}$ based on the integral demands arrays.
3. Iterative procedures for analyzing results and coordination:
 - a. status of implementation tools SK_f, SP_f with the status corporate K_f and personal demands P_f .
 - b. status of controls CK_f, CP_f with the status of the corporate K_f and personal demands P_f .
 - c. the current status of corporate K_f and personal demands P_f .

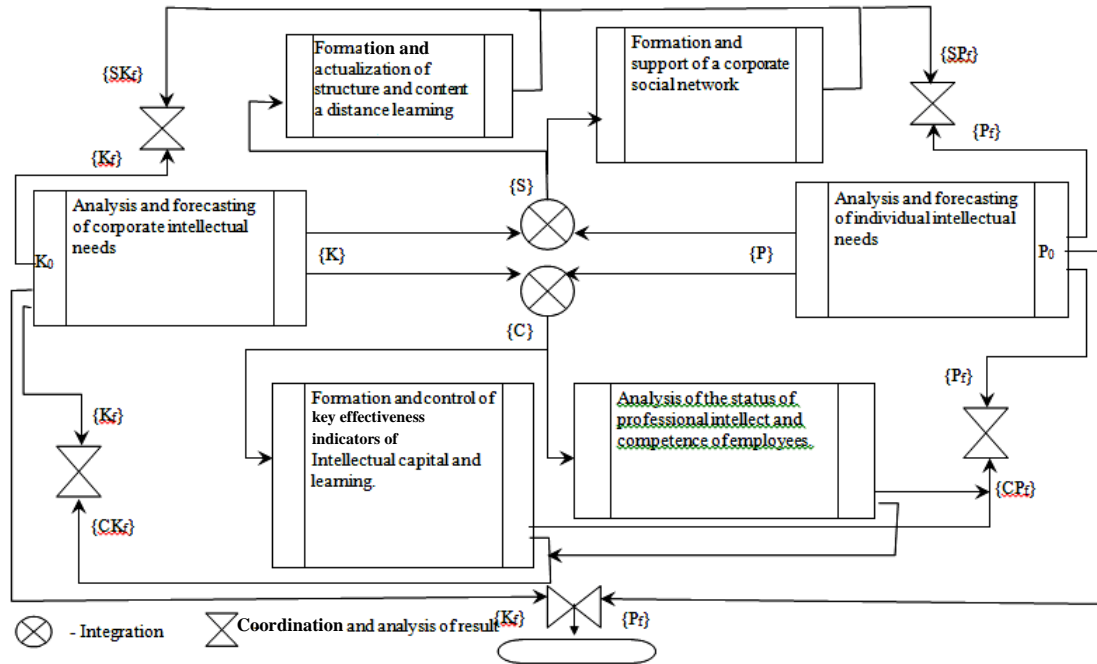


Figure 2. Diagram of corporate intellectual capital automated management method

Based on corporate demands the structure of distance learning environment is formed according with the company competences demands and the each course content. In addition, this approach allows the integration of forming and actualization functions of the structure and content of distance learning environment with functions of the corporate intellectual capital knowledge base (Figure 3) (Gurtyakov A.S. et al., 2012).

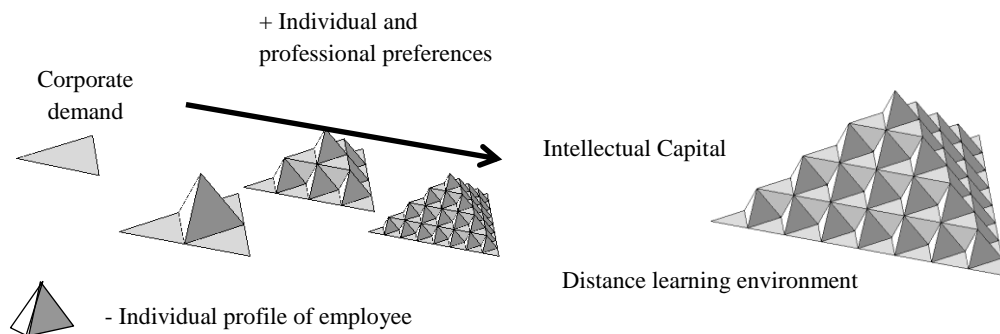


Figure 3. Formation of a distance learning environment and knowledge base of CIC (BK CIC)

3.4 The Architecture of the Learning Environment for Corporate Intellectual Capital Automated Management

To describe the architecture of corporate intellectual capital automated management through the organization of learning environment we developed diagrams which explain the structure and implementation approach. The proposed system architecture is shown in Figure 4.

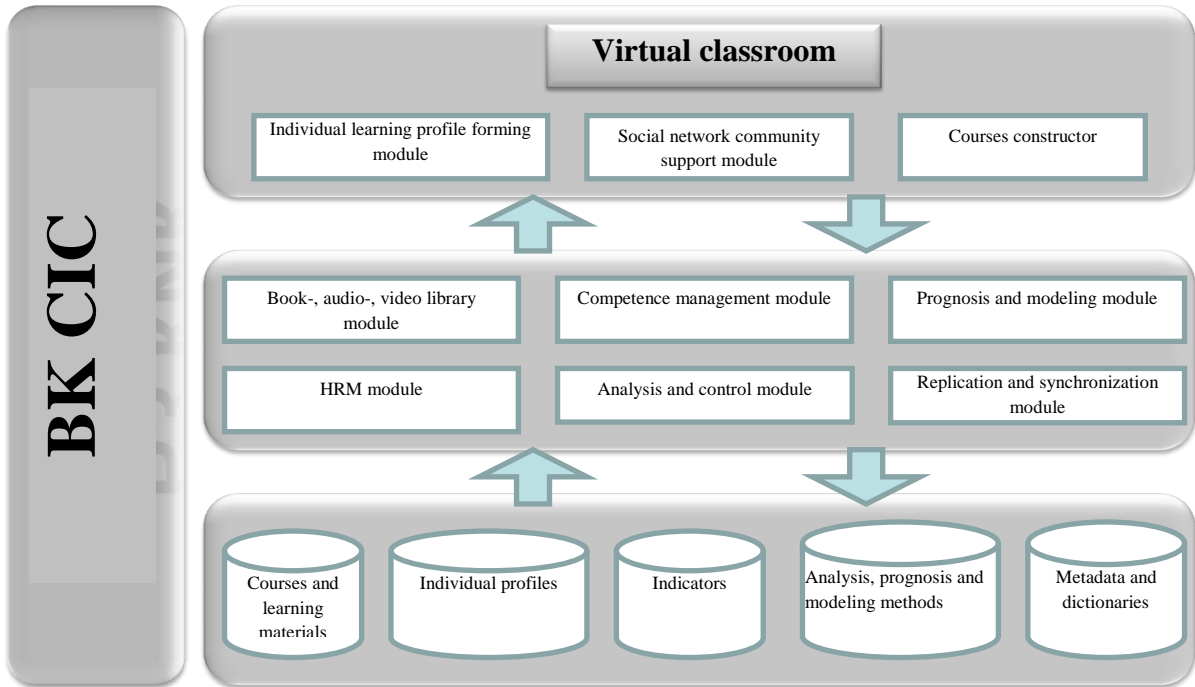


Figure 4. Architecture of the distance learning environment

The concept of an automated system implements the following developed method:

- The main components as individual modules(Add-ins)
- Differentiation of rights without restricting the possibility of interactive effects
- Work in real time with minimal delay to the processing of information (slide shows, audio and video content)
- Sharing of resources and management of several conferences at the same time;
- Means of social learning;
- Replication and synchronization.

BK CIC is realized with the “cloud” architecture and SaaS (software as a service) approaches (Figure 5).

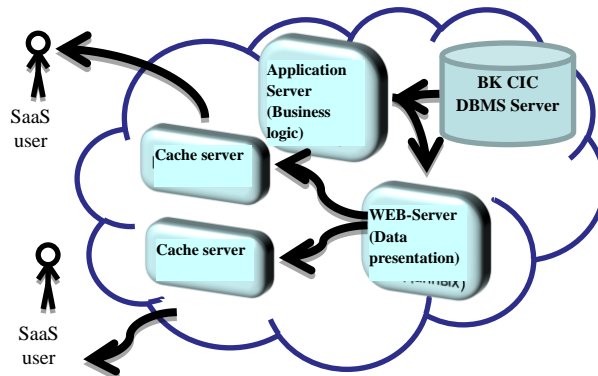


Figure 5. Architecture of BK CIC

4. METHOD IMPLEMENTATION

Method of corporate intellectual capital automated management through the organization of learning environment has been effectively implemented in four companies: number of employees - 50 or more, implementation period - 12 months. For the experiments, companies with different initial parameters in terms of CIC management (Table 3) were chosen (Chiung-Ju Liang et al., 2013).

Table 3. Description of the initial parameters of an experimental implementation

#	Activity of a company	Technology of management	Additional parameters
1	ERP-systems development and implementation	Management by objectives (MBO), Key performance indicators (KPI)	Authorized training center(ATC)
2	IT-department of a telecommunication company	Balanced Scorecard (BSC), Key performance indicators (KPI)	
3	Software development	Project management	Startup company
4	Group of companies – construction and maintenance of buildings	Project management	Evaluation of IC was not carried out

The results of experimental implementation (Figure 7) show the dynamics of key effectiveness indicators corresponding to (8), (9), (10):

- increasing the rate of accumulation of BK CIC from 1.7 to 2.5 times;
- increasing the number of trainees from 1.7 to 3.8 times;
- reducing the time adaptation of new employees from 40 to 64%;
- reducing the training time from 33 to 64%.

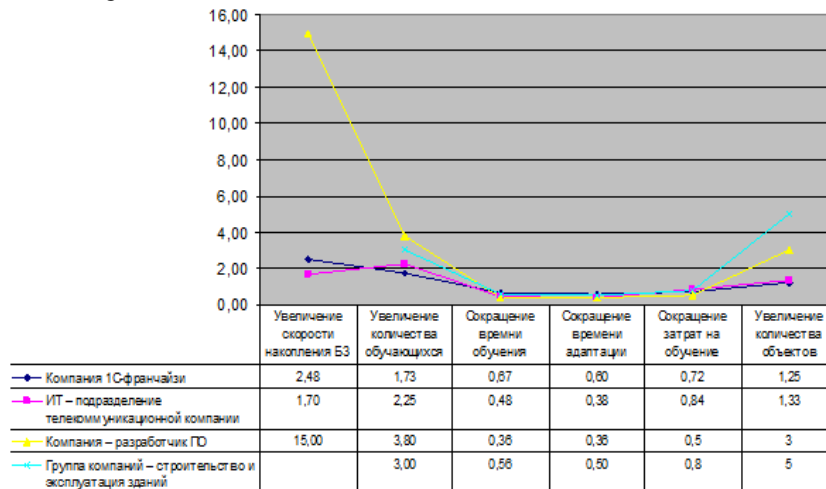


Figure 7. Results of an implementation.

In addition to the confirmation of key effectiveness indicators also was shown positive results for the target goals: reducing training costs from 16 to 50%, increasing the number of intellectual property items - from 1, 25 to 5 times.

5. CONCLUSION

The developed method for the corporate intellectual capital automated management through the introduction of distance learning environment differs from existing methods because it implements the integration processes of corporate intellectual capital accumulation and professional staff adaptation.

Within this method, the following were proposed:

- the basic concept of corporate intellectual capital management;
- management key effectiveness indicators;
- model of corporate intellectual capital.

Distance learning environment was developed in Microsoft Visual Studio, Java, ActionScript and Red 5 Server.

Based on the proposed methodology and mathematical models the intellectual capital management automated system was developed and distance learning environment was implemented. According to the implementation results, we have the following results:

- reducing training costs by 16 - 50%;
- increasing in the number of intellectual property items by 1.25 - 5 times.

Future researches will be connected with: study of correlation between company's initial parameters and key effectiveness indicators results; study of IC management efficiency improving methods.

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COMMUNICATION IN WEB 2.0: A LITERATURE REVIEW ABOUT SOCIAL NETWORK SITES FOR ELDERLY PEOPLE

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ABSTRACT

The usage of Internet and Social Network Sites (SNSs) is an ongoing trend within the 21st century. The present article investigates the existing publications in the research area of older people and SNSs. Due to five exclusion criteria the systematic literature review reveals 27 articles out of 22 online bibliographic databases with overall 660 search operations. Of them, only eight articles concentrate exclusively on people over the age of 50 years and even two articles solely on persons over 60 years. The analysis shows that more than 80 percent of the relevant articles were published between 2009 and 2011. The majority of the articles can be seen as fundamental research. The sample size differs from 17 to nearly 80.000 people. To obtain generalizable results for elderly persons' usage of SNSs, further research is necessary. On the one hand, communication in SNSs provides the potential of reducing isolation and feelings of loneliness. Beyond, data security, privacy or trust could become an obstacle for the usage of SNSs.

KEYWORDS

Literature Review, Elderly People, Social Community, SNS, Social Network Sites.

1. INTRODUCTION

The increasing success of social networks and the ongoing worldwide demographical change lead to the research question: *How many publications exist in the area of tension between older people and Social Networking Sites (SNSs), and which results were obtained for future research?*

Today's time is often referred to an era of information society, which is characterized by permanent access to information via mobile phone, handheld, television, etc. Due to the distribution of social media and Web 2.0 services in recent years, a new information channel has been created that enables creation, transmission and access to digital information and content that is posted by Internet users themselves. Thus, a large portion of the currently available information is already user-generated content (UGC) (Brandtzæg & Roibás, 2009).

The most popular applications in social media are SNSs, which experience a global boom since 2003 (Boyd & Ellison, 2007). In 2010, the SNS Facebook replaced Google as the most frequently visited website in the United States. In March 2012, Facebook was the largest SNS with a total of 901 million monthly active users worldwide (Facebook Inc., 2012). Although, nowadays more older people use the Internet (Eurostat, 2011), SNSs are still communication channels, which are mainly used by 'digital natives' (Prensky, 2001; Smith, 2010). Digital natives are characterized by the facts that they are born after 1980 in the western industrialized nations and speak the digital language. Internet, mail and computer games are inherent part of their daily life. In contrast, people, who are born before 1980, are known as 'digital immigrants'. They need to learn the usage of new technologies in older age with major effort. This creates a digital gap between digital immigrants and digital natives, as for digital immigrants it is not possible to gain the same capabilities as it is for native speakers (Prensky, 2001). With increasing age it is more difficult to solve certain tasks on the Internet. Often older people need more time for the tasks or cannot achieve a solution (Hargittai, 2002).

Because of the demographic change the world population is demonstrably getting older and therefore the consideration of digital immigrants is gaining importance (UNDESA, 2010). Non-usage of SNSs increases

the risk for a large proportion of older people to be excluded from the growing complex information society (Brandtzæg & Roibás, 2009). Private and public offers are increasingly available in electronic form. Communication, economic transactions, political decision-making processes and volition are shifting more and more to the digital world. Due to the shift from industrial to knowledge society, the economic and social importance of access to information rises substantially. Successes in professional careers as well as participation in recreational activities presume the competent usage of new media. As a result, the risk of personal isolation occurs for digital immigrants due to decreased participation in social and economic life (Deutscher Bundestag, 2002). Moreover, the adoption of Enterprise 2.0 applications in firms leads to growing differences between digital natives and digital immigrants in professional life.

The present study is structured as follows: The background section comprises the characteristics of older people in the information age and gives a deeper understanding of Social Networking Sites and its importance for the elderly. The literature review as research methodology is described in the third section. In the fourth section, the results of the quantitative analysis are presented. Following, a discussion of the received results is performed and an insight into further research activities is given. Finally, the limitations of the present study are demonstrated.

2. BACKGROUND

2.1 Characteristics of Older People in the Information Age

In addition to the gradual digitalization of the society another development, which could change life in our society, is observed: the population is getting older (UNDESA, 2010). Initially, it should be mentioned that age cannot be unambiguously defined. Although the chronological age of two persons is equal, the biological, psychological or social age may differ (Stuart-Hamilton, 1994; WHO, 2011). Also the cohort shift may influence differences in persons' age. Due to this fact "there is no United Nations [UN] standard numerical criterion, but the UN agreed cutoff is 60+ years to refer to the older population" (WHO, 2011). Therefore, the relevant target group in this study are persons over the age of 60 years. In the context of new media these people belong to the so called 'digital immigrants', which have not grown up with new technologies in contrast to the 'digital natives' (Prensky, 2001).

In 2009 the proportion of older people in the more developed regions amounts to more than 20 percent. With 2.6 percent the annual growth rate is more than twice as high as the growth rate of the total population, which is 1.2 percent. According to calculations, the number of older people will triple within 40 years from 700 million people in 2009 to around 2 billion in 2050. This signifies almost a third of the total population (UNDESA, 2010). These figures underline the importance of addressing the target group 60+ years in scientific research.

2.2 SNS in Context of Social Media

Social Media is defined as: "[...] a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content." (Haenlein & Kaplan, 2010). To the definition of social media, it is necessary to explain the terms Web 2.0 and user generated content in advance.

Since 2004, the term Web 2.0 is used as a new form of Internet usage. The Internet serves as a platform on which content and applications are created and published by all users in a participatory and collaborative way and no longer by individuals. This new form of Internet usage is the technical and ideological basis of social media. User-generated content (UGC) is an umbrella term, used by many people, for all forms of social media (eg. text, video, photos) (Haenlein & Kaplan, 2010).

SNSs are one type of Social Media and are defined as: "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site" (Boyd and Ellison 2007).

SNSs have their beginnings in the '90s with the cross-linking of various online diaries to a common 'Open Diary' by Susan and Bruce Abelson (Kaplan & Haenlein, 2010). In 1997 the first official SNS was followed by 'SixDegrees.com' (Boyd & Ellison, 2007).

[Boyd and Ellison 2007] clarify, that the majority of SNSs are originated from 1999 onwards. The technological developments as high-speed Internet and hardware, tablets or handhelds, are available for the mass. In combination with economic factors, which provide the tools for creating UGC, as well as social causes, such as the emergence of a generation that grew up with the Internet, the boom of SNSs starts in 2003 (Kaplan & Haenlein, 2010; Boyd & Ellison, 2007). According to Karahasanovic et al. (2009) only a small number of older persons are active on SNSs and use this new form of online participation in contrast to younger people.

The research literature referred to this as the digital divide between the generations and could also be demonstrated in several studies (Kiel, 2005; DiMaggio et al., 2004; Cothey, 2002; Loges & Jung, 2001). In digital divide, a distinction is made between the first level digital divide and the second level digital divide. The first digital divide can be justified by the variation in access to the Internet or to computers in general (Korupp & Szydlik, 2005). Older people are less likely to have an Internet ready device and therefore, have less access to the Internet (Loges & Jung, 2001). The second level digital divide describes user profiles of new technologies, differences in people online skills and Internet usage intention (Korupp & Szydlik, 2005; Hargittai, 2002).

The Internet and SNS user numbers prove the variation between the generations. In 2011, 94 percent of the 18- to 29-year-old, 87 percent of the 30- to 49-year-old, 74 percent of the 50- to 64-year-old and just 41 percent of the over 65-year-old in the USA used the Internet. This can also be illustrated by current Facebook user numbers. In March 2012, Facebook recorded about 901 million monthly active users worldwide (Facebook Inc., 2012). Around 156 million users of those come from the USA (Socialbakers.com, 2012). 14.2 percent of the users are older than 54 years (Socialbakers.com, 2012) with this age group representing 24.9 percent of the American population (U.S. Census Bureau, 2010). By comparison, the 25- to 34-year-old make up 23.4 percent of the Facebook users in the USA (Socialbakers.com, 2012) but just represent around 13.3 percent of the population of the USA (U.S. Census Bureau, 2010). Another example is the UK where about 30 million inhabitants use Facebook. The proportion of over 54-year-old users reaches 10.2 percent, where their percentage of the total population is 20.5 percent in 2010. In contrast to that 13 percent of the citizens between 25 and 34 years represent 25.4 percent of the Facebook users in the UK. The situation in Germany reflects a similar trend. Around 24 million people use Facebook. The percentage of over 54-year-old users lies at 5.7 percent and the share of 25- to 34-year-old users stands at 26.8 percent with a population distribution of 33 percent or 12 percent in 2010 (Statistisches Bundesamt, 2009).

Additionally, there exists little knowledge about older people and their needs in relation to participation in SNSs (Karahasanovic et al., 2009). Nevertheless, critics note that recent research neglects older persons in the topic of SNSs (Brandtzæg & Roibás, 2009).

3. METHODOLOGY

A structured literature review was performed to disclose the relevant articles in connection of SNSs and older people. The methodology enabled a systematic overview about quantitative as well as qualitative information in this field of research. Primary, the identification of relevant articles was carried out. By means of computerized search on the platforms 'Web of Science' (ThomsonReuters, 2011) and 'EBSCOhost' (Ebscohost, 2011) 22 different online bibliographic databases were used in total¹. The overall database research was realized starting in April 2011 up to its publication in May 2011. The database searches were carried out with a filter. In the database 'Web of Science' the key search terms were filtered by a topic and in the 'EBSCOhost' by subject terms.

The key search terms, which were used in the research, were divided into two descriptors to structure the interplay between terms of social communities and elderly people. The first descriptor, called 'Platform' contained the keywords *Online Social Network/ Community*, *Social Community* as well as *Social Networking Site*. Additionally, the shortcut SNS was integrated. The second descriptor 'Population' comprised the used terms for people over the age of 60 years. The keywords *aging*, *adult* and *digital immigrants* as well as the stated terms and derivatives of words *elder* and *old* have been taken into account (Table 1).

Table 1. Key search terms

Platform	Population
Online Social Network	Adult
Online Social Community	Age*
Social Community Site	Digital Immigrant
Social Network Site	Elder*
Social Networking Site	Old*
SNS	

Note: *Search included stated terms and derivatives (e.g. elder; elders; elderly).

Summarized, 30 different search term combinations were performed over 22 databases which signify in the aggregate 660 search procedures. Both descriptors were interrogated alternatively, beginning with the search term combination *Online Social Network* and *Adult*. Afterwards, the term *Online Social Network* was requested with the term 'age' and with the other search terms of the descriptor '*Population*'. In a second step, the further key search terms of the descriptor '*Platform*', beginning with *Online Social Community* were combined with those from the second category. Due to the large number of potentially relevant articles, the abstracts of the search results were partly analyzed during the database research. A set of *exclusion criteria* was composed for obtaining consistent results. For inclusion in the final literature analysis articles had to comply with the following criteria:

- (a) The paper described explicitly the relation between SNSs and the participation of older people
- (b) The study was published in a journal or presented on an international conference
- (c) Articles which were first presented on a conference and afterwards published with identical findings as a journal article were only taken into consideration with the journal release
- (d) The publication was written in English
- (e) Due to the database research date, articles are included until end of May 2011.

During the review a data form was used to remove the important information for each relevant article. The data sheet was subdivided into various columns. First, the study details Summarized, 30 different search term combinations were performed over 22 databases which signify in the aggregate 660 search procedures (author, title, year, journal type and name or conference paper and follow-up study status) were integrated. Furthermore, the keywords of each article were listed. Moreover, the data sheet included a distinction between conceptual and empirical/experimental articles with a detailed description of the used quantitative or qualitative methodology (e.g. experiment, qualitative interview or framework development). Furthermore, a detailed listing of the measurement was written. *Participant information number, age or age group*, as well as *gender* were listed likewise. Finally, the findings of the diverse articles are noted. Keywords, bullet points and full-text are used for the data documentation. After integrating and clustering the data on the fact sheet, a detailed analysis of the relevant studies was performed.

4. RESULTS

4.1 Quantitative Data Analysis

Based on the initial key term search with a total of 660 search procedures within the online bibliographic databases, 4.860 potentially relevant articles were detected. Based on the initial finding, the exclusion criteria have been applied to each of these relevant articles. As a methodological approach for this exclusion, the abstracts of the potential studies were reviewed. After the first exclusion phase, an overall number of 68 studies remained as potentially relevant matches for this research. Articles that focus on another age bracket and did not cause a reference on the age or did not meet the scientific requirements (magazine and newspaper articles, partly transcripts of television or radio interviews – especially concerning articles found on EBSCO) as well as articles that did not cover Social Networking Sites or Communities but social networking and communities in real life, were excluded. In addition, articles that refer to SNS in terms of an abbreviation for Sacral Nerve Stimulation, Somatic Nervous System, Sympathetic nervous system and Spallation Neutron Source were excluded as well.

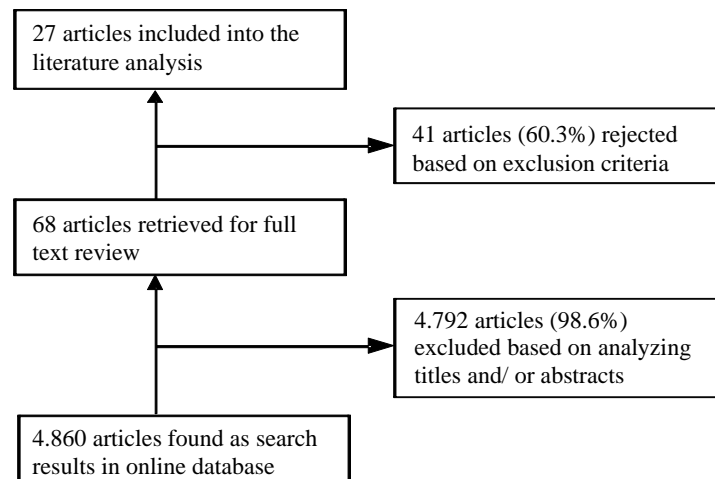


Figure 1. Literature research sequence diagram

Based on the five different exclusion criteria shown above, 41 articles (60.3 percent) were further excluded after the full-text review. A large portion of these studies (32 articles) was not relevant due to its disjunctive topic focus after reading the complete article. The articles did not analyze the relevant age groups. Furthermore, six studies were eliminated since they were not published at a conference or in a journal, due to its missing scientific contribution. Finally, the last three articles were excluded due to duplicative publications in journals and proceedings of conferences. These studies are only considered once with a more recent journal article in our results. The rigid exclusion criteria ensured the topic focus on relevant research for this specific field of interest. In the end, 27 relevant articles were analyzed in detail in this literature review (Figure 1).

Table 2. Overview about the 27 articles integrated into the literature review

Author	Year	Participants Number	Age Group	Research category
Bateman, Pike, and Butler	2011	54	multiple	Survey
Chang and Zhu	2011	278	multiple	Experiment
Etchemendy et al.	2011	17	50+	Experiment
Hanson	2011	-	-	Metaanalysis
Margaryan, Littlejohn and Vojt	2011	160	multiple	Survey
Yoon, Yoon and George	2011	126	50+	Exploratory study
Chung, Park, Wang, Fulk and McLaughlin	2010	248	multiple	Survey
Ji, Choi, Lee, Han, Kim and Lee	2010	-	-	Metaanalysis
Kontos, Emmons, Puleoc and Viswanath	2010	3031	multiple	Exploratory study
Ordonez, Yassuda, and Cachioni	2010	42	60+	Experiment
Rivera-Nivar and Pomales-Garcia	2010	64	multiple	Experiment
Slajan, Schönwetter and Cleghorn	2010	52	multiple	Experiment
Wang and Wellman	2010	1178	multiple	Survey
Arazi	2009	-	-	Metaanalysis
Blaschke, Freddolino and Mullen	2009	-	-	Metaanalysis
Chou, Hunt, Beckjord, Moser and Hesse	2009	7644	multiple	Survey
Karahasanovic et al.	2009	767	multiple	Survey
Nimrod	2009	79.665	50+	Exploratory study
Pfeil, Arjan and Zaphiris	2009	100	multiple	Exploratory study
Pfeil and Zaphiris	2009	47	50+	Exploratory study
Pfeil, Zaphiris and Wilson	2009	31	50+	Survey
Sum, Methews, Pourghasem and Hughes	2009	222	50+	Survey
Wong, Fung, Law, Lam and Lee	2009	2511	multiple	Survey
Russel, Campbell and Hughes	2008	154	50+	Survey
Xie	2008	33	50+	Survey
Kanayama	2003	120	60+	Exploratory study
Butler	2001	not mentioned	multiple	Experiment

After structuring these articles and including them into a structured fact-sheet, an in-depth analysis was undertaken. Based on the first definition of SNSs and the occurrence of digital natives / immigrants in the year 2001 (Prensky, 2001), the distribution of the related research articles clearly underlines a switching focus towards the target group of digital immigrants in social media within the last two years. Hence, the publication distribution shows that the vast majority of the relevant articles were published within this time period. Figure 2 illustrates the distribution. Focusing on the period between 2009 and 2011, more than 80 percent of the relevant articles were published in this period of time.

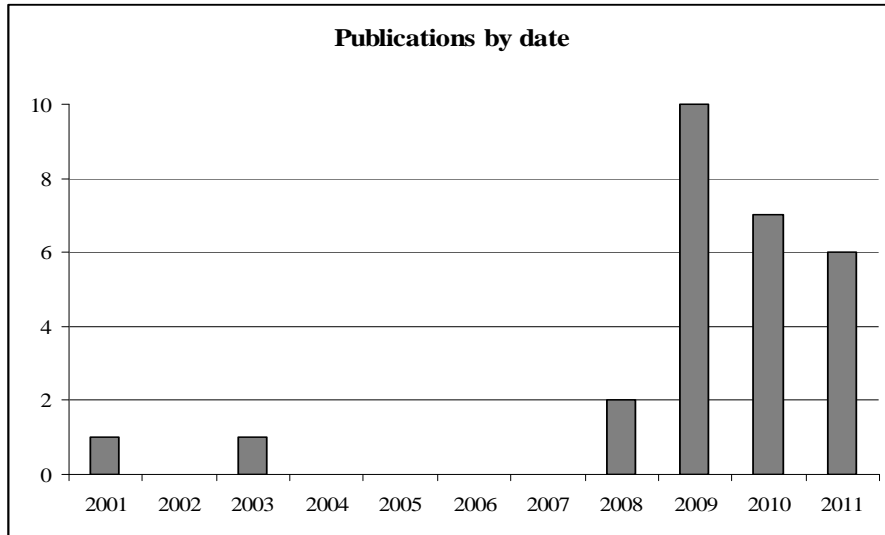


Figure 2. Distribution of the publications by publication date

Due to the analyzed articles, three different age groups can be clustered. In contrast to the initial assumption that most studies feature an older target group for their studies, the literature review indicates a counter-intuitive finding. 13 articles considered a multiple age group which includes on the one hand younger and on the other hand older people over the age of 50 years. Eight articles regarded the target group 50+ years, while only two articles concentrate on people over the age of 60 years. Additionally, the four meta-analyses are structured without age consideration. Figure 3 visualizes this distribution.

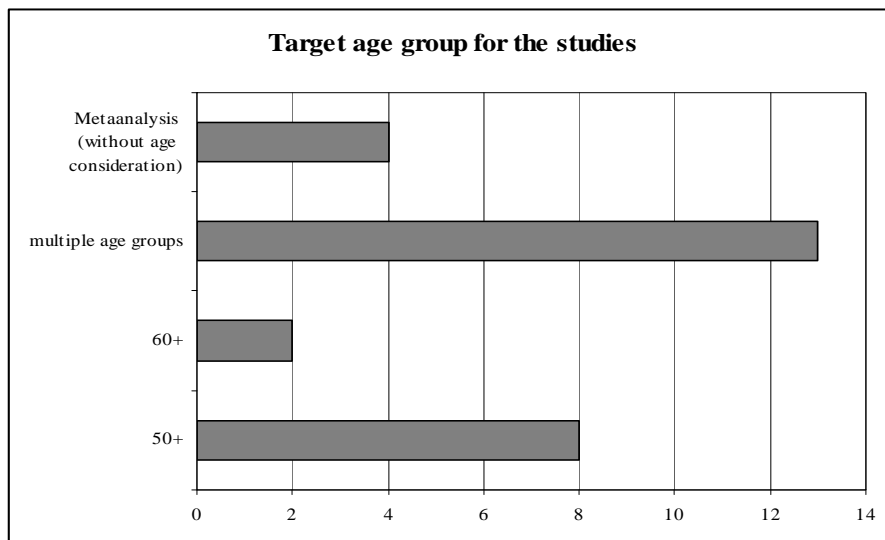


Figure 3. Distribution of the publications by age-groups

In a next step, the 27 articles were differentiated in research type categories. 11 articles cover surveys such as online studies through questionnaire as well as offline studies (telephone interviews, face-to-face interviews). Six articles performed experiments and other six can be seen as exploratory studies. Furthermore, as stated previously, four meta-analyses are included within the literature review. The clear focus towards explorative studies, experiments and surveys indicates that most of the underlying research can be perceived as fundamental research. Initial questions about the motivation and the behavioral impact of the social communities on digital immigrants are analyzed through data collecting research approaches. Interestingly, many of these articles use a combined methodology to underline or verify their results. Typical combinations of synergizing research methodology are used to provide most reliable data (such as combining questionnaires with follow-up interviews).

Finally, the differentiation along the number of observations in each of the studies gives an overview about the various quantitative and the qualitative approaches. Nimrod (2009) interrogated in total 79.665 people over the age of 50 years and has consequently the largest number of participants in the investigation (Nimrod, 2009). In contrast, Etchemendy et al. (2011) examined 17 people between 58 and 79 years in an e-health platform experiment. Due to the different survey methods and experimental setups, there exists a large standard deviation (Etchemendy et al., 2011). A total of five studies examined up to 50 participants, three trials included 51 to 100 persons, eight articles reported 101 to 500 participants, five studies included 501 to 10.000 and one study up to 80.0000 persons.

4.2 Qualitative Data Analysis

After an evaluation of the statistical results the main qualitative findings within the articles can be highlighted. Increased possibilities of communication due to the extension of Internet use support people of all ages to reduce feelings of loneliness and isolation (Cole & Robinson, 2002; Katz et al., 2001). An easy operability of communication may lead to the usage of SNSs and thus to a possibility of creating and sustaining social capital (Russell et al., 2008). Based on the prior argumentation, several of the studies indicate that the easy accessibility and the aligned success in communication with others is one main driver for active participation. Especially for older adults' active participation in online communities may increase life quality, well-being and satisfaction (Etchemendy et al., 2011; Nimrod, 2009). Experience and frequency of using the Internet and living environment are factors which influence the general importance of online communities (Sum et al., 2009). Sum et al. (2009) revealed furthermore a positive connection between older adults' sense of belonging to an online community, importance of community and well-being. The type of empathic communication allows statements about the connection within social networks (Pfeil & Zaphiris, 2009). Moreover, different aspects of online social support affect older adults' motivation of using online platforms (Pfeil et al., 2009; Xie, 2008). In this context, the perceived trustfulness of the social network is a vital factor to overcome the initial resistance for participation (Bowker & Tuffin, 2003).

The integration of older people in the digital world can support their intellectual activities. As soon as the participant can use the computer independently, the value of an SNS increases. Ordonez et al. (2010) revealed that a workshop for people over the age of 60 years to introduce Internet and usage of online communication simultaneously improves their cognitive language and memory skills. Additionally, the content of the senior platform is important for usage. Yoon et al. (2011) identified that there are almost no topic preferences due to the age. Individual occupation and income, gender as well as experience in Internet usage influence the preferred topics within SNSs (Yoon et al., 2011). Finally, several of the articles underlined the relevance of data security and privacy as important aspect for initial usage of SNSs (Bateman et al., 2010; Chung et al., 2010; Ji et al., 2010).

5. CONCLUSION

Due to the technological progress and the increasing importance of the Internet, the demand for additional online communication channels of older people is growing. Personal well-being as well as the reducing and the obviating of isolation reinforce the sense of SNSs for older persons. This study described a quantitative and qualitative literature review approach for elderly in online social networks. Therefore, the underlying problem field was addressed. Based on the background information, the leading research question for our

approach was *How many publications exist in the area of tension between older people and Social Networking Sites (SNSs), and which results were obtained for future research?*. In order to provide the necessary information, two platforms within total of 22 different online bibliographic databases are used. Out of the initial 4.860 articles, only 27 articles in this specific topic were left out, which acted as the set of articles integrated in the review.

The findings for these articles underlined the rising attractiveness of this topic within the last three years. Nearly all relevant publications were published between 2009 and 2011. Regarding the target group, only ten out of 27 articles investigated solely people over the age of 50 years. The methodological focus shows the current need for background information whereas the older adults have to be more integrated in the research. As a result, it should be mentioned that only two of the six experiments are performed exclusively with older adults. Due to the different research categories, the number of participants differs from 17 people in an experiment (Etchemendy et al., 2011) to nearly 80.000 in an exploratory study (Nimrod, 2009).

Summarized it can be highlighted that the success factors for SNSs for older people are not considered near sufficient in the literature. Importance of operability as well as the understanding and willingness of older people to interact within SNSs are detected as important factors. Beyond, variables as trust in new technologies and confidence in the correct handling of personal data has to be analyzed in more detail.

Based on the insights from our research, further follow-up questions need to be addressed. In the next step, we will therefore focus on the underlying factors for a successful social network design with the specific target group of elderly people. Methodologically, this will require a standardized questionnaire with in-depth interviews. The results also need to be compared to similar findings for digital natives in order to highlight differences. Moreover, the existing German speaking SNSs will be investigated and special design requirements analyzed. Finally, based on these results a prototype for an experimental environment can be created.

6. LIMITATIONS

During the structuring of the systematic review some limitations in the research process have been encountered. First, the selection of online databases: While the topic of social networks and digital natives provides sufficient research material, the interrelation between elderly people and these aspects is rare. The articles were distributed in completely different journals wherefore the usage of 22 bibliographic databases should cover the studies best possible. Second, the information provided in the articles: Due to the current state of the research in this field, many of the articles are either working status or overall trend analysis. Since both of these types do not offer a scientific contribution (in terms of new information or research approaches), many of the articles were excluded from the review. Third, due to the fact, that only English language articles were included into the review, a distorted picture is drawn. The topic of elderly people has a strong focus within Germany, especially in the social science. Further implications about possible motivational factors were not considered in this review due to the prior language focus. Fourth, an expansion of the used key search terms, for example with a third descriptor, would cause additional articles in the first bibliographic database search.

ACKNOWLEDGEMENTS

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NOTES

¹The platform EBSCOhost (Ebscohost 2011) includes the following 21 databases: Business Monitor Online; Business Source Premier; EconLit; Emerald; informaworld; INFORMS PubsOnline; JSTOR; Kluwer Law

International; MIT Press Journals; Oxford Journals Online; Palgrave Macmillan Journals; Passport Global Market Information Database; Periodicals Archive Online; PsycARTICLES; Psychology and Behavioral Sciences Collection; PsycINFO; Regional Business News; ScienceDirect; SpringerLink; University of Chicago Press; Wiley Journals.

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DEVELOPMENT OF THEORETICAL TOOLS FOR THE ANALYSIS OF KNOWLEDGE-INTENSIVE WORK

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ABSTRACT

New Ways of Working (NewWoW) refers to knowledge-intensive work in which knowledge is applied to produce novel and innovative tools to different application areas. The aim of the present paper is to present three key features of New Ways of Working, and to apply two theoretical frameworks for the analysis of these features. Firstly, we present a conceptual approach according to which New Ways of Working factors are embedded in and influenced by a surrounding set of events, and in most cases, these factors and a specific outcome measure are influenced by surrounding events. Secondly, we present a model of psychic self-regulation which allows for studying well-being in the workplace from the perspective of the construction of the self. Some implications of the application of these theoretical frameworks are considered.

KEYWORDS

New ways of working, knowledge-intensive work, contextual theory, psychic self-regulation.

1. INTRODUCTION

Knowledge-intensive work is defined as the creation, distribution or application of knowledge by highly skilled, autonomous workers using tools and theoretical concepts to produce complex, intangible and tangible results. A characteristic feature of knowledge-intensive work is that “new ways of working” are introduced. For example, based on a recent literature review, the following features were considered to be characteristic of New Ways of Working: working from home, activity-related working, satellite offices, mobile working, flexible working hours, use of internet and social network services, use of video conferencing, use of collaborative ICT tools and management based on trust and commitment (Blok et al., 2011). According to our view, there is always a combination of physical, virtual and social environments involved in the use of the term (Figure 1). Furthermore, several additional factors can be connected to these three types of environments, as shown in Figure 1.

There is an increase in knowledge-intensive work, mainly due to the fact that scientific and technical knowledge play an ever more central role in the development of new products and services. According to Pyöriä (2005), the economic growth is more dependent on human innovativeness than on effectiveness, and knowledge becomes a “product” that the organization can “manufacture” to increase its value in the market. From the organizations’ point of view, one of the key ways to increase the productivity of knowledge workers is to develop new and more flexible ways of working.

This paper focussed on three key features of New Ways of Working, introduction of new kinds of office concepts, distributed work and use of collaborative and smart ICT tools. Firstly, we introduce the three key features of knowledge-intensive work; after that, we present two theoretical frameworks by which we can better analyse and understand change processes in workplaces and impacts of knowledge-intensive work on workers’ well-being. We propose that since there is a need to describe and study the interactions between people and their work environments, a more complex contextual perspective is needed. By this way decision makers can better take into account all the relevant factors that contribute to their decisions.

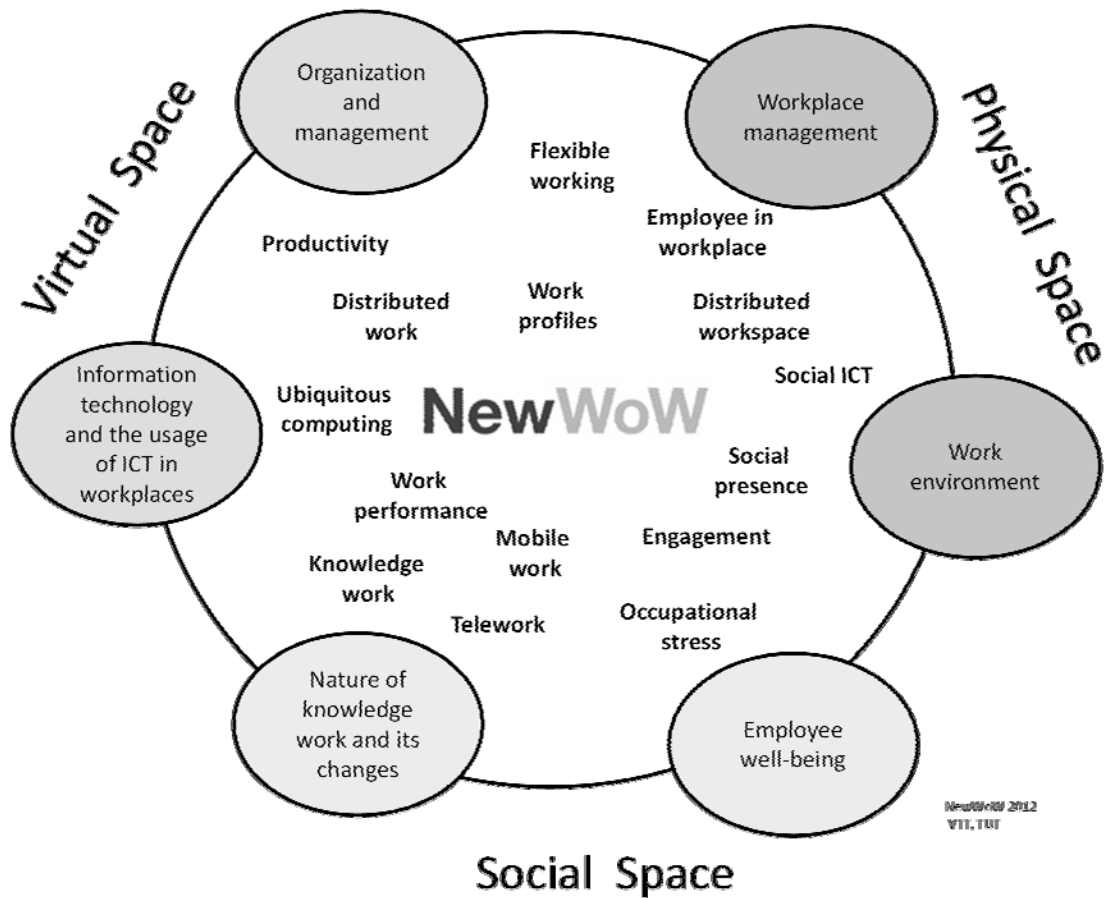


Figure 1. Illustration of complexities involved in New Ways of Working (Aaltonen et al., 2012).

The work is conducted under “Built Environment Process Re-engineering” program of the Strategic Centre of Science, Technology and Innovation for Built Environment (RYM) in Finland. The goal of NewWoW research is the creation of concepts, implementation of management models, and key metrics for high-performance and sustainable New Ways of Working. Research includes development in assessing environmental impacts, life-cycle management and space management. Developed concepts, frameworks and tools are piloted in real work environments.

2. KEY FEATURES OF KNOWLEDGE-INTENSIVE WORK

2.1 Flexible Multifunctional Workspaces

There is a long history of studies on the effects of physical work arrangements on various independent factors such as productivity, job satisfaction, well-being and social relationships. In general, the effectiveness of the work environment is related to the degree it supports the user in his/her tasks and activities. We have prepared an extensive literature review in which the effects of the following physical parameters have been studied: open vs. closed office, workspace size, partition/divider height and the number of dividers in the open-plan office, interpersonal distance/proximity, desk position, superior/co-worker visibility, distance from corridor or door, density, openness, accessibility and visibility (Aaltonen et al., 2012). Typical outcome measures in these studies have been: individual experience (privacy, concentration, crowding, stress), interpersonal experience (frequency of interpersonal contact, level of collaboration, interpersonal satisfaction,

supervisor/co-worker feedback, interpersonal trust), and outcome reactions (job satisfaction, self-perceived/supervisor-rated performance, office turnover, motivation).

The most general lesson learned from the literature review is that all the multiple ways to reduce worker privacy (with various pretences) increase distraction, reduce job satisfaction and quite often also hamper performance (Aaltonen et al., 2012). We should not fall into a trap and think that that other promised benefits (“more collaborative culture”, “more favourable work-related attitudes” etc.) could (at least totally) compensate the detrimental effects. In other words, the negative effects cannot be nullified in the name of all the good provided by knowledge-intensive work.

For example, de Croon et al.’s (2005) recent meta-analysis showed strong evidence that working in open-plan offices reduces the worker’s privacy and job satisfaction. Limited evidence was found that working in open workplaces increases cognitive workload and reduces interpersonal relations. In addition, limited evidence was found that close distance between workplaces increases cognitive workload and reduces psychological privacy, and desk-sharing improves communication. This meta-analysis clearly indicated that innovative design solutions may have an impact on the workers’ work conditions and well-being, and this way they may contribute to the organization’s productivity and costs (De Croon et al., 2005). Especially, innovative office solutions should provide shelter from noise and harmful visual stimuli, and they should be equipped with enclosed, sound-dampening workplaces. As the authors suggest, the participatory design of workplaces may lead to more favourable solutions and workers’ attitudes. Several other aspects of office environment (that may affect worker health and performance) also need to be considered. These aspects include lightning and thermal conditions, colour and material use, furniture and computer technology.

The opportunity to control task-relevant features of the work environment (privacy, lighting, thermal controls) is typically associated with increased job satisfaction and performance (Aaltonen et al., 2012). Personalisation helps workers to establish their workplace and professional identity. It also helps them to affirm distinctiveness and uniqueness; it has also shown to improve mood and reduce psychosocial stress and it may increase workers’ organizational attachment. A negative effect is that personalisation may lead to stereotyping at the individual or organizational level.

Overall, the literature review suggests that providing workers with more control over their workplace may fulfil individual and group needs for flexibility (De Croon et al., 2005). End-user-friendly workplace design should strive to support both group collaboration and distraction-free individual work. It seems to be difficult to reach both of these aims at the same time.

2.2 Distributed Work

Due to the changes experienced in the working life, knowledge-intensive work can be conducted in an increasingly distributed manner. Various studies have examined the distributed features of organisations, and there are many concepts referring to the distributed nature of knowledge-intensive work, such as multi-locational work, remote work or telework. According to Andriessen & Vartiainen (2006), the variety of the concepts reflects the confusing state in the recent developments in work conditions. For example, the term telework is often associated with home-based telework and is strongly related to an individual’s preference to do the work on another place than in a traditional office.

Because of mobile technologies, work is freed from the limitations of place and time, and many knowledge workers spend their working hours at a number of different locations (Bosch-Sijtsema et al., 2010). A workplace is no longer only the physical office spaces but rather a combination of physical, virtual, social and mental spaces, which form a collaborative working environment (Vartiainen, 2009)

According to Vartiainen et al. (2007), mobile workers are those who spend some paid working time away from their home and away from their main place of work, for example, on business trips, in the field, travelling or on customer’s premises. According to them, the main challenges of distributed work include loneliness and isolation at work, workload, excessive travelling, requirements for self-management, ambiguity of roles and objectives in a distributed group, uncertainty in career development, and inequality inside a work group.

It has been suggested that telework provides a cure for a variety of organizational and social problems in the workplace (Bailey & Kurland, 2002). For example, it could provide a route to a better work/private life balance. However, according to Bailey and Kurland (2002), there is little evidence of increased job satisfaction among teleworkers. For example, even though some interview studies suggest that workers enjoy

freedom and flexibility of working at home, there is no clear empirical evidence of higher satisfaction among teleworkers. On the other hand, a meta-analysis by Gajendran and Harrison (2007) showed that the correlation between telecommuting and job satisfaction is positive suggesting that telecommuting has a slight positive impact on job satisfaction. One reason for that may be that telecommuting offers greater opportunities to adjust work task with non-work and family activities.

Golden and Veiga (2005) found a curvilinear relationship between the extent of telecommuting and job satisfaction. This finding suggests that employees are the most satisfied with their jobs at moderate levels of teleworking. Their findings can be explained by suggesting that at moderate levels of teleworking people have more opportunities to utilize the benefits of social interaction provided by face-to-face interaction and thus better fulfil both individual and organizational needs, whereas at higher levels of teleworking social isolation would increase, reducing thus people's job satisfaction (Danna & Griffin, 1999; Virick et al., 2009).

Findings of Virick et al. (2009) support the evidence of a curvilinear relation between the level of teleworking and job satisfaction. Their results also suggest that the relationship between teleworking and job satisfaction depends on which kind of criteria are used in workers' evaluation. When objective criteria (output control) are used, job satisfaction is at the same level regardless of the level of telecommuting; when subjective criteria (e.g., monitoring of employees) are used, job satisfaction is the highest when the level of telecommuting is at the moderate level. Richter et al. (2006) found that work in virtual teams has more elevated job characteristics which are linked to increased symptoms of stress. There was a curvilinear relationship between health and increased job demands.

There is thus some evidence that telework may increase flexibility, which has a positive influence on both work and personal life. On the other hand, several characteristics of telework and mobile virtual work may cause mental workload, increased amount of working hours, role conflicts, personal concerns, and especially increasing amount of organizational and procedural regulations and diminishing contacts with colleagues (Richter et al., 2006). Overall, when working at home, the balance between work and private life is important, and people need strategies to separate work life and non-work life (Richter et al., 2006).

2.3 Usage of Collaborative and Mobile ICT Tools

Use of ICT has often been considered as one of the key characteristics of knowledge-intensive work (Pyöriä, 2005). Many New Ways of Working have been at least partly enabled by the development and deployment of ICT. For example, mobile workers have a great need for ICT tools that support their work. Mobile work and ICT has, accordingly, been addressed from several viewpoints, such as the use of mobile phones and palm computers, costs of technology and usability in mobile systems in general (Andriessen and Vartiainen, 2005). On the other hand, even though ICT is often thought to reduce manual work and help the worker to concentrate on the contents of their work, ICT has also created new challenges in which workers can be distracted from their work by interruptions, e.g., in the form of e-mail and social media.

Knowledge workers do not necessarily use ICT, although ICT is already an integral part of many knowledge workers' everyday work. With the evolving society, physical matter becomes less important and knowledge that workers possess becomes an increasingly valuable asset. ICT has enabled many flexible ways of working, especially those related to mobile and distributed work. Although ICT has relieved the knowledge workers from many routine tasks, it has created new tasks related to the use of complex computer programs that do not fit the task at hand, data sharing, storage and security, or new requirements related to being constantly available. Perhaps the greatest benefits ICT can offer to knowledge workers are those that reduce the effort needed to do secondary interface manipulation tasks, which distract from performing the primary tasks.

3. CONTEXTUAL APPROACH TO NEW WAYS OF WORKING

We propose that we need a contextual approach to tackling the impact of the above-mentioned factors of knowledge-intensive work on different outcome measures. According to this approach, New Ways of Working factors (e.g., flexible office environments, teleworking, use of collaborative ICT tools) are embedded in and influenced by a surrounding set of events, and in most cases, the relationship between

NewWoW-factors and a specific outcome measure (business productivity or job satisfaction) are influenced by surrounding events.

The contextual approach that is based on the ideas of ecological psychology is driven by the conviction that technology-oriented approaches have to be complemented by more user-centred approaches of the work environments (Aaltonen et al., 2012). We need a user-centred theory of the environment that enables to make links between knowledge of user experiences and needs and conventional business drivers. In other words, a systemic contextual model of workspace and worker behaviour and experience should be developed that is based on ecological-psychological research on environment-behaviour relationships.

The contextual theory describes the variations that can be seen in the relationships between, behaviours, different types of variables and relevant contextual factors (Clitheroe Jr et al., 1998). Context is defined as a specific group of personal, physical and social aspects of an environment and the relationships between them. Clitheroe Jr et al. (1998) differentiated between focal variables and contextual factors. Focal variables have a direct impact on behaviours that can be identified in the context, and contextual factors refer to aspects of the environment that may affect these focal variables. According to Clitheroe Jr et al. (1998), the relationships between focal variables are moderated by contextual factors. The key task in contextual analysis is to identify those contextual factors that are most relevant for understanding the target behaviours.

Clitheroe Jr et al. (1998) have used the term “prompt” to describe a starting point of a behavioural change process. The process is going on over a specific interval of time, and it involves interactions between personal, physical and social aspects of the context. After a particular time period, the process is successfully completed, or it may be terminated before completion. Clitheroe Jr et al. (1998) identified four kinds of personal, social and physical factors that are relevant: personal factors, formal social factors, informal social factors and physical factors. Three attributes of outcomes are called intended or unintended outcomes, reciprocal outcomes and final or intermediate outcomes. According to their model, the context is constantly changing. Contextual shifts are evolutionary changes that do not necessarily change the behaviours; contextual transformations, in turn, are sudden and significant changes that may be caused by dramatic changes in personal, social and physical factors. Contextual transformations may be caused, for example, by the introduction of new technologies and New Ways of Working or office relocation (see Figure 2 which is modified from Clitheroe Jr et al., 1998).

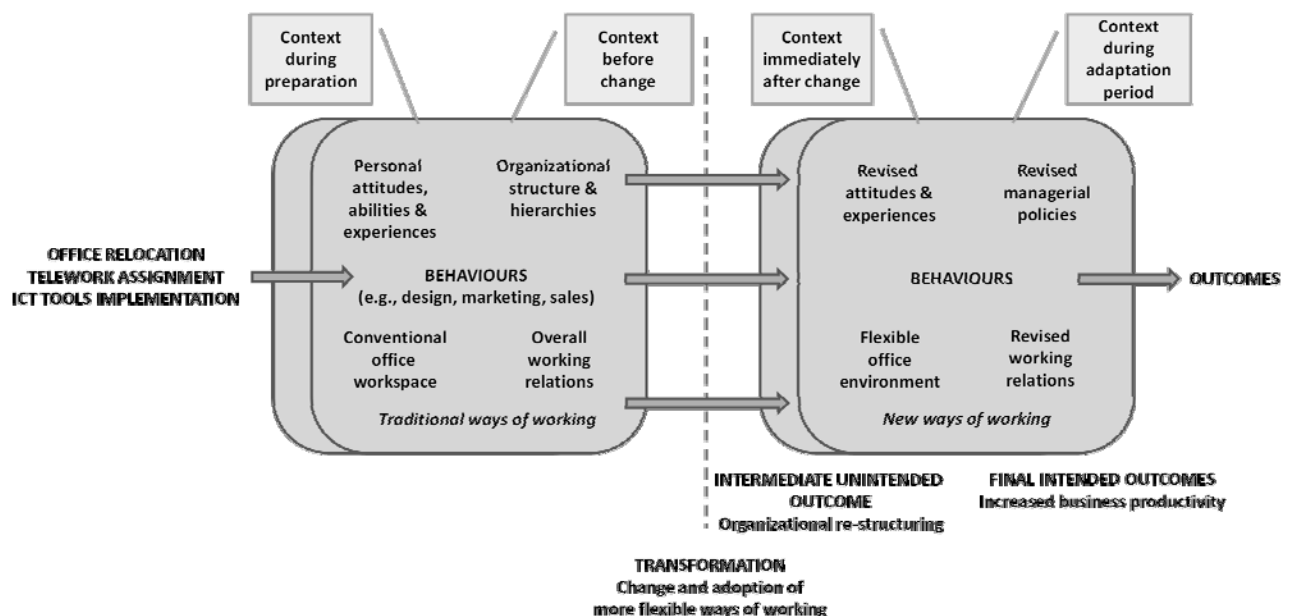


Figure 2. Contextual transformation triggered by office relocation/telework assignment/ICT tools implementation and adoption of more flexible ways of working (modified from Clitheroe Jr et al., 1998).

Characteristic features of New Ways of Working (e.g. working at home, flexible office space, mobile work, use of collaborative tools and increased trust) can be placed on different locations of this contextual model: For example, they can function as prompts that elicit system transformations, or they may be unintended changes of some contextual factors. For example, in the new building the office space can be more flexible, and new collaborative tools can be taken into use. In this case, new ways of working can be considered as parts of the prompt. Some of them may also be unintended consequences, e.g., of the removal to the new building: If the introduction of more flexible office space has detrimental effects on working relations and personal experiences, employees may be more willing to work at home which can be considered as an unintended consequence of the change. This kind of contextual model may be helpful in specifying the effective context of New Ways of Working and in differentiating causes and effects.

4. PSYCHIC SELF-REGULATION AND WELL-BEING IN KNOWLEDGE-INTENSIVE WORK

There is a huge amount of literature about health and well-being in the workplace. One of the key reasons for the popularity of the theme is the recognition that health and well-being may have negative impacts on employees. Well-being can be viewed as including all the satisfactions enjoyed by individuals in their life (Danna & Griffin, 1999). Health is considered as a subcomponent of well-being comprising various psychological and physiological indicators (Warr, 1987). Typically, well-being can either refer to the actual physical health of workers as indicated by physical symptomatology and amount of physical illnesses or to the mental, psychological and emotional states of employees (Danna & Griffin, 1999).

Affective well-being is considered as one component of mental health, as well as competence, autonomy, sense of direction, and integrated way of functioning (Warr, 1987). According to Diener (1984), subjective well-being reflects a person's self-experienced happiness and satisfaction with life, and there is surplus of positive affect over negative one. Subjective well-being is some kind of ideal condition that people like to strive, and it can be considered as a synonym to life satisfaction.

Danna and Griffin (1999) considered well-being as a general concept that takes into consideration the whole person, and the term could include both general job-related experiences such as job satisfaction and job attachment as well as more specific aspects such as satisfaction with one's salary and co-workers.

Occupational stress can be defined as the harmful physiological and psychological responses when the requirements of the work exceed the individual's capacities. According to Cooper and Marshall (1978), occupational stress can be classified into six categories: factors intrinsic to the job itself (e.g., work overload, shift work, excessive travelling and new technology), role in the organization (e.g., role ambiguity, role conflict and the degree of responsibility for other workers), relationships at work (e.g., relationships with managers, colleagues, and subordinates), career development (e.g., fear of unemployment), organizational structure and climate (e.g., lack of participation, poor communication and fear of downsizing) and home/work relationship.

The contextual approach helps us to understand the systemic transactions of different factors in the workplace context. The contextual approach, however, does not allow for understanding the impact of these factors on individuals in a personal level. For this reason, we have strengthened our methodological perspectives by using a psychodynamic model of psychic self-regulation which allows for well-being in the workplace studied from the perspective of the construction of the self (Horelli-Kukkonen, 1993; Vuorinen, 1990, 1997). According to the model of psychic self-regulation, well-being is defined as a striving towards and occasional success in generating a sense of psychological coherence. Solutions related to knowledge-intensive work can support the process in various ways.

Figure 3 shows an illustration of the transaction between the worker and the ways of working in a particular physical and social context. According to the model, the self actively strives for the psychic integrity by conducting psychic work. This includes, e.g., all the thoughts, mental images and emotions concerning one's ways of working and evoked by particular situations. Another way to regulate one's psychic balance is to actively influencing one's surroundings and making adjustments to one's ways of working. The success of this kind of psychosocial regulation of psychic integrity is affected by a variety of contextual factors that are described above in Chapter 3. Partial failures in the psychosocial control of psychic balance drive the self to generate new thoughts, images and emotions.

There is a diverse set of contextual factors of the workplace that people utilize in their psychic self-regulation. According to our literature review, their well-being is correlated, e.g., with:

- to what extent they have private space that the worker himself/herself can tune;

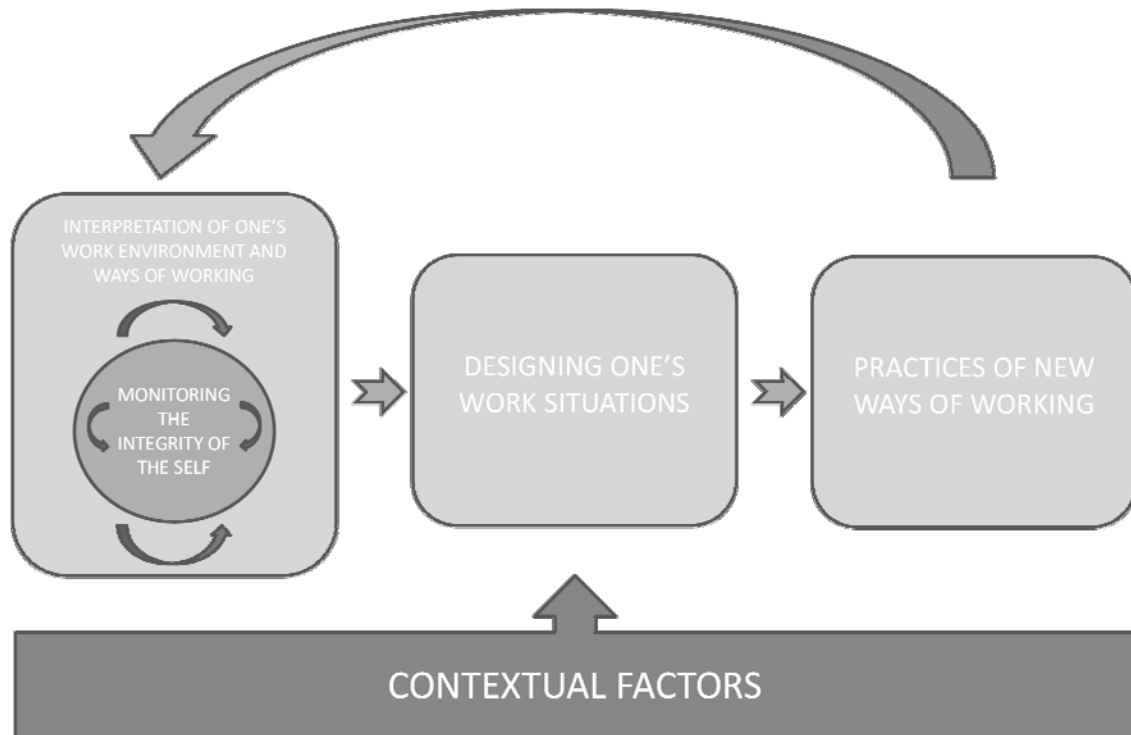


Figure 3. New Ways of Working in psychic self-regulation (for similar models, see, e.g., Horelli-Kukkonen, 1993).

- to what extent they have control over high density;
- to what degree they can regulate their ways of working;
- to what extent they can participate on the design and selection of ICT tools.

If the use of psychosocial means in the psychic self-regulation is not successful, other means have to be adopted. Occupational stress, for example, can be considered a negative (but understandable) result of the psycho-physiological self-regulation.

5. CONCLUSIONS

The distribution of work is seen as being an increasingly critical part of knowledge-intensive work in the modern working environment. Distributed work has expanded the concept of work environment; it is now seen as an entity of comprising of social, virtual and physical space, consisting of the social context and network of an organisation, ICT solutions and the built environment. The main aspects of distributed work are its locationally flexible features, which enable knowledge workers to work in a mobile manner in various places. Technology has made it possible to be constantly online, which enables the employees to conduct their work tasks wherever. Distributed knowledge work will increase in the future, and that is why organisations should seriously start to develop new workplace strategies and acknowledge the benefits and challenges distributed knowledge work offers.

Designing for distributed work places a new challenge for workplace managers and designers. Knowledge workers no longer focus only on one particular task during a work day, but the day is composed of different tasks in terms of collaboration and complexity. A concept of activity based workspace has been suggested to support the different tasks conducted during a workday, giving the possibility to work in solitude, or social spaces or group spaces – according to the task at hand. The complexity of the workplace

increases, because it is no longer seen only as physical space, but the social and virtual aspects need to be considered as well.

The evaluation of worker well-being in a distributed work environment is becoming increasingly important, as the distributed and mobile work easily increase employees' workload, especially when comparing to regular on-site work. The challenge of arranging the workspace so that it supports mobile and distributed work should be approached by examining the work requirements of knowledge workers and by better understanding their work tasks. Organizations play a key role in making the arrangements for New Ways of Working and for collaboration in distributed settings. Also social support from the work community and individual coping and self-regulation strategies help manage occupational stress and maintain well-being in distributed work environments.

Analyses based on a contextual perspective have, for example, shown that there are complex interactions between different characteristics of New Ways of Working. All the possible implications should be carefully considered when implementing NewWoW-programs.

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COMMUNICATION BETWEEN INFORMATION SYSTEM DEVELOPMENT TEAM MEMBERS FROM DIFFERENT CULTURAL CONTEXTS: A CASE STUDY

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ABSTRACT

The aim of this study was to investigate how communication is affected by the different cultural contexts of information system development (ISD) team members in order to achieve ISD project results. The study investigated the level of difficulty of communication with ISD team members from different cultural context such as cultural affiliation, job class distinction, language, non-verbal communication, group size, gender, age, and profession. A qualitative, interpretive multiple case study was conducted in Gauteng province of South Africa where ISD team members were interviewed. The results may show that South Africans have made big strides since the first democratic elections of 1994.

KEYWORDS

Communication, cultural context, information system development teams and intercultural communication.

1. INTRODUCTION

A Communication is one of the success factors in the development of information system projects. Experts agree that failure to communicate is the greatest threat to project success, especially information technology projects (Schwalbe 2011). According to Avison and Fitzgerald (2006), people and organizational factors, rather than technical factors, have led to many information systems failures. People are the key success element in information systems development.

The South African government laws and statutes in the last 19 years have given rise to multiculturalism in the workplace (Department of Trade and Industry 2003). Previously mainly white men occupied most positions of power in organizations. South African society is categorized by many groups classified by themselves or others using specific identities (Grossberg, Struwig & Pillay 2006). These categorizing identities have resulted in tensions in the South African society founded on “racial, ethnic, religious, gender, and linguistic groupings” (Grosberg *et al.* 2006). According to Mbeki (2006), developing a multicultural community is one of the immense challenges for many African countries.

A challenge for culturally diverse teams is to communicate effectively to successfully complete ISD project results. Therefore, the study investigates how communication is affected by the different cultural contexts of ISD team members in order to achieve ISD project results. The Sub-Saharan Africa [SSA] unique cultural, political, social, and economic arena presents fertile research grounds for expanding existing theoretical paradigms and at times new and different research frameworks (Mbarika *et al.* 2005). This study may be beneficial by assisting in understanding cultural diverse team in a South African environment, given the legacy of apartheid among cultural groupings. The study may also bring an understanding into the different cultural contexts and how they influence communication among team members.

This report starts with a short literature review and then it outlines the research methodology, the data analysis, the limitations of the study and finally the conclusions.

2. LITERATURE REVIEW: COMMUNICATION, CULTURE AND INFORMATION SYSTEM DEVELOPMENT

The aim of this section is to provide a brief literature review on the key aspects used in the paper. It starts with a discussion on communication, followed by a brief discussion of culture, cultural contexts and ISD teams in order to clarify key terms used in the paper. The difficulties associated with inter-cultural communication are touched on section 2.4.

2.1 What is Communication?

Communication can be defined as the undertaking, by one individual, two or more persons, used to convey and receive messages that are altered by noise, transpiring within a context, that have an effect and afford a chance for feedback (Lowe 1995). Communication involves conveying and receiving of information between a sender and a recipient and this happens through words and non-verbal actions, such as gestures and facial expression (Jandt 2004). The basic components of any communication system are source and recipient, context, sending or encoding process and receiving or decoding process, message, channel, noise, feedback and effect (Lui, Volčič & Gallois 2011).

Communication is reliant upon the context in which it happens (Lui *et al.* 2011). Context is the environment where communication occurs that helps define the communication (Jandt 2004). The context can be categorized as physical, social relationship or cultural (Jandt 2004). It aids the communicator to know the degree to which the source and the recipient have the same meaning for communicated symbols and the same comprehensions of culture where the communication occurs are vital to the success of the communication (Jandt 2004).

2.2 What are the Different Cultural Contexts?

Culture is a learned way of life passed on to group members (Martin & Nakayama 2011). All the cultural elements are learned through interaction with others in the culture (Lui *et al.* 2011; Jandt 2004).

The use of the word culture by interculturalists, mean different culture contexts namely: national culture, corporate culture, professional culture, gender, age, religious culture, regional culture and class culture (Oetzel 2005; Gibson 2002). The different cultural contexts complicate the interpretation of the non-verbal aspects of communication (Beamer & Varner 2001). Hofstede & Hofstede (2005) refers to these cultural contexts as layers of culture. They outlines six layers of culture as national level; regional, ethnic, religious and/or linguistic affiliation level; generation level; gender level; social class level and organizational level.

People inescapably carry numerous layers of culture, since everyone belongs to a diverse groups and categories of cultures at once (Hofstede & Hofstede 2005). Cultures are hardly ever homogeneous creations as subcultures subsist based on region, religious beliefs, and language (Limon & La France 2005). The mental programs from diverse cultural contexts may be conflicting and this makes it difficult to anticipate an individual's conduct in a new scenario (Hofstede & Hofstede 2005).

2.3 What is an Information System Development Team?

A team is a group of people, who individually possess special skills and knowledge, led by a competent leader (Gibson 2002). An IS team is a group of professionals responsible for developing an IS product (Schach 2011). An IS team concerns itself with daily IS development and includes analysts, systems architect, hardware engineer, programmers, network specialist, quality assurance specialist, software engineer, technical writer and users (Schwalbe 2011; Avison & Fitzgerald 2006). Teamwork makes it possible to successfully complete most IT projects (Schwalbe 2011; Schach 2011). ISD project teams are generally assembled when project exists and disbanded when project ends (Bentley & Whitten 2007). Many ISD project teams include a sizable number of contract workers (Schwalbe 2011).

Intercultural ISD teams tend to require high quality team building due to cultural heterogeneity that exists in the teams, so that they experience less communication problems and also so that they efficiently utilize social and technical skills (Iles & Hayers 1997).

2.4 Communication in Different Cultural Context

Culture and communication mutually benefit each other resulting in varying behavioural patterns in varying contexts (Lui *et al.* 2011). Culture is an important aspect in creating good communication (Jamieson & O'Mara 1991). It manages people's perceptions as it informs them what sensory information is pertinent and therefore results in different cultural interpretations (Jandt 2004). Culture is an important aspect in creating good communication (Jamieson & O'Mara 1991). It manages people's perceptions as it informs them what sensory information is pertinent and therefore results in different cultural interpretations (Jandt 2004).

Diverse cultural backgrounds have many cultural variables that influence our communication with others and are frequently stumbling blocks to successful communication (Parry & Potgieter 1995). These differing cultural variables make communication complex and these includes differing group identity, stereotypes, gender, values, attitudes and prejudices, perception, social background, encoding, decoding, language, worldview and non-verbal communication (Gibson 2002). Diverse cultural backgrounds and the use of different languages for communication in ICT projects can complicate the basic barriers to communication and create explicit project risks that should be managed (Wooding 2005).

Information systems project communication is made more complex by geographic location and cultural background (Schwalbe 2011). Differences across cultural values may produce contradictory perceptions and approaches in ISD (Leidner & Kayworth 2006). It is important to conduct intercultural communication research because the chance of a misunderstanding between culturally diverse team members increases when the link between culture and communication is overlooked (Jandt 2004).

3. RESEARCH METHODOLOGY

The research design is an overall plan for a research or a section of research guided by four major ideas: the perspective framework, the strategy, the participants, and proper tools and techniques for data collection and analysis of empirical materials (Punch 2009). The study was conducted using an interpretive framework. The research strategy employed is a multiple case study. Semi-structured interview was the preferred data collection tool to gather data from ISD team members. Qualitative content analysis was used as a data analysis tool.

3.1 Data Collection

The participating employees are members of information system development teams in three organizations in Gauteng province of South Africa. From each organization five participants from diverse cultural backgrounds were interviewed. The organizations are termed A, B and C for ethical reasons. The participants had cultural diversity in terms of race, gender, religion, age, job description and home language. Participants had experience in a multicultural ISD team context and some had also worked in a homogeneous environment previously.

The characteristics of the participants are represented in Table 1. Table 1 also includes an assigned identification code used to identify the specific individual in the analysis process.

Table 1. Participants' profiles

Participant identification code	Organization	Job description	Race	Age group	Gender	Religion
AF	A	Developer	White	<30	F	Christian
AL	A	Developer	Coloured	30-40	M	Agnostic
AMO	A	Data modeler	Indian	>40	M	Hindu
AMA	A	Resource manager	Black	<30	F	Christian
AP	A	Developer	Black	<30	M	Christian
BG	B	Developer	Indian	<30	M	Christian
BE	B	Developer	White	>40	F	Atheist
BGU	B	Team manager / analyst	Black	<30	F	Christian
BJ	B	Developer	White	>40	M	Atheist

Participant identification code	Organization	Job description	Race	Age group	Gender	Religion
BA	B	Team manager /developer	Indian	<30	F	Hare Krishna
CMO	C	Business analyst	Black	<30	M	Christian
CRU	C	Business analyst	Indian	<30	F	Spiritual
CD	C	Developer	Coloured	<30	M	Christian
CM	C	Business analyst	White	30-40	F	Christian
CRA	C	Developer	White	30-40	M	Christian

From an extensive literature review (not reported in this paper), questions were formulated to better understand perceptions of the participants of their team's intercultural performance. The left hand side of table 2 contains examples of questions asked to participants.

3.2 Data Analysis

The study investigated the level of difficulty of communication with participants from different cultural context such as cultural affiliation, class distinction, language, non-verbal communication, gender, age, profession and group contexts.

Table 2 provides the results of some of questions of the study. The results present the question, the analysis type, the category and the count. There are two types of analysis in this report: type 1 and type 2. Type 1 data analysis caters for the questions where categories could be created for mutually exclusive and differing viewpoints of the participants. Each participant's overall view could be categorized and the total for the respective categories matched the total participants. Type 2 data caters for participants' responses that are not mutually exclusive. Some of the questions provided such diverse answers from specific participants that the categories are not mutually exclusive. This implies that a specific participant's answer could be coded and categorized in two different categories. The responses from participants were categorized into relevant categories based on what participants said. The count column presents the number of participants whose answer was in correspondence with a specific code. The count shows the number of participant(s) and their organization. For instance 2B means 2 participants from organization B and 1A means 1 participant from organization A.

Table 2. Example of data analysis

Question	Analysis Type	Category	Count
1. Do you find it difficult to communicate with colleagues?	1	Category 1-1: Communication easy	3A, 4B, 4C
		Category 1-2: Communication difficulty sometimes	2A, 1B, 1C
1.1. Does their culture influence this?	1	Category 1.1-1: Culture influences communication	3A, 3B, 3C
		Category 1.1-2: Culture has no influence on communication	1A, 1B, 2C
		Category 1.1-3: Question not asked	1A, 1B
2. What makes it easier or more difficult to talk to colleagues?	2	Category 2-1: Easy to communicate with friendly individuals that displays openness	1A, 1B, 2C
		Category 2-2: Difficulty linked to individual's resistance to critique	1A
		Category 2-3: Difficulty linked to different opinions on everyday non work issues	1A
		Category 2-4: Difficult communication linked to individual personalities	1A, 1B, 1C
		Category 2-5: Other reasons for communication difficulty	1A, 2B, 1C
		Category 2-6: Question not asked or answered	1A, 1B, 1C
4. Do you use the same language when communicating with your colleagues?	2	Category 4-1: Same language in communication	4A, 5B, 3C
		Category 4-2: Different language with some colleagues	3A, 2B, 2C

Question	Analysis Type	Category	Count
5. How do you feel when others use a different language in your presence?	1	Category 5-1: Different language speaking acceptable	4A, 2B, 2C
		Category 5-2: Different languages in meeting unacceptable	1A, 3B, 2C
		Category 5-3: Answer cannot be categorized	1C
6. Do you use non-verbal communication?	1	Category 6-1: Non-verbal communication used	2A, 4B, 3C
		Category 6-2: Non-verbal communication not observed	1B, 2C
		Category 6-3: Question not asked	3A
7. Do you experience colleagues using non-verbal communication?	1	Category 7-1: Non-verbal communication observed	5A, 4B, 2C
		Category 7-2: Non-verbal communication not observed	1B, 3C
8. Do you prefer e-mail or direct communication?	1	Category 8-1: Both email and direct communication	2A, 1B, 3C
		Category 8-2: Email Communication preferred	1B
		Category 8-3: Direct communication preferred	2A, 3B, 2C
		Category 8-4: Question not asked	1A
9. How easy is it for you to communicate with individuals?	1	Category 9-1: Communication easier with individuals	4A, 4B, 3C
		Category 9-2: Communication difficult with individuals	1B, 2C
		Category 9-3: Question not asked	1A

4. INTERPRETATION OF DATA

From analyzing the data in table 2, the following finding was formulated: Communication in general is open, but culture, personality and age may affect the level of communication difficulty.

This finding is discussed here based on all the questions asked. Eleven participants, 3 from organization A, 4 from organization B and 4 from organization C, communicate easily with colleagues and 4 participants had difficulty communicating with colleagues at times.

Nine participants, 3 from organization A, 3 from organization B and 3 from organization C maintain that culture influences communication with colleagues. Four participants, 1 from organization A, 1 from organization B and 2 from organization C, said that culture does not influence communication. Two participants were not asked this question. A participant said:

CM: "I probably would seek out a certain cultures. I probably seek out what's closest to what I know from a language point of view I would guess. I would most likely seek out a woman I think, and I think, I, thinking about, but now I think it would be done subconscious. You I would think about it, in fact no, I would choose what's the closest I do know."

Four participants, 1 from organization A, 1 from organization B and 2 from organization C, communicates easily across cultures. Individual participants maintain that communication is made easy by open people, jokes, asking questions, friendly cues and openness to others' viewpoints and ideas. A participant from organization A linked communication difficulty to individual resistance to critique. A participant from organization A linked communication difficulty to differing opinions on everyday non-work issues. Three participants, one from each organization, linked communication difficulty to personalities. Individual participants attribute communication difficulty to individual resistance to critique; differing opinions on everyday non-work issues; individual personalities and other reasons include inexperience, negative setting, unfriendly cues and language. A participant from each organization was not asked this question.

Seven participants, 1 from organization A, 4 from organization B and 2 from organization C said communication with their superiors was easy. Five participants, 3 from organization A and 2 from organization C said communication with superiors was difficult. A participant from organization C said communication with superiors was difficult initially. A participant each from organizations A and B were not asked this question. Communication difficulty can be complicated by culture as AP says:

AP: "uhm. My line manager, no, but with Elsa*, it's a difference in culture now, cause with my line manager I can be as open as I can be but with Elsa. I do start something to say but then I'm thinking I'll probably be disrespecting her in a way or two so I won't say those things sometimes."

* names have been changed.

Twelve participants, from organization A, 5 from organization B and 3 from organization C, use English as a communication language with their colleagues. Seven participants, 3 from organization A, 2 from organization B and 2 from organization C maintain that other languages are used in individual communications and occasionally in meetings as well.

Six participants, 1 from organization A, 3 from organization B and 2 from organization C, felt that the use of a different language in their presence was unacceptable. Eight participants, 4 from organization A, 2 each from organizations B and C maintained that they are unbothered when others use a different language in their presence. An answer by a participant from organization C was unclear. Most participants had no problem with speaking different languages, other than English, in private chats but some participants would be offended by speaking of different language in a meeting. Language impacts the communication process.

Some participants feel that it is important in a meeting that all participants understand the language of participation and not be excluded. BGU explains this when she said,

BGU: "It's not okay. To make an example, you find that I'm, I am only a Zulu amongst Afrikaners, so sometimes you feel that they have just forgotten about you or they are ignoring you. They spoke their language, so you can't really understand what they are saying. Although it won't be you, maybe somebody asks a question and the other one will try and explain in Afrikaans that doesn't feel good, cause you also want to know what they are talking about. It might not be that they are talking about you, but you just want to know, you don't want to feel that you are, you know. And it happens here."

Nine participants, 2 from organization A, 4 from organization B and 3 from organization C use non-verbal communication. Three participants, 1 from organization B and 2 from organization C, said they were oblivious to non-verbal communication and the other 3 from organization A were not asked this question. A participant defines non-verbal communication.

BE: "according to my definition non-verbal communication is everything that we do. Smile or laugh, where we look, the way we act, the way we move. It does show about our emotions, uh, on those rare occasions you will use non-verbal communication to communicate sexual things."

Eleven participants, 5 from organization A, 4 from organization B and 2 from organization C experienced non-verbal communication, whereas 4 participants, 1 from organization B and 3 from organization C did not observe non-verbal communication. Time may make non-verbal communication acceptable. This is what AMO said:

AMO: "I think I do, but it's only after you, because I work long enough with people so that you build up and understanding you work long enough with a person then obviously certain facial expression body shrugs or whatever you understand this person is upset today or showing disgust or whatever."

Six participants, 2 from organization A, 1 from organization B and 3 from organization C, prefers both email and direct communication. Seven participants, 2 from organization A, 3 from organization B and 2 from organization C, prefer direct communication. One participant from organization B prefers email. One participant from organization B was not asked the question. Direct communication is preferred because it provides instant message delivery and feedback. Email is preferred because it leaves delivers the message, and it facilitates record-keeping. Email is disadvantageous because it is impersonal, it is open to misinterpretation and typing and message delivery takes longer. Direct communication is disadvantageous because it does not provide proof of communication.

Eleven participants, 4 from organization A, 4 from organization B and 3 from organization C maintains that communication with individuals is easy. Three participants, 1 from organization B and 2 from organization C find communication with individuals difficult and one participant from organization A was not asked the question. Communication difficulty can be as a result of culture, language, personality and strangers. A reserved participant said this when asked about communication with individuals,

CRA: "If I walk into a room of strange people well I would kind of stand around for a bit because it takes me a while to. What would happen in that case is I probably would relate with probably would relate more to somebody initially from my own culture but because I'm standing around it take I guess somebody to get the communication going."

Nine participants, 3 from organization A, 3 from organization B and 3 from organization C, maintain that communication with homogeneous culture is easier. Five participants, 1 from organization A, 2 from organization B and 2 from organization C, said culture makes no difference to communication easiness or difficulty. A participant from organization A was not asked this question. A participant said:

BE: “you mean of my own culture. Given that we speak the same language, oh that makes such a big, big difference and of course it’s just myself with much more detail and with much more finesse if I speak in my mother language.”

Nine participants, 2 from organization A, 3 from organization B and 4 from organization C, maintain that communication is easy with all genders. A participant from organization A prefers communication with same gender colleagues. Four participants prefer communication with the opposite gender and 1 participant from organization A was not asked this question.

Six participants, 3 from organization A, 1 from organization B and 2 from organization C find communication with a group easy. Six participants, 1 from organization A, 3 from organization B and 2 from organization C find it difficult, whereas 3 participants, one from each organization, were not asked the question.

Thirteen participants, 5 from organization A, 5 from organization B and 3 from organization C, say that nonverbal communication is cultural, a participant does maintains that nonverbal communication is not cultural and a participant does not observe nonverbal communication. Nonverbal behaviour is cultural as BJ said.

BJ: “Yes. I am sure, but I wouldn’t be able to tell you in what ways. Oh I guess it’s just a way of expressing myself and people use a lot of different ways to express themselves.”

According to participants nonverbal communication expresses cultural behaviour through posture, speech acts, eye movement, smiling, sitting, hand movements, and head movement.

Six participants, 4 from organization A, 1 each from organizations B and C find communication with team members who have different skills easy. Seven participants, 1 from organization A, 4 from organization B and 2 from organization C, find communication with team members who have different skills difficult. Communication with team members who have different skills facilitates learning and develops a common understanding among participants. A participant said,

CRA: “It’s not it can be difficult depending on what you trying to explain and so I’m quite aware of a process of some you got to have some strategy to put this across in a way that they’ll understand. I am aware of that. We get it quite often here in the office, where you got to put something together for someone who don’t understand or it’s the first time they doing it. So I’m kind of aware of the people might not understand initially or they won’t relate to me or just then you have to put it in a way that they understand.”

Four participants, 1 from organization A, 1 from organization B and 2 from organization C, found communication with team members who have different technological experience difficult. Three participants, 1 from A and 2 from B found communication those who have different technological experience easy.

Seven participants, 3 from organization A, 1 from organization B and 3 from organization C said that age influences communication with team members, 4 participants maintain that age influences communication negatively. Seven participants, 2 from organization A, 3 from organization B and 2 from organization C, said that communication is not influenced by age. A participant from organization B was not asked this question.

BG: “possibly, I think maybe more with the experience, I think eh, it’s possible. Maybe with an elderly person who has had a lot of experience who’s generally very highly regarded maybe. It’s it’s maybe I can maybe chat casually with a peer or fellow colleague you know when meeting someone maybe CEO or manager, that’s different.”

Knowledge and skills are highly respected across the organizations rather than age in years.

The overall finding of this study is that communication in intercultural ISD teams in general is open and people have a good understanding and practice of intercultural communication between team members with heterogeneous cultural contexts such as gender, religion, age and ethnicity.

5. CONCLUSIONS

Communication is one of the critical success factors in information system development teams. Context aids the communication process by facilitating understanding between the source and the recipient. This study concentrated on small group communication between culturally diverse team members.

The objective of the study was to determine how communication is affected by the different cultural contexts, such as gender, age, class, job description, skills and technological experiences of the communicator and the receiver, in order to achieve ISD project results.

There are different cultural contexts namely: national culture, corporate culture, professional culture, gender, age, religious culture, regional culture and class culture and these different cultural contexts complicate the interpretation of the non-verbal aspects of communication. Individual carry different cultural

contexts at the same time. Intercultural communication is more difficult because the source and recipient have different contexts and share a few symbols.

The important areas that constitutes a knowledge of another culture includes verbal language, nonverbal language, beliefs, values, and attitude systems, social organization, worldviews and thought patterns.

The overall finding of this study is that communication in intercultural ISD teams in general is open and people have a good understanding and practice of intercultural communication between team members with heterogeneous cultural contexts such as gender, religion, age and ethnicity.

This study has some limitations. Because of the personal nature of interviews the results might be biased. The findings of the research depend solely on the accounts recounted by the participants. The study could have benefited from observations so as to corroborate the findings from the interviews. The researchers had no control over selecting the participants of the study. The managers were responsible for selecting the study participants. Only people who met the manager's approval could participate, possibly biasing the results.

However all participants were keen to participate in the study and were able to speak openly to the research team. Such a study gives hope that the dreams of Mbeki (2006) are realizable.

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FACEBOOK SOCIAL SUPPORT: A COMPARATIVE STUDY ON DEPRESSION AND PERSONALITY CHARACTERISTICS

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ABSTRACT

The explosive growth of Social Networking Sites such as Facebook had a huge impact on psychological research. One of the most controversial questions regards to whether online relationships provide meaningful social support. Although international literature on the psychosocial effects of Social Networking Site usage is constantly growing, little research has been conducted in Greece. The purpose of the present study is to investigate the relationship between depressive symptomatology, personality traits and attraction to online social support in Facebook. A sample of 278 young adults, between the ages of 18 and 26 ($M=22.5$) completed anonymously, on a volunteer basis, three questionnaires on depressive symptomatology, personality characteristics (neuroticism, extraversion, openness to experience, conscientiousness and agreeableness), attraction to online social support and sociodemographic factors. According to the results, high scores on depressive symptomatology and Neuroticism, as well as low scores in Agreeableness and Conscientiousness describe people who are more attracted to online social support. An unexpected finding concerns the lack of gender differences in depressive symptomatology, though, interestingly, men compared to women reported higher levels of attraction to online social support. Finally, gender, Neuroticism and Agreeableness were strong predictors of attraction to online social support on Facebook. The results are limited by the self-report questionnaires and the correlational nature of the results, as well as the fact that only one Social Networking Site was studied. In spite of the above limitations, the present study has some important implications on future research.

KEYWORDS

Facebook, online social support, depression, personality.

1. INTRODUCTION

Social Networking Sites (SNS) are starting to become intertwined within the fabric of Society and are being embraced quicker and more internally than any other technology in history (Ellison et al, 2011). Their explosive growth in the last years has had a huge impact on psychological research and international literature on understanding their role in mental health and social support is constantly growing. However, little research has been conducted in Greece regarding the psychosocial effects of Social Networking Site usage, even though Facebook is the second most visited site online with more than 4 million active Greek users (Konsulas, 2012). This paper narrows its scope on Facebook and its purpose is to examine the relationship between depressive symptomatology, personality traits and attraction to online social support in a sample of young adults in Greece.

Social support is considered as an important predictor of health, either mental and/or physical well-being (Burlson & MacGeorge, 2002). It is a multidimensional concept (Chronister, Johnson & Berven, 2006) that includes structural (i.e. network size, frequency of interactions, type of relationships) and functional aspects, specifically, emotional support (offering empathy, affection, acceptance, encouragement), instrumental/tangible support (providing goods or services), informational support (offering advice, or useful information) and network support (social interactions that can create positive emotion). Various studies (i.e. Tichon & Shapiro, 2003) have demonstrated that the same types of social support found in the offline world, also

existed online, however, it is unclear whether online relationships can provide meaningful social support (Eastin & LaRose, 2004). Activities in Social Networking Sites could provide users with social support (Ellison et al, 2011) and Facebook in particular can be a source of online support to users that are in need (Kim & Lee, 2011), as networking and sharing can help transform casual online relationships into more intimate ones (Manago et al, 2012).

Few studies investigate the relationship between depressive symptomatology and seeking support in Facebook, even though depression is one of the most common health issues impacting young adults (Berry, 2004). Depressive symptoms such as pessimistic mood, hopelessness, anxiety, and sleep difficulties are frequently undiagnosed, particularly in students, as many do not perceive a need for help and do not seek clinical services. Young adults (18-25 years of age), in general, appear to have the highest incidence and cumulative prevalence of depression (25%) than any other age group (i.e. Kessler & Walters, 1998), as the stress and challenges of life choices (e.g. studies, jobs, dept, relationships) they face, could lead to serious emotional and mental health issues. Research findings indicate that frequent email exchanges (LaRose et al, 2001) and chat room/instant messaging use (Morgan & Cotton, 2003) increase perceived social support and decrease depression symptoms.

While there has been significant research documenting the relationship between different personality traits and depression, there are no studies in Greece that examine how both personality and depression are related to seeking social support on Facebook. Individual differences can play a moderating role in predicting online behaviors (Hamburger, 2002). The Five Factor Model of personality dimensions is commonly used in studies examining the connections between personality traits, social support and depression. One of the dimensions, *Neuroticism*, is described as the tendency to experience mood swings and negative emotions (McCrae & Costa, 1996). High levels in Neuroticism are positively associated with depression (Bienvenu et al, 2004), as well as low perceived social support in face-to-face interactions that may potentially result in the use of the Internet in search of support (Swickert et al, 2002). *Agreeableness* is another dimension that has been shown to be associated with online social interactions. High levels describe friendly and cooperative people (McCarty & Green, 2005) and low levels describe selfish and rude people. While people high in Agreeableness perceived higher social support online (Swickert, et al, 2002), those with low levels would have fewer friends in SNS, as they would also have difficulties forming relationships in the offline world (Landers & Lounsbury, 2006).

The dimension of *Conscientiousness* describes people that are responsible, dependable and helpful members in groups (McCrae & John, 1992). People with high levels seem to spend little time in Social Networking Sites (Butt & Phillips, 2008) and Facebook (Ryan & Xenos, 2011). With regards to the dimension of *Extraversion*, individuals that are sociable and outgoing have been found to use the internet for social purposes and experience more social support (Valkenburg & Peter, 2007). However, there are no sufficient evidence linking the dimension of *Openness to experience* with social support, even though it is found to be associated with trying out new methods of communication (Butt & Phillips, 2008) and keeping up with new social networking technologies (Vodosek, 2003).

Research has shown gender differences in SNS usage patterns (e.g. Peluchette & Karl, 2008); men are more likely to use Facebook in order to find dates (Raacke & Bonds-Raacke, 2008) and make new friends, whereas women tend to use it in order to maintain their existing relationships (Muscanell & Gaudagno, 2012). Gender is found to influence the perceived intimacy and posting behavior of users (Rau et al, 2008) and may also have an impact on support-seeking behaviours (MacGeorge, 2003), even though no significant differences were detected between males and females in terms of support-seeking strategies in online settings (Hui-Jung, 2009).

Given the study objectives, as well as the literature review, the following research hypotheses are set: there is a significant positive relationship between depressive symptomatology and attraction to online social support. There are significant relations between attraction to online social support and personality characteristics: positive correlations with Neuroticism and Openness to Experience and negative correlations with Extraversion, Agreeableness and Conscientiousness. There are significant differences among individuals with low, average and high daily Facebook use, as well as gender differences with regards to depression, personality characteristics and attraction to online social support. Personality dimensions, depressive symptomatology and gender are good predictors of attraction to online social support.

2. METHODOLOGY

2.1 Subjects and Procedure

The sample for the study consisted of 278 young adults, 132 males (47.5%) and 146 females (52.5%), between the ages of 18 and 26, with a mean age of 22.5 years. They were approached in public places (e.g. University campus, coffee shops and internet cafes), in the extended area of Thessaly, central Greece and asked to participate anonymously, on a volunteer basis, by completing, in site, a written questionnaire on the use of Facebook and Social Networking Sites. The majority of participants ($N=161$) lived in a city with more than 100,000 residents and at least 80% ($N=226$) were undergraduate students, whereas the rest of the participants ($N=52$) had either finished their degree or were postgraduate students.

The average amount of time that participants had maintained a profile in Facebook was three or more years, whereas half of the participants (52.5%) used, together with Facebook, other SNS such as Twitter. The majority of participants (72%) used Facebook for up to 1.5 hours on a daily basis, whereas only a small number (14.4%) used Facebook for more than two hours a day. Eighty-two percent indicated that the closest relationship they had on Facebook was either an acquaintance or a friend, half of the participants ($N=125$) reported that they had met their friends initially offline and used Facebook as a means to stay connected, whereas only 31% ($N=86$) indicated that had they met online and stayed in contact that way.

2.2 Materials

A short demographic survey was employed to provide information on the characteristics of the participants, as well as on their Facebook habits. Additionally, four questionnaires were administered that were translated, adapted into Greek and revised through back-translations by a team of four bilingual professionals: two psychologists and two specialists in English and Greek language.

Questionnaire of Self Evaluated Depressive Symptomatology (QD2). The questionnaire that was created by Pichot et al. (1984) consists of 52 items that describe a variety of depressive symptoms (affective, cognitive and somatic). It is a self-report questionnaire and is answered with “true” or “false”. The scores range from 0 to 52 and high scores relate to more severe levels of depression. The QD2 has three basic dimensions: feelings of loss of general drive, depressive-pessimistic mood and anxiety with Cronbach’s alphas ranging from .92 to .95 (Pichot et al., 1984).

NEO-Five-Factor Inventory (NEO-FFI). According to the Big Five model (Costa & McCrae, 1992), there are five domains of the adult personality; Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. The *NEO-Five-Factor Inventory* is the brief subset of the full 240 question NEO-PI-R and is used to measure personality traits. There is a total of 60 items that ask the respondents to rank their agreement with the statements on a 5-point Likert-type scale. People scoring high on a scale are considered to have a significant degree of that trait. Respective internal consistency alphas of .86, .77, .73, .68, and .81 were obtained for the *NEO-FFI* Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness scales (Costa & McCrae, 1992).

Computer Mediated Social Support. This instrument was developed by Walther and Boyd (2002) to reflect the advantages of electronic support and the disadvantages of face-to-face support. The 33 scale items are rated in a 5-point Likert-type scale and the four factors that were identified are social distance, anonymity, interaction management and access. Reliabilities, measured by Cronbach’s alpha, were .88, .75, .72, and .72 respectively (Walther & Boyd, 2002).

3. RESULTS

Since the validity of the measures used in the present research has not been studied in a Greek population, it was deemed necessary to study their factorial structure based on our sample. Principal-components factor analyses, using Varimax rotations, were conducted on all instruments. The QD2 questionnaire showed the three primary factors that were found in the study of Pichot et al. (1984) explaining 35.1% of the variance

and had reliability coefficients .94 (Cronbach's α) and .91 (split-half reliability). The *NEO-Five-Factor Inventory* revealed five primary factors that explained 34% of variance. The Cronbach's alpha reliability coefficients, as found in the present study, for the factors of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness, were .74, .66, .57, .52, .78 respectively. Finally, the *Computer-Mediated Social Support* instrument, in regard to the sample, showed the four factors proposed by Walther and Boyd (2002), explaining 44% of the variance. The reliability coefficients, as found in the present study, were .91 (Cronbach's alpha) and .86 (split-half reliability).

We hypothesised that there would be significant correlations between depressive symptomatology, the personality dimensions (Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness) and attraction to online social support. In accordance with our expectations (Table 1), the higher the scores on depressive symptomatology, the higher the attraction to online social support. People with high levels of Neuroticism, as well as individuals low in Agreeableness and Conscientiousness were also more attracted to online social support. The dimensions of Extraversion and Openness to Experience showed no significant correlations with online social support.

Table 1. Correlations among depression, personality subscales, attraction to online social support

	1	2	3	4	5	6	7
1. Depressive Symptomatology	-						
2. Neuroticism	.46**	-					
3. Extraversion	-.31**	-.25**	-				
4. Openness to Experience	.04	.02	.02	-			
5. Agreeableness	-.22**	-.21**	.16**	.11	-		
6. Conscientiousness	-.22**	-.14*	.42**	-.01	.11	-	
7. Online Social Support	.30**	.35**	-.11	-.07	-.37**	-.16**	-

* $p < .05$, ** $p < .01$

In order to examine whether individuals with low, moderate and high daily use of Facebook differed significantly as to depressive symptomatology, personality dimensions and attraction to online social support, the sample was divided into three groups based on their daily usage: individuals that spent less than 30 minutes daily ($N=87$), individuals that spent 30 to 60 minutes daily ($N=76$) and individuals that spent more than 60 minutes daily on Facebook ($N=115$). The cutoff scores were indicated by previous research studies (e.g. Harbaugh, 2010). As expected (Table 2), comparisons showed statistically significant mean differences as to Neuroticism [$F(2,275)=10.81, p < .0001$], Agreeableness [$F(2,275)=7.44, p < .01$], depressive symptomatology [$F(2,275)=3.08, p < .05$] and attraction to online social support [$F(2,275)=3.86, p < .05$].

Table 2. Comparison (One-Way ANOVA) of means (M) and standard deviations (SD) regarding Daily Facebook Use, Personality characteristics, Depressive symptomatology and Attraction to online social support

	Daily Use of Facebook			F
	<30 minutes	30-60 mins	>60 mins	
	($N=87$)	($N=76$)	($N=115$)	
	M (SD)	M (SD)	M (SD)	
Depressive Symptomatology	8.7 (10.01)	10.96 (10.84)	12.5 (11.16)	3.08 (2)*
Personality				
Neuroticism	20.7 (6.14)	24.5 (6.91)	24.95 (7.31)	10.81 (2)****
Extraversion	29.2 (5.51)	28.8 (5.72)	29.2 (6.37)	.18 (2)
Openness to Experience	25.4 (5.58)	26.5 (6.05)	24.5 (5.97)	2.77 (2)
Agreeableness	28.2 (4.55)	27.4 (5.46)	25.5 (5.48)	7.44 (2)**
Conscientiousness	29.99 (6.58)	30.9 (7.35)	30.7 (6.81)	.40 (2)
Attraction to online social support	79.1 (19.9)	84.4 (21.07)	86.97 (20.31)	3.86 (2)*

$p < .05$, ** $p < .01$, **** $p < .0001$

Significant differences were found comparing the scores of men and women on personality characteristics and attraction to online social support. Our expectations were partially verified. Specifically, women ($M=24.7, SD=7.05$) compared to men ($M=22.2, SD=6.93$) reported higher levels of Neuroticism, $t(276)=-2.99, p<.01$, as well as higher levels of Agreeableness, $t(276)=-2.11, p<.05$, with mean scores for women ($M=27.5, SD=5.14$) and men ($M=26.2, SD=5.45$). Interestingly, men ($M=87.8, SD=19.76$) compared to women ($M=80.2, SD=20.2$) reported higher levels of attraction to online social support, $t(276)=3.17, p<.01$. Unexpectedly, there was a lack of gender differences in depressive symptomatology.

Finally, to identify the predictor variables that most strongly influenced attraction to online social support on Facebook, a multiple regression analysis was conducted, utilizing all five personality variables, gender and depressive symptomatology as independent variables and the factor of social support as the dependent variable. Regression analysis (Table 3) yielded an overall multiple correlation of $R=.52$ accounting for 27% of the variance [$F(7,270)=14.26, p<.0001$]. According to these results, gender ($B=-.20, p<.0001$), Agreeableness ($B=-.26, p<.0001$) and Neuroticism ($B=.29, p<.0001$) were the most important factors in predicting social support online. Predictive qualities to a far less extent, though not significant enough, had the factor of depressive symptomatology ($B=.11, p<.08$). None of the other personality variables showed predictive qualities, even though Conscientiousness ($r=-.16, p<.01$) was negatively correlated with attraction to online social support (see Table 1).

Table 3. Summary of regression analysis for variables predicting attraction to online social support on Facebook ($N=278$)

	R=.52 R2=.27 F(7, 270)= 14.26****			
Variables	B	SE B	β	t
Depressive symptomatology	.21	.12	.11	1.79
Gender	-8.28	2.22	-.20	-3.74****
Personality				
Neuroticism	.82	.18	.29	4.75****
Extraversion	.29	.21	.08	1.40
Openness to Experience	-.17	.18	-.05	-.93
Agreeableness	-.99	.21	-.26	-4.65****
Conscientiousness	-.12	.17	-.04	-.69

* $p<.05$, ** $p<.01$, **** $p<.0001$

4. DISCUSSION

The present study attempted to identify factors affecting the use of Facebook in relation to social support. In that regard, the researchers focused on examining the relationship between depressive symptomatology, personality and attraction to online social support in a sample of young Greek adults.

Regarding the correlations between factors, the results indicated that individuals low in Agreeableness were significantly more attracted to online social support. They, usually, are characterized as having less empathy and as being suspicious and unfriendly (McCrae & John, 1990), therefore, unsatisfactory face-to-face communication could lead them to use Facebook in search for social support. Furthermore, highly neurotic people are found to be more likely to experience stress and nervousness and one way to help alleviate these feelings could be to seek support from friends. Studies show that neurotic users disclose information online because they seek self-assurance (Amichai-Hamburger & Vinitzky, 2010) and may seek support through activity in Facebook groups by “liking” other users’ updates, hoping that they in turn would reciprocate (Bachrach et al., 2012).

Additionally, low levels of Conscientiousness were related to high attraction to online support. Impulsive and spontaneous people could be easily attracted to use a medium such as Facebook that can enable self-expression and provide multiple communication opportunities (Ellison et al, 2011). Interestingly, even though research findings (e.g. Connor-Smith & Flachsbar, 2007) show that there is a definite link between Extraversion and social support seeking, this study found no evidence to support that. An explanation could be that extroverted people usually have extensive social networks (Pollet et al, 2011) with different levels of closeness that could provide them with high levels of support, without them needing to search support online.

In order to examine whether individuals with low, moderate and high daily use of Facebook differed significantly as to personality, depressive symptomatology and attraction to online social support, the sample was divided into three groups based on their daily usage. Our hypothesis was, in part, confirmed, indicating that frequent daily Facebook usage is related to high levels of Neuroticism. This could be explained by the fact that emotionally unstable individuals tend to avoid the risky face-to-face interactions and may prefer the safer online social environment of Facebook (Amichai-Hamburger & Vinitzky, 2010). This finding is in accordance with the existing literature (e.g. Hamburger, 2002) that suggests that personality can only partially predict the amount of time spent in Social Networking Sites.

Significant differences were found comparing the scores of men and women on personality characteristics. Women, more than men, reported higher levels in Neuroticism and Agreeableness, whereas, men in contrast to women were significantly more attracted to online social support. Previous research (Salem et al., 1997) shows that men use computer-mediated support more frequently than they use face-to-face support groups. The findings of the present study add the use of Facebook as a medium for seeking social support. Men seem to choose to openly share their concerns and rely on others for assistance, thus, breaking out of the traditional masculine role to ask for help (White & Dorman, 2000). An interesting and unexpected finding concerns the lack of gender differences on depressive symptomatology, since studies unequivocally show that the risk of depressive disorders is higher in females than males (e.g. Piccinelli & Wilkinson, 2000). Factors inherent in the sample such as the number of participants and the small age range, as well as the fact that recent epidemiological studies in Greece show that there is a rise in depression among men (Economou et al, 2013), could be possibly responsible for this result

Finally, the importance of gender, depressive symptomatology and personality dimensions as predictive factors of attraction to online social support on Facebook was explored. Collectively the variables accounted for 27% of the variance. The hypothesis was partially verified, as apart from gender, only the personality dimensions of Agreeableness and Neuroticism were good predictors of social support. The findings are in contrast to those of Wilson and colleagues (2010), who suggest that personality variables have no impact on Facebook use. Another important finding in this study was the highlighting of gender as a more salient factor compared to the existence of depressive symptomatology in understanding the use of Facebook in search for social support. Previous research indicates that men are less likely than women to seek help for problems such as depression and anxiety (Tudiver & Talbot, 1999), however, there is a growing amount of evidence suggesting that such gender differences on the Internet are rapidly diminishing (Weiser, 2000).

5. CONCLUSION

Studies show that Facebook can create an environment that can foster in-depth self disclosure (Krasnova et al, 2010) and provide multiple communication opportunities. Facebook could be a valuable tool for counselors and psychologists that work with young adults as well as students that seek social support on Social Networking Sites. Discussing the client's online interactions during sessions could be used not only to gain further insights into their thoughts and behaviours (DeLambo et al, 2011), but also as a feedback for the course of the therapeutic process. However, counselors should be aware of the potential risks (the counselor's self-disclosure, confidentiality and privacy issues), should they choose to interact with clients on Facebook or other sites. There is little agreement on whether it is inappropriate to have relationships with clients via Social Networking Sites (Zur & Zur, 2011), however, complications could, potentially, arise when a client pursues a relationship with his counselor online, either by sending e-mails or texts with intimate details or posting a Friend Request to their counselor's Facebook page. The possible impact on trust and potential harm to the therapeutic relationship could be great if there is no definition of the parameters of such involvement and if counselors do not make clear distinctions between their professional and personal lives online.

In conclusion, the results of the present study were limited by the self-report questionnaires and the correlational nature of the results that did not allow "cause and effect" conclusions. Another limitation is the fact that only one Social Networking Site was studied and thus the results cannot be generalized to other sites. In spite of the above limitations, the results of the present study have some important implications on future research. Experimental methods could further explore how Facebook activities (posts, online groups, games) and different types of relationship interactions influence online social support, as well as the potential benefits or risks in encompassing Facebook in the therapeutic process.

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ENGAGING FACTOR IN CHANGING THE RELATIONSHIP OF SOCIAL CONTRACT

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ABSTRACT

Social contract is the surrender of certain individual freedoms to a higher authority, in exchange for the protection of natural rights. It is an exchange between two parties for the improvement of the existing status. Contemporary idea of social contract can benefit from the informal civic dialogue on social media that would encourage a mutual rapport. A grounded theory analysis of Singapore's socio-political blogs and readership (blogosphere) were accomplished in order to examine the engaging factors that would reveal through the data. The analysis revealed that political trust as one of the engaging elements in dejected jeopardy. Thus, as a mitigating factor to strengthen the mutual engagement by strengthening the political trust, authors would suggest empathy. Empathy has been discussed as the ability to see things from the other person's point of view, which will ensure a more effective communications, understandings and practices.

KEYWORDS

Empathy, Social contract, Social media, Grounded theory, Engaging factors

1. INTRODUCTION

Although the world is remarkably articulate about the bottom-up governing and broader democratic approaches, the intended use and the actual use are, in reality, two different spectrums. Governing still regards civic participation more in philosophy and less in practice. With the easy accessibility of information and highly connected society through online social media, governing process has the ability to evolve with a robust civic involvement that would see significant change in the social contract. E-governance is one of those initiatives where civil services are easily accessible to various sections of society. The question here is has the paradigm change that ensued with ICT in governing changed the engagement & interaction to the advancement of the contract? Have we explored all the possibilities of building a mutually beneficial and enriched social contract through the inclusion of new ecologies in civic participation?

Empathy and social contract are two premises that scholars would be reluctant to discuss in a single essay. Empathy is psychological connection built through the "take yourself out of your shoes and put yourself into the shoes of another person"(Richards, 2010). Social contract is an implicit contract between the institutions in the society and its citizenry(Barker, 1960). The citizenry surrenders certain freedoms to the state in exchange for the protection of natural rights. In theory this exchange appears to be constructive, since there is a relationship erected on an offer and an acceptance of mutual benefit.

However, the genuine social contract, an agreement that would create political authority which in turn will assure the protection for the citizenry, is debated as a fiction (Leeson, 2009), because the exchange of power has no contract. Durkheim(Durkheim & Coser, 1997) summarized this as "The conception of a social contract . . . has no relation to the facts . . . Not only are there no societies which have such an origin, but there is none whose structure presents the least trace of contractual organization." Nowadays, the social contract is the concept that legitimized the right to govern, how that process can be evaluated.

Hence, the concept of social contract discussed in this paper deviated slightly away from original ideology in its complete form, to introduce a new contract; a contract that is enhanced for mutual benefit by the inclusion of public interactions on social media. The authors will concentrate on the contemporary

relationship between governing institutions and citizenry and social attitudes that could lead to a mutually constructive social contract. This paper is a discussion of the outcomes of a grounded theory study of socio-political blogosphere with the objective of examining the emerging factors of engagement. The emerging data revealed a regrettable lack of political trust which impedes a dynamic social contract. In this paper, we will argue that the mitigating factor to preserve social trust is empathy.

The authors will introduce two terminologies; empathy and social contract, and then progress towards the literature and prior research to rationalize the research and then will explain the case study in brief and ends with discussing the results and limitations of the case study.

2. UNDERSTANDING TERMINOLOGIES

Nowadays, the concept of empathy has gathered a considerable amount of awareness by being at the forefront of numerous movements, from political campaigns¹ to studies on mirror neuron (Gallese, 2001). It has been part of the human existence, part of altruistic tendencies in religions, policy making and political thoughts, and rather an unacknowledged silent presence in the midst of all our activities. As Coplan & Goldie (Coplan & Goldie, 2011) concluded it may be hard to identify the exact meaning of empathy but it is important to every aspect of our lives.

Empathy has been deliberated as the capacity to see things from the other person's perspective, which will assure more productive communication, and practices (Coplan & Goldie, 2011). Empathy has the ability to bind entities into being responsible for welfare of each other, expanding growth of human capabilities, and changing the perspective on communication and relationship building. Giacomo Rizzolatti says humans as social creatures survive on understanding the actions, intentions and emotions of others (Blakeslee, 2006). Empathy is not just a conceptual reasoning, but also a tactile feeling. It is an effective response more appropriate to another's situation than one's own (Hoffman, 2001). Thus, empathy resonates with sharing, trust, caring, communication & relationships.

The first modern day philosopher to articulate social contract was Thomas Hobbes. He talked about a state of nature where individual life is asocial and amoral and "solitary, poor, nasty, brutish and short". Following this state of nature is the social contract, where to protect certain rights, individuals yielded part of their natural rights in exchange for authority (Buchanan, 1975). John Locke's (Locke, 1988) social contract is about individuals who will surrender their rights to a 'neutral' ruler in order to protect their lives, liberty and wealth. He believed in a near absolute authority of the sovereign. Rousseau, on the other hand, said "Man was born free" (Rousseau, Dunn, & May, 2002), which explain the reason for the contract; to protect that freedom. There were later developments on contractarian theory, such as the individual sovereignty of Pierre-Joseph Proudhon (Prichard, 2007) and in recent history Rawls developed the idea that individuals in a supposed 'ignorance' and in a hypothetical rationality would agree to a certain principles of justice as a social contract (Freeman, 2012).

The original concept of social contract highlights that in order to validate the contract there needs to be an offer and an acceptance, therefore the contract is built on mutual concerns. Most scholars debunk the concept of social contract, a written, unanimous agreement created by individuals in the state of nature with the sole resolution of forming political authority. They argue that the contract is not a contract at all but a document of surrender of the individual to the collective (Ardrey, 1970) neither mutual nor uniform, either in practice or theory. Nonetheless, there still exists a contract between individuals and the State in the form of constitutions and rules and regulations, which are constantly questioned, analyzed and amended. Jefferson (Jefferson & Boyd, 1958) said "Whenever the people are well informed, they can be trusted with their own government..." which illuminates responsibilities in the social contract between the state and citizenry. Thus, it is naturally the task of both parties to revitalize it to be mutually beneficial.

¹<http://www.deseretnews.com/article/765602502/President-Obamas-campaign-strategy-is-to-maintain-empathy-gap.html?pg=all>

3. LITERATURE & PRIOR RESEARCH

Literature and prior research would be discussed on two terminologies of this research- namely empathy and social contract. Additionally, grounded theory studies of social media would be discussed to present the novelty value of this research approach. To provide an understanding of blogosphere as a social media and Singapore blogosphere in particular, an account is offered as the last part of this section.

Empathy is commonly a psychological domain, where researchers study human attachments and the function of empathy as an emotional bond. The authors will present several writings on empathy covering two broader spheres –1) how to create empathy and 2) projections of creating empathy. Borg(Boag, 2011) argues that both attachment avoidance and anxiety is a result of the lack of empathy, emphasizing that individuals with more understanding of the others will not fear or avoid attachments. Empathy is effective and productive only when it can be practiced with certain philosophical detachment(Abdel-Wahab & a El-Masry, 2010; Crews, 1979), and it can bring far-reaching changes by revolutionizing the human relationships(Krznaric, 2012).

Social contract is naturally criticized in a fundamental manner emphasizing that there was no consensus in creating the sovereignty, that the contract is a myth. Especially after the recent financial crisis, the roles of the government was questioned and highly condemned. Nevertheless, as we mentioned above there exist an agreement. Leeson(Leeson, 2009) in his effort to debunk the myth of social contract argues that the social contract has first been practices by pirates who employed the same decision making calculus. He is trying to demonstrate that the social contract practiced by pirates is an example of how the constitutional democracy of today is more than a reasoning device or hypothetical explanation but rather an example of how such a government could emerge. There was an effort to understand the relationship between unemployment and social contract in Gulf countries, concluding that the ‘ruling bargain’ in oil rich countries needs modifying and re-communicating especially by the ruling elites(Forstenlechner & Rutledge, 2010). Reconstructing a new social contract is key to long term conflict resolution, and a viable social contract is sufficient to restrain conflict(Wall, 1996). On a different level, Gordon & Lima-Turner(Gordon & De Lima-Turner, 1997) maintain that online advertising can be viewed as a social contract on basis of the availability of access and information that connect two parties.

Grounded theory (GT) research is a bottom up approach where the research starts with a question(s) and relies on the emerging themes to reveal the research outcome(Glaser & Strauss, 1973). Several publications describe the use of GT in analyzing web contents. Researchers used GT to analyses the mental health and experiences of young adults using their blogs as data generator(Marcus, Westra, Eastwood, & Barnes, 2012). Chen & Moeller(Chen & Moeller, 2011) analyzed the online news comments on racial perception using online comments received for TV program produced by CNN on how the children perceive racial difference. Santana’s(Santana, 2011) research on the engagement of newspaper journalists with the online readers by analyzing their feedback comments. Thus, inspecting the existing literatures, one can detect particular perspectives of research which has studied the comments of the reader. 1) Reader comments used to map the negative/positive public opinion 2) Reader comments used to measure the relationships of actors/practices 3) Reader comments used to select specific individuals

It has to be noted that numerous literature on the premises of empathy, social contract and GT studies are plentiful. However, there is an unfortunate lack of GT methods used to qualitatively analyze social media contents.

A blog or weblog is a form of content management system or a website that has limited functions of a customary website(McDermott, 2007). Blogs incline towards projecting the individuality and persona of the author(s) and fairly fitting to deliver time-sensitive information in the form of a commentary or an analysis of a certain episode. Pole(Pole, 2005) contends that the research on blogosphere can be grouped into three types; 1) informative accounts, 2) inquiry in to the relationship of blogs and politics 3) bloggers and political participation. Bloggers in the United States used their blogs to engage in political participation(McKenna & Pole, 2004). They also indicate that blogging turns political activities of individuals intense and more involved and facility of reader response cause the social actors into being effective and responsible participants. Attempting at an ethnographic study of Singapore’s blogosphere, Mcdetmotte(McDermott, 2007) says that Singapore’s an isolated and distinct community and to understand the nature of the it, a researcher needs to use the participant observation methods instead of data mining. His study concluded that

the civil community created by Singapore blogosphere shows potentials from moving beyond a resistance group to building a project identity. Visa², a young blogger of Singapore thinks "...we're still a little "young". We are still new to all of this. It is still mostly a small community at the heart of it, with a lot of passers-by". Of late, Singapore government has slightly deviated from strictly enforcing its policy of banning 'explicit political content', perhaps recognizing the ineffectiveness of doing so and to avoid discrediting themselves. Nevertheless, the government maintains a sharp vigil over the blogs by denouncing them with the threat of defamation lawsuits. Previous year, Alex Au, the blogger of Yawning bread was threatened with a letter of demand by none other than the PM of Singapore for slander in one of his blog posts.

4. CASE STUDY & DISCUSSION

The understanding that empathy could be an engaging factor that would create a political trust towards a new social contract was ascertained by examining the discussions on socio-political blogs of Singapore. Singapore has a very limited socio-political blogosphere due to the highly regulated environment. The regulated environment itself and modest blogosphere provided an exceedingly rich dialogue, in contents and intentions. Singapore's social media landscape is greatly encouraged by the internet penetration which is little shy of 100%³. The country is a multi-ethnic with a diverse population of 5.31 million (2012)⁴ who are exceptionally tech savvy. Thus, Singapore presents several trajectories; the highly regulated environment, small yet multi-ethnic context, high connectivity and being exceedingly tech savvy. These different and sometimes conflicting spectrums caused this study to be challenging but enlightening.



Figure 1. Blogs & Readership

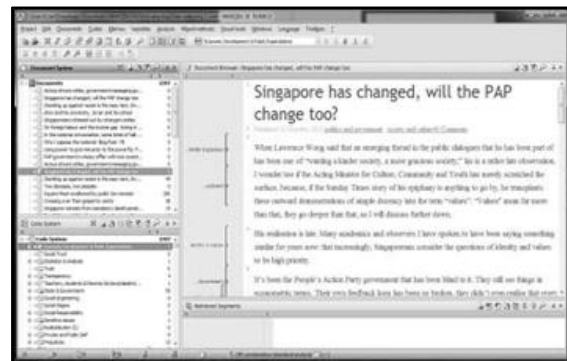


Figure 2. Data Analyzing

As method of research we employed the grounded theory method, where data is systematically collected and analyze to generate an inductive theory about a significant range(Charmaz, 2007; Glaser & Strauss, 1973). The method constantly compares the data to examine the emerging patterns for a conclusion. The authors employed two types of sample data; 1) blog contents (Fig 1) and 2) interviewing bloggers and readership using the snowball sampling(Goodman, 1961) method. When examining the blog contents for analyzing, the authors decided to select blogs with larger reader interactions since those will generate an energetic discussion. Since in qualitative studies and especially in GT studies, the researchers have the authority to evaluate the richness of data collected, we took the liberty of selecting various blogs which generates prolific discussions both in contents and arguments.

Interviewing presented problematic because most of the bloggers incline towards anonymity and suspicious of anyone who is attempting to gather information. Considering the earlier outlined regulated environment in Singapore, it was justifiable. Some of the bloggers and readers have dismissed the idea as mere paranoia however; the authors have experienced constant difficulties in acquiring permission for interviews. We approached bloggers through emails, Facebook and Twitter and readers were approached by placing an open entreaty on comments section of blogs. As formality and courtesy are in high regard our

² <http://www.visakanv.com/blog/>

³ Infocomm Development Authority of Singapore <http://www.ida.gov.sg/>

⁴ http://www.singstat.gov.sg/statistics/browse_by_theme/population.html

approaches were very formal and courteous, clearly stating our objectives and presenting credentials from our university. All the same, they either disregarded our email, Facebook messages, or they did not want to be disturbed. Some bloggers/readers courteously refused stating that they are too occupied to answer a long questionnaire. Nonetheless, bloggers/readers that consented to be interviewed were very enthusiastic, and productive. We have provided them with three options in answering our questions; 1) a sit down with the author(s) to an audio recording 2) answering questions through emails & also follow-up questions 3) through Skype. For content analysis, we used a commercially available data analyzing software (Fig 2).

Table 1

Sample source	Quotation	Code	Category	Memo
Comment	"...the difference between HK & SG lies in concentration of economic control, hence job opportunities, for the well-educated class..." - Yuen	Economic vulnerability, control, indifference	Relationship (gov & citizenry)	HK & SG successful economically and majority Chinese
Comment	"To think critically? What is the use if you cannot really apply it when it matters most in national issues and institutions—which is the nub of the problem" -Jimmy	Relationship, public input, policy & practices	Education & National Issues	
Interview (face-to-face)	"...government seemed to do far more social engineering than I am comfortable with, and social control... to large extent the role of the government is to mitigate and counteract market failure..." – Alex Au	Role of Government, Social control, Social Engineering	Government & Power	SG Gov controls the market less people more
Interview (online)	"...that we really, most of the time, have no idea how things work at such large, complex levels, so we should be less recklessly interventionist and spend more time and energy carefully observing what's going on." - Visa	Negotiating, Informed, less intervention, understanding	Relationship parameters	Idealistic, let intellectual discourses guide him, less eager to jump to conclusions

The authors analyzed 100 blog posts (Tables 1) and responses from readers, along with 10 interviews of bloggers/readers where they answered 30 open-ended questions. Analyzing the blogs and the readership (blogosphere) and interviews it is revealed that rather than becoming a narrative of one-sided exchange of information, the interactions become a dialogue that create arguments. Arguments were mostly the existing socio-political environment and how the changes can be achieved through 'listening' and 'understanding'. Alex Au (Yawning Bread⁵), who is a very active and influential blogger in Singapore, referred to these as lack of self-reflection on both parties; State and citizenry. As a commonly made complaint responding participant voiced their dissatisfaction, but in terms of the distance between government and public Blogger Daniel Yap (Signs of Struggle⁶) is with the impression that 'distance' between the State and public is lack of proper attentiveness and responsiveness

Table 2

Code	Category	Sub –category	Themes
Economic vulnerability, control, indifference	Relationship (gov & citizenry)	Mutual Bonding	Faith
Critical thinking, Practices	Education & social engineering	Accountabilities	Integrity
Role of Government, Social control, Social Engineering	Government & Power	Function	Expectations
Negotiating Informed, less intervention, understanding	Relationship parameters	Limitations	Engagement

⁵ <http://yawningbread.wordpress.com/>

⁶ <http://doulosyap.wordpress.com/>

The frequent association of terms such as trust, consideration, integrity, social engineering, care and equality in negative connotation exposed the present-day position of the relationship between both parties. Visa is not unfavorable in giving a wider berth to the government, stating that he would like it if the government informed the society more about the trade-offs. He is prepared to understand the role of the government when it is transparent, and by that he is insistent, he does not mean he has faith in the system. He essentially perceives the need for both government and citizenry to be trusting, especially 'sitting down and talking' for the social capital to flourish.

Thomas Jefferson has expressed, as mentioned above in this paper, a well-informed citizenry strengthen the political trust. Singapore has depoliticize the citizenry for a long period, through various methods (McDermott, 2007), thus political participation can adopt multiple forms and serve many different interests. Visa termed the predicament of citizens as 'politically cauterized' status, which means that the governing authorities are suppressing the civil liberties of citizenry by cautioning them constantly with reduced economic growth. The constant admonitions and priority setting have not only created apathy but also misgiving and political cynicism, reducing the political participation. Political participation has clear potentials in creating a well-informed society and important for communitarian forms of democracy. Even though the participation in modern democratic societies is contested endlessly, trust plays a major role in participation in any form of engagement, especially the mutual trust. Scholars have defined political trust as a basic evaluation to examine the performance of the government according to people's normative expectations (Hetherington, 1998). In the rational choice model of decision making, political participation is considered as a method of defeating the collective action dilemma by creating trust (Fennema & Tillie, 1999). Undeniably, political trust is taking on a new dimension with international terrorism, and economic recession.

Rhetorical map of our pilot study was completely occupied by the factors of trust, accountability, integrity and somewhat undesirable social engineering. Kristen⁷, also in her early 20s, argues that the government should stay out of extra social control and provide more social benefits for the citizens, which is calling for a reconsideration of redistribution and regulation policies. Both bloggers & readership are jaded and tired of social engineering, which is constant source triggering negative attitude towards the governing institutions. Even though the majority of bloggers/readership has admitted government's aptitude in achieving monetary success, the admiration seemed to have finished there. The dialogue constantly turned towards expectations of the role of the government and trustworthiness. There seemed to be decreasing trust in the government as an institution, the other party of the social contract. Hetherington and Husser (Hetherington & Husser, 2012) suggest that trust influences public opinion and in certain conditions trust in government could fluctuate dramatically. However, a trust shared by both the government and people will encourage a new social contract.

In Table 2 we have summarized the outcome of the GT study as a prototypical sample to provide an understanding of the conceptual themes emerged out of the study.

Consequently what would be the element that would restore the trust between governing institutions and citizenry? In 16th century Germany Johann Herder talked about the human potential of 'imaginative insights', as the basis of understanding cognition. 'Imaginative insight' was more vividly described by Giambista Vico "aspiration to leave one's won world and enter into the world of other" (Calloway-Thomas, 2009). This is called empathy. Empathy is building trust, improving faith through an imaginative tour of the world of the other party. Empathy is 'listening', 'hearing' and 'understanding' not through assumptions but through sharing, informing, collective faith and practically 'walking in another's shoes'. When Krznaric (Krznaric, 2012) talked about the age of Outrospection, a term he coined as opposed to introspection, he was discussing about stepping out of the individualistic socio-political aspiration, in to creating empathy.

We have discussed lengthily the encouraging, trust reinforcing, and relationship fostering value of empathy. Thus, we argue empathy as the engaging factor to establish the political trust for a dynamic social contract.

⁷ <http://spuddings.net/>

5. CONCLUSION

Before concluding this paper we would like to draw attention to certain limitations in our study. Singapore socio-political blogosphere as a case study presented considerably challenging due to the decidedly regulated media environment in the country. Most of the bloggers/readership prefers to appear anonymous, thus making them incommunicado. Therefore, the interviews were testing, though some openly rejected the idea of anonymity and unguarded in answering questions. The additional limitation in this research is that we only researched on English language blogs in a country where over 70% are Chinese in ethnicity and mostly conversed in Mandarin. Granted that English is one of the official languages and almost all population can converse in English, yet the research parameters discard the voices of language tested individuals considerably. Naturally, it can be argued that the bloggers also are guilty of this rebuff in the first place because they blog in English language.

To summarize, the authors have performed a grounded theory study of blogosphere in order to reveal the engaging factors that would emerge. The objective was to examine the engaging factors that would support a mutually beneficial social contract. Data analysis revealed trust as an element that impedes the contract. Thus, for political trust to flourish for bonding social contract, authors argue empathy as an engaging factor.

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DESIGNING COOPERATIVE, INTERACTIVE EMOTION GAMES AS A PRESCHOOL SOCIAL INTERVENTION

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ABSTRACT

An important component of the social competencies needed when children arrive at school is the child's ability to recognise the basic emotions of happiness, anger, fear, surprise and sadness. This study reports on the design and development of a game designed to test emotion recognition and also to be used as a fun, touch screen tablet game for cooperative play. The development was based on two field studies with the same children a year apart. In the first year the children engaged in a series of play activities to pose emotion faces in order to capture images that were turned into age-appropriate cartoon emotion faces used in a game that tested the ability to recognize whole emotion faces. The design process was iterative and evaluation took place in school as part of normal play activities. The children were tested for emotion recognition skills using cartoon emotion face cards before playing a revised emotion game in same-sex and mixed sex pairs, and retested after the game. The collaborative play was evaluated using an adapted model of paired play with analogue games. The more expressive children scored significantly higher in emotion recognition than their less expressive peers. The results show a link between children who had difficulty in recognising emotions and the effect of the game as an intervention, with boys benefiting from playing with girls while girls gained more from playing with other girls. This is significant in that it suggests that some less expressive, young children may benefit from an emotion recognition intervention.

KEYWORDS

Design and evaluation, Games as interventions

1. INTRODUCTION

Many children enter preschool lacking the requisite social and emotional skills to engage successfully in learning (Bulotsky-Shearer and Fantuzzo, 2011; Denham, 2006) and for some this manifests as difficulty in recognising the major group of emotions (McClure, 2000). Children develop a complex set of skills in the first 3 years of life that enable them to interact socially with, and learn from, others, mostly in the context of home and friends but Burger (2010) argues that early care and education affects cognitive development and cites evidence (Camilli et. al. 2010) that preschool participation improves social and cognitive development with modest effects persisting for many years. The purpose of this paper is to report on the research based design of an exploratory initial study in a preschool into the design and evaluation of an interactive, touch screen game to measure emotion recognition and the subsequent refinement into a game using age-appropriate cartoon emotion faces. The research-based design approach is an amended form of action research (Cobb, 2007). The contribution of this paper is to describe the iterative user-centred design process and evaluation of a series of games designed to both engage and enhance emotion recognition skills in children and to serve as a tool for teachers to test and use in collaboration with children to help their self-esteem and use of technology. The novel feature of the design is the use of a touch screen tablet with age-appropriate and contextually valid images, designed to be used by children alone or in pairs without an adult's intervention. The game can also be used with an adult (teacher or parent). The main research question is how technology can help bridge the gap by providing a fun intervention to enhance these skills.

2. DESIGNING AND EVALUATING GAMES AS INTERVENTIONS FOR PRESCHOOL CHILDREN

Baron-Cohen et. al. (2009) in their research with children with autism spectrum conditions (ASC) argue that empathy comprises two major components: cognitive (a recognition of the mental states of others) and an affective component (an emotional reaction to someone else's mental state). Their work with The Transporters (trains with emotion expressions) with 4-7 year-olds showed that this intervention had a positive affect on the learnability of emotion expressions, supporting their argument that children can be taught this affective component. The Transporters was based on a DVD intervention but increasingly children have access to more engaging, interactive technology. The children arriving at preschool have different levels of prior engagement with technology with income, ethnicity and education identified as some of the complex factors driving the digital divide (Wartella et. al. 2002). The lack of experience with or exposure to digital technology may further confound children's readiness for school learning and socialising if they are lacking social competency skills. Some children arrive in mainstream education with different levels of exposure to rich verbal language and social skills (Burger, 2010) and a few may also be recently diagnosed as being on the autistic spectrum (ASC) and so have especial difficulty in socialising with their peers and adults. There have been some applications designed to address social competencies but most have been designed to be used by an adult with a child. Technology has developed so rapidly that Donker and Reitsma's (2007) argument that young children are just as capable of using a mouse for control using drag and drop as using click, move and drop has possibly been overtaken by the development of iPads and other touch screen devices. If this control is married to an engaging game format, technology has the potential to provide the motivation to play and the possibility of value from experience and engagement (Higgins, 2006). There is wide use of computers now in preschools so it is timely to debate how technology can be harnessed to help close the digital and social divide. These children are pre-literate and therefore any interaction instructions must be based on basic ideas and used in an intuitive way. Ideally interaction should be achieved via direct manipulation, and game play should also leverage the children's natural curiosity and provide a level of challenge, control and reward (Keller, 1987). Many children are already familiar with cartoons and interactive games such as those provided on the cBeebies website (Joly, 2007) where a multimodal design provides interest and motivation. Porayska-Pomsta et. al. (2012) suggest adopting an interdisciplinary methodology for designing interactive multi-modal technology for young children with ASCs. They believe that using approaches from developmental psychology, the creative arts, artificial intelligence is key to developing technology in this context. Preschool children arrive in mainstream schools with a range of skills and some may yet to be diagnosed with ASC but could benefit from lessons learnt in designing games for children with ASC, especially multimodal design. In their digital world success can be rewarded using sounds. In their review of the design considerations for children's games, Gelderblom and Kotzé (2009) formulated ten design guidelines in six categories: developmental appropriateness; development of specific skills; design of built-in support; catering for a diversity of users; interaction environments and devices and support for the collaborative use of technology. The recent development of touch screen devices allow children to interact in a less formal way and lessons can be learnt from design guidelines for mobile interaction devices (McKnight and Cassidy, 2010) while consideration can be given to devices such as touch screen tablets (Humphries and McDonald, 2011) that can be used in informal group play. Evaluation of children's interaction with games have used various devices such as simple questionnaires and smiley faces for a rating scale (Markopoulos, Read, McFarlane and Hoysniemi, 2008). However, although these techniques can be adapted for pre-literate children, evaluation using video equipment may offer more opportunity to evaluate away from the school when activities have taken place in a relatively unstructured action research mode. Applications that motivate tend to engage children's natural curiosity and interest in novelty and also provide challenge, control and reward (Keller, 1987).

Hypotheses arising from the development of social competencies and technology as intervention considerations are:

H1 There is a difference in preschool children's emotion recognition scores after using the touch screen emotion faces game.

H2 There is a difference in how children cooperatively play together using digital technology.

3. DESIGN AND EVALUATION OF THE EMOTION GAMES

3.1 Research Based Design Approach for the First Prototype Emotion Game

The research took place over 2 weeks in the first year with children from the preschool Foundation Stage (nursery) and another 2 weeks a year later in the same primary school when the same children were in Year 1 (Reception) of the Foundation stage. An important part of learning to negotiate the social rules of play in the school environment is the ability to read people and situations. Emotion recognition is a basic skill that underpins these socio-competency abilities. The aim of the study was to design a high-fidelity prototype of a touch screen game that could be played on a tablet pc by children in pairs or with a teacher or parent. The design concept was based on recognising emotion faces by matching pairs of eyes and mouths for the five of Ekman's (1971) six basic emotions: anger, sadness, happiness, surprise and fear. Disgust was omitted because evidence (Widen, and Russell, 2010) suggests that children up to the age of 9 confuse the facial expression of disgust with anger and link explanations of this emotion to anger. The start point for the design process was the collection of realistic images of face parts and emotion sounds. Cartoon images of face parts showing the emotions fear, anger, happiness, surprise and anger were drawn based initially on a full face template of two children, one boy and one girl (Humphries and McDonald, 2011). The design was iteratively deployed and tested by a small group of children, teachers and parents. A high-fidelity prototype of this face part game was deployed on a Fujitsu Lifebook T series multi-touch tablet computer programmed in C#. The participants were 31 children from the morning and afternoon preschool (Foundation Stage) children. The visit to the North of England primary school was arranged in order for the researchers to immerse themselves in everyday nursery activities, alongside the regular teachers and teaching assistants, to introduce emotion recognition activities and to evaluate children playing alone and in pairs with the interactive tablet game. The play activities included Emotional Musical Statues - a variant of the musical statues game where when the music stopped the children were asked to display a specified emotion. In an emotion Photo Shoot the children were asked to take turns posing emotion faces and sounds to represent a specified emotion. Consent was obtained from the parents to take still and video images of the children with the aim of developing age-appropriate cartoon emotion faces. The final design employed cartoon depictions of emotion eyes and mouths based on these collected images and sounds. The children's images were redrawn digitally as cartoon emotion faces by a graphical designer with the design based on Ekman's FACS (Ekman and Friesen, 1978).

The children were asked to line up and one by one they were asked to display a specified emotion from happiness, fear, surprise, sadness and anger. One emotion was shown on a large card and each child in turn was allowed several attempts to show say a happy face then the next child in line sat down until all the children had completed that one emotion. They then lined up again to be photographed for the next four emotions. Three children did not want to take part at all. The scores for the children who participated were rated on a scale from 0 showed no emotion, 1 made some attempt at an accurate emotion face, 2 showed accurate emotion faces. The still photos were coded by one researcher and checked by another. Both computer science researchers have experience and qualification in research methods in Psychology.

It was observed during the photo-shoot that the children differed in their expressiveness and the extent to which they could make image faces. There may be a gender difference in the ability to simulate emotions in pretend play and this may be linked to the ability to see things from another child's perspective at preschool age (McClure, 2000) with a suggestion that girls at preschool age have a start on boys in recognizing facial expressions. It was also noted that the children who declined to participate were unsure of what to do when playing emotion statues and rarely posed an appropriate emotion face.

3.2 Design of the Emotion Faces Games

During the months following the first phase of the research the first prototype was refined and work started on the design and development of a whole face emotion game. The first stage of the design was a paper prototype that was tested on a 4-year-old volunteer. The paper prototype comprised 20 emotion faces, an easel to display the 4 correct choices and 5 smiley buttons to represent the emotion selected (Figure 2a). The child was asked to select an emotion the put the correct faces on the easel in the centre of the page. When they were all selected correctly she moved on to the next emotion and repeated the selection. The faces stayed on the paper but were mixed up manually by the researcher to simulate a random selection and

placement of the images. The child enjoyed playing the game and when the game was repeated a second time she was left alone to play (with her mother in sight but not participating). When the researcher returned she had completed all the selections and had systematically removed each emotion button to the desk to signify that she had finished that emotion. She was reluctant to finish the game and it kept her attention well. This removal of the completed button was incorporated into the design of the final digital game. This was a good example of participatory design. The design concept carried over to her school work the following week when she came home with her own game design (Figure 2b) to give to her mother. When asked what the drawing represented she replied that this was



a Child aged 4 testing the paper prototype of game



b An unprompted drawing of the game designed as a new game but adapted to the theme of bugs.

Figure 2. Testing the paper prototype and design lessons carried over into schoolwork.

Observations from the exploratory part of the research (Humphries and McDonald, 2011) that there was a gender difference in some aspects of emotion recognition led to the idea of developing a revised game to test emotion recognition based on the use of whole, age-appropriate faces. The rationale for this was that whilst the children had great fun with the first game there were some doubts as the value of process of matching the face parts as some children found the face parts difficult to identify out of context and the boys especially chose a strategy of repeatedly selecting the angry face parts as they enjoyed hearing the angry sound clip. The original aim of developing a series of cartoon emotion faces from the images collected was extended so that the images would be integral in the new game. This game would be used as a possible intervention as well as a fun game with emotion recognition as a different domain to the usual school games. The children would be tested on 20 emotion cards (2 x 5 emotions x 2 genders). The children would then play the developed emotion face game (Figure 3) based on the paper prototype.

3.2.1 Design of the Emotion Cards

One of the aims of this study is to produce a fun game that children can use to practise emotion recognition skills rather than being explicitly taught. It became an essential design requirement then to design age-appropriate emotion cartoon faces that children would enjoy using but whose design was based on scientific principles such as Ekman's FACS (Ekman and Friesen, 1978) and also based on artistic drawing of faces in proportion for both the age of the child and the proportions of the features to the face itself. For this a graphical artist was instructed in the required design principles and the resulting 40 images were tested on several children aged 3-5 who selected the faces, from the 40, that they recognised as the named emotion. The artist produced digital versions using as a basis the children's images collected previously and artistic license to make the images appealing within the scientific constraints. They were also designed to include ethnic minority images, as there was a lack of diversity in the children's images from this one school. Some images were collected from a school in Sunderland with children from a more diverse population. A selection of the images can be seen in the screenshot of the emotion face game in Figure 3. The hypothesis that there would be an increase in emotion recognition scores using the cartoon cards after using the emotion game (H1) and that the children, when playing in pairs (girl-girl, boy-boy and girl-boy pairs) would help each other and so increase their scores through collaborative activities. The design was a pre-test with 20 emotion

faces (2 sets of 5 emotion faces for each gender) with an intervention with the game then a follow-up post-test where they were retested using the same faces as in the pre-test. The intervening game was a random selection of 4 of each emotion face in sequence to minimize the learning effect. The test design was a Latin Square design in that children were split into 4 groups with some starting with the boys' set of cards, some with the girls' set and the other 2 groups rotated around the order that the emotions were presented. This was done in order to eliminate practice effects.



Figure 3. Finished game showing the emotion “angry” in play.

3.2.2 Procedure

The pre-test took place during 2 days at the school when the children were allowed to pair up to play the game in boy-boy, girl-girl and boy-girl pairs for approximately 10 minutes. A digital SLR camera was set up on a stand to record the children playing. The activities took place in their normal classroom and after an initial look at the camera they soon forgot it was there. No child appeared to change its behaviour as a result of the presence of a camera. The children were first allowed to play the game with the minimum of intervention. The game was designed for children to play without adult help. There were no textual instructions and large smiley buttons of different emotions were used to move the play on. Sound and colour was also used as feedback mechanisms e.g. a correctly chosen image appeared on the easel with a green background, an incorrect choice with a red background. After an initial explanation of how the buttons worked the children were allowed to play freely. The videos were analysed for the quality of cooperative play based on an adapted version of the 7-point Dewey scale (Dewey et. al. 1988). This scale has a section for observing and rating joint endeavour using symmetry, fun, complexity of social-play building towards a common goal, negativism (reverse-scored) and complexity of verbal behaviour. There are in addition 2 individual scoring criteria: cognitive complexity of play without the other pairs and the child's interest irrespective of his/her partner. This scale is based on a developmental study of the analysis of pair play of non-digital games with children on the autistic spectrum and normal children.

3.2.3 Results

The results for each child e.g. 1st boy M1, 1st girl G1 etc. are presented (Table 1) with their pair type. Their emotion recognition scores using the cards before and after playing the game are the pre- and post-test scores. The pre- and post-test scores were correlated ($r= 0.497551$). The mean scores for emotion recognition increased but not significantly overall, pre-test $M(18)= 14.39$, post-test $M(18)= 15.22$. There was no significant correlation between overall cooperation scores and emotion recognition scores.

Table 1. Analysis of video data of children playing the emotion game in mixed-sex and single-sex pairs

Gender	Pair (Boy- Boy, Girl- Girl, Mixed)	Pre-test score	Post-test score	increase	Expressiveness 0=none, 1=low, 2=full	Cooperation score /45
M1	M	16	13	-3	1	39
M2	B	16	12	-4	2	28
M3	M	18	18	0	2	32
M4	M	12	19	7	2	35
M5	M	16	20	4	2	27
M6	B	15	17	2	2	33
M7	B	15	15	0	2	45
M8	B	13	12	-1	2	32
F1	G	11	15	4	0	34
F2	G	13	14	1	0	45
F3	G	10	13	3	0	29
F4	G	12	11	-1	0	45
F5	M	15	14	-1	0	39
F6	M	11	11	0	1	31
F7	M	20	17	-3	1	34
F8	M	12	15	3	2	32
F9	G	15	19	4	2	35
F10	G	19	19	0	2	30

The maximum score that can be obtained on the adapted cooperation scale is 45. The boy-boy pairs scored $M(4) = 34.5$, the girl-girl pairs obtained a mean score of $M(6) = 36.33$ and the mixed pairs $M(8) = 33.63$. There is no significant difference between the mean individual scores but there were differences with the children with low expressivity scores (0 and 1) differing on how the game influenced their post-test emotion recognition scores. When playing in mixed pairs the girls scored lower $M(4) = -.18$, $p > .05$ than when playing in single-sex pairs $M(6) = 2$, $p > .05$. Conversely, the boys scored higher when playing in mixed pairs $M(4) = 2$, $p > .05$ than in single-sex pairs $M(4) = -.75$, $p > .05$ (Figure 4).

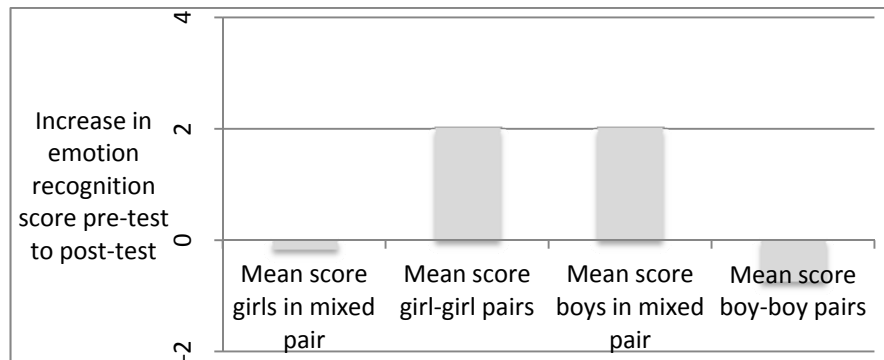


Figure 4. Boys increased their scores more in mixed pairs while girls did better in single-sex pairs.

It seems that boys learn from the girls in mixed pairs but the girls gained most when playing with other girls than in mixed pairs. The children who had posed more emotion in the photoshoot gained a significantly higher mean score for their post-test emotion recognition ($M(10) = 16.6$, $p < .05$) than those children who did not take part or could not pose accurate emotion faces ($M(8) = 13.5$, $p < .05$). Conversely the less expressive children gained a significantly higher score in the cooperation scale $M(8) = 42.29$, $p < .05$ than the more expressive children $M(10) = 29.91$, $p < .05$.

4. DISCUSSION

The initial exploratory study was designed to test the emotion game as a research instrument as well as an opportunity to immerse ourselves in with the children's normal activities and it was a natural progression to ask them to do the emotion activities. They saw all the activities as play. The emotion face parts game worked well and interesting observations were made about the differences in the ability of children to express emotions. These appeared to be linked to a reluctance to both take part in the activities and play the game. This led to the first hypothesis. In this study H1 was supported in part. This supports McClure's (2000) meta-analysis of the literature on children's ability to recognize faces that there are mixed results on whether there is a gender difference. The results of the cooperation scores for the pairs suggests that children played with attention and fun for over 10 minutes at a largely self-directed multimodal game with emotion as a domain. The touch screen device made it easy to share the play without passing the mouse between them. The position on a desk in a play area, as opposed to where many desktop computers are placed, usually on a shelf or in an alcove, made sharing activities more accessible. The design with sound as a reward and one where they could choose their own strategies seemed to have been successful both in the fun element and from the perspective of increasing their emotion recognition scores. Not all increased their emotion recognition score, the more successful children at expressing posed emotions in the first year of the study gained higher scores than those who found it difficult to pose emotions or who did not elect to participate. This was a small study that resulted in some rich data that was successfully analysed using an adapted psychology scale designed for observing pairs of children playing non-digital games. The use of the designed emotion faces in cartoon format was engaging and popular with the children and proved valuable in assessing their emotion recognition skills and also as assets for the game. This is a school with low index of deprivation (defined by a low percentage of free school meals, 12.5%) and an inspection of the results for those with low expressive scores shows that these children showed some large improvements in some scores and it may be that a larger study may yield more significant increases. Further work has been planned to extend the testing in more schools, especially in those with a more diverse population and also to children on the autism spectrum.

H2 is partially supported. The children with low expressivity scores had differing results on how the game influenced their post-test emotion recognition scores. It seems that boys learn from the girls in mixed pairs but the girls gained most when playing with other girls than in mixed pairs. This is an interesting result but is not statistically significant. However, children with deficits in emotion recognition form the minority in this class and possibly other mainstream schools but the results suggest that attention could be paid to identifying this group and giving them support. H2 is also partially supported with regard to cooperation scores with those scoring lower for emotion recognition gaining higher cooperation scores. This is not so easily explained and it may be that these children are more willing to share and learn or that their partners were very accommodating. This supports Baron-Cohen et. al.'s (2009) work of an intervention using emotion recognition having positive outcomes but with a broader ability range and at a younger age. On a broader note, while resources are limited and emphasis with touch screen development is mostly on media applications for use in school, there is no imperative to produce technology that children can easily share. We need all our children to be confident both socially when they start school and adept at using technology.

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SOCIAL FEEDBACK AND SOCIAL BOOKMARK USAGE

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ABSTRACT

Bookmarking, a basic feature of Internet Web browsers, lets users save and collect their favorite web page locations, but not use those bookmarks on other computers or share them with others. Social bookmarking lets people share bookmarks on the Internet. The term was first used by del.icio.us in late 2003, who found that letting users store, organize and access bookmarks online also reveals community favorite web sites and the common tags they are organized by. This research investigates the factors that affect social bookmark usage. A social bookmarking simulation was created to see how various levels of cognitive effort and social feedback affected use. At first, effort was significant and feedback was not, but when social feedback effort was controlled for, it became significant. That reducing effort while increasing community feedback improves intention to use social bookmarking marks it as a possible “sleeper”, a killer application of the future.

KEYWORDS

Social bookmarking, socio-technical, cognitive effort; social feedback.

1. INTRODUCTION

Bookmarking, a basic feature of web browsers, lets users store their favorite web page locations and manage them in folders to find them easily. As the data is held on a local computer, the bookmarks aren't available on other computers nor are they shared. *Social bookmarks* let users manage bookmarks publicly or privately on the Internet and subscribe to the lists of other users. On the World Wide Web, social bookmark buttons appear on many websites, e.g. the BBC website shows them under each news story (Figure 1).



Figure 1. Social bookmark buttons

Social bookmarking advantages like user created tags and rankings (Ivory and Megraw, 2005) make it increasingly popular (Millen, Feinberg & Kerr 2006), e.g. in April 2009 about 38 million people visited digg.com, but this was only 0.41% of all Internet users, compared to 18% visiting Facebook in May (Alexa, 2009). In Internet terms, relatively few people use social bookmarking.

In general, social bookmarking involves clicking on a bookmark button, registration (if not already done), login, submitting a bookmark website, then community feedback for that site. Current systems differ greatly in how this is done: some like Digg register many details while others like Reddit need few; some like Delicious require a click for social feedback but others like StumbleUpon give it right away; for some login and register are separate pages and for others the same; some auto-fill fields like title and description; etc. There is little agreement on what designs are best.

Others have analysed social bookmarking functions like tagging (Sen et al. 2006), filtering (Bateman 2009), ranking Heyman et al, 2008) and searching (Yanbe, 2007), but these benefits need contributed bookmarks to begin with. So why do people social bookmark in the first place? In an experiment, subjects new to social bookmarking tried out various buttons then reported how likely they were to continue to use the service. In theory cognitive effort and social feedback affect social bookmark use, based on the literature that users seek the most effect for the least effort (Clark and Wilkes-Gibbs, 1986). The results will interest the designers and operators of social bookmark systems those who wonder how they work.

1.1 Cognitive Effort

Ease of use is well a known application usage factor, defined as the cognitive effort a user must expend to get what they want from a web service (Whitworth, Banuls, Sylla & Mahinda, 2008). A social bookmark system that is hard to use is expected to be used less often. Cognitive effort is important because only 16% of users have the time to read all of a web page to get to information they want – the rest just scan it (Underwood, 2001). Each user may have a specific threshold and if it is exceeded they click-on to another site. So even just one extra click can stop some people using an application.

The web interface model shown in Figure 2 suggests element, page and site interface aspects, where element covers text, links and graphics, page covers loading and transitions and the site aspect is the overall experience (Ivory and Megraw, 2005, p.468). Page effort involves users navigating between pages (Sklar, 2009), e.g. clicking on to get information. So cognitive effort includes things like:

1. Font styles and sizes (Watrall and Siarto, 2009).
2. Length of link text (Sawyer and Schroeder, 2000).
3. Number/types of links (Spool, Scanlon, Schroeder, Snyder and DeAngelo, 1999).
4. Number/types of graphics (Flanders and Willis, 1998).

Finally, the overall site experience affects cognitive effort, as doing what we enjoy is naturally "easier". Cognitive effort can be reduced by having fewer colours and fonts, consistent layouts, information chunking, use of graphics, faster loading, fewer click and scroll-down acts, intuitive interfaces and community help.

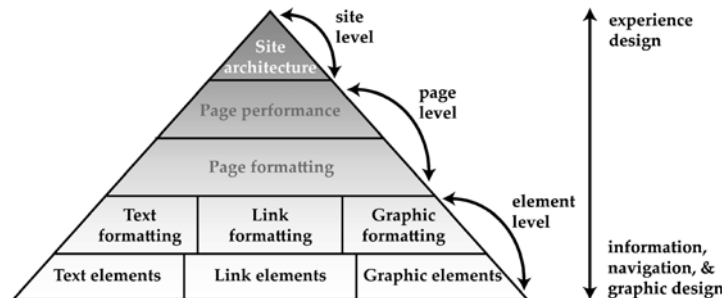


Figure 2. A web interface model (Ivory and Megraw, 2005, p.468)

1.2 Social Feedback

Social bookmarking uses tags, comments and ratings to summarise the web sites a community is looking at (Park, et al, 2008). The number of users bookmarking a web page measures its authoritativeness (Chen, Scripps, & Tan, 2008), so social bookmarking can identify quality sites better than a web search as it is less susceptible to marketing (Bian, Liu, Agichtein, & Zha, 2008).

Social feedback as an element of social change is illustrated by the story of the hundredth-monkey effect: *Scientists observing Macaque monkeys in the wild saw a young female monkey washing potatoes in a stream before eating them. The skill spread to the whole island, to other island colonies and to the mainland. Old monkeys didn't copy the new trick, but young ones did.* (Blair, 1975)

While some consider this an urban myth, the concept that a new skill can pass on socially remains, whether for the hundredth monkey or the millionth human. If one individual in a social group discovers something new, and the young copy it because it works, it will become part of the culture passed by one generation to the next, as "what we do". While physical evolution passes on by genetics, social evolution passes on by culture, so it is faster. It is what the brain inherits by learning not what the cell inherits by sex. So we went from minor plains scavenger to global dominance in a few thousand years by social not biological evolution.

The primitive but powerful psychological mechanism that allows communities to learn is *normative influence*, defined as the effect of the group on its members (Whitworth, Gallupe and McQueen, 2001). Normative influence generates agreement to keep groups together so they act as one. For individuals, it

manifests as a need to belong to a group, to go where it goes, and to not be different. While groupthink diminishes individual creativity, without it there is no social learning.

If the instinct that keeps herds together also works for ideas, art and fashion, how then do new forms replace old ones? If an individual learns something new, it is copied if it works, then becomes the norm at a "tipping point" when the majority goes that way (Gladwell, 2000). Normative influence is what pulls in the rest of the group after a critical mass, so allows culture to pass from generation to generation, e.g. the Internet was just a quirk of computer nerds in the seventies but is today for everyone.

Gladwell's "law of the few" is that 80% of the activity is done by 20% of the people, with the rest indisposed, disinterested or just watching, and the ratio of online "lurkers" to posters is about the same. His active 20% includes *connectors* who know people, *mavens* who hold knowledge, and *salesmen* who sway others. They, plus the millionth human, make the breakthroughs that create a tipping point to create a new norm. The rest of us contribute to this social evolution by *following*, which isn't doing nothing because we *are* the group.

Micro-blogs like Twitter quickly reveal where the group is going, and social bookmarks that show the web sites everyone likes do the same. Both are *socio-technical systems*, social systems emerging from a technology base (Whitworth, 2009). The technology supports social needs, as people need to know what others are doing, i.e. get social feedback. Social evolution needs followers and leaders, and online social feedback needs this as never before.

2. THE EXPERIMENT

If people begin using social bookmarking by trying buttons on the web, simulating that should predict actual usage. Social bookmark buttons were simulated for various values of cognitive effort and social feedback. Cognitive effort was how many clicks, scrolls or text entries were needed to bookmark a web site, and social feedback was the amount of community information given in return for submitting a bookmark. The biggest bang for the smallest buck was then high social feedback for low cognitive effort. The research question was how cognitive effort and social feedback affected intention to use?



Figure 3. The simulation task

2.1 Phase 1

To avoid any bias, a new social bookmark system called *Bligg* was built, with register, login, bookmark and feedback features. Sixty subjects, selected randomly from computer rooms in a University, were invited to learn about social bookmarking by trying out a system we had developed. They had to have Internet but not social bookmarking experience. Subjects introduced to social bookmarking in groups were shown examples, then they tried out two types, with questions after each. Six versions of the *Bligg* social bookmark button were trialed, but each subject only tried two cognitive effort versions with the same social feedback.

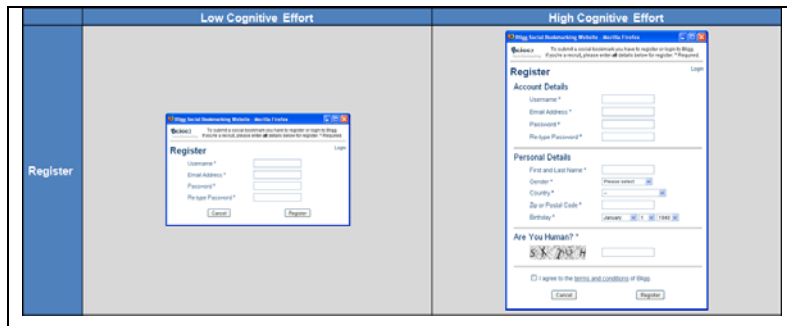


Figure 4. Low versus high cognitive effort

The task was to bookmark preferred Beatles songs in a group (Figure 3). The Bligg buttons varied by high and low cognitive effort, and high, low and no social feedback. High cognitive effort was primarily more registration (Figure 4). No social feedback just said thank you after a submission, low social feedback gave basic song details while high social feedback gave the group response (Figure 5). High social feedback also had high-low cognitive effort versions. The experimental design was repeated measure for cognitive effort, so the button effort presentation order was randomized to avoid bias. After subjects tried each Bligg button type, the expected usage dependent variable was measured by these questions:

- “I would like to use social bookmarking in the future”
- “I think I will use social bookmarking in the future”.

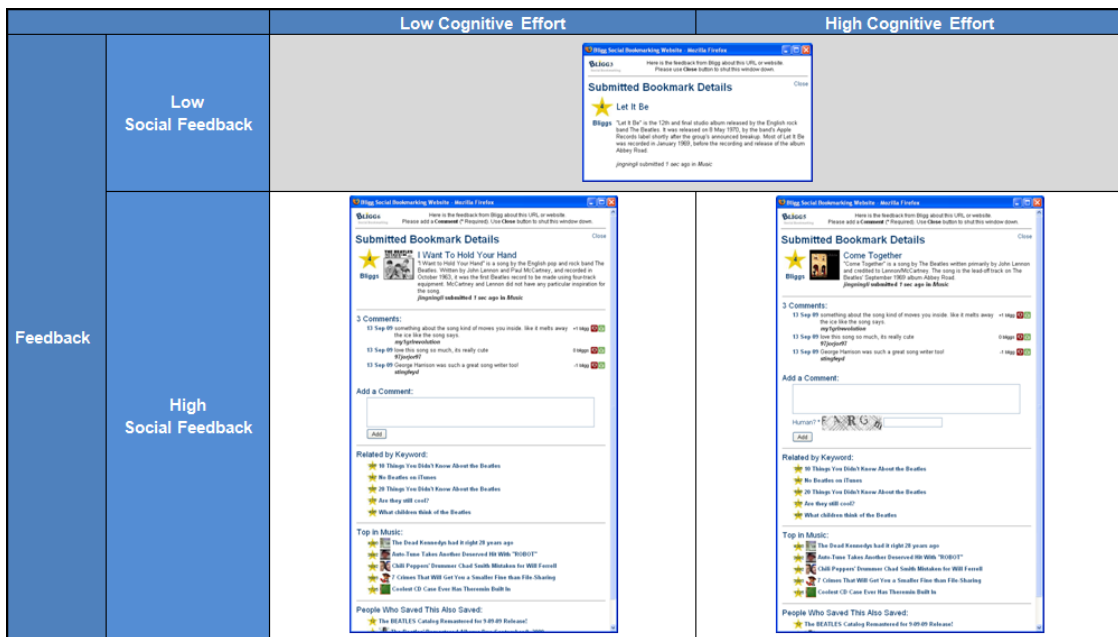


Figure 5. High and low social feedback

On a 10-point semantic differential scale. The software also measured the time taken.

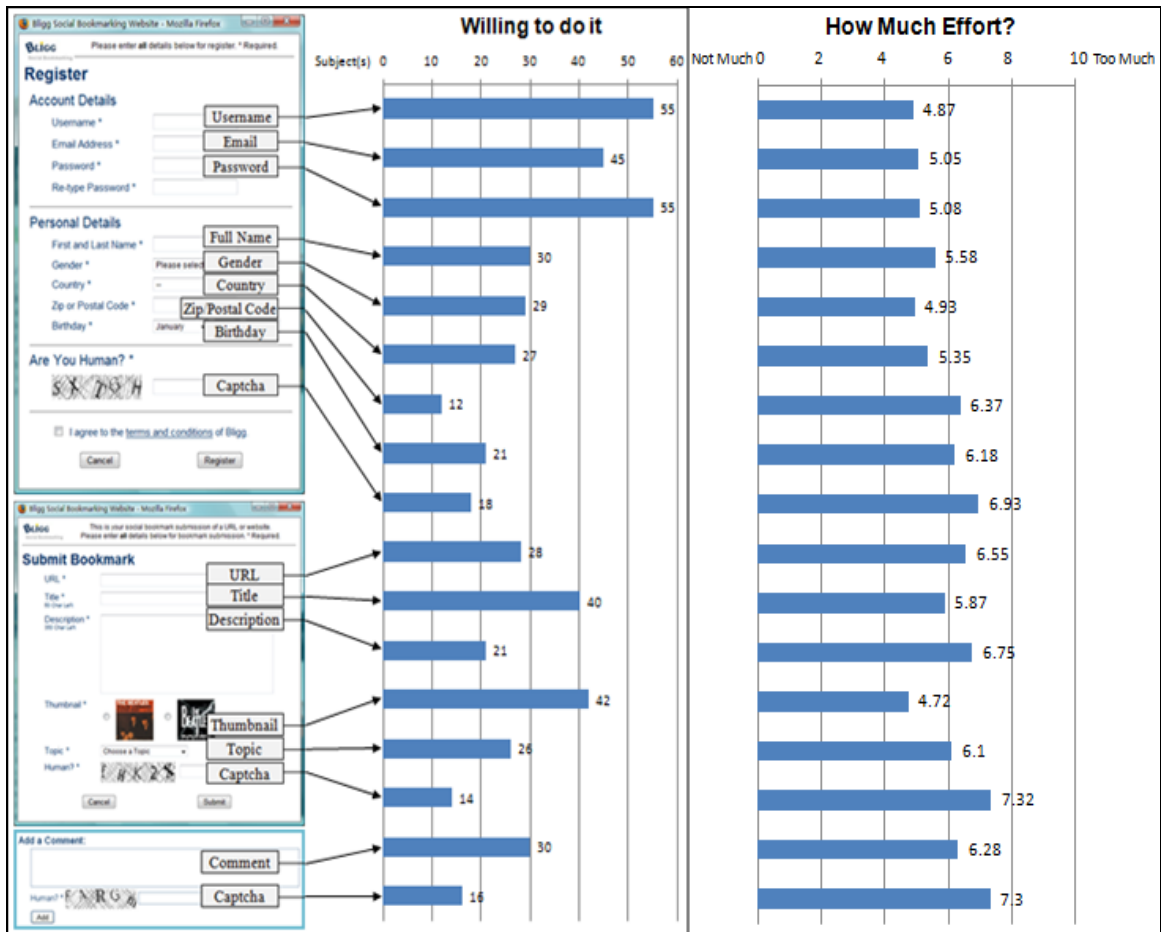


Figure 6. Cognitive effort breakdown by detail (N=60)

In the first stages of explaining social bookmarking and seeing examples, attitude to social bookmarking showed no significant differences between the participant groups, but after trying the Bligg variants, cognitive effort significantly affected expected social bookmark usage (paired t-test, $p < 0.001$). High cognitive effort also actually took significantly longer to complete: nearly ten times as long overall; three times as long for registration and 1.5 times as long for the result comment section.

Figure 6 breaks down the cognitive effort by detail, with captchas, URL description, URL, making a comment, postal code, birth date and topic being seen as onerous, in that order. In contrast, users seemed happy to provide the greatest effort: full name, gender, country, URL and were seen as effort, with and especially onerous. Yet while less effort increased expected future usage, as predicted, social feedback had no significant effect (ANOVA, $p = 0.352$). In the social feedback detail, bookmark number, details and top in music were the most useful (Figure 7). Subjects were not very interested in other's comments.

Yet low effort alone is not a reason to use social bookmarks in the first place, so if social feedback level didn't positively affect usage, what did? On review it became clear that increasing social feedback also increased cognitive effort, as subjects getting more feedback had to do more reading, and spent more time on it, i.e. the treatment confounded cognitive effort and social feedback. If more social feedback to increase usage also involved more cognitive effort to decrease it, the two effects could have cancelled. Phase 2 extended the study to eliminate this confound.

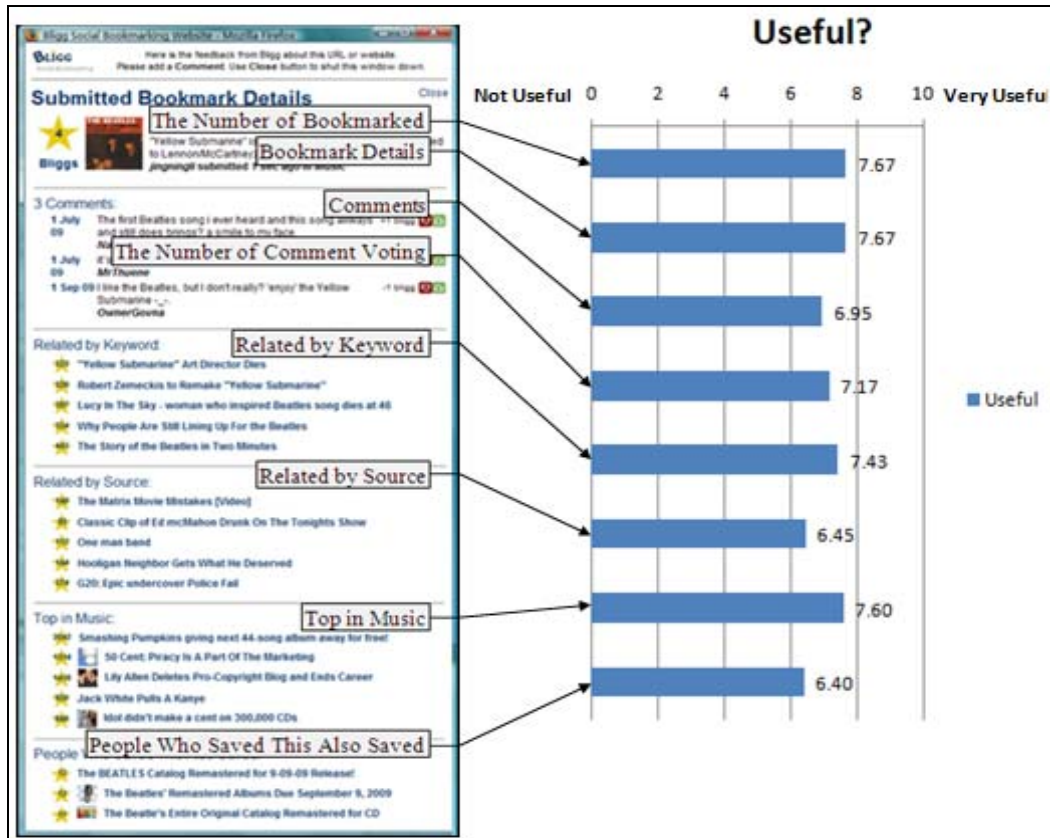


Figure 7. Social feedback breakdown by detail (N=60)

2.2 Phase 2

This phase varied social feedback but controlled for reading effort. The method was the same, but the social feedback variants had the same reading length, images and layout (Figure 8). No social feedback just thanked the user, low added song information, medium had the bookmark number and high gave links to more data. The feedback cumulated but this time the reading length was the same. Twenty-four bookmark newcomers tried out these Bligg buttons in a random order.

Table 1. Actual time taken by feedback

Feedback Level	Time Taken (Secs)
None	14.3
Low	9.2
Medium	11.3
High	26.2

When effort was controlled for, social feedback significantly affected likelihood of use and future intention to use social bookmarks (ANOVA, $p < 0.001$). Intention to use increased for every value (Figure 9). For the high social feedback level, 71% of subjects clicked on feedback links: 82% clicked on “See other bookmarks in Pop Music” and 18% clicked on “See other bookmarks related by Keywords”. Male subjects were more willing to click the links than the female subjects and found doing so less effort. While subjects spent about twice as much time on the high social feedback system (Table 1), they still found the system easiest to use, i.e. giving feedback links increased actual time taken but not perceived cognitive effort.

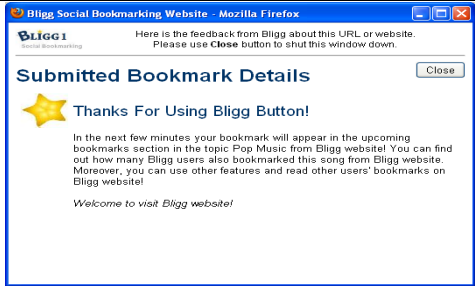
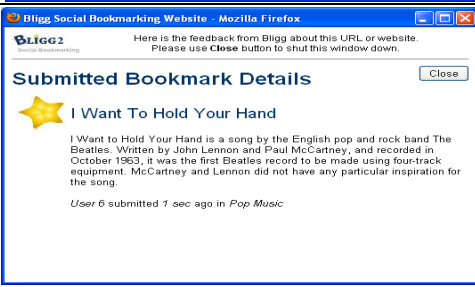


Feedback	Interface
None: No feedback	
Low: Song details	
Medium: Details & bookmark number	
High: Details, bookmarks and links	

Figure 8. Varying social feedback for same cognitive effort

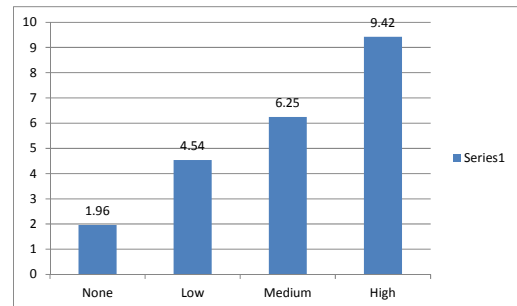


Figure 9. Intention to use by social feedback

3. CONCLUSIONS

It seems that the effort users are willing to put into social bookmarking is less than most current designers suppose. Adding "Are you human?" captcha requests lowers usage as does asking for web site details, comments, birthdates or post codes. Keeping it simple also applies to the feedback itself, as more feedback for more reading was a wash for our subjects. Yet more feedback as optional links added value, as it did not add to perceived cognitive effort.

The thesis that social bookmarking systems giving more feedback for less effort are more often used is supported. So the "utility" of social bookmarking is to provide social feedback, to tell users what the group is doing. The relatively slow uptake of social bookmarks compared to say social networks may relate to *the social feedback received for the cognitive effort required*. If social feedback is an activating factor and cognitive effort an enabling factor, the latter can deny the former. The steady advance of social bookmarking

suggests it is a “sleeper” online application, as grass roots mirror on what people are looking at online that can’t be bought, manipulated or biased as search engines can. To realize this however social bookmark systems need to:

1. Focus on community level feedback (not say individual level user comments).
 2. Significantly reduce cognitive effort, including for feedback delivery.
 3. Specialize in communities of interest, rather than all web users.
- The social bookmarking challenge is to increase social feedback but reduce cognitive effort.

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INDEX DEVELOPMENT AND APPLICATION FOR MEASURING THE LEVEL OF DIGITAL CULTURE

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ABSTRACT

This study introduces index development for assessing the level of digital culture in a society. The social and cultural impact of digitalization today has increased to a point where it cannot be separated from daily lives of citizens. Authors recommend using the Digital Culture Literacy Index (DCLI) as a means to measure the level of social and cultural impact of digitalization. This article criticizes the existing studies on the Digital Culture Literacy Index and its application results in an analytical manner, and recommends improving the Index to a more advanced one.

KEYWORDS

Digital culture literacy, Digital use, Digital values, Digital ethics and norms

1. INTRODUCTION

Digital culture, often described as the environment that results from digitalization, can be considered as the overall lifestyle that incorporates the awareness, attitudes, and behaviors of citizens who live in the digitalized environment. Digital culture of today goes beyond the symbolic level to ultimately compose human life and serve as the essential foundation. Voluntary and active digital culture helps maintain cultural independency of a country in the globalized world while taking the initiatives of cultural changes worldwide. In economic terms, moreover, digital culture facilitates development of the digital industry for earlier achievement of the information society. Also in social terms, digital culture plays a significant role in substantially improving the quality of citizens' life.

In order to determine the domains of digital culture, the method used in classifying cultural types can be applied to features of digitalization. There may be many different classification methods, but the one that classifies culture into three types – culture of the values, culture of the norms, and culture of the tools – is generally used (Bae Young, et al., 2012). 'Culture of the values' is related to the goals of citizens – a desirable and commonly understood recognition of what they should be pursuing in their lives. 'Culture of the norms' sets rules and standards of conduct that should be followed as socially tolerable. 'Culture of the tools' works as the means to achieve what is pursued by individuals in the society.

In terms of changing speed, culture of the tools changes the fastest whereas culture of the values changes the slowest. The rapidly changing information technology of today can be considered as the domain that stimulates culture changes to the strongest level. On the other hand, culture of the values, being all about adopting new values or changes, can be evaluated as a challenge to or rejection of the existing values or social framework, which makes it the most unlikely to change. Based on these assumptions, digital culture can be defined as 'a suited type of culture for digital society that encompasses cultures of the values, norms, and tools in digitalization' (Roh Gyu-Hyeong, et al., 1988). In this regard, the standards of conduct required in citizens for broad development of digital culture should be focused on a balanced growth among the domains of values, norms, and tools.

In this article, authors introduce some of the main elements that make up the 'Digital Culture Literacy Index', which is a tool for measuring literacy of citizens in the digital environment. Main domains have been first defined through theoretical verification. Detailed measurement items have been then developed for each domain. And lastly the indicators were applied to a survey for Internet users in Korea to measure the current level of digital culture.

2. COMPOSITION OF DIGITAL CULTURE LITERACY INDEX (DCLI)

2.1 Rationale for DCLI

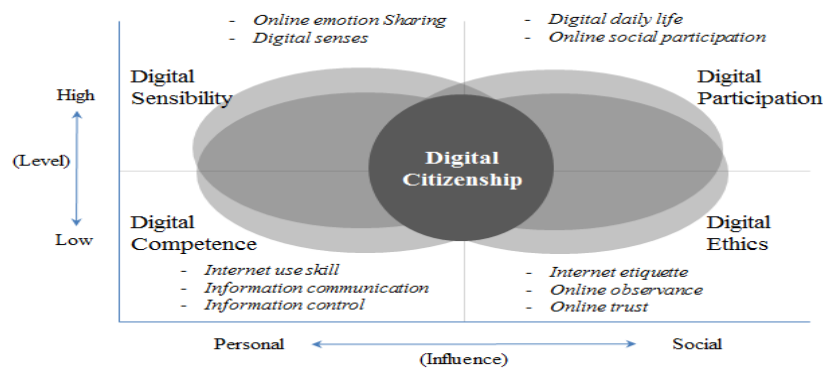
DCLI has been developed in an environment, where advanced digitalization in the understructure of the society such as supply and manufacture was not being met by academical and policy considerations on digitalization in the life and social culture of citizens. First of all, it is very important to have a scientific measuring tool which will help determine the level of awareness of the general public and social tolerance as well as what are needed and important for achieving a balanced and society-oriented digitalization. The fact that digitalization, which is a tool for scientifically measuring and evaluating the level of digital literacy of a country or a society, lacks measurement items for social tolerance and driving force will bring substantial limitations in evaluating development toward a true information society.

This explains the need for DCLI, which assesses the driving force of digitalization and the social and cultural environment for digitalization. DCLI provides guidelines for analyzing objectively as well as scientifically the status and level of digitalization in our society in terms of demand and social or cultural lifestyle. In addition, it enables surveys on the domains that had not been covered by the existing indicators, serving as the drive that expands the horizon of digitalization from technological and industrial terms further to cultural and social terms (Sohn Yeon-Ki et al., 2000).

2.2 Status Analysis of Previous Studies

Studies on DCLI have been carried out at the national level as part of promoting efficient digitalization. A 1996 report of Korea Agency for Digital Opportunity and Promotion (currently, National Information Society Agency) attempted structuring DCLI by categorizing the Index down to digital culture as tools, digital culture as systems, and digital culture as values. Digital culture as tools consisted of three sub-indices – computer/information and communications hardware and infrastructure, software, and information and communications services. Three sub-indices of digital culture as systems were legal environment for digitalization, status of computer and information and communications education, and status of R&D for digitalization. Three sub-indices of digital culture as values included awareness on digitalization and the digital society, information ethics and norm consciousness, and application of digital culture in everyday life (Sohn Yeon-Ki et al., 1996). Each sub-index was again categorized into specific measuring physical and awareness survey data such as telephone and PC penetration rates, information and communications industry market volume, human resources, etc. However, the complex composition of the indices led to measuring difficulties and the calculation based on these indices was left unattempted, still remaining as a proposal. It is considered that different measuring times of the indices must have caused additional difficulties in calculating the Index.

The second attempt for developing DCLI was made in 2008 by National Information Society Agency (NIA). At this time, the focus was on the qualifications of citizens in the digital environment and finding out the maturity of digital citizenship in a comprehensive manner. The DCLI developed at this time was defined as ‘ a whole set of intelligent, ethical, esthetic, and practical qualifications or outcomes that could add to the meaning of life or values in the digitalizing lifestyles (Kim Mun-Jo et al., 2008). This Index consisted of four domains as its main indices – digital capacity, digital ethics, digital emotions, and digital practices – along with 10 sub-indices with a total of 63 measurement items.



Source : Heein Yang, Kangtak Oh. 2011

Figure 1. Conceptual Diagram of 2008 Digital Culture Literacy Index

The 2008 DCLI was calculated based on the survey that had been constantly carried out until 2011 for the Internet users aged 6 or older in Korea. The result showed a slight increase in the score by year, with 61.6 in 2008, 66.2 in 2009, 68.0 in 2010, and 69.2 in 2011. This Index turned out as a very useful policy indicator for comparing and analyzing the level of digital culture by year as well as the progress of development, though the detailed items for measuring the Index were so much excessively complex that the survey process for actual users faced difficulties in the field. In particular, with the domain of digital emotions requiring users' awareness on emotional exchange of digital contents, it is difficult to deliver the meaning of what is to be surveyed from general users of a wide range of ages. Therefore, training of interviewers is a very significant variable for obtaining reliability and feasibility of the survey result. With the DCLI mostly consisting of measurement items on users' awareness and experiences, the need was raised to minimize arbitrary interpretation by survey respondents and simplify measurement items while at the same time improve the Index so as to assess qualifications of citizens in the digital environment.

2.3 Composition of the Improved Index

As explained above, a classification framework has been applied to set domains of digital culture. Based on such classification, the three domains of digital culture are the cultures of the tools, culture of the values, and culture of the norms. Digital culture of the tools can be defined as a means for humans to maintain his/her social life in the digital society and considered as the ground for other elements of the digital culture. Digital culture of the values is a belief system that provides meanings or goals for human behaviors or social activities in the digital society. Finally, digital culture of the norms represent normative procedures and rules that are socially acknowledged in carrying out digital activities. Main indices of DCLI, therefore, can be drawn as 'digital use' from culture of the tools, 'digital value' from culture of the values, and 'digital ethics/norms' from culture of the norms.

2.3.1 Digital Use

The first domain that measures the level of digital culture maturity, digital use, is composed of measurement items that represent how digitalization is used in citizens' everyday lives and social activities. Therefore, the digital use domain consists of two sub-indices – digital life and online social participation. Measuring digital life can find how diversely users use online services and devices and develop a usage pattern. In addition, measuring online social participation allows to find how much citizens use the Internet to participate in the process of policy-making and how far they are practicing their rights and responsibilities. All of these will help evaluate the current maturity level of digital use in both qualitative and quantitative terms.

Table 1. Detailed Measurement Items for Digital Use Domain

Main Index	Sub Index	Measurement Items
Digital Use	Digital Life	<ul style="list-style-type: none"> - Online Production <ul style="list-style-type: none"> . I post writings or write comments. . I take photos or videos myself or post them after editing. . I share or pass on other person’s writings, photos, or videos. - Online Transaction <ul style="list-style-type: none"> . I use Internet-banking or online stock-trading. . I use Internet shopping. . I use civil services via the Internet. - Online Exchange <ul style="list-style-type: none"> . I use email. . I use SNS such as Mini-hompis, blogs, Facebook, Twitter, etc. . I use online cafes or communities. . I use real-time messaging services such as MSN, NateOn, KakaoTalk, etc.
	Online Social Participation	<ul style="list-style-type: none"> - I search information on policies or political/social issues on the Internet. - I participate in polls or surveys related to policies or political/social issues on the Internet. - I upload writings, photos, or videos on policies or political/social issues on the Internet. - I join cafes or communities related to policies or political/social issues on the Internet. - I participate in demonstrations or signature-gatherings regarding policies or political/social issues on the Internet. - I participate in volunteer activities or donations for the common good on the Internet. - I report risky contents that have obscenity, violence, and anti-sociality on the Internet.

※ 5-point rating scale (always – often – sometimes – rarely – never)

2.3.2 Digital Values

Next, the digital value domain consists of items that measure the level of awareness that is required to maintain social and cultural communities based on democracy. This domain, therefore, has two sub-indices of online trust and online tolerance. Online trust is the basic value and norm for active digital culture. Without trust, there will be challenges to smooth social exchanges or economic transactions on the Internet. Trust as a social capital on the Internet is a significant element of value or norm that leads digitalization. Online tolerance is also essential for creating and maintaining a civic society. Without mutual understanding and tolerance between users on the Internet where diverse cultures co-exist, it would be difficult to establish order for digital culture as desired.

Table 2. Detailed Measurement Items for Digital Value Domain

Main Index	Sub Index	Measurement Items
Digital Value	Online Trust	<ul style="list-style-type: none"> - Trust in information on the Internet <ul style="list-style-type: none"> . I trust information on goods or services of online shopping malls or private businesses. . I trust public service information provided in websites of the government or public agencies. . I trust online newspapers or news information. . I trust information posted on SNS such as blogs, Mini-hompis, Facebook, Twitter, etc. . I trust all information posted by users on the Internet. - Trust in Websites <ul style="list-style-type: none"> . I trust online shopping malls or websites of private-sector businesses. . I trust websites of the government or public agencies. . I trust websites of online news media companies. . I trust SNS such as blogs, Mini-hompis, Facebook, Twitter, etc. . I trust portals such as Daum, Naver, Google, etc.
	Online Tolerance	<ul style="list-style-type: none"> - I think other persons with different opinions from mine also have rights to express their opinions. - I think I need to listen to opinions that are different from my own. - Some opinions are tolerable, even though they are different from my own. I think online signature-gathering or group petitions by persons having different opinions from my own should be allowed.

※ 5-point rating scale (completely likely – very likely – moderately likely – not likely – not at all likely)

2.3.3 Digital Ethics Norms

The third domain, digital ethics/norms domain, consists of measurement items that assess the level of ethical and normative awareness, behaviors, and attitudes on the Internet. It has two sub-indices – Internet ethics value and ethical attitudes and behaviors. Internet ethics value literally means the level of awareness on potential problems caused by a variety of deviations on the Internet. With no awareness on such adverse impact of the Internet put as prerequisite, unhealthy Internet culture will spread. Ethical attitudes and behaviors are based on the will to control various deviations found on the Internet and the ability to keep oneself from deviating. Maintaining sound digital culture will require attitudes that determine morality from immorality and pursue ethical behaviors on the Internet.

Table 3. Detailed Measurement Items for Digital Ethics Norm Domain

Main Index	Sub Index	Measurement Items
Digital Ethics/Norms	Internet Ethics Value	<ul style="list-style-type: none"> - It is wrong to use other person's private information on the Internet without permission. - It is wrong to offend or slander others personally on the Internet. - It is wrong to download or use contents on the Internet without permission. - It is wrong to distribute unverified information on the Internet. - It is wrong to distribute unhealthy information on the Internet. - It is wrong to bully others on the Internet.
	Ethical Attitudes and Behaviors	<ul style="list-style-type: none"> - Will to control other person's deviation on the Internet . I will stop my family or friends from using personal information on the Internet without permission. . I will stop my family or friends from offending or slandering others personally on the Internet. . I will stop my family or friends from using contents on the Internet without permission. . I will stop my family or friends from distributing unverified information on the Internet. . I will stop my family or friends from distributing unhealthy information on the Internet. . I will stop my family or friends if they decide to join bullying on the Internet. - Will to keep oneself from deviating on the Internet . I do not use others' personal information on the Internet without permission. . I do not offend or slander others on the Internet. . I do not download or use contents on the Internet without permission. . I do not distribute unverified information on the Internet. . I do not distribute unhealthy information on the Internet. . I do not join bullying on the Internet.

※ 5-point rating scale (completely likely-very likely- moderately likely-not likely-not at all likely)

3. APPLICATION OF DCLI: WHERE KOREA STANDS

3.1 Calculation of DCLI

DCLI is calculated by setting each of the three domains – digital use, values, and ethics/norms – to have the full score of 100. Measurement items of each domain are on the rating scale of one to five, where respondents are asked to select from number one to five. In order to convert the five-point scale to 100, each number is multiplied by 20. That is, the lowest and highest values are respectively 20 and 100 after conversion of the five-point scale to 100-point basis.

- Digital Use Index = Digital Life score*0.5 + Online Social Participation score*0.5
- Digital Values Index = Online Trust score*0.5 + Online Tolerance score*0.5
- Digital Ethics/Norms Index = Internet Ethics Value score*0.5 + Ethical Attitudes and Behaviors score*0.5

3.2 Application of DCLI

3.2.1 DCLI of the Entire Respondents in General

A status survey carried out in 2012 for 5,000 Internet users in Korea based on the new DCLI to find the level of digital culture showed the usage level of 48.8 points, value level at 71.8 points, and ethics/norms level at 88.7 points. In the digital use domain, the level of digital life was 54.2 points and online social participation level, 43.5 points, showing higher level of digital life than online social participation level. In the digital values domain, online trust and tolerance levels scored 64.2 and 79.4 points each, with online tolerance level being slightly higher than online trust level. In the ethics/norms domain, Internet ethics value level scored 87.1 points, and the level of ethical attitudes and behaviors was at 90.2, signifying satisfactory level of ethics in general.

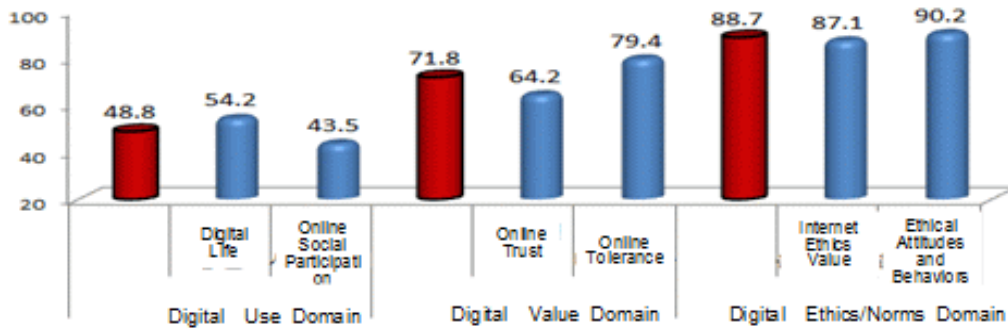


Figure 2. Digital Culture Literacy Index by Domain (2012, N=5,000)

3.2.2 DCLI in Socio-demographic Terms

When calculated by gender, DCLI in digital use domain was 49.0 for men and 48.6 for women whereas it was 71.5 for men and 72.0 for women in digital value domain. In ethics/norms domain, points for men and women were 88.1 and 89.4 each. Though there was no big difference in the level of digital culture between men and women, men had a slightly higher level of digital use, while women had a slightly higher level of digital ethics/norms. By age, the digital use domain showed the highest points in the 20s with 61.2. On the other hand, children less than 10 years of age (28.0) and those in their 50s or older (38.9 for those in 50s and 32.8 for those in 60s) showed lower level of digital use. As for the digital values domain, children less than 10 years of age showed higher level with 73.2 points compared to other age groups. This can be interpreted that lower age groups who are not as often exposed to the Internet as other age groups are likely to have higher level of trust and tolerance on information or websites on the Internet. In the digital ethics/norms domain, teenagers showed the lowest level with 86.4 points. On the other hand, those in their 40s or older showed gradually increasing level for Internet ethics value (90.3 points in age 40s, 90.3 points in age 50s, and 90.9 points in age 60s or older).

Table 4. DCLI by Age (2012, N=5,000)

Age Group	Digital Use			Digital Values			Digital Ethics/Norms		
	Index Value (unit:point)	Digital Life	Online Social Participation	Index Value (unit:point)	Online Trust	Online Tolerance	Index Value (unit:point)	Internet Ethics	Ethical Attitudes and Behaviors
<i>Total</i>	48.8	54.2	43.5	71.8	64.2	79.4	88.7	87.1	90.2
6-9	28.0	31.7	24.3	73.2	67.3	79.0	87.9	86.3	89.5
10-19	37.7	45.2	30.2	72.0	65.1	79.0	86.4	85.0	87.7
20-29	61.2	68.8	53.7	71.7	63.3	80.1	87.4	86.8	88.1
30-39	57.8	64.0	51.6	71.1	63.2	79.1	88.7	87.3	90.2
40-49	51.7	55.9	47.5	71.9	64.4	79.3	90.3	88.5	92.1
50-59	38.9	40.6	37.3	71.7	64.1	79.3	90.9	88.0	93.8
60 +	32.8	31.5	34.0	72.5	65.0	80.1	91.1	88.7	93.5

4. CONCLUSION

Unlike other data collection or accumulation methods regarding digitalization, which are generally focused on material or technological terms of digitalization, DCLI encompasses social and cultural behaviors in digitalization, further enabling examination of the social and cultural process or result of digitalization that is likely to be overlooked in the process. In the meanwhile, many efforts have been made into studying the framework for collecting data on various hardware environments and citizens' awareness, only to be challenged by difficulties in analyzing the massive amount of data on a certain point of time and maintaining a balance between the survey result and hardware data. However, the need for DCLI will be constantly raised by policy-makers, social scientists, and politicians for various interests and purposes, and the Index will be actually used in the future. In this regard, the existing DCLI, though remaining as a tool for measuring development of awareness and behaviors of individuals in the digital environment, will be still able to serve as an efficient policy indicator that measures social and cultural maturity level.

Since DCLI should especially incorporate basic social interests and requirements of communities in the digital society, it needs to go under constant revision every three or four years. Moreover, DCLI should, in the mid- and long-term, serve as a tool for objectively comparing and analyzing digital cultures between different places based on larger-sized surveys, and even further contribute to establishing the standard for global digital culture as a global index that can be used between countries.

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VOICES FROM THE MARGINS - USERS' PERSPECTIVES ON TECHNOLOGY AND TECHNOLOGICALLY MEDIATED SOCIETY

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ABSTRACT

Understanding mundane use of technologies and reciprocal construction of technology relations is utmost important now when new technologies are entering to Finnish homes and society in ever-increasing pace. According to the tradition of cultural and social studies of technology, the users of technologies are seen as active agents who are commenting current technological changes, technologically mediated society and technology policy. The focus of the article is on user groups that are marginalized from the technologically mediated society based on their age, gender and / or place of living and, thus, does not represent mainstream users.

Our society where technologies have major role in people's everyday life, technological pressure is often present. With the concept of technological imperative social, cultural and everyday life pressure towards utilizing technologies that have become a central part of our society and culture is analysed. Adapting and using mundane technologies is examined through the theories of domestication. With domestication it is possible to follow the argumentation and practices that people are using when they are adapting, opposing or left aside the technologies and technological development.

The data is gathered and analysed with the methods of ethnography and oral history. The data is based on 1) ethnographic longitudinal interviews of women living in remote areas, 2) interviews of local level technology policy-makers and 3) technobiographies i.e. autobiographical writings where people describe their relation to technologies of elderly people.

The article shows how marginalized user groups are interpreting, reacting and practicing technologies and technological imperative which prevails in technologically mediated society. The article is concentrated on questioning on how technological imperative is interpreted in the everyday life of marginalized users? What are the ways of reacting to the technological imperative? Why some technologies get domesticated and others do not and in what circumstances these domestication processes are happening?

KEYWORDS

Science and technology studies, technological imperative, domestication, users, oral history, ethnography

1. INTRODUCTION

"It was the mid-1950s, I cannot remember the exact time. We had many children, so there was a lot of laundry. At that time, we already had our own sauna, where there was a container in which we used to heat the water, and white laundry and linen were boiled. We had water and piping in the house. On Sunday night, I put the white laundry in a big sink to soak. In those days, clothes were left to soak so that it would be easier to get the dirt off when they were washed with the washboard. On Monday morning, I felt sick, and I also had fever. It was going to be a hard day, big laundry, children... My husband left for work in the morning. On his way, he stopped at a hardware store and bought a washing machine, and the shopkeeper brought it to me to the sauna, where I was washing a large bed-sheet. The shopkeeper told me how to use the machine and how to press the clothes between the rollers so they did not need to be folded out by hand. It felt so good, how easy it was now to do the laundry. And I felt I recovered at the same instant... The new device made it possible – UPO washing machine. After that pulsator UPO, we've now had an automatic washing machine that fills with water automatically. A good innovation, that washing machine!" (female b. 1925).

Let me start with a story from 60 years ago. This quote is written by over 80 years old woman who is living in Finnish countryside and it is from a technobiography that I have used as a research data. Before the washing machine, either a hand-cranked or an electric one, washing laundry was very hard work for the

mother (cf. Cowan 1983, 151–191). In the Finnish countryside, laundry has traditionally been washed in the sauna. This writer praises the washing machine. She found it really useful for helping her everyday life and she is telling how happy she was when she got the machine. Having a washing machine has been so important that the writer remembers all the details after 60 years.

But why do I speak about washing machines? The washing machine has clearly been remarkable for the writer but what makes it interesting as a social and cultural phenomenon? Korean economist Ha-Joon Chang has claimed in his recent book *23 things they don't tell you about capitalism* that the washing machine has changed the world more than the internet. Washing machines have save time and changed everyday life, especially for women. *"I have made this point deliberately provocatively by pitting the humble washing machine against the internet, but my examples should have shown you that the ways in which technological forces have shaped economic and social developments under capitalism are much more complex than is usually believed"* (Chang 2011).

When I have been analysing my research data I found out that the most powerful and meaningful experiences that the people have had with technologies are not with the most recent ICT but with household and agricultural technologies that have really change the life of my informants. The technology relation that people have become more understandable and the complex but often stabile nature of them is revealed when looking those mundane technologies. Domestic spheres are filled in with technologies and new technologies are waiting to enter to our home in ever-increasing pace. This entering is by no means straightforward, simple or deterministic. Several issues related to social and cultural living sphere are encountered before, during and after technologies are ready to settle our domestic sphere.

My view of technology is not deterministic – I do not believe that either internet or washing machine could change the world as such. But I do think it is important to realize that the most recent technologies are not always the most meaningful for the people. We are just attended to think that the most recent innovations are the most revolutionary. My research is based on social and cultural studies of technology that has been developed within science and technology studies (STS). I do not regard technology as mere *artifacts* but include the *use* of these artifacts and *knowledge* about them in technology as well (see Grint & Woolgar 1997; MacKenzie & Wajcman 1985). When technologies are viewed as culturally and socially constructed processes, their users are not regarded as mere receivers but rather as active agents, who are commenting current technological changes and technologically mediated society and who shape technologies together with other societal actors (Grint & Woolgar 1997). According to the tradition of social construction of technologies, the sociocultural and political situations of the social group of users shape its norms and values, which influence the meanings given to the artifacts (Pinch & Bijker 1989).

My aim is to show how technology relations are not depending on the certain technology. Instead, these relations and meanings depend on user's gender, age and place of living and they are quite stabile in nature. However, the practice of using particular technology can change, develop or end when changes are happening in user, life situations, technologies or surrounding society. So I am looking old and new, domesticated and wild technologies side by side. I am interested in the questions of using and adopting technologies as a phenomenon in a society as well as users' everyday life. I am looking back for those moments when technologies, that are now mundane and domesticated in everyday life, were new and exiting. I am concentrating on those moments of adapting new technologies and the meanings that users are giving to technologies and their use. My data can be considered as snapshots from Finnish homes and technologically mediated everyday life. At the same these snapshots are part of wider social discourse. Everyday life is not loose from society but political decisions and strategies have consequences in users' everyday life and at the same users' have possibility to comment public discourse and contemporary policy.

With the theoretical concepts of technological imperative and domestication I want to contribute within the field of science and technology studies. I am interested the pressure that drives us to use technologies as a phenomenon that effects in users' everyday life as well as our society. My analysis of the technological imperative creates a new point of view on STS studies, when I focus on the phenomenon of *technological pressure* (Talsi & Tuuva-Hongisto 2009). By technological imperative I mean social, cultural and everyday life pressure towards utilizing technologies that have become a central part of our society and culture. When I am examining on how users adapt and tame technologies to fit in their everyday life I am using the theories of domestication (Silverstone et al. 1992). With domestication it is possible to follow the argumentation and practices that people are using when they are adapting, opposing or left aside the technologies and technological development.

I am concentrating on users but the users that I have studied are far from mainstream users. The focus is on user groups that are marginalized from the technologically mediated society based on their age, gender and / or place of living. I have given the voice to those user groups that are hardly heard when developing technologically mediated society or creating technology policy. My informants are living in the geographical and demographical margins of Finnish technologically mediated society. By margins I mean symbolic and spatial positions that are constructed in a relation to socially strong centres – such as technologically mediated society. Usually technology relations and needs of elderly people or people living in remote areas are defined by others – by the technology policy-makers or the developers of technologies. In my research they can speak with their own voice and tell about their relation to technology, technologically mediated society and technology policy. The data of my research consists of technobiographies written by elderly people, interviews of middle-aged rural area women and interviews of local level technology policy makers.

The article is concentrated on questioning on how technological imperative is interpreted in the everyday life of marginalized users? What are the ways of reacting to the technological imperative? Why some technologies get domesticated and others do not and in what circumstances these domestication processes are happening?

1.1 Multi-sited Qualitative Research

The research data is gathered and analysed with the methods of multi-sited qualitative research. I have applied the methods of ethnography and oral history, which are both methodologies of qualitative research used widely in social sciences and cultural studies. With the methods of ethnography and oral history, it is possible to collect mundane experiences with technologies and the effects that technologization has had on informants' lives. Oral history and ethnographic materials provide us with information about the past that is specific and could not be reached with other types of data.

Oral histories acknowledge the historicity of personal experience and the role of individuals in history and public events (Portelli 1997). With methods of oral history, it is possible to reinterpret the history and describe the feelings of people in situations in which they face technological changes and challenges (cf. Thompson 2000, 1–24). There is a clear interplay between memories, cognition and history; historical events shape the narrator's views about the present (Tonkin 1992, 1).

The strength of ethnographic research is its ability to understand the everyday life experiences and question self-evident facts. My approach has been sensitive to the special characteristics of ethnographic knowledge, which include, among others, to consider situated characteristic of knowledge (Haraway 1991), to use reflexive and transparent research practices and to write thick descriptions (Saukko 2003).

The data is based on 1) ethnographic longitudinal interviews of women living in remote areas, 2) interviews of local level technology policy-makers and 3) technobiographies of elderly people. These sets of data are gathered in Finland during 1998-2007. With this extensive qualitative data it is possible to understand the long processes of technologization in Finnish society and everyday life and reveal how technology relations of the user's have developed and changed over time.

1) Ethnographic interviews of women living in remote areas: Ethnographical longitudinal interviews of five women, who have participated in ICT education. Each of these women has been interviewed four times during the years 1998-2003. These women were middle-aged and living in small villages in North-Karelia, Eastern Finland.

2) Interviews of local level technology policy makers: The interviews of 21 technology policy-makers were made 2004 in North-Karelia, Eastern Finland. The interviewees were policy-makers and visionaries who planned, developed and carried out technology and innovation policy and its strategies.

3) Technobiographies of elderly people: By technobiographies I mean autobiographical writings where people describe their relation to technologies (cf. Henwood et al. 2001). Technobiographies were collected 2007 nationwide in co-operation with Finnish Literature Society and this resulted in altogether 52 responses. Of the writers, more than 60 percent were women and more than 80 percent pensioners. Almost 20 percent were more than 80 years old.

2. INTERPRETING, REACTING AND PRACTISING TECHNOLOGIES AND TECHNOLOGICALLY MEDIATED SOCIETY

2.1 Interpretations

In current societies it is necessary, almost a must, to use various technologies. Many practices are technologically mediated and technologies have a meaningful part in contemporary societies and in people's everyday life. Different social and cultural structures, practices and discourses guide people's use of technologies. I have used the term technological imperative to refer to these social and cultural pressures that force people to use culturally crucial technologies (Talsi & Tuuva-Hongisto 2009). I base the idea of technological imperative on the social and cultural studies of technology, which approach technology as a culturally constructed phenomenon. Technology can be seen as a socio-material product – a seamless web or network that combines artefacts, people, organizations, cultural meanings and knowledge (Wajcman, 2004: 106; Bijker, 1999: 6). Technologies both shape, and are shaped by, their social, political, economic and cultural contexts (Grint & Woolgar, 1997: 19; Lievrouw & Livingstone, 2002).

Mundane thinking about technologies is often dominated by determinism, which means that there is a straightforward cause-effect relationship between technology and society: technology is the cause that effects to the society (see, e.g., Bell, 2005: 45). While technological determinism views the pressure and force as deriving from technology, the technological imperative takes as its starting point the social and cultural force, the social and cultural interpretations of the technological pressure. Behind technologies I find social and political intentions and dimensions, which have to be taken into account when studying technologies, since the technological imperative is present everywhere in the society (see Winner, 1985).

Technological imperative, the pressure that drives us to use technologies consists of three simultaneous and intertwining pressures. The cultural pressure derives from the settings and practices, the general atmosphere and discussion, the guidance and recommendation to use the 'practical and useful' technologies, and it is a normative pressure. The social pressure comes from the family, friends, and social environment that force us to use and buy technologies. The everyday life pressure derives from our personal life and yearns for convenience that drives us to acquire new technologies to ease our everyday life. (Talsi & Tuuva-Hongisto 2009.)

Political guidance and recommendations towards using new technologies are part of cultural pressure. Cultural pressure that is often interpreted of normative and standardising is by no means the only way for technology policy to guide the uses of new technologies. As a user's perspective, technology policy has three kinds of means of guiding people towards users of new technologies. In addition to political recommendations these means include also forced use and economic reasoning. I will give some examples of each of them on the basis of my data.

In my research data, technologically mediated society where using culturally centre technologies feels mandatory, was interpreted through everyday life practices. The pressure towards using technologies was fuzzy feeling that 'everyone knows how to use these things'. This pressure came to my informants' lives through media and common opinion. My informants could not name the one thing behind this pressure but it seems to be clear that some kind of vague *political recommendations and guidance* is behind this. In my analysis I have called political recommendations as part of technological imperative. Even though they are not forcing people to behave in certain way or buying new equipments they are quite normative and pushing people to act in a normative way. This causes pressure especially for those who have limited skills or means to use latest technologies. Finnish technology policy and policymakers are constructing elderly people and people living in remote areas as groups of needing special attendance in order to keep up in the technologically mediated society and technological development. So the political recommendations and also political actions such as development projects are causing especially strong pressure for these groups of people who have limited means or ways of using latest technologies. Development of technologically mediated society seems inevitable and deterministic for those people who are nonusers or limited users of technologies. When all vital practices are mediated through technologies not using them makes everyday life harder. Not using ICT does not mean exclusion of certain technologies but for the whole society and lifestyle mediated through technologies.

In many cases making recommendations and giving guidance is relevant technology policy. Political decision makers are passing the responsibility for actions to ordinary citizens when policy is conducted through recommendations. In this way policy makers are also safe from criticism and opposing citizens (Shove et. al 2012). Sometimes recommendations are not enough and my informants recognized also *forced use* as a way of conducting technology policy. Forced use could be easily seen in Finland 2007 when analogical television broadcasting services ended and only digital TV channels were broadcasting. For the citizens this meant that everyone was forced to buy digital receiver in order to be able to watch television. This caused a lot of opposing and anger because this well domesticated and mundane technology was not working anymore unless you buy new device. The transition to digital television broadcasting was regarded as politically regulated. My informants felt that they had no influence over the matter, and the digital television was criticized widely. Although the Finnish media has criticized the digital television mainly for its technical problems, this was not the focus of the critique in the elderly writers of technobiographies. The writers mainly complained about the dominance of the English language and the fact that people were generally advised to find more information on the Internet. The lacks of media literacy and language skills of elderly were, after all, more problematic than their lack of technical skills required to use the new media technologies. (Talsi & Tuuva-Hongisto 2009.)

Third way how technology policy was interpreted in my informants' everyday life was *economic reasoning*. Technology and innovation policy is guiding Finnish technologically mediated society to greater effectiveness and competitiveness. In this development marginalised groups of users are looking even more problematic. The needs of ageing people and people living in remote areas are not encountering this politics based on economic reasoning. Economic reasoning has guided for example the planning and building broadband internet connections in Finland. Especially people living in remote areas suffered from this politics based on economic reasoning since they were years without broadband connections and when the connection finally became available they were many times more expensive than similar connections in urban area. Now every Finn has a 'civil right' for broadband but there are still areas where broadband are hard to get or they are terrible expensive.

2.2 Reactions

Users have different ways on reacting to the demands and pressures caused by technological imperative in technologically mediated society: opposition, left aside, passive acceptance and enthusiasm. These ways of reacting are related to age, gender and place of living of the users as well as their socio-economical position and their social surrounding. The same person can have different ways on reacting towards different technologies in different time and place.

Opposing technologies requires quite a lot of skills and knowledge about that technology. Actively opposing for example digital television is a way of reacting for elite users. It is not an option for marginalized groups. They do not have knowledge about the technological artefacts, knowledge of how to use it or knowledge enough to make the decisions (cf. Grint & Woolgar 1997). It is important to make a difference of left aside and opposing the use of technologies (Wyatt 2003). Freedom of choice of using or not using technologies is essential when looking the ways of reacting to technological imperative and adopting new technologies. Opposing technological imperative and latest technologies requires abilities, motivations and resources and without those the risk of left a side of technological development increases. On the other hand opposing the latest technological development can also be seen as a criticism for consumerism. If marginalised groups of users are not able to oppose certain technological devices they certainly can oppose society that they felt is run by consumerism and techno-optimism.

Left aside of the development of latest technology and finally from the knowledge society development is mostly happening to elderly citizens. It is giving up when my informants were saying, '*we are in the margins anyway*'. Left aside from latest technological development means more often also left a side from the whole technologically mediated society. When all the vital practises are mediated by technologies living without them can marginalize not only from technologies but also from the society itself. Non-use of the internet means also very restricted use of bank, tax or healthcare or education services in Finland. The situation is new and especially shocking for the elderly informants: use or non-use of technologies used to be private thing and no one was excluded from the society if they were not using for example washing machine or chain saw.

Keep in touch of technologically mediated society and *passive acceptance* of technologies is often normative use of technologies. It is a mainstream use of technologies where technological development is accepted and users want to be part of this development with the resources they have. Technologies are purchased because it is a must to use culturally central technologies – or at least technological imperative makes people feel that they have to buy new technologies in order to be part of technologically mediated society. Technological imperative is seen here as cultural and social pressure. Cultural pressure is coming to my informants lives through media and public opinion which guides the thinking of ‘right’ and ‘normal’ use of technologies: technologies that are used by everyone and are part of normal household. Also social pressure is effecting to my informants: family members, friends and relatives are often introducing new technologies, can be important opinion leaders and they are shaping the view that my informants have of the useful and necessary technologies.

Enthusiasm for new technologies is sometimes happening also for marginalized groups of users. In remote areas people are having do it yourself –attitude and they can be sometimes very creative and passionate when they are finding ways to get for example a broadband internet connection to the village. If new technology was related to work and user had a sense of control over this technology they often were quite enthusiastic with the devices. The users that were already at pension or soon to be retired did not have this enthusiasm anymore and they felt that it is the duty of next generations to learn and domesticate new technologies and software. Also the technologies that eased everyday life were the technologies that informants were happy to live with. This everyday life pressure to buy and domesticate new technologies was happily accepted by the working age people. My elderly informants were quite happy to get new technologies when they were young and were living with small children. Also the women who lived in remote areas were very keen to their ICT-technologies that helped with the routines of everyday life.

2.3 Practices

The ways of reacting towards technological imperative that reveals in society will tell us whether or not the technologies in question ended up to be domesticated. Within the field STS studies the concept of domestication has been used to describe of what is going on in the households when new technologies arrive and how these technologies find their place in people’s lives (Silverstone et al. 1992, Silverstone 1994). Domestication studies emphasize the active role of users when they are adopting and “taming” new technologies to fit their everyday life and serve their mundane needs. When studying domestication the emphasis is also on consumption rather than on mere use. As an experience adopting new technologies are always linked in everyday life and household practices. Naming this adaptation process of technologies as domestication, I do not regard domestication as a one-time process with end-point of stabilization or closure (cf. Hand & Shove 2007). Understanding adaptation and use of technologies requires appreciating the negotiation and interaction within family members and politics of the home (Haddon 2003, 45). The tradition of domestication research emphasizes the active role of users in this process. Still the domestication is not one-sided but based on reciprocal change: the term refers to a learning process whereby things and people reciprocally influence each other. (Serres 2001; Lehtonen 2003). The negotiations that are required when domesticating technologies are not conducted only with the living members of household but with technologies as well. This opens up new possibilities to re-shape the roles and the practices within households. (Talsi 2012.)

Technologies become meaningful when they are connected to everyday life (Lie & Sørensen 1996). So, technologies that do not find they place in user’s everyday life stay meaningless. They are not domesticated and settled to user’s life. Opposition against new technologies seem to happen because the rhythms of everyday life and technologically mediated society are not encountering. Everyday life is already settled and routines are fixed but changing society is pushing new demands that especially elderly people are not willing to respond. I am looking everyday life practices and their problematic encounters with the demands of the technologically mediated society through practice theory (Shove et al. 2012). The pressure caused by technological imperative is felt worse and worse when the demands of the technological imperative are far away from everyday life practices and responding for these demands would require reshaping and renegotiating these practices.

As Shove and Pantzar (2005, 61) have pointed out *“that new practices consist of new configurations of existing elements or of new elements in conjunction with those that already exist”*. According to practice theory practices appear, settle and finally disappear when the links between practices and technologies break (Shove & Pantzar 2005). The middle-aged rural area women in my data were ready to change the practices of their everyday life when they started to learn and domesticate ICT technologies. They had everyday life need and pressure to get these new technologies and to domesticate it to their everyday life. They were ready to change the practices and negotiate within family members the new division of work. These women told how their husbands have previously take care of the finance of their family and farm, but now when wives learned to use internet banking, excel, accounting and other programmes related to financial administration and farm management they have take the responsibility over the financial issues.

Great changes in technologies have happened over the lifetime of my informants. For decades homes were appointed with technologies that have only one function like vacuum cleaners, washing machines, transistor radios, electric saws. Now technologies have become more complex. Changes in technologies would require changes in practices. The problem for the elderly users is that they are unwilling to changes the practices. According to my data it seems that technology relations are quite stabile as a nature. For example the elderly men of my data have enjoyed the technologies when they were young and when technologies were simpler to modify and build. Their technology relation has based on knocking down and putting back together technologies like cars, and they felt joy when they could fix broken washing machine or typewriter. Now when technologies became more complex it is harder and almost impossible to built these technologies anymore. These elderly men are not ready to change the practices on how they have used to work with technologies – they are not ready to settle to be mere end-users so they are easily opposing or left aside for the whole development.

3. CONCLUSION

Values like competitiveness and effectiveness are extensively guiding the development of Finnish technologically mediated society. In this development marginalised groups of users are seen ever more problematic. Especially elderly people and people living in remote areas are seen as problematic in this development. The development based on market logic does not encounter the needs of these users groups and they are easily left aside from technologically mediated society. There is no place for technological dropouts at the society where all the practices are mediated through technologies and assumption of technologically savvy users is prevailing.

In this article I have shown how technological imperative is interpreted, reacted and practiced by marginalized user groups of technologies. With the concepts of technological imperative, domestication and practice theory I have shown the various and complex nature of technology relation of users. Technology relations stay quite stabile but the links to particular technologies are easy to break or change when changes are happening either in technology per se or its user's life situations.

According to Finnish technology and innovation strategies and the interviews I have conducted with local level technology policy makers it appears that there is strong and united believe that it is only matter of time when everyone knows how to use latest ICT technologies. It is believed that when elderly non-users of technologies pass away new generations of elderly people can naturally use latest technologies. However, it is not recognized that when technologies are developing all the time it requires constant updating of both devices and skills how to use them. It also requires readiness and ability to buy, adapt and use new technologies. When elderly people do not have the financial or technical support from their employers the motivation and resources are even harder to achieve. Technology and innovation policy is more or less based on assumption of active citizens who are life long learners and techno-optimistic. In my data it is quite obvious that technological skills are considered as part of working life. After the retirement my informants may use the already existing technologies but not buying or learn to use new ones anymore. According to my data it seems that new generation of pensioners will face the same problems when new technologies are entering to Finnish society and its vital practices. Technologies are developing so fast that even after couple of years of retirement, not to mentions couple of decades, technological solution that this elderly population is able to use will seem outdated. The stabile nature of technology relation will make it quite hard to adapt fundamentally different new technologies that would demand chances in these practices. Keeping in mind that Finland has the fastest ageing population in Europe it is quite obvious that solving the problem requires social and political actions.

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REFLEXIVE ENGAGEMENT – REFLEXIVE ORIENTATION FOR PARTICIPATORY DESIGN

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ABSTRACT

This article contributes to the current discussions calling for more reflexivity in Participatory Design (PD). We offer an account of our experiences with reflexivity from a study in which a social media supported collaboration model was designed by and for professionals working with the topic of workplace harassment. This article draws from the researchers' interdisciplinary frames as we locate reflexivity in the current PD discourses and in the experiences of our study. We introduce the concept of reflexive engagement, which we describe as an orientation to design and research that has the potential to influence design, extend conceptual discoveries, and afford a way to balance the research-design gap. We conclude by encouraging the PD community to embrace reflexivity as a way to address current practical and disciplinary challenges. While our focus in this article is on PD, we also see the potential of reflexive engagement for other user-centric or collaborative design approaches in Information and Communication Technologies (ICT).

KEYWORDS

Reflexivity, reflexive engagement, participatory design, participation, relationships, social media

1. INTRODUCTION

The purpose of this article is to discuss reflexivity as an understudied orientation for user-centric or collaborative design in Information and Communication Technologies (ICT). We have chosen to focus on the tradition of Participatory Design (PD) because it is commonly regarded as one of the most reflexive approaches in ICT design due to its guiding principle of users and designers collaborating in design. Nevertheless, based on a review of PD literature, we will show that there is still room for more discussion on the topic. There certainly is a long-time prevalent interest in PD for understanding and framing design as a 'reflective practice' and designers as 'reflective practitioners.' We find these notions limited in comparison to how reflexivity is defined in the ethnographic and critical approaches from which we draw. Therefore, we join researchers calling for PD to take reflexivity seriously (Finken 2003, 2005; Balka 2006; 2010; Dearden and Rizvi 2008; Karasti 2010; Wagner et al. 2010; Blomberg and Karasti 2012).

We consider reflexivity important, especially as we look toward the (emerging) challenges outlined in current discussions of PD. These debates address the realization of the massive changes the object of the discipline (technology, its users, and uses) is going through, and how the people involved are getting more diverse when PD is taken into contexts beyond the accustomed work organizations, e.g., into homes, virtual environments, public spheres, commercial settings, community contexts, and developing countries (Shapiro 2005, 2010; Hagen and Robertson 2010; Kyng 2010; Bannon and Ehn 2012; Blomberg and Karasti 2012).

These ongoing changes in technologies and environments were visible in our study of developing a collaboration model supported by social media for professionals who deal with workplace harassment as part of their work. Social media gave low-threshold access to tools and practices online with less need for technological expertise. Organizations or groups of employees can take on new tools easier than before and engage in PD 'in the wild' (Hagen and Robertson 2010), independent of professional designers. Our research

site was an evolving one: professionals working around the topic of workplace harassment wanted to form a network and to design interactive technology support for their expanding virtual collaboration.

In addition to the literature review, we discuss the ways reflexivity permeated our research in the field and in our interdisciplinary dialogue. The first author, drawing from her background in anthropology and gender studies, worked using reflexivity as a central orientation during fieldwork. The second author, with experience in ethnographic workplace studies, participatory design, and feminist technosciences, joined in interdisciplinary dialogue. These sessions allowed for an unfolding, concurrent, reflexive process to take place between the fieldworking and non-fieldworking researchers.

After locating reflexivity in and beyond the field, we put forward the notion of ‘reflexive engagement.’ We highlight the potential of reflexivity and reflexive engagement in relation to PD’s current practical and disciplinary challenges. We conclude by emphasizing the possibilities of affording new perspectives for design and conceptual re-discoveries and creating a balance between research and design.

2. REFLEXIVITY IN PD

In the PD world, Schön’s (1983) notion of ‘reflective practitioner’ has been widely used to gain understanding of what designers artfully do and how different domains of knowledge figure in the design process. According to Schön’s ‘knowing-in-practice’ epistemology, ‘reflection-in-action’ (‘thinking on our feet’) is based on considering one’s experiences, connecting with one’s feelings, and attending to one’s theories. This entails building new understandings, typically by experimenting within various situations, to inform actions in unfolding situations. ‘Reflection-on-action’ takes place after the activity and enables the exploration of what happened and why in order to develop questions and ideas, and bring examples of the activities and practices into focus. These reflections have yielded insights about how the designer’s own tacit understandings have affected the design work (Blomberg and Karasti 2012). Reflection by a ‘reflective practitioner’ by definition remains embedded in and focused on design practice.

While PD has traditions of reflecting in and on practices, reflection by the designer-researcher on him/herself, moving towards a more reflexive research stance, has been less frequent. With the influence of ethnography as exemplified by accounts of the ethnographers’ changing role in design settings, (e.g., Jordan 1996; Rogers 1997), similar accounts by researchers with PD backgrounds have emerged. As part of an attempt to find ways to relate PD and ethnography, Karasti (2001) reflects on and discusses her experiences in ‘becoming participant observer’ and ‘turning into participant interventionist’ both through engagement in actual activities and relations in the field and interdisciplinary questioning of the taken-for-granted assumptions in different designer-researcher roles. Similarly, Voss (2006) reflects upon his experiences as a ‘corealizer’ of systems, and having a focus on work and artifacts that afford it, different knowledges and skills, the methods employed, establishing a trust relationship and maintaining ‘access.’

Feminism-inspired discussion continues to extend the realm of reflexivity beyond practice. Suchman (2002, p.95) challenges researchers to locate the ‘designer from nowhere’ and to analyze the “boundaries within and between technology production and use” (Ibid. p.94). She argues that in order to transform technology design, researchers need to recognize “the various forms of visible and invisible work that make up the production/use of technical systems, locating ourselves within that extended web of connections, and taking responsibility for our participation” (Ibid. p.101). There is a call to make the researcher visible and for reflexivity that takes into account the researcher as a historised, discursive, situated, embodied subject (Markussen 1996). Reading Balka’s (2006) venture into the ‘belly of the beast’ takes not only politics and various relevant organizational contexts into account, but places the researcher in them, navigating “the political minefields at each turn” (Ibid. p.140) not only within the design context, but in academia as well. For Balka, explicating this venture is a question of making values and ideals visible and taking them also into account when discussing the outcomes and their scope of influence (Balka 2010). It is then not just a question of making visible but of being responsible.

3. SETTING FOR DESIGN AND RESEARCH

Our research was funded as one of four pilot studies in a large two-year research project on the use of social media in the field of workplace safety and wellbeing in Finland (Heikkilä et al. 2011). It was organized as a

university and trade union study center partnership. The aim was to develop a collaboration model supported by social media for professionals in their work against workplace harassment. The collaboration started through meetings with three key members of the study center who had been involved in collecting stories of workplace bullying and developing a manual for interventions. Due to this interest, they also had time and funding to participate in the process. After the first formal meetings, more informal ways of collaboration were adopted, including online meetings to ‘check up,’ plan further actions, and prepare for upcoming workshops. The overall design process was organized through this collaboration.

The study center acted as a link between the other participants, all future users of the collaboration model. These participants were invited by the study center and they participated in the project as part of their work. They were invited to represent different target groups: professionals in various workplaces who encounter cases of harassment e.g. as shop stewards, and professionals from unions, who consult and support them in their work. These participants formed an expert group of twenty people with whom a series of workshops were carried out utilizing online collaboration during the year and a half pilot period.

In the first expert group workshop, the collaboration model was framed by the professionals as a ‘website’ and ‘e-learning’ that offers information, possibilities for asking for and providing support, and informal discussions. A preliminary social media platform was chosen based on these needs by the researcher together with the study center and taken to use in the following workshop. The expert group met in workshops for visioning and developing the new way of collaborating. In between the workshops, they participated in online activities, such as using a wiki to write case narratives about workplace bullying and using their experiences online to discuss and agree on the guidelines for the collaboration model. Working hands-on with the collaboration model, the group gained experiences and new ideas were developed which led to a change of platform. Reliability and ease of use were among the elements guiding the design process. Also, specific elements such as linking the discussions taking place in social media to other mediums of communication (mainly e-mail), collaborative writing and forum for support were central guiding principles.

The social media supported collaboration model was designed in and through use with the purpose of catering to continuing development in a sustainable manner during and after the pilot period. Once the collaboration model was launched, the group of experts expanded as the initial participants, based on mutual decision, used their networks to inform and invite new participants to join. The extended network of professionals (numbering hundreds) continued to work using the new model and tools. Additionally, the experiences with social media and design collaboration had created new projects and influenced the work practices of the study center beyond the pilot study.

The design process was recorded in audio, memos, and ethnographic notes. Also Google Analytics data was collected about the use and visits to the pilot’s social media platforms. This data was used with the user-practitioners to discuss the collaboration. Qualitative analysis was integrated into the research as a cyclical, reflexive process. It combined the collected data from different sources with the observations creating a dialogical relationship between them. The analysis was done through reading and re-reading based on the data collected by the fieldworking researcher. The analysis continued in the interdisciplinary discussions between the fieldworking and non-fieldworking researchers in which the experiences from the field were discussed and related to the assumptions, concepts, and current discourses in the PD tradition. These sessions allowed for a reflexive process to take place that was meaningful for the concurrent design process as well as for the continued reflexive conceptual deconstruction and reconstruction work after the pilot study.

4. REFLEXIVE PROCESS IN PRACTICE

In this section we provide an account of the reflexive process of the study using ‘I’ as the voice of the fieldworking researcher, and ‘we’ when referring to the dialogue between the fieldworking and non-fieldworking researcher, although acknowledging that reflexivity and reflections of all the participants influenced the process. The reflexivity we describe in this article was performed through the fieldworker’s self-reflection and observations on the reflexive process. The fieldworker’s voice depicts a turn inwards as a form of introspection, reflexivity that is interdependent with other participants and the evolving situations, and reflexivity looking actively forward to inform the process of design. The voice of ‘we’ takes the reflexivity in the field into an interdisciplinary reflexive dialogue ‘beyond the field’. With reflexivity as a central orientation, the study provides insight into the processes of locating oneself, negotiating participation,

and making discoveries in different arenas of research and design. The locations of reflexivity form the basis from which we continue to sketch the notion of reflexive engagement.

4.1 Reflexivity in the ‘Field’

The setting of our study had a strong focus on social media portrayed as a ‘hot topic’ in many current discussions. From the first expert group workshop on, I began to reflect on how the understandings of technology and social media were influencing the process and the different ways the participants were entering the collaboration. As a designer-researcher, I was entering the field representing a social media project and coming into the process as a ‘social media expert.’ The expert group identified themselves (as a collective) in large part as ‘older’ and ‘non-native’ to computers/technology. They were professionals whose shared framework was workplace harassment. For some of the participants computers were considered work related and the anticipation of difficulties was causing hesitation from the beginning. At the same time, social media was seen as having the potential to facilitate work. With these personal experiences, we were positioning ourselves and others in relation to the ‘social media’ that was yet to be mutually discovered.

Personal experiences and histories framed the understandings, interests, and expectations of the participants. Social media influenced some of them, but was in no way the only thing framing our participation. I soon realized the different meanings of ‘being there’ as a researcher and as a designer. There was a benefit in being a researcher as this was something valued by the user-practitioners. Sometimes I would feel that my assigned ‘role’ was writing notes and observing rather than participating in the design. As a designer, I sometimes felt distrusted regarding my ability to understand the needs and frames for participation of the ‘actual users.’ I realized that my position was the result of the mutual processes of positioning through reflections and interpretations. The realization of the difference in our starting points and the ambiguity of our roles challenged me to continuously critically evaluate and re-position myself.

While dwelling on ‘being there,’ I was also discovering how the negotiations of the positions of the others were influencing the process and the outcome. The reflexive acknowledgement of the gaps and negotiations of participation emerged as a space for discovery. The value of experience-as-knowledge that was advocated opened a space for collaboratively re-defining social media technology. From the beginning, I refrained from pushing a preset notion of social media; the medium we would use was called ‘web.’ By saying that the experience we/they had on social media was relevant knowledge, helped us to create a feeling of mutual trust and empowerment. Going further, we discussed this knowledge and experiences as necessary contribution for the understandings of social media. This meant that the different understandings of social media were allowed to influence the design. All of us had different preconceptions about what constitutes social media and some of these ideas were seen as unfit for the participants’ professional use, for example the topic of openness. Challenging these preconceptions afforded a space for collaboration and learning. The question of openness was consequently revisited, which influenced, for example decisions about a restricted access and the development of a practice for sharing acute harassment cases anonymously. Social media was discussed by contrasting different examples of, and experiments with, social media use and the ideas, visions and knowledge the professionals had about the extended network. Also, the emotions and experiences were legitimized as a relevant part of the design process. When the risks and threats of the use of social media, particularly with the topic of workplace harassment, became a central question, work on rules and guidelines was included in the process. The development of the collaboration model manifested in a social networking site with shared contents, discussions, online meeting sessions and online seminars.

The technology and contents were inseparably intertwined, which created a space for exploring, trying out, and ‘doing together,’ during and between the workshops and making discoveries as we went along. The researcher in me was tuned in to listening, searching for authentic experiences, fears, and frustrations as well as joy, enthusiasm, and the constructions of meanings. The designer in me was learning from these experiences. The design was turned into a process of discovery—instead of ‘making them learn’ to use social media, the premise was to plan new ways of working together to meet the needs, expectations, competences, and culture of the participants. As a result, for the members of the study center, the dynamics of becoming a participant moved beyond being a participant in a pilot study and extended into a more thorough ownership of the process. As a manifestation of the continuing and evolving nature of the process, the practices based on the collaboration model have continued with online meetings and discussion after the project. Some practices, for example wiki writing, have become more marginal, and new ways of combining the developed

model with other existing practices have emerged. Simultaneously, new projects have been discussed that would continue the participative process with the user-practitioners.

4.2 Reflexivity beyond the Field

If the reflexive process described through ‘I’ was taking presence in and around the field, we locate another, though not separate, arena for reflexivity in the interdisciplinary reflexive dialogue between the fieldworking and non-fieldworking researchers. This dialogue was based on the appreciation of our histories and backgrounds. One of us had a formal background in information systems and particular interest in PD. The other came to the project with no prior exposure to PD. Common grounds existed as well. The fieldworking researcher had been engaged in prior projects using social media and in developing practices online. The non-fieldworking researcher, in turn, had familiarity with gender studies and feminist technosciences as well as her own fieldwork experience in learning to relate ethnography and PD (Karasti 2001).

The interdisciplinary reflexive dialogue unfolded through a series of meetings where we elaborated experiences from the field, drawing from our histories, and discussed the different design and research approaches encountered within the larger frame of the overall project. Through the reflexive dialogue the experiences of ‘I’ and ‘we’ were scrutinized by working with interplay and juxtapositions of different vantage points of inquiry, breaching the boundaries of some ‘source discipline,’ and working with ambiguity and paradox (Romm 1998). This dialogue extended beyond the field engaging us in multidimensional discussions.

Emerging as a central theme was how the researcher—where she is coming from and how she is ‘being there’—is saturated with connotations and meanings and how the designer-researcher is a constant object of interpretation. This is something that has been problematized in the PD discussion as well deeming the PD designer-researcher “the best kept secret, with scarce articulations of the associated roles, activities, skills, knowledge, agencies, relationships, and responsibilities’ (cf. Finken, 2003)” (Karasti 2010, p.89). In our interdisciplinary dialogue, the conceptualization of ‘roles’ became problematic. The two principal roles of ‘user’ and ‘designer’ afforded in PD literature (e.g. Robertson and Simonsen 2012, pp.2-3) were contrasted with our empirical experience. The dynamics experienced in the field were described by the fieldworking researcher as ‘relationships’ and ‘negotiations.’ The notion of ‘roles’ certainly creates frames through which the relationships can be approached, but it is through their critical and reflexive negotiation that the situationally appropriate agency can be/is more likely achieved. This allowed us to conceptually scrutinize—and re-discover—the ‘designer-researcher’, the ‘user-practitioner,’ and the ‘designer-user relationship’.

When the roles became visible and questioned, ‘participation’ started to emerge as a troublesome concept. For the fieldworker, the PD notion of participant felt too narrow as it seemed to exclude her despite her struggle and efforts in the field to be included as one. In PD, participation is a concern in relation to the users (e.g. Karasti 2001 p.64; Robertson and Simonsen 2012, p.5), not the designers whose involvement is preordained. We started to re-frame participation by discussing the vulnerabilities of researchers’ participation and through explicating the power inherently at play in the ways the user-practitioner and the designer-researcher engage in design. For PD, this suggests acknowledging power “as dynamic and relational” (Holland et al. 2010) in the ways the designer-researcher makes decisions regarding design, defines how others can participate, and makes interpretations.

Not only the field in our study, but also the larger context of the research project, were challenging us to explore the practices of design and research. The different approaches to design at play in the three other pilots were set next to one another allowing us to place other accustomed routines and assumptions of information system design as well as our own presumptions and practices under scrutiny. The deconstructive attempt we were engaging in seemed relevant. It made visible the ways and frames of doing design and research, and challenged us to articulate the self-evidences and the frameworks that create them. Our interdisciplinary dialogue was feeding constantly back to the field—the cues from the non-fieldworking researcher were affecting the design practice and nurturing reflexivity in the design and research.

5. REFLEXIVE ENGAGEMENT

Our discoveries in the field were prompted by sensitivity towards design/research that we shared through our developing reflexive interdisciplinary dialogue. During our dialogue, we were unearthing the designer-

researcher, including ourselves, and the dynamics of multiple, situationally evolving relationships. We return now to the reflexivity in PD and present the reflexivity we unearthed in our case as ‘reflexive engagement.’

Reflection—particularly influenced by Schön’s notion of reflective practitioner has gained firm ground in PD but is limited to reflection on *professional practice*. Ethnographic, anthropological, feminism-inspired accounts, on their part, extend the realm of reflexivity beyond that of practice by pressing to ‘hold the mirror’ more closely on the researcher. The reflected positionality of the researcher found in ethnographic accounts focuses on understanding the assumptions, biases, and perspectives that underlie the research as a form of self-inspection (Stuedahl et al. 2010).

Following the prerequisites of reflexivity highlighted by mainly ethnographically inspired (self-)reflexive researchers and the more critical call to contextualize the researcher, we take the notion of reflexivity as an orientation to make visible the dynamics of the research and design process. This ‘making visible’ challenged us to critically contemplate the process of participation and to make inquiries into our own subjectivity. This means discovering the ‘web of connections’ (Suchman 2002) or rather the web of meanings through which the relationships are created. Furthermore, reflexivity should include “epistemological questions and contextual conditions of understanding that are at work and how these are rooted in practices of collaboration and negotiations well as in decisions affecting the exclusion and inclusion of perspectives” (Ibid. p.10).

The reflexivity ‘discovered’ through our case directs our focus to the *relationships* that are being constructed for and in the design process. Reflexive orientation is/should not be directed solely to the self (“navel-gazing”; Romm 1998, p.66) nor to the ‘other’ (the user-practitioner), action (methods, tools and techniques), technology or society (institutional reflexivity; Karasti 2010). It should be directed to the engagement and interdependencies of *relationships* in and beyond the design/research, and the *dynamics* through which, on their part, the self, the other, the action as well as the technology within the realm of the design and research are defined.

By grounding reflexivity in relationships and foregrounding their dynamics, we come to the notion of ‘reflexive engagement,’ which we define as *reflexivity located in the dynamics of multiple situationally evolving relationships*. We understand reflexive engagement taking place in multiple arenas simultaneously. It can be located in the negotiating and discovering taking place in design and research, in the society, as well as in and between disciplines. It is particularly the relationships and dynamics between these arenas we wish to foreground. *Reflexive engagement means ‘making visible,’ ‘paying attention to,’ ‘negotiating,’ and ‘discovering’ at the various arenas of design/research simultaneously.*

Reflexive engagement offers PD designer-researchers the possibility of viewing design practices from new perspectives. Emphasizing the dynamics of multiple, situationally evolving relationships, we move from ‘roles’ to acknowledging the continuum of positionalities and relationships that are in a perpetual process of becoming. This focus challenges the designer-researcher to acknowledge the evolving interdependencies and the power embedded in design/research and their effects, for example, on the process and the outcome. Our experiences underline the fragility of being and becoming a participant both for the user-practitioners and the designer-researchers. This challenges the taken-for-grantedness of the notion of ‘participation’ in PD and encourages the PD community to rediscover the notion through reflexive explorations and approaches.

With reflexive engagement, new perspectives in design are affording rediscoveries of traditional conceptualizations. We propose reflexive engagement as an orientation that is based on acknowledging the dynamic, yet situational, relationships in practice (design) that *transcend practice* by turning and returning to conceptual questioning, debate, and discovering. In our case, it was the interdisciplinary dialogue that challenged us to unravel the incongruities of the different languages of design we were encountering. However, something similar can take place elsewhere—the entries into the disciplinary self-evidences and blind spots emerge from the interface of the familiar and the strange. The moment one enters new terrain—be it one of new culture (Dearden and Rizvi 2008) or technological context (Hagen and Robertson 2010), or is faced with the incompatibility of accustomed roles in new contexts (Dittrich et al. 2002)—we become acutely aware of ourselves, the tools we use, and the expectations we have.

By helping to disclose the invisibilities of design and revisiting traditional conceptualizations, we see reflexive engagement as an approach for designers and researchers to balance between, and to make the most of both being a designer and being a researcher. Instead of addressing the division of, for example, use and design or practice and research, reflexive engagement forms a continuum; it bridges the separating gaps and boundaries in that it carries along a continuing engagement in multiple arenas and dimensions.

6. CONCLUSION

Our experience of reflexivity, grounded in the interplay of practice and research, afforded sensitivity towards the dynamics of participation and negotiations in the design. Valuing the space for mutual discoveries informed the sustainability of the design. Participants took ownership of the process beyond the project and participated in empowered and critical explorations with technology (e.g. Sengers 2005). Furthermore it offered a space for us as researchers to explore the frames of the participatory design and research process extending beyond design, to research.

There is a reason and relevance in reflexivity with regard to the current discussions in PD and other user-centric and collaborative ICT design approaches. These discussions relate to bridging the gap between theory and practice (e.g., Mathiassen and Nielsen, 2008) that challenge pairing design more intimately with research. Challenges are also rising from the designer-researchers venturing into new cultural contexts and breaching disciplinary boundaries (Dearden and Rizvi 2008; Hagen and Robertson 2010; Karasti 2010; Blomberg and Karasti 2012). When considered from the point of view of reflexivity, common interests can be identified that relate to understanding the challenges and possibilities of 'being there,' participation, and how one becomes and is a participant (Karasti 2001; Puri et al. 2004). In light of the appreciation for the particularity of settings in PD, reflexivity offers an orientation for seeing relationships and participation as complex, dynamic, and situational as they are.

Although it may be argued that reflexivity is hard to adjust to suit all PD projects or designers, we suggest that embracing it as an orientation in PD, and in other user-centric and collaborative ICT design approaches, enriches both the research and design of the disciplines. Embracing reflexivity is not taking it as a 'tool' to support the design practice, but taking it as an orientation to being and doing design and research. For project work this means increasing sensitivity towards the dynamics of multiple situationally evolving relationships, embracing the ambiguities and uncertainties in the field, and paying attention to the taken-for-granted in design. Furthermore, embracing reflexivity sets the challenge to extend reflexive orientation to the concepts and languages through which design is discussed and to adopt an openness to revisit the core concepts and assumptions.

Reflexive engagement is our attempt to conceptualize reflexivity that has the potential to permeate throughout all situations, contexts, and arenas of design and research extending from the wide frames of the discipline to the theory and to the minute micro-practices of design and research. It has an inherent potential to address the need for theory with firm grounding in practice and which extends to the multiple arenas of research/design simultaneously. The reflexive dialogue and interplay of perspectives in and between design and research affords the reframing and reconsideration of the assumptions deeply rooted in the history and tradition of the disciplines. It is this space for discovery that contributes to the current challenges of PD.

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HOW CHINA REGULATES ONLINE CONTENT: A POLICY EVOLUTION FRAMEWORK

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ABSTRACT

This paper describes the evolution of China's online content control (censorship) policies from the mid-1990s through 2011. This paper reports the results of an ongoing research project employing content and citation analysis to examine the implementation of Internet censorship policies promulgated by the Chinese government over nearly two decades. We find that content control in China is not an isolated set of policies, but is situated in a context of Internet regulation and history of media censorship in China. Between 1994 and 2011, the regulatory foci shifted from peripheral control of the Internet infrastructure to direct control of information content and then to indirect control of new online services and the market. The policy paradigm adopted by the Chinese government to regulate the Internet is expected to evolve as more stakeholders participate in Internet activities and the market assumes greater importance to the Chinese economy.

KEYWORDS

China, Internet, censorship, content control, information policy

1. INTRODUCTION

The context for Chinese information policy extends back to the 1970s (Du et al. 2004; Ma et al. 2012). It is not, however, until the 1990s, that China's information policies emerge publicly and begin to "receive scrutiny" (Mueller and Tan 1997). Since the mid-1990s, the Chinese government has adopted a large number of Internet content control (censorship) policies (we use "content control" and "censorship" interchangeably). "Content control" or "content regulation" refers to all aspects of authority over the creation (production), processing (transportation, distribution, storage, preservation, destruction), and access to and use (seeking, communication) of information by the state. By virtue of these policies, China has established the most pervasive, sophisticated, and effective online censorship system in the world (Zittrain and Edelman 2003). China's Internet content regulation plays a particularly important role in governing society, advances the power of the state over the online world inside the country, and provides the government with economic benefits from the Internet industry.

Most previous studies on the topic of China's online content control have been, to some extent, temporal, cross-sectional, and limited in scope. In contrast, the current study employs policy documents as a lens to examine the implementation of China's Internet content regulatory regime over nearly two decades from the development of the Internet environment in the mid-1990s, when regulations were first promulgated to create its infrastructure and provide online services, to the recent evolution of regulations that define the role of business operators and use of cybercafés and online games.

We make three contributions to research on China's policies that control online content. (1) We focus on the evolution of Internet content regulation and its interdependence with the dynamically changing Internet environment. (2) We create a three-dimensional policy evolution framework to show that China's Internet content regulation should be considered part of a larger strategy of Internet regulation and one aspect of the historical context of media and information control in the society. (3) We apply content and citation (network) analysis as methodological strategies to examine Internet content policy in the context of related Internet and mass media policies.

The next sections briefly summarize the policy and methodological frameworks that organize our study (Part 2); describe how the data (policy documents) were collected and methodologies that we applied (Part 3); report the results of some of the analysis that we have carried out (Part 4); and discuss the usefulness of the theoretical and methodological frameworks that we have applied to understand the evolution of Internet content policy by the Chinese government (Part 5).

2. RELATED THEORIES AND POLICY EVOLUTION FRAMEWORK

Sabatier's (2007) discussion of multiple theoretical lenses that have been employed to explain the policy process has sensitised us to the complexity of policy design and change during the evolution of Chinese Internet content regulation. However, we have found that the New Institutionalism approach is especially helpful because it emphasises the role of rules, historical factors that influence the evolution of policy, governance structures and the concentration or distribution of power in government and non-governmental (interest) groups, and non-market factors that influence policy change (Ciarney 2012; Liu and Jayakar 2012; T. S. Wu 1997). The Advocacy Coalition approach emphasizes the role of multiple actors (Sabatier and Jenkins-Smith 1993). The Network Approach offers a potent metaphor for examining "governance structures," "potential patterns of interaction among the policy subsystems" and applying a "quantitative approach to examine social network analysis" (Adam and Kriesi 2007, p. 130). Similarly, information and media policy scholars like Trauth (1986), Braman (2006), and Browne (1997a, 1997b) sensitise us to the complexity of the information policy regime. Trauth's Input-Process-Output conceptualization informs us of process and life cycle in the production of information in an adaptive systems model: its processing, transportation, distribution, storage, destruction, and seeking. As with Braman, we recognize the power of the state. And following Browne, we focus our attention on the political and social contexts of information policy and the opaque quality of the policy process. The trajectory of our work follows an argument made by Braman: that "laws and regulations from diverse areas of the law are now understood to commonly populate the domain of information policy" (p. 4).

Three organising perspectives have been applied to China's Internet content regulation policy. First, different policies address content control in different ways. Some regulations target information content directly to decide if certain information should be presented or not, whereas other regulations affect Internet content indirectly by restricting user behaviour, physical network connections, market orders, technological standards, and other ancillary affairs (Feir 1997; Hong 2001; Qiu 1999; Stone 1983). Second, Chinese Internet regulations can be divided into different subject areas. The methodology of classifying policies in several categories is helpful for identifying the functional structure of its content regulatory regime (Wu 1996; Sohmen 2001; Gomez 2004). The third perspective adopts a stage perspective. The changing history of Chinese Internet content regulation reveals the evolutionary features of the entire regime and its interactions and developments in relation to the Internet environment, including technology, online services, and user communities (Harwit & Clark 2001; Endeshaw 2004; Cheung 2005). Our analysis of China's Internet content regulatory regime and its evolution integrates these three perspectives.

We created a three-dimensional policy evolution framework to provide a better understanding of the history of China's Internet policy regime. The first dimension (R dimension) is a relevance hierarchical scheme, to evaluate the relevance of a particular policy to online content control, thereby answering the question of what Chinese Internet content regulations were in place. The second dimension (C dimension) is a policy subject category typology, to identify the functional structure of the regime. The third dimension is time (T dimension), to reveal the evolutionary features of the entire regime and its interactions and developments in relation to the Internet environment.

This paper is a first step: to provide empirical evidence about relationships that have not been historically investigated in the context of China's information policy regime. We note that space limitations prevent us from expanding on the application and utility of the policy and organizing frameworks.

3. METHODOLOGY

Content regulation permeates all policies that cover diverse Internet issues. In this study, content regulation is not considered a set of particular policies that only addresses online content, but one type of regulative

function found in many policies. Because these policies target more issues than content, the strategy adopted here is to collect as many Internet regulations and policies as possible and then to evaluate the extent to which a policy has or relates to the function of content regulation.

The policy documents were downloaded from Chinalawinfo.com (<http://www.Chinalawinfo.com>) on 5 March 2012 for the period 1994 through 2011. Chinalawinfo.com is an online database that contains nearly all Chinese national laws, administrative regulations and policies, and other types of regulations of various facets of Chinese public administration issued by authoritative organs in both the Chinese legal and governmental systems. Search terms were specified and noise was then filtered from the retrieval outputs using both Java programs and human judgment. One hundred and ninety-five national policy documents constitute the sample data set S1. Data mining techniques were applied to analyse the policy data both quantitatively and qualitatively (Elo and Kyngäs 1989). Based on the content analysis (coding was done independently by two researchers and differences resolved), a three-tiered hierarchical scheme was developed to describe a policy's relevance to online content regulation. Table 1 Panel 1 shows the hierarchy criteria as well as distribution of policies for each relevance category. Also, the policy text was classified into 14 content-related categories according to their subject areas. The categories are shown in Table 1 Panel 2 and ranked in descending order of the number of policies in each category. In the context of Chinese public policy, policies always cite laws and other policies to supplement some requirement or to regulate some issue in the context of other issues. Thus the citation relationships constitute a network among policies. Citation analysis (MacRoberts and MacRoberts 1989; McCain 2008) was applied to the policy documents to examine the relationships between policy subjects, describe the core part of the regime that were most likely to be cited by other policies, and describe how those citation links have evolved in the history of the Internet content policy regime.

Table 1. Content regulation classification.

Panel 1. Relevance of Internet Policy in Content Regulation			
<i>Relevance Hierarchy</i>	<i>Meaning</i>	<i>Description</i>	<i>Quantity</i>
R=3	Directly Related	Policies with clear requirements in the texts on certain online content, often presented as a list of the types of forbidden content	60
R=2	Indirectly Related	Policies that do not regulate the content directly, but restrict content by influencing the conditions, approaches, agencies, implementation, and other affairs of content regulation	81
R=1	Peripherally Related	Policies that are not related to Internet content regulation but provide ancillary limits and services on hardware and software as basic needs of Internet regulation, including content control	34

Panel 2. Category Description			
<i>Category</i>	<i>Code</i>	<i>Description of Regulations</i>	<i>Quantity</i>
Domain Names	A	Registration, disputes, and management of domain names	29
Cybercafe	B	Cybercafés	25
Website & Network Connection	C	Website architecture, IP address, and network connection	24
Online Games	D	Online games	21
Security & Confidentiality	E	Information system security, data resource security, and national secrets	18
Internet Information Services	F	Online news, BBS, e-mail, weblog, online publications, and other online information services	16
Health & Medicine	G	Information related to medicine, physical and mental health, drugs and chemicals	15
Online Videos & Broadcasts	H	Online videos and broadcasts	15
Pornography	I	Online pornography	11
Intellectual Property	J	Intellectual property, copyright, right to communicate	7
Online Culture	K	Online cultural products and activities	7

Maps & Mapping	L	Geographical mapping and use of maps on Internet	4
Education & Public Welfare	M	Protection of minors, information application in schools, public networks	2
Executive Affairs of Regulation	N	Coordination of regulating departments, interpretation of policies, and organization of regulatory activities	1

4. RESULTS

Figure 1 shows the evolving history of policy distribution in the R (relevance to content control) and C (policy category) dimensions using different colors to represent different relevance values and categories. Panel (a) shows the number of policies issued each year which fluctuate with different R values. There are four large increases of policy promulgation in 1996, 2000, 2004, and 2009, respectively. Panel (b), which confirms that indirect as well as peripheral control was the primary way that online content was regulated, shows the changing percentage of policies with each R value in the 18-year regulation history. During the early years of China’s Internet era, most content regulation policies had a relevance value of 1 or 2. The number of polices with an R=3, which indicates the need for direct control of online content, began to increase around 2000.

Although there are some fluctuations, the proportion of R=3 roughly increased along the time axis. By about 2008, the percentage of each R value became stable and equal. Panel (c) shows the history of the accumulated number of policies as well as the proportional distribution of each category in the entire policy set during the 18-year period. The total number increases with an average of almost 11 policies per year. The historical percentage distribution in Panel (d) shows that the proportion of each category converged in 2004, after fluctuating in earlier years. The first category that appears is Security & Confidentiality (E), while the last one is Maps & Mapping (L). China’s Internet content regulation, initially focusing on information system security, network connections, and domain names, became more diverse in recent years in response to content services such as online games, online videos, online medical information services, and the presentation and use of online maps.

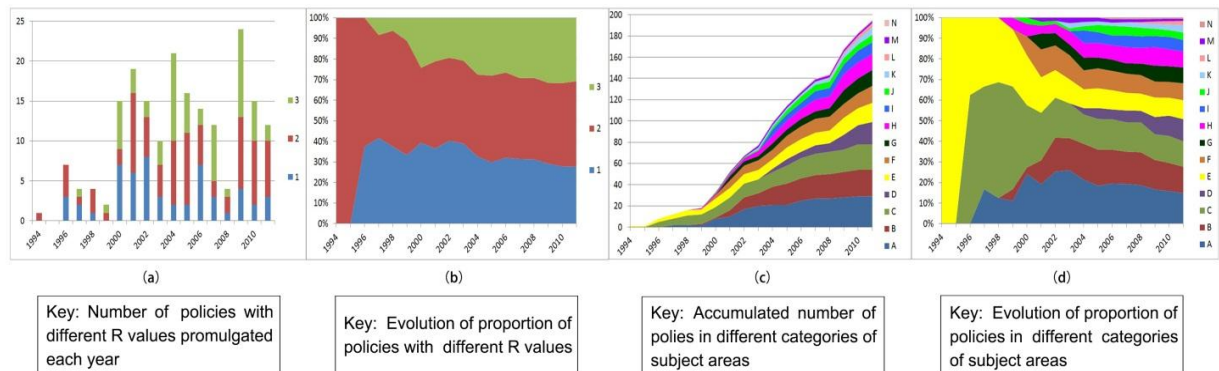


Figure 1. Policy distribution in R (relevance) and C (categories) dimensions over time.

In the earlier years, policies that regulated network connections (C) and domain names (A), which by and large shared an R value of 1 or 2, were the principal components of the content regulation regime. Several of the basic regulations on Internet information services (F), such as the 2000 Regulation on Internet Information Service of the People's Republic of China, were issued around the period from 2000 to 2003, to provide guidelines to the Internet industry as a response to the increase in various online services. Policies regulating the cybercafés (B) have been the principal aspects of indirect content control (R=2). Direct content regulations (R=3) emerged largely from 2004 to 2007 and targeted online pornography. The number of direct content control policies declined after 2008, whereas regulations on special and new online services such as online games (D) and medical information services (G) became the principal set of policies that were promulgated.

By combining the R and C dimensions, we see that the foci and approaches of China’s online content regulation moved from peripheral and indirect control of regulation of network infrastructure and domain

names to direct content regulation, and then again to indirect regulation of various novel online services and markets. Most of these six frequent categories experienced a downward trend over time, especially in recent years, suggesting that new regulations for new online services such as online games (D) began to occupy the policy regime's attention.

Figure 2 shows the structure of the policy regime in terms of the relationships among policy categories and the regulatory foci as well as their strength. This figure illustrates how the Chinese regime has restricted online content and how different policy categories interact with each other. The R value and category that a policy belongs to are labeled by different node shapes and colors (using diamonds, squares, and triangles to represent R= 1, 2, and 3, respectively). Each node in the graph represents one policy, while the arcs represent citation links from an older cited policy to a newer citing one. Larger nodes have greater out-degree, meaning a higher frequency of being cited.

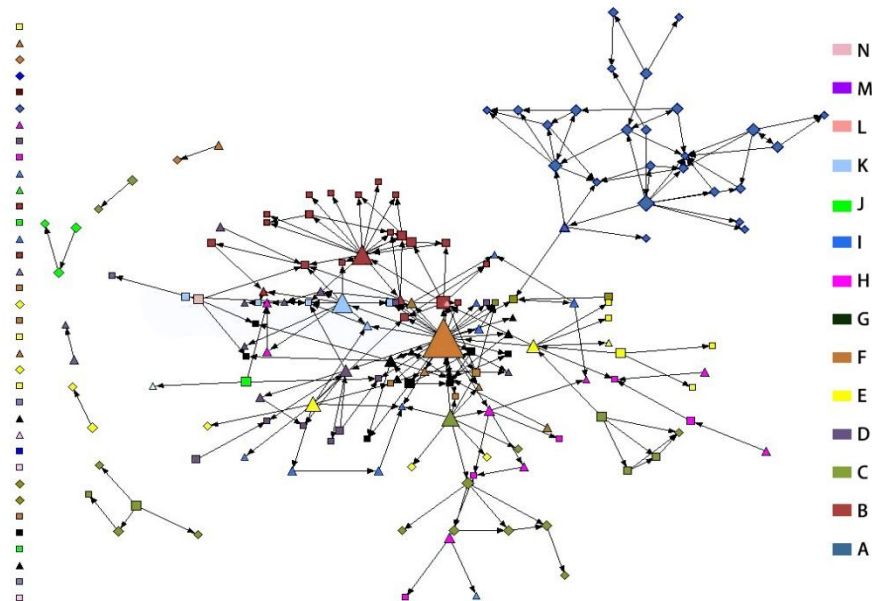


Figure 2. Policy distribution in citation network.

Applying the centrality measure to the policy citation network, the out-degree and in-degree network centralization is 16.962% and 3.491%, respectively; thus, the differences between the nodes out-degree are relatively significant, whereas the in-degree among all nodes is likely to be similar. In fact, the nodes out-degree, which reflects the cited frequency and the importance of a policy in the entire regime, ranges from 0 to 34 in this 195-node network. Only four policies have an out-degree greater than 10, however, implying that only a few policies serve as the foundation for the entire regime. The 2000 Regulation on Internet Information Service of the People's Republic of China has the greatest out-degree of 34 in the entire network and is thus at the core of the regime's regulatory interest.

Table 2 presents the cited and citing frequency of the categories, as well as the self-citation frequency among policies in the same category. The policies that regulate Information Services (F), Network Connection (C), Information Security (E), and Online culture (K) are often cited by other categories, making these the central policies for the entire regime. Policies that regulate Online Games (D), Cybercafés (B), Medical Information (G), and Pornography (I) are more likely to cite other categories to complete more specific policy tasks. Policies that concern Online Culture (K) have both relatively higher out-degree and in-degree figures, implying that K has significant interactions with other categories. This may be due to the terminology of Online Culture that is used only by the Ministry of Culture to describe diverse types of online products and services that interact with other subjects such as online games and online videos and broadcasts. Most citations take place in the same category. Policies regulating Domain Names (A), Cybercafé (B), Network Connection (C), and Medical Information (G) have strong inner citation relationships in their category, implying that these policies are a relatively independent functional subgroup. In addition, there are 36 isolated nodes in figure 2 that function independently in special policy issues. Most isolated policy nodes belong to Internet Information Services (F) and Security & Confidentiality (E), whereas the main measure adopted by them is indirect control (R=2).

Table 2. Citation frequency among policy categories.

Category Code	Category Name	Cited Frequency	Citing Frequency	Self-Citation
A	Domain Names	1	0	49
B	Cybercafé	3	12	33
C	Website and Network Connection	10	5	21
D	Online Games	2	13	10
E	Security and Confidentiality	10	3	8
F	Internet Information Services	35	6	8
G	Health and Medicine	0	12	13
H	Online Videos and Broadcasts	2	7	11
I	Pornography	2	10	3
J	Intellectual Property	3	0	2
K	Online Culture	10	9	6
L	Maps and Mapping	0	3	0
M	Education and Public Welfare	0	2	0
N	Executive Affairs of Regulation	4	0	0

This analysis of policy evolution and citation network reveals that between 1994 to 1999, new policies and explicit punishment based on existing laws and regulations were the principal features of the first stage of China's Internet age. Between 2000 and 2003, online services and regulations rapidly developed; the relatively high percentage of citations implies that the online content regulation regime experienced an important renewal in this period: more Internet-specific policies established the foundations for subsequent regulations. Citations between 2004 and 2007 suggest the requirement of direct content control (R=3) during that period. By 2008, novel Internet services and phenomena called for the development of new policies and new regulatory approaches.

China's online content regulation appears to manifest cyclical features in a larger scale evolutionary history, where the reliance on old policies and the emergence of new policies, as well as strict and looser regulation, in turn replace each other. More services have brought more stakeholders into the arena of online content control making it thornier for Chinese government to balance each party's interest. Furthermore, our study also seems to suggest that the policy system institutions are fragmented (results not shown), which may lead to a more fragmented policy-making process (see Rowlands 1996).

5. DISCUSSION

T. S. Wu (1997) has offered two paradigms to better understand the global online content regulation: (New) Institutional Theory, which treats regulation as collective action by a rational state actor, and Liberal Theory, which considers regulation as the state's preference for a compromise that results from the interaction among different society stakeholders. Wu contended that Institutional Theory appeared to be more applicable in those states that took an instrumentalist view toward the Internet, viewing it mainly as a technical service that served an economic purpose. If the Chinese government is seen as a "sole source regulator" that has reduced the policy goals of content regulation to the simple requirements of economic growth as the context for social stability, the country's online content regulation has certainly and without a doubt become more successful and mature in recent years.

However, things are changing in China and with Internet services, in general. New policies "chase" issues that emerge as the technology and services evolve. This suggests that these policies may be ad hoc tools for solving specific issues, rather than levers that provide intelligent and farsighted solutions that are compatible with the entire regulatory strategy. The Internet industry also confronts the large costs of self-regulation that have been required by government agencies. Meanwhile, different government departments and agencies consider regulation to be a lucrative project because it provides local benefits. So, were we to adopt T. S. Wu's Liberal Theory or Sabatier and Jenkins-Smith's (1993) Advocacy Coalition perspective to take account

of other stakeholders such as different government departments, IT companies, and Internet users that are advocating for different and competing policies, we might conjecture that China's Internet content regulation policies may not only be ineffective but also harmful to the growth of the Internet industry.

However, a paradigm change for understanding and regulating Internet content is clearer than ever before because novel online services have recently emerged in China. Indeed, to some extent, the Chinese government has already manifested a tendency to respond with a looser and more flexible regulatory approach. More openness about competition and cooperation between various policy-making institutions will help deepen our understanding of the dynamics of the evolution of the Chinese content control regime. Looking at our future work on theoretical frameworks that can usefully explain the evolution of China's content regulation regime, Cherry and Bauer (2004) may offer a useful theoretical perspective, Adaptive Regulation, about the policy making process in complex social systems. Cherry's (2007) Paradigm of Adaptability extends Liberal Theory to interpret the behaviour of different actors as they relate to a regulatory regime.

The diffusion of communication networks and the convergence of information technologies have intensified China's modernization and have also contributed to accelerating globalization that has characterized nation-state economies. We see the origins of the first information laws and policies for the Internet and also, reflected in the development of policies from the mid-1990s forward, the dilemmas that China confronts as a function of its political and economic systems: increasing domestic demands, cultural tensions, and an international arena dominated by Western market economies. Recent regulations are also evidence of the lucrative nature of content regulation projects and how deeply involved government agencies and groups in the private sector are in the high stakes of Internet use and regulation. Although in the current environment an Institutionalist theoretical perspective coupled with an Advocacy Coalition perspective supported by a Network Approach appears to be a good explanatory "fit" for the Chinese government's regulation of the Internet, we can expect the government to rethink the future of content regulation. The state will need to confront emerging stakeholder concerns and needs as the Internet develops in China.

6. CONCLUSION

By illuminating practices over time, we provide evidence of the continuity in content regulation that also animates further exploration of how various contextual factors inform the development of Chinese government Internet content policy. By classifying policies according to their content and visualizing the citation (networked) relationships among the policies, we explain the meaning of content regulation, differentiate content control policies in various subject areas, and describe the evolutionary features of the regime.

To our knowledge this study represents the first analysis of the evolution of China's Internet content control policies. We have applied policy process theoretical frameworks developed by U.S. policy theorists to understand China's policy regime. Future research needs to examine the adequacy of theoretical frameworks of the policy process that have been developed in a Western context.

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CHARACTERISTICS AND MODALITIES OF CHANGES IN HUMAN TECHNOLOGY RELATIONSHIP MODELS

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ABSTRACT

Technology adoption research has distinguished several models of human-technology relationships such as resistance or rejection, acceptance (Davis, 1985) and technosymbiosis (Licklider, 1960; Brangier & Hammes, 2006, 2007, 2011), the latter considers human-technology relationships through the ideas of co-evolution, capabilities extension and mutual dependence. This paper aims to show that those models are not stable over time; people change their model or transform it. With questionnaires completed by verbalizations used on a sample of 60 people, we were able to highlight different types of courses of technology relationships in which symbiosis often starts after a period of more than one year. It seems that symbiosis occurred when some factors are present: a positive attitude towards technologies, rich, but not too complex technology, capable of completing human abilities. The most decisive factor being the link created between human activity and technology.

KEYWORDS

Human adaptation, Regulation, Ergonomics, Human-technology symbiosis, technology acceptance.

1. THEORETICAL ORIENTATIONS

Technologies are developing in such a way that humans are being transformed by them. Humans live increasingly in technological environments: They communicate, shop, play and work in them... Sometimes they accept the technologies, sometimes they refuse them and sometimes they have a very close relationship with them, considered as symbiotic.

Various disciplines have studied the issue of human-technology relationships from several different angles: operational compatibility for cognitive ergonomics (Brangier, & Barcenilla, 2003), evaluative processes at stake in decision to use for social psychology, which produced Davis's TAM model (Technology acceptance model) (1989) and decision to use by strategic actors for sociology (Scott, 1990; Orlikowski, 1992). Other approaches have attempted to convey to technology, to the user and to the context an equivalent role in the forming of a special relationship, sometimes called coupling. They have focused on feedback and co-construction between the two interactive partners. The man-computer symbiosis notion (Licklider, 1960), inspired by biology, has been used as a starting point, from which the «symbionts», human and technology, benefit mutually from their close relationship. Each of these theoretical currents provide undeniable contributions, however, they have never been integrated into the same model. Having said this, this research has brought forth three main forms of relationships with technology (Brangier, Hammes-Adelé & Bastien, 2010):

- The *rejection* model corresponds to various forms of resistance: The person has a globally negative opinion of technology; or, doesn't want to use this technology for instrumental reasons (uselessness) or non-instrumental (convictions...); or wants to use the technology but is unable to.
- The *acceptance* model corresponds to chosen or forced use of the technology with regard to certain criteria: usefulness, ease of use, social presence... According to this model, the technology is used to carry out regular utilitarian tasks, with a conscious ease of use of the technology.

- The *technological symbiosis* model corresponds to a natural, intense, simple, and integrated use with no problem in using the technology. People use it as a matter of course. The user has no intention of going back to previous habits because the technology skillfully complements his/her capacities. Sometimes it is even dependence.

In literature, the existence of these three models seems to confirm the dynamic and intrinsically progressive character of human-technology relationship. Very few studies have actually looked into the changes which affect the relationship during the time that the technology is used. How do users develop their interactions? Do they change model? How do they shift from the rejection model to the acceptance one? Do they ever leave the technological symbiosis model to finally reject the technology?

Adopting a technology is neither static nor linear. Akrich, Callon and Latour (1988) consider that construction of usage and adoption are temporal, changing, and spiraling phenomena. They propose adoption in sequences: iterative loops of interest. This expression emphasizes the negotiated nature of the adoption between actors and technical devices, conditioning occurrences of a growing interest, as well as its sequential nature. Each loop represents a change, a redefinition of this innovation which leads to, in the best case, « *a reciprocal adaptation of supply and demand*» (Callon, 1994, p.11).

Docq and Daele (2001) propose a definition of usage as «a set of practices, a special way of using something, a set of socially shared rules by a reference group and built over time». In the same vein, Morris (1996) challenges the linear character of the relationship with technology and postulates that it comes in a loop form, the quality of usage influencing retroactively the evaluation of Davis' two decisive factors (perceived usefulness and perceived usability) (1989). Furthermore, although he doesn't challenge the role of perceptions in the decision to use a new system, it seems risky to him if it is based solely on perceptual measures, as changes occur with the user over time (Dillon, 1987). Bhattacharjee (2001: 351-352) postulates that «While initial acceptance of information technologies is an important first step to insure the success of this technology, long term viability [...] and its potential success [...] depend more on continuous usage than initial usage».

In another vein, some emphasize the importance of the time factor, using terms such as « *Adoption trajectory*» or « *usage trajectory*». For Proulx (2002), these terms refer to «*the individual courses through the constellation of past, present, and emerging communication devices on offer, and which make up a privileged informational and cognitive environment for the individual to develop their communication and information practices*».

Finally these studies postulate that the relationship with technology is neither stable nor unimodal, but evolves over time, following particular dynamics and regulations. In this state of mind, the research which we are presenting seeks to define the course of the human-technology relationship. This means notably, understanding the way people choose their course and set out their arguments, resulting in the development of behavior and attitude patterns of rejection, acceptance or technological symbiosis.

2. PROBLEM AND METHOD

Drawn from works which have emphasized the existence of three models (rejection, acceptance, and technological symbiosis), we wish to test the evolution capacities of the human-technology-context over time. How is the human-technology relationship changing? Does this change occur through adopting a new model or is it a marginal evolution of the same initial model? How does the transition occur from one model for another? Do evaluations of usage circumstances and personal or technological characteristics encourage the change in technological interaction towards adopting an increasingly symbiotic model?

This study concerns a sample of 60 people familiar with technologies and their use:

- 30 men with an average age of 26,2 (standard deviation = 4,72),
- 30 women with an average age of 26,2 (standard deviation = 5,38).

Approximately a third of each of these groups comes from a student population and two thirds are salaried. The respondents were requested to take part in an experiment to be carried out in three stages:

a) The respondents were asked to fill in a questionnaire concerning their ICT usage (frequency, time spent, length of experience), and more specifically concerning the technologies we chose for the study (mobile phone, computer, digital camera and internet). They also had to define how they positioned themselves in relation to technologies in general in a «questionnaire on human-technology relationship»

which we developed (Brangier, & Hammes, 2006, 2007, 2011) and which aims to characterize the symbiotic nature of the relationship that humans develop with technology.

b) We then examined four technologies (mobile phone, computer, digital camera and internet) and their usage at five chronological stages: before usage (T1), at the start of usage (a few hours to a few days, T2), after a short period of usage (a few weeks T3), usage after an average length of time (a few months T4), after a longer period of usage (more than 6 months T5). It was also possible to add a period further in the future (T6) if the subject so wished. For each time period, the respondent was asked to choose a scenario among the three below and explain their choice (they could also create a new scenario, however none of the subjects did so.). They were also encouraged to talk about the reasons for a shift or non shift from one scenario to another. Here is the content of these scenarios:

- Rejection: *«This technology demands a lot from me because it is difficult to use. Furthermore, learning how to use it is complicated. It isn't useful to me and doesn't improve my efficiency. I waste more time using it. Furthermore, it doesn't enable me to carry out my daily tasks appropriately, disrupts my habits, and doesn't fit into my lifestyle. Finally, my friends don't use it at all or very little, they think it isn't suitable for me ».*
- Acceptance: *«This technology doesn't require a lot of effort from me because it is easy to use and to learn. It is useful to me and makes me more efficient as I gain time. Furthermore, it is adapted to my daily tasks, enables me to keep my habits and fits well into my lifestyle. Finally, my friends use it and recommended it to me».*
- Symbiosis: *«This technology is so familiar to me that I take it for granted. It's presence in my life is normal. I think of it as being a part of me. I have projected some of myself into it. I feel that I have adapted myself to it and it has adapted to me. It improves my abilities and reinforces my skills. Finally, I use it systematically and I wonder how I would manage otherwise».*

c) The third and final stage consisted of assessing the technologies studied from a questionnaire based on the 8 technological symbiosis criteria (Brangier, Dufresne, & Hammes-Adel , 2009). The respondents had to say, on a 7 points scale whether each technology:

- Amplified their intelligence,
- Reinforced their perceptual skills
- Handled or foresaw their mistakes ,
- Balanced their emotional state,
- Expanded their interaction potential,
- Enabled them to gain knowledge from other users,
- Decreased distractive elements
- Enabled continuity of information transfers with other technologies.
- In agreement with the respondent, the interview was recorded and then transcribed again.

3. RESULTS

3.1 Scenario Choices

The scenarios, in which the respondents recognized themselves, differ according to time, as the figure below indicates (Figure 1). Time is therefore an important factor of change in attitude and behavior with regard to technologies. Moreover, the distinct profiles obtained through the technologies coupled to the qualitative data obtained, points to the important role of the technological features (rich functionalities, complexity of use) in the type of relationship developed by the users.

Each technology requires differentiated analyses. For example: The mobile phone provokes a low level of rejection and a high level of acceptance, this acceptance tends to become symbiosis after more than six months (T5). The computer and internet are initially rejected, this continues for the computer during early contact, then disappears rapidly as acceptance grows. Symbiosis appears later, it actually begins to appear after several months (T4), becoming stronger after more than a year (T6). The computer and internet seem to differ in the speed of evolution of symbiosis, taking the form of a straight line for internet and a curve for the

computer. The digital camera is more an accepted technology. To sum up the data, it could be said that the 4 technologies studied present 3 different «types» of relationships to technology:

- A growing and sustainable acceptance.
- Rapid symbiosis preceded by rapid acceptance.
- Slow symbiosis preceded by rejection followed by acceptance.

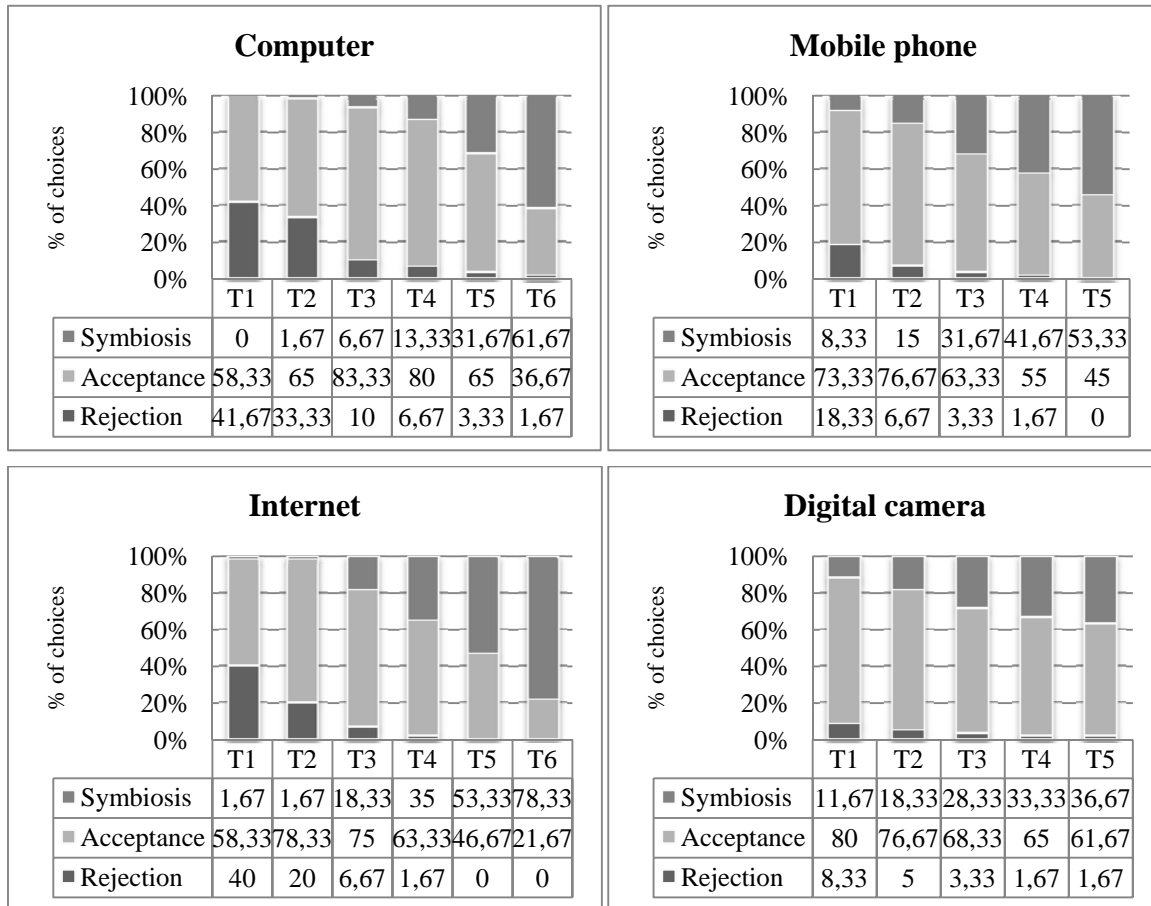


Figure 1. Percentage of choices of scenarios over time by technology (mobile phone, computer, internet, digital camera)

3.2 Changes in Technological Usages

For each temporal stage proposed, all the respondents positioned themselves easily in the three scenarios; they recognized themselves and verbalized the fluctuations in their relationship. The series of choices carried out can be considered as a technological relationship course. Firstly the results show that among the 189 possibilities of courses of relationships with technology (counting the number of possible combinations), only 12 were observed among our respondents. 7 include a backward motion, 4 of them being a back and forth shift from and to acceptance. Some courses include only one single model of the relationship to technology, acceptance being the most frequent. However, this unique model isn't equated to linearity since the qualitative data from the interviews suggest that all the interviewees indicate fluctuations, for example, in terms of perceived usefulness or perceived ease of use, which influence the relationship with technology. We can therefore confirm firstly that the technological relationship is dynamic, and secondly, none of the technological relationships models (rejection, acceptance, symbiosis) are stable, established or sustainable.

The most commonly observed courses are:

- Acceptance → Symbiosis (38 % of all the courses)
- Acceptance only (25 %)
- Rejection → Acceptance → Symbiosis (15 %)

- Rejection → Acceptance (10 %)

These results enable us to support two ideas: On one hand, the relationship to technology can be qualified by a limited number of courses, and on the other hand, these courses don't show a consistent linearity in the form: rejection, then acceptance, then symbiosis. They can also show backward shifts or changes in the same relationship model.

3.3 Course Differentiation

Certain elements seem to influence the evolution of the relationship with technology. These concern the users and the technologies' characteristics and a link created between them through activity (as understood by ergonomics).

Depending on the way the users qualify their relationship with technologies in general, the scenario choices will be more or less directed towards symbiosis. More specifically the respondents with the highest symbiosis scores (measured by our questionnaire) choose the symbiosis scenario ($r = .46$; $p < .01$) more than the others.

Furthermore the respondents recognizing their current state of relationship with technology in the symbiosis scenario consider, more than the others, that the technologies fulfill certain human ability amplification criteria. These criteria change partially, depending on the technology, mainly due to the specific features of each technology:

- For the mobile phone: intelligence amplification ($t = 2.10$; $p = .04$) and contextual knowledge management (gaining knowledge from other users) ($t = 1.99$; $p = .05$).
- For the computer: intelligence amplification ($t = 3.22$; $p = .01$), increase in perceptive abilities ($t = 3.36$; $p = .001$), contextual knowledge management ($t = 3.55$; $p = .001$) and multiplying operating efficiency (expand interaction potential) ($t = 1.96$; $p = .05$).
- For the digital camera: decrease in distractive elements ($t = 2.43$; $p = .01$).
- For internet: intelligence amplification ($t = 3.23$; $p < .01$).

The qualitative data derived from the interviews enable us to understand the courses followed by the respondents, especially the reasons for the transition to symbiosis. Overall, two main reasons were given by the participants:

- The growth of a close relationship with the technology (39.5% of reasons given). This closeness is revealed by high frequency of use, using the technology without thinking about for some tasks, and a feeling of co evolution with, and dependence on the technology.
- The intricate connection of activity and use of the technologies, (42.8 % of the reasons given for the change in scenario). A change in activity explains, very often, the break in the technology course. The respondents notice that the technologies play a facilitating role in their activity but also spark off the creation of new activities.

4. DISCUSSION

Our results show that it is possible to identify and qualify four main course types of relationships with technology (see Figure 2). These courses include up to three states of the human-technology relationship that is to say, rejection, acceptance (the most common) and symbiosis. These states can be considered as stages. These stages are not uniformly organized, but the most frequent courses show a progression which can culminate in symbiosis. The length of this progression depends on the complexity of the technology (from a few months for the mobile phone to more than a year for the computer and internet).

Depending on the technology, the most common course type varies. The «richest» technologies (i.e. the ones including a multitude of functionalities) such as the mobile phone, the computer and internet show more courses leading to symbiosis whereas the digital camera tends to remain in the acceptance stage.

Moreover, a clear distinction appears between Internet, the computer and the mobile phone, on the one hand, and the digital camera on the other. Regarding the latter, users care more about criteria relating to those proposed by Davis' TAM (1989), that is to say usefulness and ease of use; here the concept of acceptance would seem to have its full meaning. However, regarding more symbiotic technologies (where at least 50% of the course ends in symbiosis), other explanatory factors must be used.

Firstly, perception of the technological features comes into play. Each technology differs in its capacity to produce a symbiotic type relationship. The more the technology is perceived as skillfully completing human capacities, the more it will lead to symbiosis. Secondly, there's a strong link between the way the relationship to technology is globally assessed and the occurrence of symbiosis. The fact that the person feels able to (a) master the technologies (b) experience a better performance and (c) perceive the benefits of mutual adaptation of human and technology, increases their chances of achieving symbiosis. Thirdly, the circumstances and the way the user integrates technology to his activity facilitate symbiosis. Symbiotic subjects have an almost instinctive use of technology where the activity carried out takes precedence over the technological constraints. However, to achieve such a symbiotic relationship, a learning or adjustment period is needed. This adjustment phase will lead to the mastering of the technology, the perception of the benefits of a mutual adaptation between human and technology, and finally to a kind of coupling between user and technology. According to our results, this adaptation phase is needed in order for symbiosis to occur, but it doesn't necessarily lead to it. From our point of view, this adaptation phase corresponds to Davis' meaning of technology acceptance. These results, derived from quantitative and qualitative data, have enabled us to consider more clearly the way a relationship to technology evolves over time. These evolutions take the shape of courses. Differences have been noticed between complex technologies such as the internet and computers, a communication dedicated technology such as the mobile phone and a basic one such as the digital camera.

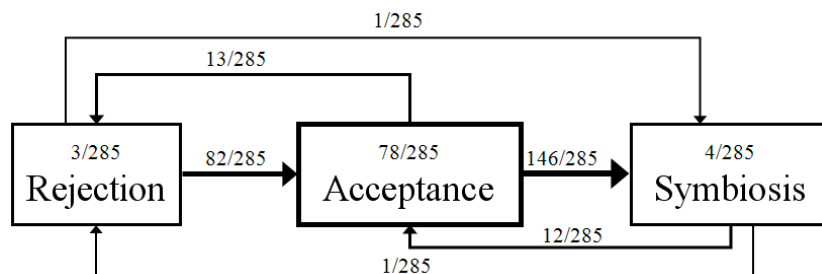


Figure 2. Developments and statements of probable courses (The number on arrows defines the number of transition from state A to state B. The number in the boxes set the number of courses containing only this state of the human-technology relationship).

So far, the human-technology relationship has mostly been studied in a static way, focused on a short lapse of time situated in the initial usage phase. Even so, the necessarily dynamic and constructed aspects of the relationship to technologies have been underlined (Dillon, 1987; Morris, 1996; Bhattacharjee, 2001). In this range of studies examining the importance of temporality in the development of the relationship with technology, our research shows that a short lapse of time is insufficient to be able to study the relationship which grows with technology since it is a process which takes place over a long period. Results show that this long temporality determines some of the attitudes towards technology. In the future, with the rapid turnover of technologies, the speed at which transitions occur between rejection, acceptance and symbiosis will increase even more, becoming volatile, thus causing a possible risk of over or under use?

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Short Papers

ANALYZING CURRICULUMS OF UNIVERSITY AFFILIATED INSTITUTES FOR INFORMATICS GIFTED IN KOREA

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ABSTRACT

The education for the gifted students is essential in the cultivating the leaders of the next generation. Among the gifted students programs, the university affiliated institutional programs should be thoroughly analyzed and investigated, due to its direct relationship with the students' careers. We analyzed the curriculums of university affiliated institutional program for the gifted students in Korea in order to propose the corresponding implications which will promote their educational environment and standardization finally. After case analysis of university affiliated institutes, we found there is a strong enforcement in the linkage with the education for the gifted students in areas such as admission methods. In Korea, programming courses and algorithm courses are heavily weighted, up to 50% of the course curriculums for most of the university affiliated institutes, due to the importance of problem solving skills and logical thinking in the information technology society.

KEYWORDS

Informatics Gifted, Gifted Education Curriculum

1. INTRODUCTION

Today's world is a knowledge based society. Based on the fact that the driving force for a nation depends on the development of knowledge based industry, the ability to "informationize" and use information technology is essential in terms of individual competitiveness. From this perspective, the importance of the science of information education for cultivating gifted individuals and student leaders is growing. The recent addition of information technology to science education for gifted students is a result of social demand and the circumstances of the current era. It has been 10 years since information technology education for gifted students begun. At this point, it is necessary to evaluate the current curriculum of information technology education for gifted students and analyze the implications of it. Furthermore, the university affiliated institutes of information technology science for gifted students should be analyzed first, due to their direct relationship with the students' careers, provided by the in-depth education starting from special classes for the gifted to Metropolitan and Provincial Offices of Education affiliated institutes. As such, the current curriculums of institutes of information technology science for gifted students were examined in this research to propose corresponding implications.

2. STATUS OF CURRICULUM

There are 25 university affiliated institutions of Information Technology for gifted students in Korea, and their corresponding curriculums were categorized and analyzed in terms of educational goal, admissions, academic schedules, education contents, and evaluation methods.

2.1 Goal of Informatics Gifted Education

The purposes of the university affiliated institutions are to develop the potential abilities of gifted students, to offer education for personal fulfillment, to promote the advanced problem solving abilities of gifted students to create highly valued new information with creativity, and to fortify the national competitiveness and development by producing future leaders who will be great additions to different fields such as Information Technology, Science, Art, and Politics. These are the expected abilities of the learners of the twenty-first century; these institutions provide educations so that students can easily adapt to society, have the ability to solve presented problems, and be prepared to select their careers in Information Technology.

2.2 Admission

Until 2010, the university affiliated institutions administered admission based on 100% document screening, written examination to test abilities such as creative problem solving skills, and in-depth interview/camp. The programs were run in three different levels: the elementary level, the intermediate level, and the advanced level. However, since 2011, the elementary level program has been abolished in regards to the admission policies of the Ministry of Education, Science and Technology, and the admission is currently based on recommendations. In the recommendation based admission policy, the eligibility to apply to the institution is given only to the students who have already completed, or are expected, to complete the lower levels of programs for the gifted. This admission process is a two-step process.

Table 1. Changes in admission procedures (Lee, 2011)

Classification	Until 2010	After 2011
Admission Process	Document screening, written examination, in-depth interview/camp	I. Recommendation from the teachers (professors) of gifted education programs → II. In-depth interview
Programs	Elementary, Intermediate, Advanced (3 levels)	Intermediate and Advanced (2 levels)
Features	Mainly based on the written Examination (creative problem solving skills) and in-depth interview	Mainly based on the observation/recommendation

2.3 Academic Schedules

The university affiliated institutions' classes are composed of attendance class, online class, and summer/winter camps. The academic year is based on 1 year curriculum, starting with spring semester beginning in March and completing in February. The attendance classes and the online classes take place on every other Saturdays. The summer/winter camps are held during the holidays for practical educations that the attendance classes may lack in providing.

Table 2. Training Schedule (Lee, 2011)

Criteria	Schedule and Details
School Year	1 year curriculum (each year March ~ the following year February)
Class Type	Online Class, Attendance Class (Saturday Class), Summer/Winter camp.
Attendance Class	Weekend Classes (3 hours x 16 weeks = 48 hours in total) held on every other Saturday
Online Class	Just like weekend classes, periodically held, homeschool, online homework.
Camps	Summer, Winter concentrated studies (60 hours), creative studies (16 periods)
Completion Ceremony	Presentation of the annual training results and evaluation (total of 124 hours)

2.4 Educational Contents

The analyzed data of information technology in the university affiliated institutes for the gifted are listed in Table 3. According to Table 3, Courses in the intermediate and advanced level, such as advanced algorithmic studies and programming, are more heavily weighted in the curriculums (up to 50% of the total curriculum), because such in-depth courses directly relate themselves to the future careers of the students. These algorithmic and programming courses train the students for problem solving skills and logical thinking so that they obtain ability to creatively lead the economic society.

Table 3. Analysis of Educational Contents (Lee, 2011)

Institution	Curriculums	
	Intermediate/Advanced (%)	Total (%)
A University	<ul style="list-style-type: none"> ◦ Advanced Algorithm (83) (ordering, backtracking, geometry, ciphers and codes) ◦ Dynamic Programming Courses (17) 	100
B University	<ul style="list-style-type: none"> ◦ Information Ethics (10) ◦ C language programming (42) ◦ Robot Programming (24) ◦ Practical Robot Control (10) ◦ Intermediate Algorithm (14) 	100
C University	<ul style="list-style-type: none"> ◦ Advanced Algorithm (100) 	100
D University	<ul style="list-style-type: none"> ◦ Algorithm (50) ◦ Robot (Line Tracer) (25) ◦ Digital Logic Circuits (25) 	100
E University	<ul style="list-style-type: none"> ◦ Programming (17) ◦ Intermediate Computer (83) 	100
F University	<ul style="list-style-type: none"> ◦ Information Mathematics (69) ◦ Algorithm (31) 	100
G University	<ul style="list-style-type: none"> ◦ Hardware Experiments (50) ◦ Sensor Experiments (21) ◦ Applied Programming (29) 	100
H University	<ul style="list-style-type: none"> ◦ Data Structure (25) ◦ Algorithm (50) ◦ Programming (25) 	100
I University	<ul style="list-style-type: none"> ◦ Computer communication and internet (14) ◦ Database (14) ◦ Multimedia (14) ◦ Programming (58) 	100

2.5 Evaluation

The evaluations in university affiliated institutes are based on the presentation evaluation of the self-conducted in-course research. The attitudes, creativity, and logical thinking abilities for each individual are observed and evaluated by the teachers or professors in class. Each university affiliated institute implements different evaluation methods, and there is no standard evaluation policy.

Table 4. Evaluation Methods (Lee, 2011)

Evaluating Area	Evaluations
Knowledge	Formative, written, observation, homework
Attitude	Class Attitude, class participation, attendance
General	Report writing, information technology related project presentation, etc.

3. CONCLUSIONS AND DISCUSSIONS

In this research, analysis was focused on the information technology curriculums of university affiliated institutes for gifted students; the university affiliated institutes should be analyzed first, due to their direct relationship with the students' career provided by the in-depth education starting from the special classes for the gifted, to Metropolitan and Provincial Offices of Education affiliated institutes. Based on this research, the following implications are discussed:

Firstly, programming courses, which are considered to be the core of computer education, are currently focused on simple problem solving such as alignment or search. These programming courses should be further improved by introducing practical, applicable content that the students may apply to their everyday lives. The Department of Education offers STEAM education method as a combination of Mathematics, Technology, Engineering, Arts and Sciences for more effective learning in ubiquitous environment and application in the everyday life; programming courses may be more effective when STEAM education method is implemented.

Secondly, there is a need for a standard curriculum for information technology education for the gifted. Despite the increase in the quantity of the information technology educations, there is no set standard curriculum. As consequences, the course contents differ depending on the curriculums of each institute; same content, but different levels depending on the institutes. Therefore, it is essential to construct a set standard curriculum for all the institutes at the directional level, so that regardless of which institute the students are educated at, they all have equal opportunity to expand their capabilities.

ACKNOWLEDGEMENT

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SCENARIO FORECASTING OF SUSTAINABLE URBAN DEVELOPMENT BASED ON COGNITIVE MODEL

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ABSTRACT

Cognitive modeling is used in order to improve decision-making in creating strategies of sustainable urban development. Development scenarios of Volgograd (Russia) are constructed, and different strategies from the perspective of sustainable development are assessed. Features of the city and factors that characterize the current state of the economic, environmental and social issues were taken into account when constructing the cognitive map. The contribution of this part of the research is related to the identification of the interplay of various factors of the sustainable urban development and the inclusion of synergistic and cumulative effects into the analysis.

KEYWORDS

Sustainable development, urban planning project, scenario forecasting, fuzzy cognitive maps, evaluation of the strategy.

1. INTRODUCTION

Dynamics of the development of modern cities is complex and multifaceted. Scientific understanding of new realities and perspectives and the definition of the principles of forming development strategies is extremely relevant. The purpose of strategic planning should be in creating of a comfortable, safe urban environment, the conditions for self-realization of residents and knowledge economy and unique cultural spaces development. Ideology of sustainable development, which is a shift from the ideas of "regulation environment" to a focused reasonable planning of economic operations, plays a special role in the transformation process of a city. Adoption and implementation of wrong decisions violate the principles of sustainable development and threaten the viability of city. There is the issue of forming an evidence-based approach to decision management solutions on implementation development plans for urban territories. This requires finding the technology to generate and analyze different solutions and evaluate their effectiveness. This paper presents an approach to the analysis of scenarios for the city of Volgograd from the position of sustainable development. Using the methodology of cognitive modeling allows evaluating the effectiveness of decision-making and analyzing dynamics of situation when implementing the different scenarios.

2. DECISION MAKING SUPPORT IN TASKS OF URBAN PLANNING

The process of urban development planning is associated with the design of strategic decisions. Their implementation provides formation of urban environment taking into account the demographic processes, ecology, resource potential, the needs of the domestic and foreign market, historical and cultural traditions, and identifying perspective directions of investment attracting.

Decisions are made at the strategic level of management principles creation and the operational level during the selection of territory use methods, funds distribution, business environment changes, etc. The task of deciding is formulated as follows: what actions are needed to achieve the set values of the indicators of sustainable development taking into consideration current state and ambient factors. Many works are associated with the development of methodologies of assess the degree of achievement of sustainable

development goals (Bossel, 2001). However, they do not solve the problem of possible consequences analysis. This requires the use of a variety of modeling and forecasting methods.

The most famous city model was designed by J. Forrester (Forrester, 1969). It describes the interaction and the development of three subsystems: population, housing and businesses, and allows to predict urban development and analyze various managing impacts options. Modern approaches for the use of simulation modeling in solving problems management of social-economic systems are offered in works of scientists (Lychkina, 2012; Putilov, 2002; Katalevsky, 2011). In many cases, the method does not allow accurate estimating of the future states of the system. This happens because of the lack of a mechanism integrating qualitative changes and uncertainties. This paper proposes to use the methodology of scenario forecasting based on fuzzy cognitive maps for support of decision-making in the creation of urban development strategy.

2.1 Sustainable Urban Development and Sustainable Development Criteria

Sustainable urban development provides safety and high life quality while preserving natural environment, resources and ecological balance. It is the primary criterion of management policy efficiency. Charter of European Cities & Towns Towards Sustainability states that «as each city is different, we have to find our individual ways towards sustainability. We shall integrate the principles of sustainability in all our policies and make the respective strengths of our cities ... the basis of locally appropriate strategies» (Charter, 1994).

Developing strategic plans for urban development is carried out under conflict of different communities and activities. Consideration of stakeholders interests is a necessary condition for efficient management and a possible step toward finding the most balanced development strategy. Stakeholder groups are determined by the mission of the city. The mission shows the main purpose of the city and its role in the region, the country and the international community, a place in the social division of labor, the competitive advantages that provide attractive to people. In this case stakeholders include not only persons vesting the power to influence achievement of the objectives, but also those who may be affected directly or indirectly by the result of the proposed activity. Table 1 presents the objectives defining interests of various target groups, the possible managing impacts that can be used to influence and indicators to assess degree of achievement of objectives.

Table 1. Target set of stakeholders, possible managing impacts, indicators of sustainable development

Goals	Managing impacts	Indicators of sustainable development
Formation of favorable business climate	Commissioning new productions	Economic efficiency
	Activities to attract investment	
	Changes in tax legislation	
	Introduction of incentives for small business	
	Investments in development of industry/small business	
	Investments in knowledge sector	
Formation of favorable social climate	Development of high-tech economy sector	Level of social well-being
	Increase in social payments	
	Commissioning of new social facilities	
	Formation of public spaces	
	Construction of social housing	
	Reorganization of governance institutions	
	Measures to increase competitiveness young specialists	
	Extension the scope of information and communication technologies	
Introduction of mechanisms popularization knowledge		
Improving urban environment	Dissemination of principles New Urbanism	Quality of urban environment
	Construction of housing	
	Infrastructure development	
	Urban transport development	
	Introduction of environmental taxes	
	Increase fines for violations of environmental laws	
	Introduction of benefits system for energy efficient facilities	
	Reduced operating costs through the introduction of new technologies	
	Development green areas	
	Introduction of green building technologies and transit-oriented design	
Creation mechanisms to stimulate and promote healthy lifestyles		

2.2 Construction Cognitive Model

The methods of fuzzy cognitive analysis and scenario modeling will be used to analyze the possible management strategies. Uncertainty of factors and their relationships is the feature of the application of cognitive modeling to complex systems behavior identification. Values of the factors are most often represented as linguistic variables and interval estimates. Model structure can be changed during the study.

The modeled situation is described by fuzzy cognitive maps (Kosko, 1986), which are weighted oriented graphs of cause-effect relationship that illustrate multiple links between the system factors, such as human factors, nature protection activity and environment components. These maps are useful for identifying and representing the second-order effects (indirect, etc.). Further, the method of pulse processes (Roberts, 1986), which falls under the category of dynamic methods, is used to obtain a forecast of development. Pulse process allows to determine concept state in discrete time. Analyzing the state allows experts to receive a forecast of system state changes at realization of various management strategies and ambient changes.

The official data of the Federal State Statistics Service of Russia, the materials General Development Plan of Volgograd, the Strategic Plan, the Investment Passport of Volgograd (FSSS, 2013; Volgadmin, 2013) served as initial information for model construction. The system "Strategist", developed at the Department CAD of VSTU (Zabolotskiy, 2008) and based on the methodology presented in the paper (Kulba, et al, 2004; Maksimov, 2005), was used to carry out cognitive analysis.

Basic factors selected to characterize urban development are shown in table 2. Cognitive map of sustainable development of Volgograd is represented in Figure 1. According to the sustainable development objectives the observed factors are the quality of urban environment (y_1), the level of social well-being (y_2) and economic efficiency (y_3). The managers: x_{16}, \dots, x_{28} are allocated from the set of basic factors that directly or indirectly affect the situation development. We can change their values using managing impacts.

Table 2. Initial change trends factors affecting the sustainable development

Designation	Name of factor	The initial trend	Changing the initial trend of factors
x_1	Physical comfort level	-0,2	
x_2	Environmental safety level	-0,1	
x_3	Psychological comfort level	-0,2	
x_4	Consumption level	0,2	
x_5	Social safety level	-0,1	
x_6	Competitiveness of territory	0,1	
x_7	Resource efficiency	-0,2	
x_8	Public spaces development level	0	
x_9	Infrastructure development level	0,1	
x_{10}	General emission status	0	
x_{11}	Aesthetic appeal of territory	-0,2	
x_{12}	Biospheric-compatibility level	0	
x_{13}	Environmental load	0,1	
x_{14}	Provision of labor resources	0	
x_{15}	Effectiveness use of territory	-0,1	
x_{16}	Proportion of green territories recreational purpose	0	0,3
x_{17}	Material well-being level	0,1	0,2
x_{18}	Proportion of "green" objects	0	0,1
x_{19}	Proportion of recycled waste	0	0,2
x_{20}	Effectiveness of environmental management	0,1	0,1
x_{21}	Resource-saving technologies level	0	0,1
x_{22}	Urban greening level	-0,3	0,2
x_{23}	Provision of social, cultural and sports facilities	0,1	0,1
x_{24}	Housing stock	0,1	0,1
x_{25}	Stretch of roads	0	0
x_{26}	Territory recreational potential	0	0,1
x_{27}	Increase of road transport (%)	0,2	0,1
x_{28}	Total emissions of polluting substances (excluding cars, kt)	-0,1	-0,2

The strength of the influence of factors on each other is defined by linguistic variables, which can take values from the interval $[-1,1]$.

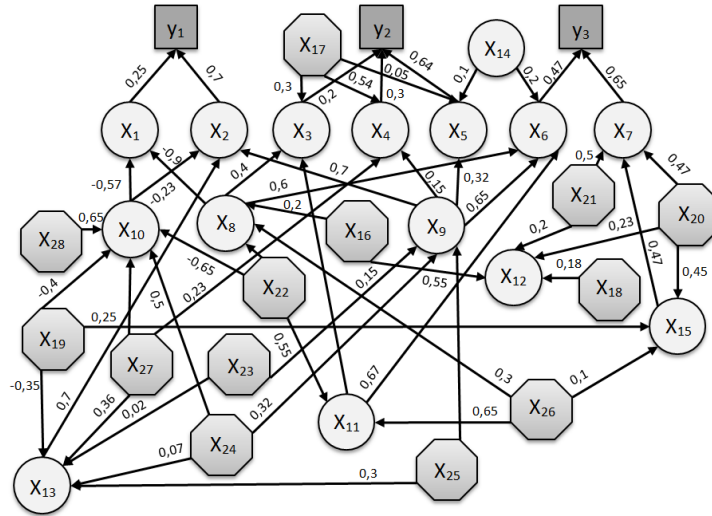


Figure 1. Cognitive map of sustainable development of Volgograd

The mutual influence of factors is defined by edge weight. For example, the value of $-0,4$ means that the factor "Proportion of recycled waste" has a significant negative effect on the "General level pollution".

2.3 Construction and Analysis Development Scenarios

Cognitive modeling provides the possibility of generating development scenarios with specified parameters. One of the main tasks of scenario forecasting is to detect factors existing in the current circumstances and situations that will create a mechanism for influencing the future state of the system.

Modeling is performed in self-development and managed development modes. The in every moment is defined as the sum of the "trend" value of the factor in the previous moment and all the influences coming from the "surrounding" factors. To determine the initial trends we used statistics (average relative values of the dynamics of indicators for 2009-2011). Qualitative assessment of trends was based on expert analysis. According to obtained results the following linguistic variables were defined:

- «no change» – 0;
- «weakly increases (decreases) » from 0,1 to 0,2 (from $-0,1$ to $-0,2$);
- «moderately increases (decreases) » – from 0,3 to 0,5 (from $-0,3$ to $-0,5$);
- «significantly increases (decreases) » – from 0,6 to 0,8 (from $-0,6$ to $-0,8$);
- «strongly increases (decreases) » – from 0,9 to 1 (from -1 to $-0,9$).

For example, the factor is "Urban greening level", its initial trend is $-0,3$ (i.e. the provision of residents of Volgograd by vegetation is moderately decreasing).

Simulation experiments carried out on the constructed model can identify factors that cause notable changes in the behavior of modeled system. Situation self-development modeling involves initial development trends preservation. It may occur that current trends develop the situation in the right direction and intervention in the course of events is not required.

In this case, the self-development forecast shows negative trends. Without active management the value of "Quality of urban environment" target factor moderately decreases, the value of "Level of social well-being" factor weakly increases, "Economic efficiency" factor weakly decreases (Fig. 2, column 3).

Managed development of the situation implies a purposeful impact on one or more factors. Changing the current factor trend that is passed to the other factors in the chain of influences, acts as management. By selecting different influence on managing factors one can generate alternative scenarios and evaluate possible solutions efficiency by proximity to the target values. Managing impacts (forced change of the initial trends of factors x_{16}, \dots, x_{29}) determine the direction of development plans correction in order to obtain stable positive performance in terms of sustainable development (Fig. 2, column 4).

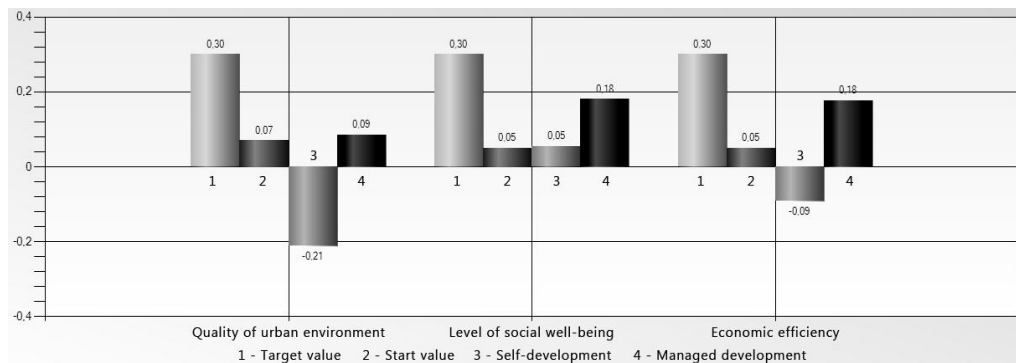


Figure 2. The values of trends of the observed factors for scenarios: self-development and managed development

3. CONCLUSION

The main contribution of this paper can be summarized in the following points:

- based on an analysis of approaches to decision-making on implementation of city development strategic programs, the conclusion about necessity of justification of decision efficiency has been made;
- the conditions of choice of urban development variants have been formulated in accordance with the principles of sustainable development;
- the model of "sustainable development of the city of Volgograd", which is applied in research of urban development alternative scenarios, has been developed. The results have been used in adjusting plans of strategic development of Volgograd in order to compare alternative programs and determine stable positive performance conditions in terms of sustainable development.

The presented results are an intermediate stage in the urban development peculiarities study. Further research is aimed at development and practical implementation of evaluation models based on cognitive maps and their introduction in intelligent decision support system in the sphere of urban planning project.

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EFFECTS AND USAGE OF EMOTION AWARE ROBOTS THAT PERCEIVE HUMAN VOICE

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ABSTRACT

Emotion perception is the process of perceiving other people's emotions based on their facial expression, movement, voice and other biosignals they emit. But, because of the vague definition of emotions, their function and manifestation are not strictly defined. Consequently, in Information Computer Technology (ICT) automatic emotion perception is hard problem that is still open. The questions that arise are weather there can exist an automatic calculation of people's emotions, how precise they are and witch are the most important human features that can be included in the perception process. Here, evidence that the robot emotion perception resembles the human emotion perception will be given. This paper also presents a discussion about our and similar robots that classify human emotions in positively and negatively evaluated emotions. Making robots that perceive emotions arises many social and psychological questions. Some of these questions are considered in this paper. Evidence that the robot emotion perception resembles the human emotion perception will be given.

KEYWORDS

Emotions, Robotics, Human-Robot interaction, Psychology, Sound Perception

1. INTRODUCTION

Information Computer technology today has a great influence in people's lives. Considerable part of human population has been in contact with a computer, mobile device or some other "smart" machine. One new and popular technology design that is in expansion nowadays is a robot. Robots are hardware machines that have a programmed processor that controls their existence.

In recent years lots of robots have been designed. By one possible classification of robots there are mechanical robots, mobile robots, nanorobots, humanoid robots etc. Mobile robots can move in the environment, while humanoid robots tend to look and act (partially) like humans. Sony AIBO robot, Zeno, HPR-45 and ASIMO robot are only few examples of existing humanoid robots. In general, robots can come with the looks of a pet (dog or cat), a human (cartoon character, man or woman) or part of a human body (arm, legs or head).

From a robot's usage point of view, there are industrial robots, personal robots and military robots. Personal robots can be used for entertainment, educational purposes, healthcare etc. So, there is variety of possible places in the life where ICT through the field of robotics can be seed. In the future robots can be seen as part of everyday human's life. In general, being surrounded with robots, humans should interact with these machines. Consequently, the main feature of robots (especially personal robots) is their interaction with humans. The field of computer technology that considers this feature is Human-robot interaction. Human-robot interaction is manly the topic of this paper.

We are considering the human-like interaction with robots as a final goal. Human's interaction with robots should be based on natural conventions like natural language or social rules (facial expression, mimic and body movements). Robots should no longer be just indifferent logical machines, but they could become capable of understanding human's feelings, needs and desires. In this paper we are considering one of the most important information that is needed for robots to understand humans: emotions. In the other direction, the influence of emotion perception on human living is considered.

The research presented in this paper will be exposed in the following sections. The first section describes how robots can perceive sound. In the following section, elaboration of robots that perceive emotions is presented. Also the robot used for this research is introduced. In Section 3.2 we present the experimental results for comparison of human's and robot's emotion perception. Next, a discussion about the influence and effects of these robots in the environment is given. In the end, the future work with the robot and its interaction with the environment are analyzed.

2. BUILDING ROBOTS THAT PERCEIVE SOUND

Human-robot interaction is a two way communication. In one direction robot perceives humans' actions and acts accordingly. In the other, robot's behavior is perceived from humans and is acted upon. Many signals that carry information about human's state and behavior are emitted by humans. These signals can be received and measured with appropriate devices. For example a camera can be used by the robot to gain a visual image of humans in the interaction. Furthermore, human sound can serve as a signal from which information about the human speech and voice in general can be perceived by robots. Many other signals exists that carry information and that can be used in many different situations. Robots that can perceive sound should have an input device that records sound signals from the environment. These signals are indirectly signals emitted from humans. As a consequence, the sound should be accordingly preprocessed. The general goal of robots that perceive sound is to extract the most valuable sound features that are needed for the robot to process. There are many different sound features that can be extracted from sound signals and several algorithms for their calculation. Usually for an action to be taken, a robot uses only some of those features.

As stated previously, in this paper we are primarily concerned with the information for human emotion. Which signals are relevant for emotion perception is an important question for building robots that can recognize human emotions. New psychological theories state that emotions can be manifested by subjective experience, peripheral physiological reactions and motor expression. Humans show their inner emotions in several ways: through mimic, using movements, gestures, but through human voice as well. Indeed, speech possesses features that are indicators of human emotions. According to Picard certain emotions are correlated with the values of some sound features extracted from human speech like pitch mean, amplitude standard deviation or tempo. For example, when people are happy they speak faster and have lower pitch. However, because of the human's individual and cultural differences there could be some differences in the emotion manifestation in the human speech. These are caused by the environment and genes factors. Also, according to some psychological researches, one person could have many emotions simultaneously, and as a result different people perceive his/her emotions differently. This is big problem named emotion ambiguity. Because of these and other difficulties emotion perception is still an open problem. In computer science and information computer technology the emotion perception problem can be narrowed down to a classification problem. This implies creating an automatic emotion perception system that chooses one class of emotion.

So far, information from speech, facial expression and brain activity has been used for automatic emotion perception. Although speech and sound signals are good candidates for perceiving emotional reactions, there exists not satisfactory accurate automatic emotion perception software.

3. BUILDING ROBOTS THAT PERCEIVE HUMAN EMOTIONS

As disused in the previous section, robots that perceive emotion from human speech can be built. These robots must have an appropriate hardware. In addition, their software must include automatic emotion perception system that decides on human emotions. This is not an easy task, since there are around twenty different types of emotions. These emotions can be put in the two dimension evaluation-activation space. Emotion activation shows the degree of emotion expression form low to high.

On the other hand, emotion evaluation shows the color of the emotion from negative to positive. There are other ways of representing emotions, but besides the classical categorical view, this is mostly used in automatic perception. This is because a few classes of emotion are easier to perceive. Researches in the field of Human-robot interaction have some positive examples of robots that perceive emotions. Here, some of them are presented.

In 2011 the Pet Robot was created. It is a personal robot capable of detection and performing different reactions based on five different emotions: happiness sadness, fear, anger and neutral. The robot reaction is displayed on a LED display. Also, some previously recorded sentences that match the emotions are played. The reported accuracy of this system's emotion classification is 80%.

Another example of practical usage on emotion classifier in robotics is presented by Charles Babbage who developed robotic co-driver and navigator. This robot detects the driver's emotion and reacts accordingly using the following features: tempo, pitch and emphasis and features from human's movement as well. The classifier implemented in this robot works with accuracy of 70%.

In the next section a robotic system built for this research is presented. Even more so, a focus is brought to its evaluation and effect.

3.1 Introducing a Custom Built Robot and Exploring its Emotion Perception

In many cultures, if someone is in need of help, the other gives him/her a hand. This is just one possible human's behavior that will be used for this research. We created a human-robot interaction application called "Wordless call for help". A robotic arm, Lynx 5, developed by Lynxmotion is used. It should straighten the hand, go in a handshaking position and put the arm back in the starting position when the speaker has negative emotions expressed by his speech. This actually simulates the giving hand gesture. The automatic emotion evaluation system built in the robotic arm gives the most probable emotion evaluation (positive or negative) from the features extracted. Sound features used by the robotic arm are the one that are found important in some psychological researches for human emotion perception.

After building the robotic arm sensitive to emotion expressed by human's speech, the test phase is conducted. In the test phase a human sound of the interaction with the robot is recorded. In the same time the reaction of the robot is captured. For system estimation, another person evaluates the speaker's emotion simultaneously and without visual contact with the robotic arm. The evaluator gives a signalization of his/hers perception on the evaluation of the speaker's emotion. For each interval with duration of two seconds decisions for the evaluation of the speaker's emotion from the robotic system and the evaluator are taken. Each interval can be evaluated either positive, negative or as a non-voiced interval. With this information gathered in the testing phase for approximately 5 minutes of real-world conversation of the speaker, evaluation of the robotic system is done.

Some statistical measures for measuring the performance of the robot's classifier in relation to the true evaluator's perception are calculated. Positive emotions are classified with greater precision than negative emotions. More than 80% of the intervals that describe positive emotions are captured by the robot. Negative emotions have a recall of 62.2%. The overall accuracy for all non-voiced intervals is 73.14%.

Evaluation of similar systems that do not have the property of perceiving spontaneous and natural speech gives accuracy between 75% and 90%. Considering that here the data is real-world, the percentage of the accuracy shows great accomplishment for the automatic emotion perception system used in our application.

3.2 Comparison of Human and Robot Emotion Perception

More important for robots that can perceive emotion evaluation is the weather their evaluation is similar to human evaluation of the emotion. Indeed, emotion perception is a complex task even for humans. Usually, a human can perceive emotions more precisely on another human if they know or are acquainted to each other. But, no matter how similar emotion expression by humans may be, there are still slight differences between emotion expressions of two different humans. This can be due to different cultural, social and other diversity issues.

In order to explore this problem more deeply, a survey is conducted on the emotion perception system. Indeed, more people were recorded expressing different emotion – positive and negative. Afterwards different human evaluators classified the recorded speech as either positive or negative evaluated emotion. This way the robot evaluator was tested. The idea of the research is to find the correlation between human evaluator's and robot's emotion detection.

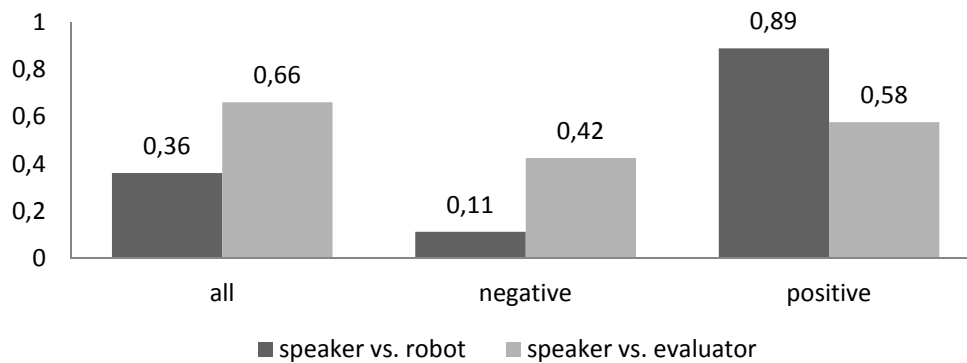


Figure 1. Emotion classification precision of the robot's and evaluator's prediction vs. the speaker's emotion evaluation.

Experiments are done with the "Wordless call for help" application. The robot's and evaluator's precision are shown on Figure 1. Great recall of 89% is noticed for the positively evaluated emotions. Unfortunately, worse results are gained for the negatively evaluated emotions. This could be because of lack of different negatively evaluated sounds in the training set for the robotic system. Unlike here, in most researches the precision is calculated for only one person. The diversity of speakers used in the testing phase, makes the problem for emotion evaluation classification harder. Because of that the precision presented in Figure 1 is satisfying for the robot. This in general shows some evidence that making emotion aware robots that function like humans is possible and applicable.

Furthermore, the calculated correlation coefficient, describing the similarity of the robot's classifier and the evaluator's perception on human emotion is 0.62. This shows a good linear relationship and similarity of the perception on emotion evaluation of the robotic system and the human evaluator. Also, the percentage of evaluator's precision is close to the precision of the robotic system evaluator.

4. EMOTION SENSITIVE ROBOTS IN THE ENVIRONMENT

The discussion made previously led us to the conclusion that robots can perceive emotions with satisfying precision and as close as humans as possible. We demonstrated one example of a robot application in Section 3. Robotics is an ongoing field of research and better accomplishment in human-robot interaction are exacted. Here we have straightened the path for building robots that can perceive human emotions. In this section the effects of building such robots are discussed. One question is how people will react on emotion aware robots.

From one point of view these robots will find its usage useful in hospitals, nursing facilities and healthcare institutions as robotic medical assistants. These can alert if a help is needed to the human with which the robot interacts. Other usage is just being a company to these people and controlling their emotional status. The goal is always to bring a positively evaluative emotion to human-robot interaction. From a different perspective, some humans don't want to recognize and appreciate the robots and their intention to improve human life. Not all humans want to have someone to detect their emotions and do something about it. Will this ruin their privacy? Either way, using these robots must always be in service of humans. A policy for usage of emotion information should be taken in consideration.

In the environment, empathic robots can be included in everyday life. In working environments, especially when working with clients and interaction with humans is present, robots can control the communication process. Empathic robots could make sure the clients are well served. In this way the administration can be controlled. Using robots sensitive to emotions in hospitals for patients that have difficult temper or in psychological institutions is one possible useful application. In order to include robots that perceive emotion in the environment, first introduction to the people must be made. People should know that these robots are present for their service. That is why ethical usage of robots must be obligatory for the robotic industry.

5. CONCLUSION

We demonstrated a compassionate human-robot interaction in practice through practical use on emotion perception in robots. Emotion perception of the robot made by human speech that is biologically driven, using the characteristics of the human sound perception, showed great precision of 72%. The relevance of the robot was evaluated with real-world speech. Also, results showed great similarity of the ability of both robot and human to perceive positive or negative emotions. This confirms the significance of robots and that they can perceive emotions similar to humans. In general, this improves the notion of human-robot interaction.

In the future, emotions differentiation in more categories would be essential for getting more precise emotion perception of the human speech. Also, more research about the emotion perception process could be made in order to increase the precision of the emotion perception systems. Bringing robots that perceive emotion in the environment should be considered carefully. Rules for their usage must be stated and introduced to humans. This arises many ethical questions that must be considered before globalizing the usage of these smart and empathic robots.

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A PILOT RESEARCH MODEL INTO ENHANCING LITERACY LEARNING IN MULTILINGUAL SUB-SAHARAN AFRICA: THE CASE OF GRAPHOGAME KISWAHILI AND KIKUYU ADAPTATIONS IN KENYA

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ABSTRACT

This paper provides an explanation on the current situation in early reading skills both theoretically and practically in Kenya with the aim of establishing how Technology Enhanced Literacy Learning can be used as plausible solution to reading problems that may develop in multilingual environments. This study examined whether GraphoGame (Kiswahili and Kikuyu adaptations) can be used as a tool to assist children who may develop reading problems as a result of exposure to inappropriate early reading instruction and conflicting language codes, problems that are prevalent in multilingual settings especially in Sub-Saharan Africa. After receiving two dictation and orthographic pretests, the children who had the lowest performance in the pretests received training time on GraphoGame for at least 4 hours. All the children then participated in a posttest intervention assessment (similar to the pretests) using the orthographic and spelling tests. The results show that there was an improvement in orthographical awareness based on the orthography (orthographical test) but are inconclusive on the spelling/dictation among the children who played GraphoGame. However, a further in depth study may be necessary to provide an understanding of how the children are learning to read and therefore help in developing better procedures to use the GraphoGame, the first being a longer training time.

KEYWORDS

GraphoGame; Reading; Orthography; Kenya, Kiswahili, Kikuyu

1. INTRODUCTION

Kenya is a multiethnic state and because of the various languages, the lingua franca is Kiswahili or at least some form of Kiswahili. English is the official language although it is important to note that, only about 15% percent of the population is proficient in English (Muthwii 2004) and these are more often than not limited to the highly educated African elite (Mazrui 2004). This leads to English being viewed by all as the most important language, considering it is the language of official communication in offices and is generally associated with affluence. Although there can be generally numerous problems that contribute to poor literacy in Kenya, one cannot underestimate the role of language in early reading instruction as a possible cause to poor reading considering children in Grade 8 cannot read a Grade 2 level paragraph in English according to a nationwide report by UWEZO (2012). Observations of early reading Grade classes during the GraphoGame research show that teachers were combining English, Kiswahili and Kikuyu languages to teach early reading in Kiswahili. The Ministry of Education, Kenya (MOE) has put in place a policy to promote early reading in local languages (mother tongue) (as these are the languages most children are conversant with when they start first grade). Practically, this policy does not work in the schools because first, the teachers have received no training on how to teach early reading in the local languages. Secondly, English is viewed as the most important language so parents insist on the use of English for early reading. Where English is used, it is more often than not below standard as it is taught by non-native speakers taught by non-natives.

On the basis of major findings of the Jyväskylä Longitudinal study of Dyslexia (JLD; for a recent review of the results of the JLD, see Lyytinen, Erskine, Ahonen, Aro, Eklund et al., 2008) - a training game has been developed to help children to learn to read (for description of the game and its development see Lyytinen, Erskine, Kujala, Ojanen and Richardson 2009). The game (known in Finland as Ekapeli) was originally intended as a research tool into reading acquisition in the Finnish language because it offers an efficient way in which the basics of reading can be observed by focusing on the main issues in learning to read i.e. the learning of connections between spoken and written language. In the process of research it was discovered that the game had the potential to prevent reading difficulties in children. The game is a digital environment that uses the phonics (agreed most effective method to teach reading instruction in both nontransparent English (e.g. Ehri, Nunes, Stahl & Willows 2001) as well as in transparent writing systems such as German (e.g. Landerl & Wimmer 2008). It systematically introduces the spoken phonemes with the written counterpart first, and then syllables which are followed by words. The child should ideally play the game for 5-15 minute periods several times a day for as long as the child requires learning the letter-sound connections (spoken communication by Heikki Lyytinen). More than 200, 000 children have played the game in Finland successfully (Lyytinen et. al, 2013). GraphoGame is the name given to all other language adaptations of this Finnish literate game. It has been developed for use by children from 6.5 years of age as research shows that children tend not to be mature enough to benefit from phonics instruction based on systematic building of connections between sub lexical written and spoken units before this age due to its abstract nature. In principle GraphoGame should be effective in providing support in teaching reading in African local languages which are similar to the Finnish language, consistent on grapheme-phoneme correlations (i.e. each grapheme - letter or letter combination - corresponds to one phoneme and each phoneme has its own grapheme i.e. consistent at grapheme - phoneme level to both reading and spelling). In Africa, the GraphoGame research was previously piloted in Cinyanja, a Bantu language commonly spoken in Lusaka Zambia and first grade children who received at least two hours of intervention improved in spelling and orthographic skills according to a research done by Chilufya (2008) and Ojanen, Kujala, Richardson and Lyytinen (2013).

2. METHODOLOGY

The participants were first grade pupils (N=111) from 1 Kiswahili speaking school and (N=85) pupils from 1 Kikuyu speaking school. N=18 children received GraphoGame Kiswahili intervention and N=16 children received GraphoGame Kikuyu intervention. However, due to absenteeism not all the data were available for analysis and comparison. In the orthography test the children were presented with a total of 80 items in the Kiswahili adaptation and 107 items in the Kikuyu adaptation. The children were required to put a circle around all items they considered orthographically appropriate items in the respective tests. The drawings started from legal/illegal letters and continue in small steps to word/nonword level. In the spelling test, the children were required to choose (by underlining or putting a circle on) the items that corresponded to the sounds they heard. These sounds of increasing difficulty starting from single phonemes and ending to words were sounded out by the teachers who had received a total of 3 hours training in sounding out prior to the tests. The children received orientation on the tests of a total of 1 hour (30 minutes each day 2 days consecutively before the assessments). The aim of the orthography test was to assess orthographic awareness of the children in print and the instructions were to identify the items (letters, syllables, words) that were correct in the particular language i.e. Kiswahili and Kikuyu. The orthography tests were scored as Correct (C) = 1 and Not Correct (NC) = -1; i.e. the children were penalized for choosing an incorrect item because, choosing an incorrect item meant they lacked orthographic awareness in the particular language. Absolute minimum score for Orthography Kiswahili -52, maximum score 28. Absolute minimum score for Kikuyu -67, maximum score 40. The Kiswahili and Kikuyu spelling tests had a total of 25 item rows; starting with letters, then progressing to syllables, then CVCV (Consonant,Vowel,Consonant,Vowel) words and CVCVCV words and were scored as Correct (C) = 1 and Not Correct (NC) = 0. From each item rows, the children were to choose 1 out of a choice of 5 items in print. The maximum score for the spelling tests was 25 and the minimum score was 0. The tests were correlated, in other words the Orthography tests 1, 2 and 3 and Spelling tests 1, 2 and 3 were measuring the same thing respectively. Orthography test Kiswahili

($p = .509$), Orthography test Kikuyu ($p = .584$), Kiswahili spelling/dictation test ($p = .522$), Kikuyu spelling/dictation test ($p = .910$).

The orthography test and spelling test Kiswahili and Kikuyu were given to the Kiswahili ($N = 111$) and Kikuyu ($N = 85$) speaking children respectively. The children were given two pretests (Orthography and spelling tests 1 and 2 (with a difference of only 1 day between the two pretests) and the post test (Orthography and spelling tests 3) after the intervention period which took a total of 5 days (i.e. at least 4 hours playing time). The tests were assessed and the low scorers (LS) based on the performance in the tests (1 and 2), ($N = 73$) for Kiswahili study and ($N = 54$) for Kikuyu study (the LS were determined by adding the total scores of each of the tests (Orthography tests separately and spelling tests separately) and then determining the means. A child who scored equal to or below 23.5 in the spelling test and a score equal to or below 12 in the orthography test was considered a low scorer in the Kikuyu study and respectively below 21.5 in the spelling test and equal to or below 4.5 in the orthography test was considered a low scorer in Kiswahili. In the Kikuyu study a group of Low-Low ($N = 16$) scorers were selected from the ($N = 54$) low scorers and respectively Low-Low ($N = 18$) scorers were selected from the ($N = 73$) low scorers for the Kiswahili group. The Low-Low scorers received the GraphoGame intervention (via cheap mobile phones) while the Low-High scorers were in a waiting list to receive GraphoGame later. The Intervention groups (GG players/Low-Low scorers) played GraphoGame for 15 minute periods 4 times a day for five days; in total they played for at least 4 hours in both studies respectively. The playing time was organized in such a way that the children played during break times while the other children (all other children in the study including the Low-High scorers) were playing outside in the school playing field.

3. RESULTS

The pre-intervention results based on the selection criteria in the orthographic knowledge and spelling show that these children are at risk of developing reading problems that stem from poor instruction and conflicting language codes. Using repeated measures MANOVAs the general results of a comparison of the means of the pretest 1 and 2 combined against the posttest 3 in the orthography test and spelling tests in Kikuyu and Kiswahili of ($N = 49$) Kiswahili (Low-High scorers) ($N = 18$) (Low-Low scorers) GraphoGame Kiswahili players and ($N = 38$) Low-High and ($N = 16$) (Low-Low scorers) GraphoGame Kikuyu players show that the children who were exposed to the GraphoGame Kikuyu and Kiswahili adaptations improved in their orthographic skills based on the orthography test assessment ($p < .001$) for both the Kikuyu and Kiswahili studies, more than the non-players. In the Kikuyu and Kiswahili spelling tests however, there was no significant change in the spelling test performance. In other words the Low-Low scorers did not catch up to the Low-High scorers in their spelling skills in the tests and there was no interaction between the players and non-players.

4. CONCLUSION

The results in this paper (although limited) provide a knowledgeable base on understanding how to improve research into early reading in multilingual Sub-Saharan settings (Kenya) where research into early reading skills is seldom conducted and/or documented. In spite of the minimal training time received by the GraphoGame players, this study has supported the expectation that GraphoGame can be used as tool to assist also Kenyan children gain orthographical awareness skills. The results show that in general there was improvement in the GraphoGame players. Moreover, the spelling test may not be the most optimal way to assess the initial reading skills in the children as it requires longer training time to assess and achieve significant progress in spelling. In addition it is not possible to be certain to what extent the GraphoGame helped the children (i.e. the children may have been motivated by just playing a game). A further limitation to this study was that the cheap mobile phones used could not store the player data for any in-depth analyses into the learning patterns during the play as is possible when using more advanced computers. Based on the fact that acquisition of reading skills in transparent orthographies is based on letter knowledge/orthographical awareness (Aro 2005) children should be taught reading skills by starting from acquisition of the letter-sound knowledge i.e. using phonetics as happens in the GraphoGame training. But the Kenyan situation is far more

complex. The children speak various mother tongues in their homes. And even where they speak Kiswahili, it is usually a form of Kiswahili that is not the correct form of correct Kiswahili. It is a form of street slang known as Sheng' (for more details see www.theteamkenya.com). Hence in reality these children are learning 'Kiswahili Sanifu' i.e. the correct form of Kiswahili (that is used in GraphoGame) as a new language (with a new structure). Similarly, where they should be taught in Kikuyu, teachers are switching to English due to pressure from parents and societal expectations. When the language situation is so complex how can GraphoGame be used to teach reading skills optimally? The teachers influence should not be underestimated in the normal classroom situation and consideration should be made to use GraphoGame as a tool to train the teachers as well in appropriate early reading skills teaching instruction. In conclusion, further better designed research with more appropriate devices (with larger displays and storage capacities), more exposure time, a comparison of GraphoGame and another educational game and a larger pupil sample should be undertaken to establish how GraphoGame can be incorporated into the classroom setting used in enabling the pupils acquire the appropriate reading skills in initial literacy and transfer skills necessary for them to switch to learning in English at the beginning of the fourth grade.

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SIMPLICITY – DRIVING TECHNOLOGY ADOPTION OR FEEDING UNCERTAINTY? EXPLORING CONSUMER CO-PRODUCTION OF NFC SERVICES

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ABSTRACT

This paper questions “simplicity” as a taken-for-granted critical factor in explaining successful technology adoption. Findings from an empirical study of consumers engaged in NFC-based service co-production are presented. The observed interactions between users, smart phones and programmable NFC tags illustrate how users explore new functions and appropriate phones. They also reveal a tension between their experiences of simplicity and uncertainty when taking the contactless services in use.

KEYWORDS

NFC, smart phone, field trial

1. INTRODUCTION

Today’s information society asks for simplicity and efficiency as interactions and operations become ever more entangled and complex. Technical as well as business convergence of information systems, telecommunications and media production generates complex structures. This complexity can be met by “smart” tools and devices that simplify tasks, minimize effort, reduce complexity, and improve efficiency. Hence, it has become a prevailing dogma in technology innovation and marketing to emphasize “simplicity” as a key component in product presentations and market campaigns, to drive consumer adoption of new technologies. The underlying notion is that intuitive user interfaces and simple functionalities are more “inclusive”, addressing the various needs and competence levels of most user segments – from the tech savvy to the laggards.

Thus, NFC (Near Field Communication) services should be a perfect fit. This short range wireless technology, embedded in recent smart phones, enables immediate links between the physical environment and digital content and services. As SIM cards and subscriptions hold personal information, NFC services might be personalized and become context sensitive, transforming the mobile phone into a reading or writing device, a bus ticket, a credit card, a loyalty card, etc. Consumers can even produce their own services and access them from stickers placed on private belongings (this latter functionality will be examined in the paper). Developers and marketers use slogans like “One click away”, “Tap to pay”, “Touch and go” when referring to NFC capabilities, signaling the apparent lack of effort involved in accessing new services. Consumers also claim, when asked, that NFC services are appealing due to their simplifying capabilities (Deuffic, 2011; Gaus, 2011).

The aim of this paper is to question the taken-for-grantedness of the “simplicity notion” as a critical and sufficient factor in explaining successful technology adoption. This is done through an empirical study of consumers engaging in NFC-based service co-production. The main goal of these activities is to explore whether the co-production of *personal services* in some way can fuel a sense of *relevance, familiarity and trust* in technologies that would otherwise remain irrelevant, unfamiliar and distrusted. One underlying assumption is that developing personal and hands-on services reduces technology anxiety and perceived

distance due to the proximity and interaction obtained in the person-technology relationship. By actively engaging with technologies, users can explore new and creative functions and appropriate phones in highly individual manners, tailored to their own needs and priorities (Barkhuus & Polichar, 2011). In this case study we explore the interaction between users, smart phones and programmable NFC tags that enable the activation of personal services.

2. THE NFC TEST BED

NFC City is an open innovation project. Its key feature is the multi-service trial held in a geographically defined area – the University of Tromsø campus in Northern Norway. This trial serves the overall goal of the project, namely to stimulate NFC ecosystems and produce consolidated knowledge on technical, business and consumer oriented NFC issues. The multi-service trial provides a fruitful test bed for piloting a diverse range of new NFC services that rely on three NFC modes: 1) the card emulation mode for sensitive information, transaction and authentication, 2) peer-to-peer communication that enables two mobile phones to exchange information, and 3) read/write mode that enables information services. The services have been developed by the project partners and work as standalone applications and in coexistence.

The information services are mostly implemented as single tags placed in strategic spots on the campus area, enabling access to updated information about cantina menus, campus events, timetables, recent news from the student paper, etc. In addition there are social networking register-services (through Foursquare check-in), service endorsements (through Facebook likes), and an NFC fitness guide. A bus ticketing service, an on-campus payment service, and a house key service will be introduced during the last months of the trial.

The trial includes 50 pilot user, all students, equipped with NFC enabled Samsung Galaxy S III smart phones. The clustering of NFC services, access points and users enable a simultaneous study of a wide range of aspects related to service adoption and eventual behavioral change. The trial was initiated in September 2012 and will end in November 2013.

3. PROGRAMMABLE NFC TAGS AND SERVICE CO-PRODUCTION

The main question guiding this paper is whether “simplicity” – hiding the real and underlying complexity of collaborative systems and actors (Woods, 1996) – should be the guiding principle of technology and service development. The obvious answer seems to be yes. The success of Apple has mainly been attributed to the simple and intuitive design and user interface of Apple products. At the same time, this characteristic is not necessarily sufficient. Simplicity may not be enough to utilize the full potential of multifunctional technologies such as smart phones. Although adoption rates may be high, this does not indicate whether all (or most) user segments are exploring and using the full capacity of their devices and native features or third party applications.

Even though the users in this trial study are young, have volunteered for the trial, have been informed about the NFC technology, and have a 24/7 help desk at their disposal, many have been hesitant to use services. In this particular study we have thus “pushed” (or nudged) pilot users to be more active in terms of exploring the potential of NFC. To many of the users, there is a great leap from using basic features to exploring more advanced aspects of their smart phones. Hence, a set of programmable NFC tags was given to the pilot users for free in the early phase of the trial period, and some training was offered. These tags are capable of holding instructions for controlling phone applications, sending messages, accessing websites or social networks, etc. The tags used here are stickers holding 144 bytes memory capacity – a low-end product, but still useful for our purpose. The initial aim of introducing tags to the pilot users was to provide extra services for the trial and to motivate users to “get to know” the NFC technology.

When the tags were distributed, some users could not wait to get the tags, while others were more reluctant and showed less interest. The former group immediately started programming tags, and the next day some self-made services were proudly presented on a project-specific Facebook page. The latter group of less interested users needed more information, which they got. Still, more than half of the users did not show any interest in self-programmable tags. To support them we decided to offer short training sessions, leaving us another opportunity to get direct user feedback.

During these training sessions ideas for new services were shared among the participants and they got hands-on experience. Most attention was given to those not yet familiar with the technology. Our strategy was to let them tell their “tag stories” and pose questions based on their eventual trials and failures. Altogether these dialogs revealed a series of everyday situations to which the programmable tags could be applied. The ideas that seemed attractive were further elaborated. The users were guided step-by-step through the downloading of NFC programming apps and the guidelines to create their first tag. The second tag was created with less assistance and ideas for new services popped up. Co-production of services continued on a Facebook page shared among the pilot users and the project staff. The possibilities to easily set the phone in a specific mode seemed most popular, e.g.; tags placed at home that switch to wi-fi and download the owner’s Facebook page, tags placed in the car that switch from wi-fi to the cellular network and Bluetooth, and connect the phone to the car network. SMS-based services were also developed, such as standard queries sent to the bank to get the balance, as well as a “start the heater in the car”-tag.

4. DISCUSSION

The training sessions uncovered *enthusiasm* for the services as well as *frustration* and *uncertainty*. The users seemed to be fascinated by the smart phone, its multi-functionality and the NFC features, but they were still without any clear understanding of its potential and limitations. This became obvious when the users explained why they came to the sessions to learn more about the tags. A girl stated that: “I did try to program a tag but I left it because I became unsure”. The uncertainty was linked to the fact that she had her “entire life” stored on that phone. So much valuable information was contained in the device and she was afraid that some of it could incidentally be transferred when the tag was touched, or that data unintendedly could be downloaded to her phone. These concerns were voiced when programming a tag for bank account queries.

This uncertainty can be attributed to the *relinquishing of control* that happens through the automation following contactless interaction. Security concerns are well known from acceptance studies of NFC technologies, in particular those involving payment (Eze et al. 2008; Shin, 2009). However, hands-on experience and the problem solving setting seemed to pay off. Specific “problems” (which were not too big) were defined by the users, and they were allowed to fail with no risk of damage. Finally, they felt confident in solving the problem there and then. One might say that they improved, and in some cases repaired, their own “mental model” of how smart phones and NFC technology work.

Consequently, these sessions of supporting users (both advanced users and novices) in programming their own tags, have provided us with some new insights that should be attended to. First of all, the act of *engagement and learning* found in the study is in no way surprising. The link between hands-on experiences and learning is well founded within pedagogical disciplines. This knowledge seems however not to be utilized to ease the adoption of new technologies. We suggest that more effort should be used to uncover people’s mental models about technology, and use these to tailor “early hands-on learning efforts” to secure sustained interest and deeper involvement with devices and services. This partly counters the prevailing situation of “going digital”. Instead of only meeting faceless e-stores when purchasing phones and applications, users could for example be introduced to (physical or virtual) “hubs” where they can meet peers and experts in the early stage of adoption.

Secondly, the notions of *familiarity and trust* seem to be essential for smart phone and NFC adoption. One perspective that addresses the relations between technologies and users is the *domestication theory* (Silverstone & Hirsch, 1992; Lie & Sørensen, 1996; Berker et al. 2006; Hynes & Richardson, 2009). The main tenet of this perspective is that people need to “tame” technology and “make it their own”. One of our female pilot users described her tags like this: “I have made an app [tag] that turns on the alarm [on the mobile phone] at 6 AM – in order to reach the early morning job shift that starts at 7.00, and another one that turns on the alarm at 8 PM – to make me catch a nap before the late evening shift. Both tags are labeled and placed on my bedside table.” In this way technology becomes familiar and part of everyday routines. It is made meaningful and does not only remain a cold or dormant technology with little significance to its users. The findings in this case study can be tested further and theorized within this perspective.

Thirdly, the element of *active users and co-production* introduces new aspects to the relationship between commercial products and its consumers. The *prosumption perspective* can be employed to get a deeper insight into how relations and loyalty are built and strengthened between products and co-producing users.

This concept was introduced by Alvin Toffler (1980) and addresses the new relations and roles formed in the market. The prosumer is seen as a “proactive consumer” or a “producer-consumer” who is actively involved in various stages of the value-chain; often improving design of goods and services, and contributing to content production. The capabilities of the NFC technologies to connect the digital and physical worlds enable new co-production arenas to occur and actualize questions on (mutual) benefits, incentives, etc.

Finally, more analyses will be performed to theorize and validate these findings. This includes other data sources available to the trial study, such as service usage loggings, surveys collecting feedback from the pilot users, walk-along interviews, and observations of usage situations. We will then be able to ground our arguments more convincingly and also make comparisons with other studies addressing users’ efforts in taking advantage of, and overcoming mental and structural barriers to, new technologies.

5. CONCLUSION

When exposed to simplifying tools some react with uncertainty and hesitation while others become engaged and confident users. This study suggests that these concerns reflect the users’ mental models of smart phones and wireless technologies, and also the smart phone capabilities of holding sensitive and sentimental information. Hands-on experiences in controlled problem solving environments seem to reduce fear of failures and motivate for adoption of new technologies. More effort should be done to understand 1) how the smart phone is used and integrated in peoples’ general conception of media technology, 2) how creative engagement with NFC services can spur enthusiasm and relevance, and 3) how smart phones and NFC services together can become entangled and routinized in the everyday life of consumers. The learning perspective, as well as the domestication and presumption perspectives, seems promising as frameworks for further studies.

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LIVING BETTER, LIVING INDEPENDENTLY THROUGH E-ASSISTED LIVING TECHNOLOGIES

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ABSTRACT

Widespread demographic changes indicate an aging population in developed societies. Ageing is associated with the onset of conditions which impact on health and the continued ability to live independently. International governments are concerned at the financial and social implications of this trend and are urgently seeking affordable solutions.

This research-in-progress paper describes early findings from research investigating new sustainable consumer generated business models for electronic Assisted Living Technologies (e-ALT). The paper includes a synthesis of the existing barriers to the development of e-ALT in the relevant literature, then summarizes a market analysis, a street survey, focus groups, and in-depth interviews with industry leaders.

Initial findings suggest that there is a major disjoint between consumer needs and wants, and the existing provision of products and services. Barriers to consumer satisfaction are highlighted, together with discussion of consumer generated solutions to these barriers and how these might be implemented. Changes to allow new business models are proposed.

KEYWORDS

Assisted Living Technology; Business Models

1. INTRODUCTION

In the current economic conditions in the UK austerity is common and government funds for health and social care are restricted or reducing. This presents a context within which the recent and forecast trend towards an aging population is causing governments some consternation of how to best provide opportunities for independent living, and how to afford them. There are well over 21 million people aged over 50 years in the UK, a third of the total population and, for the first time in history, there are now over 14 million people in the UK aged 60 and above (Office of National Statistics, 2011). An estimated 33% of people aged 65–74 and 46% of those aged 75+ in the UK have a limiting longstanding illness (Age UK, 2010: 25). It is now widely accepted that Information and Communication Technology (ICT) applications can provide new ways to help older people to live independently (European Commission 2008). The uptake and use of these products and services is, however, far from extensive or sustained. Both uptake and use are likely to be influenced by a variety of factors, including design factors and usability, individual attitudes such as perceptions of need for, and effectiveness of such products, fears surrounding use of them, and societal attitudes towards assisted living technologies. It is clear then, that merely creating innovative, ‘good’ products that are fit for purpose may not be sufficient to transform the sector and develop a sustainable market to support independent living.

This paper describes a UK research project which aims to identify:

1. barriers to the adoption of electronic Assisted Living Technology (e-ALT) products and services by Younger Older People (YOP), aged between 50-70, as potential or actual purchasers or users of ALT
2. solutions proposed by consumers to overcome these barriers
3. business models that will address the existing gap between supply and demand for e-ALT provision.

A synthesis of key cross disciplinary literature is first presented, followed by a description of the approach adopted to gather data from all key stakeholders, including a street survey, consumer focus groups, in-depth interviews from a cross section of senior managers from industry, and finally co-creation workshops with industry representatives, consumers and potential consumers to identify solutions to the barriers identified. Findings from the research are summarized, followed by a preliminary discussion of the implications for potential new business models, and areas for further research are suggested.

2. LITERATURE REVIEW

The literature review focuses on barriers to adoption of ALT, and was both broad and cross disciplinary so as to not exclude important factors that may also influence the more focused e-ALT later in the study, however, only a brief summary can be included here. Several authors have noted that the evidence on which to base an ALT selection and advisory process is sparse (Brend, Van Deer Pijl. and De White 2009), (Clark and McGee-Lennon 2011). Martin et al. (2011: 255) also summarize the need for “additional data that illuminates consumers behaviour, satisfaction and AT use” to create models to support best practice delivery.

Brownsell (2009) identifies 10 different terms that could all be used interchangeably to describe telehealth interventions, and there is additional terminology encountered, but the term “assisted living technologies” (ALT) has been adopted as a working definition, as research has shown that terms such as “assistive technology” and “telecare” can be confusing and are not understood by service users or consumers (Which 2009). Of all the barriers to adoption discussed, arcane or confusing terminology can also be added.

The review highlights what are seen as the most important or most prevalent barriers to adoption, including different types of ageing, including biological, cognitive and social ageing. Biological ageing is the progressive decline in physiological function and physical and cognitive ability (Adams & White, 2004).

Table 1. Barriers to adoption of ALT

perceived lack of need for ALT
lack of information/awareness of products/solutions/services
lack of information/ awareness of routes to purchase
stigma associated with using products (frail, old, dependent)
differences in cultural views about acceptability of ALT
lack of acceptance of ALT
not wanting to be ‘assessed’
lack of support in choosing the best product to meet the customer's needs
cost/affordability
lack of information/awareness of direct payments and personal budgets
limited knowledge of how to use the technology
lack of training in how to use the technology
complexity of some devices/ease of use
technical issues that affect performance/reliability of the ALT
lack of confidence/trust in the technology
lack of confidence in risk management both at an individual and service level
lack of regulatory standards
worries about maintenance and accountability if the technology goes wrong and after sales back up
worries about confidentiality of personal data, especially in sharing data between organizations
ethical issues, particularly in relation to privacy and control of monitoring technologies
fear of a reduction in human contact
lack of awareness amongst social and healthcare policy makers
lack of awareness of health and social care staff about ALT
lack of education and training for staff
lack of vision/ poor integration of technology into routine care/services
poor aesthetics and design issues
design issues that affect performance of the product

Social ageing has been defined as “the norms, values and roles that are culturally associated with a particular chronological age.” (Giddens, 2006) and cognitive age “is the age one perceives one’s self to be and is considered an element of self-concept” (Stephens 1991, cited in Age UK, 2010). Most of the previous research on the use of assistive technology focuses on older, frailer users rather than younger older people (YOP). All the research points to the fact that in order for technology to be used, it needs to be perceived as relevant to the everyday lives of older people.

3. METHODOLOGY

The research question seeks answers as to what strategic interventions may be necessary in order to encourage a sustainable consumer market for electronic Assisted Living Technologies. In order to achieve this, the review of the related academic and also the ‘grey’ literature highlighted a series of barriers to the adoption of ALT. A market analysis was conducted by a project partner, a consultancy specializing in market research in the aging sector, and this confirmed that in the UK the statutory sector (particularly the National Health Service and local government care services) was currently a dominant influence on the market. In addition, the scope of the wider ALT sector was too broad to make the research achievable within the available resources. Consequently while the early research included the broader definition of ALT, the latter elements was restricted to focus particularly on the electronic ALT sector (e-ALT), which includes:

1. Environmental control technologies and Services
2. Tele-health and tele-care technologies and services
3. IT based devices and services used to support health and wellbeing (e.g. health apps.)

In order achieve a clearer understanding of the existing position, triangulating methods were used to confirm and further explore the barriers identified, and also to gain an appreciation of the industry perspective.

Four focus groups were held in different locations in the UK, for users but not purchasers, purchasers but not users, both purchasers and users, and potential purchasers. A street survey of 500 respondents was conducted to further investigate barriers to adoption of ALT. Consumers were asked to rank the importance and influence of the barriers and enablers to purchase and use of ALT products. Further, a workshop with 5 companies represented, an additional 5 telephone interviews with different firms, and a follow up questionnaire of all 10 companies were used to gain the views of a cross section of industry participants. This was followed by a series of 12 in-depth interviews with senior managers representing a cross section of the ALT industry: small, medium and large; design; manufacture; retail, e-commerce and third sector. These managers were questioned about their views on the existing ALT markets, and how they saw the future.

4. RESULTS

There is insufficient opportunity to give detailed results here. However, a summary of key findings follows:

Consumer Street Survey: the top three barriers that were ranked as having the strongest influence for the 50-70 age group (YOP) were: cost; knowing how to choose what to buy; and a lack of awareness that a product that might help exists. The top three enablers were: belief that a product would really make a difference; a feeling that costs are affordable and worth it; and a belief that the product would make life safer at home. The data suggests differing perceptions and responses between experienced, new and prospective consumers.

Focus Groups: overall, there was a lack of knowledge and awareness regarding assistive technology.

Participants also felt there was a lack of information available which was a significant barrier to purchasing such products. Many products were linked to stigma, and products did not always meet functional needs. People were concerned about the quality of unknown products, and if they would be getting value for money.

Industry Perspectives: generally, there was strong consensus within the industry group that lack of awareness is a major barrier to the uptake of ALT. Awareness-raising around the existence, need for, and benefits of ALTs must become an important area of activity for firms. Key questions to address with potential ALT purchasers could be: what media they regularly use in their everyday lives which could be used by firms to distribute information and promote ALT products and services; in what areas of their lives would they use technology if it were available; what sort of information they would find useful to help them choose between ALT. Assisting industry in understanding users' views on where and how ALT services and everyday services should interface in order to meet their needs and help them feel connected to their community is also a potential area for development. Another area in which industry participants may be helped to address barriers is in demonstrating the business case for and economic benefits of ALTs.

Co-creation Workshops: here participants were asked to create potential solutions to the identified main barriers to adoption of e-ALT. Key suggestions were: 1. improved education and information as to what 'solutions' in terms of products and services were available, and how to find them; multiple access points for information to make it easily available 2. improved design to make ALT "desirable" rather than the more typical stigmatizing 'look' 3. develop confidence in the ALT through standards, brands, demonstrator options, returns policies, and independent reviews.

5. DISCUSSION

At this stage of the research-in-progress paper much of the early data gathering has been completed, with much corroborating evidence from the different stakeholder respondent groups to indicate that there is a clear disjoint between current and potential purchasers and consumers of e-ALT on one side, and designers, manufacturers and retailers on the other. Analysis of the in depth interviews with senior industry managers is still in progress, but already there are some clear themes developing about the need for new business models.

Currently the industry is dominated by the statutory sector, the NHS, and local government care services. This has had the effect of dictating ALT design based around safety, durability and often (high) visibility, rather than adopting a more user centered, universal design focus which would be more attractive to users. It further causes industry to organize around "selling" into governmental, or clinician buyer groups, whereas what will be required will be more of a "marketing" approach where there are more diverse, scattered and numerous customer segments. In addition potential customers and consumers will need to be informed, and persuaded of the availability and benefits of the e-ALT products and services that will provide solutions to the difficulties of living independently for the ageing and disabled.

There is a need for 'normalization' of much of the technology, in order to overcome potential customer ignorance and uncertainty. An example of this is being piloted by a large UK utility company where familiar technology is being extended to help monitor health and wellbeing in a very low key manner.

In order to make a significant impact on the market there will be a need for "systems integrators", or service integrators. These organizations will provide a critical stimulus for the market by 'bundling' products and services together to provide the level of service that small and medium size companies would struggle to provide on the type of scale required. A strong and consistent theme from customers was the need for confidence and trust in the products and services provided, with the ability to try, be advised, and return if faulty or inappropriate to their needs. Large systems integrators can provide the "brand" that often serves as a proxy for 'standards' and trust, and they can liaise with suppliers of the 'bundled' products so that the customer has confidence that the solution provided will satisfy their e-ALT needs. Analysis of the interviews with industry leaders is continuing, with the intention of validating the findings with industry experts.

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Reflection Papers

FROM SLOW FOOD TO SLOW TECH: A REFLECTION PAPER

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ABSTRACT

Increasing challenges are facing the information society, particularly in terms of its sustainability and continuity. Human beings are finding it more and more difficult to cope with the accelerating speed of information and communication technologies (ICT). Society has been seduced by a rapid pace of development of ICT, progressively celebrated year on year for its growing speed and power. This reflection paper proposes a new way of thinking about ICT in the future: a slower, more careful, more considered, and more ethical manner (a slow tech approach). It concentrates on the need for slow tech: ICT that is good, clean, and fair. It then provides some additional reflections on how such an approach could be developed further.

KEYWORDS

Clean, fair, good, information and communication technologies (ICT), slow tech, speed, time.

1. THE INFORMATION SOCIETY AND ITS CHALLENGES

The use of computers has grown rapidly throughout both the late 20th century and the first decade and a half of the 21st century. Technologies have converged, become smaller, and have been miniaturised. ICT is now embedded in other forms of equipment, and is even being implanted inside human beings (Patrignani, 2013). These technologies can be described as constituting a “Global Mind” (Gore, 2013).

A greater level of wisdom is required to face the contemporary challenges that exist in the information society. Today, human beings are learning that new – social and societal – forms of innovation are needed (Von Schomberg, 2011), for example, to compensate for the wide-scale proliferation and adoption of ICT. People must learn to design and handle with care the incredible forms of power that lie in their hands. A major challenge is the preservation of the planetary environment (Whitehouse et al, 2011).

This reflection paper highlights a number of the challenges posed by today's technologies. It attempts – in advocating a slow tech approach – to respond to three essential questions: Is today's approach to ICT fair? Is it desirable? And, ultimately, is it sustainable? Since an immediate response to these questions is unlikely to be positive, there is a pressing need for those who research, study and work in the ICT field to find new ways of designing, manufacturing, deploying, and “retiring” ICT products and services. As a result, a set of useful guidelines may be provided to ICT designers, ICT companies, organisations in general, and society's policy-makers.

2. THE EFFECTS OF ICT ON HUMAN DEVELOPMENT

In recent times, information sharing and transmission have modified substantially notions of both space and time. In the early 21st century, in particular, people – often in the west and north, but also increasingly in the south and east, in Brazil, Russia, India, China and South Africa (the BRICS countries), and even at the “bottom of the pyramid” (Prahlahad and Hart, 2004) – have developed a sense of the rapid expansion of information availability and use. Yet people's capacities to multi-task, in order to cope with this growth in data processing, remains a considerable challenge. People are also challenged by the growth in the complexity of data processing, and in the quantity of information, together with uncertainties about its reliability and relevance.

Today, ICT is changing very fast. It contributes to altering both human beings' ways of doing things as well as their perception of who they are. Overall, the natural rhythm of human life takes place at a rate that is both different from, and slower than, the processing and data transmission speeds of computers. Personal computers now run at speeds of several gigaHertz a second, and a local area network in the home at 10 to 100 gigabits per second. Yet, the cognitive capacities and competences of human beings are in the order of hundreds of bits per second (Patrignani and Whitehouse, forthcoming).

How human beings perceive time is also changing dramatically. Computers certainly speed up the transfer of data. There are at least two ensuing challenges. First, the urgency, importance and time over which specific information is needed all modify how data are stored. Data storage in the long-term is thus facing a number of problems with relation to the time-period over which it is required. Like crops and seeds, the long-term preservation of literary, artistic and musical masterpieces remains as important as the archiving of business data. Second is the quantity of data (Big Data) that needs to be stored at any one time for processing purposes (Op cit., forthcoming).

Yet all these rapid changes that are taking place within what we call the information society are, ironically, acting as an encouragement to consider a set of guidelines on how to act slower and be slower – slow-tech. It is now critically important to focus on the ways in which processing power and storage could be used to improve the quality of life, well-being, and sustainability. Such guidance should help human beings to live at a pace that is more reflective of their needs and of their ability to satisfy these needs appropriately.

3. ON THE SPIRIT UNDERLYING THE SLOW FOOD MOVEMENT AND ITS RELEVANCE TO TECHNOLOGY

The international grassroots organisation called Slow Food was founded in 1989. Its aim was to counter “the rise of fast food and fast life” (Slow Food International, undated). The movement launched a reflection process which covers the entire food-chain. It focused on the idea that food must be good, clean and fair.

The slow food movement's founder, Carlo Petrini, describes slow food as food that must be good or taste good, and must be a pleasure to eat (Petrini, 2007; 2011). Food that is good is often based on local history, tradition, and recipes, and its products are chosen according to quality criteria. The food should be produced in a way that respects the environment, and promotes biodiversity and sustainability, i.e., it must be clean. Its cultivation and production must also respect the rights of farmers. It must be fair, i.e., it must be just or equitable vis-à-vis those who produce it. Such food is thus good, clean and fair.

In a similar way, a slow tech approach could also start with a reflection on the whole of the ICT value-chain – building on a collection of socially aware and ethical characteristics. It would be feasible to apply precisely the same concepts of good, clean, and fair – that originated within the slow food movement – to ICT (Patrignani and Whitehouse, 2013). Thus, this paper aims at developing a parallel set of notions to those that underpinned the initially Italian, but now worldwide, slow food movement. It examines the roots of the ICT development process. It focuses on providing a number of suggestions and reflections for ICT engineers and designers, policy makers, end-users, and ICT companies. It acknowledges that thinking about, and applying, a slow tech approach is likely to become increasingly important in the twenty-first century.

4. THE IMPLICATIONS OF TAKING A SLOW TECH APPROACH

Considerations with regard to slow tech are, of course, not new. They also range across a number of disciplines. Here are just a few examples: at the start of this century, as mobile telephony grew, researchers started to investigate the cultural and social impacts of mobile ICT devices (Kopomaa, 2007); many groups have investigated technologies that use low or zero fossil fuels (Slow-Tech, undated); other movements work to minimise the use of technologies in our lives (Slow Tech Movement, undated); and some writers/researchers have pleaded for more robust, ecological engineering techniques (Price, 2009), or have aimed at creating technologies that permit “reflection and moments of mental rest” (Hallnäs and Redström, 2001).

Slow tech implies a criticism of the status quo. It rejects the view that a technological imperative must determine the solutions to the challenges that are encountered in everyday life. A slow tech approach

provides not so much a single solution to the challenges posed by technologies, but rather it acts as an invitation to begin a reflection process about current ICT values and uses in a societal context. It opens up a call for people to work together on combining the environmental, the social and the ethical in a more considered, reflective way – regardless of their disciplinary or professional background.

Slow tech could eventually permit a return to a more leisurely pace of life. Its three dimensions of good, clean and fair can be worn, like a new pair of glasses, to provide a new way of seeing. These insights into a slow tech approach are, ultimately, proposed as a possible opening up towards a dialogue. To paraphrase an anonymous commentator in this field, it offers a general awareness and acceptance of “the brakes required in the technological Indianapolis” (Patrignani and Whitehouse, 2013).

5. A SLOW TECH APPROACH AND ITS DETAILS

A simple definition of slow tech is proposed, based on three desirable aspects of ICT. Like slow food, ICT should be good, clean and fair – thus, it can be slow tech. These three basic criteria – good, clean, and fair – should be applied when undertaking any new ICT development or initiative. These characteristics relate to putting human beings at the centre of the technology (good ICT), involving the full set of stakeholders (fair ICT), and considering the whole ICT lifecycle (clean ICT).

5.1 Good ICT: Putting Human Beings at the Centre

Good ICT is a collection of systems and processes that should serve people and society (De George, 2003). In the author’s words: “Computers and information technology should help and serve people and society. Where they do not, they should not be passively accepted” (Op cit., 2003, p. ix).

Any technology initiative involves an analysis of human needs. Taking such a position implies developing either a system, a device, or a service both for and with human beings. Good ICT puts human beings at the centre of the use of technology; thus, the needs of human beings are the very starting point of the design process. Good ICT is designed directly around human beings.

Even before starting on a specific ICT initiative or project, it is therefore important to ask a number of questions. Three such questions are: What are the problems or issues or needs that are triggering the project? Is the technology a matter of technology push, or has the idea emerged from civil society itself? Is the project socially desirable (Von Schomberg, 2011)?

Even during this first exploratory and investigatory step of a new undertaking, both researchers and eventual implementers are therefore already being encouraged to slow down. Participatory design emerges as an essential element of the slow tech approach. As a design technique, participatory design is by definition slower than other design approaches. Yet, it is also able to guarantee a high rate of success for a technological project or development. This is because human beings contribute not just at the requirements capture stage but throughout the entire project lifecycle. They work together with other personnel, such as designers and scientists, and with groups that can investigate the full meaning and needs of the project. Examples include anthropologists, philosophers, and sociologists.

Taking this first, slower, step will provide society with good ICT.

5.2 Fair ICT: Involving the Full Set of Stakeholders Involved in the Project

Fair ICT is based around an understanding of the complete stakeholders’ network that surrounds a system or product or service. Thus, fair ICT is also in harmony with the corporate social responsibility strategy of the companies involved in the development of ICT products or services. It also pertains to the value-chain (the ICT value chain is based on the notion first initiated by Michael E. Porter on the chain of actions that produce valuable products or services (Porter, 1985)). Fair ICT’s focus is on equality, equity, and social and employment conditions.

This second step of activity in the slow-tech approach originates in the work of R. Edward Freeman (1984). Stakeholder theory is the most significant theoretical construct in the field of business ethics. It articulates the view that a business ought to be managed in such a way that it achieves a balance among the interests of all the stakeholders who have a relationship with the firm. In Freeman’s account (1984), the purpose of the firm is its coordination of, and joint service to, its stakeholders. Thus, slow tech implies

investigating the whole network of stakeholders involved in an ICT initiative (including a consideration of the implications of producing ICT at a very low cost in countries where workers' basic human rights are not respected). Here, stakeholders are understood to include all sorts of persons with an interest or a concern in an initiative, which makes this understanding far broader than the traditional business-related definition (Pearsall, 2001).

In assessing the stakeholders' network surrounding a particular form of ICT, a set of questions needs to be answered: Who produces the components that are used in the project? What are the conditions of the workers throughout the ICT value chain? What is the social impact of the products produced? Can the providers and business partners in any given project be required to operate according to transparent internal processes? Can some kind of "certification" be applied to the project in terms of international standards such as the United Nations Global Compact (undated) or ISO 26000 (ISO, undated)?

This second step of questioning will provide society with fair ICT, or at least a fairer form of ICT than it produces at present.

5.3 Clean ICT: Bearing in Mind the Whole ICT Lifecycle

The third criterion, clean ICT, involves considering the entire lifecycle of the specific form of ICT that is being designed, developed or used.

Clean ICT implies asking a further set of challenging questions. Here are a few of those example questions (based on the ideas first expressed by Patrignani et al, 2011): Where do the materials, such as metals or plastics, that are being used to manufacture the product come from? What is the power needed for the functioning of the servers or cloud data centres? How can ICT help human beings to reduce their environmental impact? What is the greenhouse gas contribution made by ICT? Vice versa, how can ICT help to reduce greenhouse gases? Where do ICT products finish up at the end of their lives? What are the destinations of electronic waste (or e-waste), discarded electrical or electronic devices? Can ICT be designed using a "recycle-by-design" approach that will minimise its material needs, facilitate its recycling, or extend the products' lives? Do human beings or organisations really need to acquire a new ICT product every 18 months?

Applying this last step will provide society with clean ICT.

6. FURTHER REFLECTIONS

This paper considers recent ICT developments, their effects on human activity, and the challenges that they pose to society. These developments open up a strong need for a cross-disciplinary approach to technology. ICT can no longer be construed as a purely "technical" discipline. ICT is now so pervasive that it requires a profound collaboration, on the technical side, among such professional categories as computer scientists, engineers and human-computer interaction experts and, on the societal front, anthropologists, social scientists and philosophers. The sole academic discipline which reflects this bridging process is that of Science, Technology and Society (a field that investigates the "co-shaping" of society and technology); yet it is an approach that is far from being comprehensively covered around the globe, whether in computer science faculties or engineering schools.

A slow tech approach could develop into a standard or a brand that could be adopted in the future. However, it should certainly not be seen uniquely as a formal checklist of items to be ticked off a list of requirements. Rather, it is a proposal to forge ahead and take up a new attitude and set of behaviours with regard to technology. Slow tech provides a form of compass, tool or instrument that can help to identify, and evaluate, new or alternative futures.

Slow tech, of course, needs to be taken up and actively implemented in the digital domain. A number of concrete recommendations with regard to slow tech need to be provided. Specific questions need to be posed to a collection of different audiences. They include the following four groups of stakeholders:

- Computer professionals: Is participatory design one of the core competences of computer professionals? Can computer professionals use a Human Computer Interaction approach (Card et al, 1983)?
- Universities, technical colleges, and schools: What kinds of curricula do they provide for their graduates to face the information society? What other skills and competences do they teach in

addition to direct technical expertise?

- Professional organisations: Do they offer a code of ethics or a code of conduct on ICT? Do they have guidelines that enable the interests of all stakeholders to be taken into account when technology is designed?
- Policy makers: What kind of “soft or “hard” laws, and recommendations do they provide that would be supportive of slow tech?

Last but certainly not least, besides an adaptation of the concepts initiated by Carlo Petrini (2007; 2011), ultimately, this slow tech quest could be expanded intellectually to include a further six perspectives. These six ideas originate from two thinkers, one who worked largely in the 1980s and 1990s (Langer, 1996), and another who is contemporary (Von Schomberg, 2011). Thus, attention could be paid to the concepts of slower, deeper, and sweeter (Op cit., 1996) and socially desirable, environmentally sustainable, and ethically acceptable ICT (Op cit., 2011). Slow tech notions can not only be grounded in the work of authors from the recent and not-so-recent past, but also expanded for more profound consideration in the years to come throughout the early twenty-first century.

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NECESSITY OF OLD STYLE INTERFERENCE IN CYBERBULLYING

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ABSTRACT

Cyberbullying is a modern style of harassment. One would believe that new style bullying should be coped with by new measures, like new wine needs new bottles. Indeed, cyberbullying is done with new technology including mobile phones and the internet. However, the actor both who bully others and who are bullied is still human even the time when cyberbullying is done is information era. New hardware, software and services would be required and work well in order to stop cyberbullying. However, the old style interference, which is not automatically conducted by machines but manually done by human, should be employed more. Teachers and managers should learn measures to cope with cyberbullying without IT goods and services.

KEYWORDS

Cyberbullying, internet, interference, feedback loop, system dynamics.

1. INTRODUCTION

Nowadays cyberbullying or cyber harassment is common problem in many organisations all over the world. Cyberbullying is bullying with the information technology and network including the internet and mobile phone network. Old style bullying which means bullying without IT is recognized as challenging and overcome and is coped with by both leaders and members in communities. In this situation, new style bullying, cyberbullying, is now focused on. The Ministry of Education, Culture, Sports, Science and Technology, Japan (2010a) reports their country's primary, secondary, and high schools found 3170 cyberbullying activities. This paper shows structures of cyberbullying and effects of interference measures using system dynamics' causal loop diagrams.

Cyberbullying has various causes. This paper supposes a situation that "real bullying" which means bullying without IT precedes cyberbullying. Showing the structural similarity between real bullying and cyberbullying, this paper explains that two styles of bullying have the same causal relationship inside; therefore, teachers and managers should deal with cyberbullying issues not relying on technological means but using dauntlessly traditional means including education and direct interference. Many existing bullying related issues are researched in school. Therefore, this paper also supposes that people concerned are students. Indeed, there are harassments outside of schools: adult community including offices. This paper's explanation can be also applicable for the adult community.

2. CYBERBULLYING STRUCTURE

Internet use is nowadays widespread all over the world. For example, Japan's Ministry of Internal Affairs and Communication (2008) reports that over 88 million Japanese people use the internet in 2008 (whole population of Japan is about 128 million). 47.2% of them use personal computers and 48.2% use mobile phone when accessing the internet.

This internet population number naturally includes younger people. The Ministry of Education, Culture, Sports, Science and Technology, Japan (2004) started the program to introduce computers connected to the internet in many classes. This means that children who cannot afford computer by themselves would have the environment to use some internet services. After that, the mobile computing environment in which children use mobile phones and Wi-Fi or 3G embedded small game players is widespread (NetSTAR, 2010). Thus, network service and communication is common even among children.

Using the internet connecting devices as common gadgets, human relations in a real world are to be affected by cyber relations with cyber communications. In particular, some believes that communication or contents publishing, like writing a blog or wiki pages, caused by unfamiliar relations makes real human relations worse. For example, they believe that the internet communications cannot bring whole atmosphere to information recipients so that such communications cause misunderstanding and worsen human relations. Walther (1997) points out the fact there are many people who believe the internet is “cold” media which cannot convey sufficient information in order to make an enough communication.

In addition, the internet culture of anonymity is often criticized. For example, the article in The Mainichi (daily newspaper company in Japan) web page article written by Katsuma argued that anonymity should be abandoned in order not to make the internet a battlefield of backbiting (Mainichi, 2009). Comments for this article were really the pros and cons.

From the viewpoints of whom one believes that the internet is “cold media” or anonymity is the root of trouble, communication troubles caused by the internet and cyberbullying naturally occur. However, this reasoning that communication without facial expression and gestures is “cold” is questionable. One difference between old, traditional “face to face” communication and network communications is the amount of information carried on the media. Spears et al (2001) point out that such a partiality for non-computer mediated communication is on the basis that the amount of information or the ability to carry information, or bandwidth, is an indicator of the quality of the content of the communication. The amount of information and bandwidth can be an indicator of the ability level of the communication services provided. However, the quality of the content is not equal to the service ability. Spears et al. (2002) pose a question to the reasoning above; they assert that one cannot say whether a communication medium is cold or not, and how messages are warm-hearted depends on the relationships between communicators. How one feels when receiving a message cannot be predicted even by oneself.

In addition, Spears et al. (2002) also point out that anonymity does not always produce an environment where one can express oneself freely. Rather, they find that computer mediated communication, such as an email, is prone to reinforce the tendency to strengthen social connections and compliance to norms. This means that users of network communications try to maintain their current relationships. Thus, the idea that the internet’s characteristic is a root of miscommunication and cyberbullying.

However, not an internet functions’ characteristics but an attitude of internet users can put stress on users themselves. For example, attitude against emails would be stressful. According to the research, conducted by the Japan Society for Child Study (2008), secondary school students in Japan shows the fact that 65.6% of them always reply to incoming emails immediately, and 19.4% of them feel annoyed when they do not receive the response from recipients of their email. This suggests that considerable number of younger people want quick responses and that they believe that their friends’ expectation of quick responses.

From the result of this research, responding pressure can make a situation in which quick reply is one of important factors to keep human relation good. When real bullying has been already occurred, bullied people would make an immediate reply in order not to make situations worse. If real bullying has not started yet, but atmosphere has been uncomfortable, prospective bullying victims would do the same as bullied people. In both scenes, while being apparently away from net communication would remove, or at least decrease, stress on bullied people as Takahashi (2009) explains, they tend to keep make themselves be under the communication pressure stress. This situation has a reinforcing feedback loop to strengthen the stress so that the correct solution is cut the feedback loop (figure 1). The feedback diagrams shown below are causal loop diagrams of system dynamics.

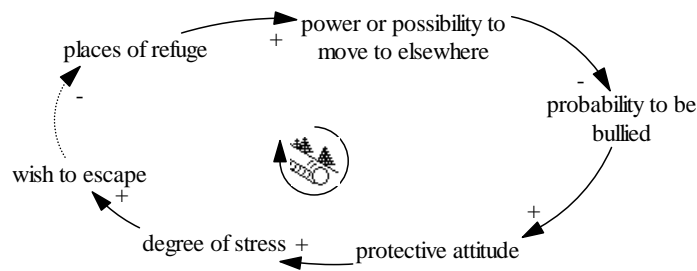


Figure 1. Possibility to escape from bullying place is gradually decreasing through bullying.

Naito (2001) shows the condition of real bullying occurrences. He explains that real bullying needs the organisations from which members cannot escape by their own willing. Japanese school class members do not change during several years, and students have no chance to choose their classes. Moreover, he also points out that bullies pursuit “the feeling of omnipotence.” Bullying victims cannot escape from the situation, and bullies continuously confirm their omnipotence; thus, bullying occurs.

As written above, network communication is now very common for most people; therefore, once internet tools are indispensable to lives and cyberspace is directly connect to real world, even cyberspace has no room to which bullying victims escape. At the same time, bullies can run after victims all time with least resource and much help of IT. Bullying place was limited in an organization. However, the internet extremely expands the boundaries of bullying place. This situation also has feedback loop (figure 2) to keep members to do the same direction activities.

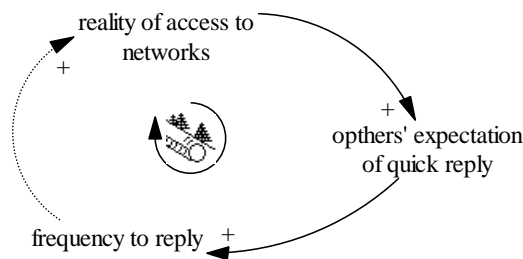


Figure 2. Network’s “quick” communication aggravates the situation.

There are many communities in the internet. Therefore, bullying victims seem to be able to find a community in which they can be relaxed. Nevertheless, Doi (2009) rejects this idea. He points out that Japanese younger people are strongly worried about what other people want them do (expected role). This expected role imposes restraints on people “to play expected role” even when they are in the network communities. This means the cyberspace communities cannot be places of refuge.

Moriguchi (2007) also propose a close idea about younger people. He argues that close communities like classroom in Japan has “the school caste system.” His idea is that Doi’s “expected role” is not only “a play role” but also the rank in the caste. Once the rank of each member is apparent, change of caste ranks is impossible; therefore, higher caste members enjoy moving their communities by their own wishes, however, lowers do not. This means lower caste members are always confined in one place or community. This strengthens bullying conditions.

These conditions, “expected role” and “the rank in a school caste,” was not influential after school time. However, nowadays the internet makes the same communication space after school as school time. This is also build reinforcing feedback loop (figure 3) around school students to retain them in bullying condition.

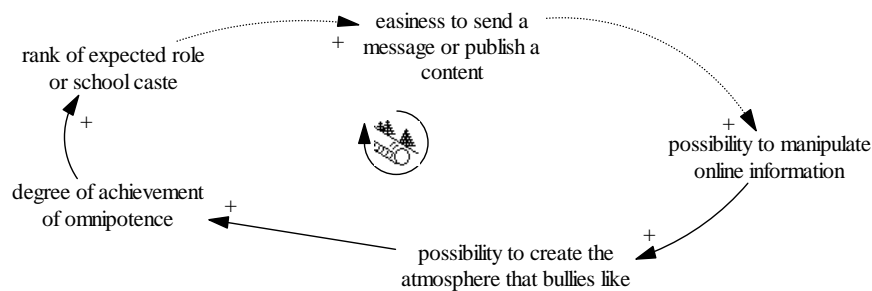


Figure 3. Bullies' behavior has an escalation mechanism in itself.

All of the problematic feedback loops have self-reinforcing structures. In order to stop these malfunctions, cutting the loops is essential. Controlling a degree of an element in the loop is not functional. Practical cutting causalities are indicated as dotted lines. In figure 1, bullying victims put themselves hopeless situation in which they cannot find anyplace to escape by themselves. Teachers or managers need tell victims that victims do not need to find escape place and that removing bullies should be done. Of course, teachers or managers must actually remove bullies from bullying places.

In figure 2, prohibition on using network devices in schools and setting clear penalties cut the dotted line. If students understand that quick response is physically impossible, they would stop expecting quick responses.

In figure 3, finding problematic online information and education how to delete disagreeable information can cut the right dotted line. In addition, making "expected role" and "school caste" fluid can help bullied people to escape from the situation. Teachers or managers should intervene the human relations in order not to make relationships fixed. This solution is cutting the left dotted line.

All of the solutions to cut the causal loop lines are indeed traditional activities of teachers or managers in bullying situations. Network devices are relatively new in human history; however, bullying is old and steadily done by humans ourselves. IT services or devices are not sufficient to stop cyberbullying. Rather, traditional approach should be given the importance to help victims.

Causal loop diagrams are descriptive; they are easy to draw and understand, however, exact time series changes of states cannot be calculated by using this diagram style. Takahashi (2008) indicate the method to make numerical simulation model from descriptive information. Employing this method, one can generate computer simulation models even if one has descriptive information.

3. CONCLUSION

This paper explains the structures and natures of cyberbullying. The structures are expressed in system dynamics' causal loop diagram style. These diagrams show the problem is self-reinforcing so that changing structure is correct solution. The solution is given from the diagrams' structures.

Some might believe real bullying and cyberbullying is completely different or disconnected. However, as shown above, the solutions of cyberbullying are "real" interventions which would look "old style." Cyberbullying can be a real bullying which is accidentally brought light. While cyberbullying is "new style," we need to cope with it with "old" measures.

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BIASOMIC - VISUAL ANALYTICS APPROACH FOR MEDIA BIAS RESEARCH

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ABSTRACT

There is a vast potential to derive significant insight from the analysis of bias inherent in media outlets and their product. Analogous to Plato's cave allegory we could imagine news stories as shadows, media outlets as different fires and bias being this thin difference in shadow shading thrown on the caves wall. Through smart triangulation we could then learn to render the actual object – the news event.

Presently media bias is analyzed using expensive qualitative methods or by the cheaper but more superficial automated methods. The aim of this work is to introduce an interdisciplinary visual analytics approach named here Biasomic approach integrating the best methods from related disciplines in which analysts aided by the information visualization methods are performing exploratory data analysis and gamers are training automated machine learning algorithms thereby overcoming the shortcomings of the traditional methods used for the research of media bias.

KEYWORDS

Biasomic, Media Bias, Gamification, Visual Analytics

1. INTRODUCTION

Media bias is generally the tendency to exhibit particular point of view and to ignore valid alternatives. This is the bias manifested in treatment of a covered topic by journalist and in particular media outlets, evident for example by the appropriation of media coverage to certain topics and in the manner in which the topics are presented. In academic research, media bias was traditionally the research topic of diverse social sciences: media studies, journalism, political science, etc. The focus of their research is on measuring the balance of media, on answering the question if the media is liberal or conservative, on analysis of the deviations in international news or on tracking and comparing certain topics. There exists strong disagreement among traditional scientists in answering basic questions such as the nature of media: is it liberal or conservative. This is due to the researcher's bias problem. There is also ambiguity of terms used interchangeably to describe media bias such as ideological perspective or media slant. Detecting media bias in the news is a challenging because it deals with obtaining semantics from many complex and different sources. Therefore it is extremely hard to measure. Additionally, the research of relations between journalists, media outlets, advertisers and owners and their inclinations play as important role. This leads to following problems:

- Researcher's Bias
- Data Complexity Problem
- Information Overload Problem
 - Scalability Problem
 - Data Presentation Problem

The core problem behind media bias research is the researcher's bias also called experimenter's bias. It is a perception problem of researchers themselves that leads to classification vagueness of terms such as liberal, conservative, right-wing, left-wing, etc.

The second problem of the media bias is its complexity. Traditional studies deliver the best results dealing with data complexity because they employ human cognitive capabilities that the automated methods still cannot match. Automated methods neglect to discern many interwoven patterns from documents that human beings, otherwise, are able to detect and comprehend easily. Automated methods do an outstanding job in performing repetitive tasks where humans are generally prone to error and overwhelmed with data volume.

The third problem is the information overload problem. An enormous pool of news is being generated each day. From this pool relevant sources have to be extracted, processed and analyzed. It makes traditional studies of media bias expensive because they require manual text annotation and analysis of large data volumes. This manifests itself then as a scalability problem: studies are limited in scope of data covered thus making them selective and open to accusation of researcher's bias based on selection of data chosen. Data presentation problem arises primarily out of information overload problem and secondarily out of the complexity problem. The results are difficult to present because data is multifaceted: multimodal, time dependent, and multivariate. This problem is addressed in the best way through application of the information visualization methods.

2. BIASOMIC - VISUAL ANALYTICS APPROACH FOR MEDIA BIAS RESEARCH

Biasomic method is envisioned as a visual analytics method for the research of media bias that applies automated text analysis methods, information visualization and human gamers as annotators. Traditional media bias studies can be seen as linear and incohesive: social studies are limited by the scope and computer science studies by the data complexity.

Biasomic method is conceived as a continuous, evolving loop of knowledge, in which gamers are used to train the automated methods and the data analysts apply visual analytics methodology to perform exploratory data analysis. It is inspired by the gamification projects such as Google's reCaptcha service (Von Ahn, 2008) that helps by digitization of old documents.

Gamification represents utilization of games in non-gaming context (Deterding, 2011) and is closely related to Van Ahn's (2009) terms Human computation and Games With A Purpose (GWAP). Human computation is described as a cooperation of human intelligence and computer methods to figure out solutions to the problems otherwise unsolvable by either of them. GWAP represents a game that produces useful byproducts.

Media bias research has to take into consideration the totality of the media bias problem (e.g. media ownership, journalists' inclinations), not only its manifestations the news content. Therefore, it is named Biasomic (suffix -ome old Greek for totality) because as an interdisciplinary solution it represents a symbiosis of the best methods available. It combines machine learning, natural language processing, visual analytics and gamification and provides solutions to the problems identified above.

Researcher's Bias Problem will be mitigated through transparency of research methodology and by using gamers to annotate news through playing annotation games. Enabling analysis to be repeated by other scientists through making relevant data sets and automated methods available mitigates accusation of media bias and it is also hard to accuse large number of gamers to be biased in the same way.

The information overload problem will be solved through a visual analytics approach applying existing information visualization methods thus enabling exploratory data analysis.

Data Complexity and resulting Scalability Problem are going to be solved through gamification. Gamification connects automated methods with human brainpower on large scale. Thereupon the human cognition is used to train machine learning algorithms in the back-end.

Challenges are the development of appropriate methods that take into consideration the complexity of the media bias research, most imperative its totality: external and internal features. Beside features obtainable from the text there are other external features that have to be taken into consideration in order to obtain true picture about media such as media ownership, journalists' inclinations, advertisement etc.

2.1 Related Work in Social Sciences

Related research from the social sciences is depicted in the recent works of Mullainathan and Shleifer (2005), Gentzkow and Shapiro (2006), Baron (2006) and Tim Groseclose and Jeffrey Milyo (2005). Besides custom surveys there are innovative methods applied, e.g., Groseclose and Milyo (2005) measuring frequency of know biased sources (think tanks and policy groups) cited by members of the U.S. Congress. The lack of consent about the media bias, its nature and the research methodology reveals itself in the criticism of Glasgow Media Group (GMG) by Harrison (1985). The GMG analyzed the media bias in the television. Their claim was that the TV News were biased in favor of more powerful against those less affluent groups such as organized labor. Harrison (1985) disapproved the GMG's methodology. He claimed that their categorization of bias was strongly influenced by their own persuasion, thus making their research biased. In the study 'A Measure of Media Bias' (Groseclose & Milyo, 2005) the quotations from various articles were mapped to their sources and it also claimed liberal nature of media. Groseclose and Milyo's study was criticized for being biased itself. The researcher's bias was identified by Liberman (2005) because of the selection of source data used for measuring media bias. On the other side of the argument, Fairness and Accuracy in Reporting (FAIR) study (Croteau, 1998) concluded that so called 'liberal bias' in the main stream media does not exist because most cited sources are conservative or centrist think-thanks. A propaganda model (Herman and Chomsky, 1988) claims that there exists a thoroughgoing bias in media that is caused by corporate interests. Media ownership, advertising money, usage of official sources, flak – discreditation of independent media, and 'anti-communist' ideology were identified as media filters that shape public opinion and prefer corporate interests. Parallel to the discussion about its nature there is also ongoing discussion about the causes of media bias. This discussion mirrors the conservative vs. liberal discussion and reflects itself as supply-demand paradigm in the economics literature. Demand side explanation for the causes of media bias comes e.g. from Mullainathan and Shleifer (2005) and Gentzkow and Shapiro (2006). On the other hand, David Baron (2006) from Stanford Graduate School of Business provides supply side explanation in claiming that journalist produce biased news because of own career interest.

2.2 Related Work in Computer Science

Quite a few branches of computer science are related to this work: visual analytics, machine learning, natural language processing, information extraction, and gamification. Keim et al, described Visual Analytics as an integrated approach combining visualization, human factors and data analysis where human factors (e.g., interaction, cognition, perception, collaboration, presentation, and dissemination) play a key role in the communication between human and computer, as well as in the decision-making process. (2008) Survey of text visualization methods by Silic and Basic (2010) provides an excellent overview of underlying methods and related state of the art visualization methods built upon them such as: STORIES, MemeTracker, ThemeRiver, EventRiver, NewsMap, Document Atlas, etc.

Automated methods perform information extraction on texts corpora level, single document level or from paragraph/sentence level. Extracted information can range from simple statistics or frequencies such as word counts over to bag-of-words method (vector space model), and different machine learning methods to the lexical affinity methods. Related work includes e.g. the research of the linking patterns and topics in the political blogs (Adamic and Glance, 2005). Fortuna, Galleguillos and Cristianini (2009) used three different methods in order to detect media bias in news, and those are: Support Vector Machines (SVM), kernel Canonical Correlation Analysis (kCCA) and Multidimensional Scaling (MDS). The results they obtained from their study showed that one can determine the source of a particular news item through statistical and machine learning methods (Fortuna et al, 2009). Similar approach using SVMs is performed by Flaounas in the Topic Selection Bias detection (2011) where each media outlet was depicted as a vector with fifteen dimensions and each dimension stood for each tracked topic.

Further state of the art work (Lin et al, 2008) applies a variation of LDA (Latent Dirichlet allocation) to identify both topics and ideological perspectives. Recent relevant work includes Culturomics (Michel et al, 2011) a research concerning the language and cultural phenomena, NOAM News Outlets Analysis and Monitoring System (Flaounas et al, 2011), information visualizations measuring conflicts in news (Brandes et al, 2006), geo-sentiment information visualizations using the literature fingerprinting method (Keim et al, 2010), Doumit and Minau (2011) a system for information extraction from news that are politically relevant.

3. CONCLUSION

User interaction is crucial for the success of a Biasomic approach. An article can be written in very cynical manner, so that automated algorithm cannot detect its true nature. User interaction with help of gamification could help classify it in a right manner. Comprehension of media bias patterns can empower us to perceive the reality behind the news better and to detect trends or different lobbies. On the other hand, this method can be used by the other forces to determine if they are doing a good job, and to improve it in order to become undetectable by text analysis methods and learning algorithms. Therefore, it is an imperative to design the interaction between users and learning algorithms, so that they can adjust themselves enabling continuous flow. On the other side, users themselves are biased (Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006) and this fact has to be taken carefully into consideration by successful user interaction and games design and studied in the future.

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METHODS FOR IT SECURITY AND PRIVACY

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ABSTRACT

The similar nature of IT security, privacy and ethics, and the difficulty to find ready-made answers, put the focus on the way one handles the problems in these areas. Philosophy has analyzed this issue in depth and it has given us the philosophical method as the means to find satisfying solutions. Psychology has shown in empirical research what skills are necessary for this purpose. Since the issues of IT security, privacy and ethics are very important for us today, we need to create and use tools and methods to take care of them.

KEYWORDS

Ethics, philosophy, privacy, security, skills, tools.

1. SECURITY

IT systems are necessary for our life and our society, and more will they be in the future. They make our lives easier. We have to thank technology research and innovation for this. Today we are depending on IT more and more, therefore systems security is of paramount importance.

Research in this area is needed and it will be needed more in the future. However, security cannot be defined by technological terms alone. Security levels and parameters are defined in a social context and are closely related to values, beliefs and interests.

Security of systems is mainly related to people and society. Security not solely a technical issue or an internal technical issue of a system but gets its meaning through its effects on and its use by people, society, other systems and environment.

We need to identify, not only possible episodes and what might be affected, but also what value this has to stakeholders. This is the way to find what is important and worth protecting as well as what has a risk to be attacked. It is also a precondition to design, install and manage the use of a system in a secure way; in a way that protects highly valuable aspects of the stakeholders and to assure that IT systems are secure in achieving valuable goals set up by stakeholders.

Furthermore, definition of what and how regarding security and security risks is dependent on personal values, cultures and subcultures. Persons, groups and cultures are significant factors deciding the security level of systems while in use. "Technical" security alone is not enough to assure a secure use. For example, what users believe is permissible plays an important role regarding security.

The following areas are of importance here:

1. Definition of an IT system's security by the identification of values of stakeholders as a precondition for the specification of technical security parameters.
2. Design of IT systems which consider weaknesses and strengths of users regarding security.
3. Formulation and application of policies, guidelines and training for users and other stakeholders to support a secure use.

Any IT system in order to be secure needs support from many other things. Information to the public is very important as well as to the users of the system. Especially users need support and special education to learn how to avoid risks and skills how to handle risky situations. Law making and law enforcement are also necessary parts in supporting and strengthening the security of IT systems.

Security affects important values always. One telling example is the controversial “naked” body scanners at airports. Such security solutions can easily instigate big scandals causing the abandonment of important, necessary and expensive IT systems. And without such a system the level of security might be significantly lower. Values have to be considered in the design and use of IT security systems.

It is clear that we cannot have any simple and ready-made answers regarding the design and use of systems related to issues of security. Important functions, systems and processes have to be protected and made reliable, and how to achieve this contains value conflicts. Furthermore, security is not only about protecting own systems. Sometimes it may be necessary to break the security of others, to spy on or attack “enemies” who may otherwise attack our systems. At the same time we may have the need to accept certain security risks because we have to trust others with whom we cooperate, because we have to design systems that are usable or because of considering cultural context and demands. Security solutions may also be contradictory to the right to information, openness, privacy and reparations (Neumann, 1991).

2. PRIVACY

There are essentially two types of definitions of privacy. One is focused on the protection of information and on the rules that govern openness and protection. Moor (1997), defines privacy like “the expression of a core value, viz., the value of security” or “sometimes used to designate a situation in which people are protected from intrusion or observation by natural or physical circumstances.... In addition to natural privacy there is normative privacy. A normatively private situation is a situation protected by ethical, legal, or conventional norms.” A similar definition is given by Edmund Byrne (1998): Privacy as a “zone of inaccessibility”.

A different approach to the definition of privacy is focused on the control of information, and the main example of this kind of definition is given by Charles Fried (1968): “Privacy is not simply an absence of information about us in the minds of others, rather it is the control we have over information about ourselves”. In the same wavelength we find the definition given by Quinn (2011): “Privacy is a social arrangement that allows individuals to have some level of control over who is able to gain access to their physical selves and their personal information”.

Which of the two lines of definitions is more accurate and fruitful, regarding its power to guide our activities toward the achievement of desired goals? If we make an effort to describe the nature of privacy we can easily and rather fast come to the conclusion that privacy is not only something that has to be protected. Although this is important, underlined by both lines of definitions, it seems that privacy sometimes has to be diminished or invaded in order to satisfy important interests and values. One is to create a bond to another person, group or organization. To achieve this one has to give access to private information, or even to give up part or all limitations toward this special person or organization. It is a matter of trust between each other. The other situation, which is the most common one, is that a person, group or organization, which we may call a separate entity, has always another important interest added to the interest of protecting its own privacy: To breach, diminish or invade the privacy of any other entity that is a prospective or actual partner in any sense. It is very important for any entity to acquire access to the information about any other entity that is of some interest.

If we now go back to the definitions of privacy, and look upon them through the glasses of our observations of its nature we may have good arguments to maintain that a definition focused on the control of information is more plausible. Given the controversial nature of privacy (protect it and breach it at the same time) and the clashes arising constantly between all entities in a social interaction, the focus cannot be on normative solutions which if they work are always limited to a certain situation, but on the ways skills, methods and tools we use to create, revise and apply policies, guidelines, rules and principles to manage the issues of privacy.

Privacy appears to be a very important issue today when IT permeates more and more aspects of our life. Mainly this is understood as a risk of invading the privacy of persons, and possibly the privacy of groups, organizations, corporations and states. It is therefore interesting to investigate the main definitions of privacy, try to grasp its nature and to discern its features, and to discuss the possible ways of suitable and needed activities.

3. TOOLS AND METHODS

There are no “perfectly” solutions to privacy or security issues. Conflicting interests and incompatible values decide what has to be done. Everything contains both risks and possibilities. We have always to reach some compromise.

A dialectic process is necessary in security and privacy in order to identify significant interests and values, and to formulate principles and policies. Handling privacy issues and working for secure IT demand continuous adjustment to relevant values as well as the necessary personal skills and suitable group processes.

No ready-made answers are available so focusing on the method and making sure that the right way of proceeding has been adopted is the way to get satisfactory answers to the problems of IT security, privacy and ethics. The philosophical method of deliberative thinking seems to be the basis of such methods. But there is also a challenge in the process of philosophizing itself. Philosophizing has to be practiced in the right way, and this has been an important issue for the philosophers to philosophize on.

The philosophical focus on the way decisions are made and the skills necessary for doing that are found in the origins of western philosophy. However, this is not easy and apparently the ability to do so has been supposed to be the privilege of the few able ones, the best of all or the philosopher-leaders (Plato, 1992). According to Platonic theory, these people were supposed to be and act as the leaders of society because they had the skill to make decisions; not because they had the right answers but because they could find the right answers. They could use the right tools to examine and discard any false idea, i.e., they were able to philosophize, and they got this position because of the skills they had. The same way of thinking can be found in Aristotle. Many different skills are necessary for one to be a successful decision maker, but one skill is the most important: virtue, *phronesis* (Aristotle, 1975). This virtue is a presupposition for all other virtues; it is the virtue of criticism, self-criticism, reflection and wisdom; it is the basis of philosophizing and it refers only to itself.

The view of ethics as a process of thought can be traced throughout the whole history of philosophy until today. Kant captured and expressed it very clearly in his theory. The solution of a moral problem can be found in the basic principle behind it, which is synthetic a priori, i.e., a truth that is absolute but not obvious and that can be discovered only by the use of the right method, like mathematical truths. Thinking is necessary to achieve this; thinking that is independent of external or irrelevant causes, i.e., autonomous thinking. It is thinking that demands the decision-maker's rational capacities. When people are free from false illusions and have the necessary skills, they can use the right method to find the right solution to their moral problems (Kant, 2006).

This philosophical position has been expressed in psychological terms and it has been studied with psychological methods. Focusing on the process of ethical decision-making, empirical psychological research has shown that people use different ways to handle moral problems. According to Piaget (1932) and Kohlberg (1985), when people are confronted with moral problems they think in a way which can be described as a position on the heteronomy-autonomy dimension. Heteronomous thinking is automatic, emotional and uncontrolled whereas autonomous thinking is systematic, holistic and self-critical. Heteronomous problem-solving and decision-making are simple mental reflexes that are fixed dogmatically on general principles, regardless of whether they belong to the decision-maker or are imported from an external authority. Thoughts and beliefs coming to mind are never doubted.

People use it most of the time and they repeatedly manage to produce satisfactory solutions to their problems. When facing a moral problem, decision-makers do not adopt purely autonomous or heteronomous ways in their efforts to solve it and to make a decision. They use a mix of these two approaches. And most often they adopt ways that are dominated by heteronomy. Heteronomy is what we can use easily, but we need the ability to use autonomy when necessary in order to be ethically skillful.

What is suggested by philosophy and psychology, when a moral problem has to be solved, is to try to run the process of problem-solving in the right way. If this condition is satisfied, it will be possible to find the most suitable solution to the moral problem at hand. Research in these areas has to focus on developing and testing practically applicable methods and tools to cover these areas. This should be done on a research level in interdisciplinary projects but also during the work on industrial applications.

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ADDRESSING THE TOTAL HUMAN BEING: WORK-INTEGRATED LEARNING FOR ICT STUDENTS

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ABSTRACT

Information and communication technology (ICT) is essential to the operation of business, and create many employment opportunities. High volumes of students graduate in ICT however students struggle to find job placement. To address the need for ICT skills, universities must create programs that meet the demands of a changing ICT industry. This requires a partnership between industry, universities and other stakeholders.

The researchers explore a work integrated learning (WIL) approach where practical and theoretical knowledge are united and linked to industry needs. This paper explores the applicability and suitability of the work of Maslow and Dooyeweerd respectively to foster a holistic understanding of the student and his/her situation.

The above methods provide tools for understanding softer issues beyond the technical skills required. This paper uses the Maslow hierarchy of needs and the aspectual analysis of Dooyeweerd to reflect on the total being of students registered for ICT WIL at Vaal University of Technology in South Africa. The study's findings suggest that besides skills requirements, a deeper understanding and empowering students from being a student to a professional need to be understood and addressed.

KEYWORDS

Dooyeweerd, Maslow, Work Integrated Learning, ICT education.

1. INTRODUCTION

Learning facts lacking interest, and reciting them is not acceptable to prepare students to survive the world of work. An educational approach is required to align academic and workplace practices for the mutual benefit of students and industry. Many benefits exist within WIL, but the success of WIL students' experiences must be examined and understood. This paper reflects on the situation of ICT students at the Vaal University of Technology (VUT) in South Africa enrolled for WIL.

This paper reports on two methodologies used as a vehicle for reflection on WIL in an ICT environment. This paper is divided into four parts, the first being the problems currently experienced with WIL in ICT. Secondly, Maslow's hierarchy of needs will be used as guideline for discourse of problems and challenges experienced by ICT WIL students. Dooyeweerd's aspectual analysis will be used as second methodology to gain an understanding of ICT WIL students (section three). Closing remarks will be provided in section four.

2. CHALLENGES WITHIN THE ICT WIL ENVIRONMENT

The responsibilities of ICT WIL student positions need to align with the needs of the ITC industry. The following challenges were identified by the coordinators of the WIL programme at VUT:

- Inadequate mentors allocated to many students;
- No suitable direction provided to many students;
- Lecturers with no industry understanding and experience;
- Risk of assigning students to large complex systems.

In the following sections theoretical frameworks are discussed to reflect on the students as total human being in the complex situation of WIL for ICT students. The authors of this paper have about 10 years of experience in visiting WIL students and coordination of WIL programmes at different universities. The reflection done here present information gathered during scheduled visits of students in industry.

3. MASLOW'S HIERARCHY OF NEEDS

Maslow's hierarchy of needs is a theory on the satisfaction of different needs in individuals developed in 1943 by Abraham Maslow (Maslow, 1943). It is divided into five stages: biological, safety, belongingness, esteem needs and self-actualisation. The basic principle of the hierarchy is that individuals will not be motivated to reach any higher-level needs before lower-level needs have not been satisfied (Brewer & Dittman, 2010). The following section will elaborate on WIL experiences of VUT students in an ICT curriculum. Maslow's hierarchy of needs are used in order to understand softer issues of ICT WIL students.

The lowest level of an individual's need to be met is biological needs. Students enrol for ICT WIL, are exposed to the world of work but with inadequate resources. Students receive a small salary while in training which makes it impossible for them to rent accommodation. Beside them struggling to find accommodation they also need to pay for travel expenses, buy appropriate clothing for the world of work, and to buy food. This caused the lowest level of needs not to be met, due to financial constraints.

Safety needs follow biological needs, but only when biological needs are met. Very few students who are in training are employed in permanent positions. These students are unsure of future employment possibilities during the final months of their training, causing them to be unsure about their future. They are unsure about their employment and income, which cause financial, housing and food insecurity.

Belongingness, love and social needs enter as soon as humans start to feel safe and things which could possibly threaten them are under control which includes working in groups, family, affection, relationships, etc. (Gerber, Nel, & van Dyk, 1987). When students enter industry, they leave behind their secure environment. Within ICT, teamwork is essential to success. Students experience being welcomed, and part of the team as positive. Most students feel a sense of belonging in their respective job environments, conversely, some students struggle to adapt to new social structures.

Esteem needs relates to self-esteem and self-respect, as well as respect to others. Students feel positive and motivated towards their future career, due to their achievement. They experience a proud feeling towards themselves as they mastered assignments and responsibilities assigned to them. Some students were allowed to make suggestions which were accepted by their respective companies. This increases their self-confidence and self-esteem. A main function within a business analysis environment, is consulting with clients of the development teams known as users in the software industry. When students start their WIL training, they are not allowed to consult users by themselves. As their WIL training continues, most students are allowed to visit users, or lead the interviews, fostering in them a sense of independence and growth of their self-esteem.

Self-actualization needs focus on the realisation of the individual's full potential when lower level needs are met. Students who are exposed to the world of work reports satisfaction and progress in terms of realising their full potential in their preferred niche area. They are motivated to enter their future careers and seek to be self-fulfilled in future employment. Their goals are refined during their WIL training and they have specific preferences on employment within the ICT industry. Students report that it is enjoyable to know that all the theoretical terminology and knowledge they mastered while on campus are actually used in industry.

In applying Maslow's hierarchy of needs it became apparent that students do not meet the first level of biological needs due to financial limitations. Students cannot afford to pay for accommodation, clothing and food. ICT WIL students however do consider themselves privileged being already exposed to the world of work. For most of these students not meeting the lower levels of needs identified by Maslow are not regarded as a hindrance in striving to meet the higher levels of needs. This situation is of specific interest to the research team as it is unexpected.

4. DOOYEWEERD'S SUITE OF ASPECTS IN ICT WIL

Herman Dooyeweerd was a Dutch philosopher (1894-1977) focusing on meaning of different aspects of reality. He developed a suit of fifteen aspects that can be used as a checklist to understand various aspects of reality (Basden, 2008). These aspects will be reflected upon from the perspective of the ICT WIL environment. A description of what each aspect represents are given below from the work of Basden (2008).

Quantitative aspect (representing quantity): In 2006 there were 104 000 vacancies in the ICT sector, translated into 46% of unfilled posts (Pop & Barkhuizen, 2010:75). In contrast JIPSA (2007), indicated in 2007 that there are approximately 200 000 unemployed ICT graduates in South Africa, with a mix of certificates, diplomas and degrees. This does not correspond with the great demand of ICT specialists.. At VUT, each semester between 90 and 120 students enrol for the last semester of their studies in ICT with only 10 to 15 students acquiring position for practical training.

Spatial aspect (representing size): Students studied in the Vaal Triangle (about an hour's drive south of the city of Johannesburg) and need to relocate to be close to their work environments. Students from international countries like Botswana and Congo prefer to do their practical training in the country of origin. Depending on mentors, supervisors company policies students and job responsibility of students they either attend meetings, or consult with clients, or they remain in the office. Thus some students are not exposed to the world outside the office.

Kinematic aspects (representing movement): Little change is noticed in the amount of students who do find positions or the types of positions they find themselves in. Within WIL environments students are assigned to one specific project with no movement between projects, causing little exposure to other fields of training. Basden (2012) explains that change is good and exposing students to various projects can be beneficial.

Physical aspect deals with energy and mass. This aspect does not indicate either benefit or detriment within ICT WIL.

Biotic aspect (representing life functions): Maslow explains biological functioning and survival, and as the most important of all the needs. Most students in South Africa in the South African experience financial constraints. Another matter is clothing. Students need to dress appropriately. Some companies send students on courses focussing on soft skills. These do not only include communication skills, motivation skills etc., but also personal skills including how to dress appropriately. Corporate companies also do have dress codes students must adhere to.

Sensitive aspect: Basden (2008) describes the kernel of the sensitive aspect as "feeling and responding" which focusses on a positive interactive engagement with the world. Students are integrated into the ICT industry. Students are satisfied in their work environment in terms of their roles in communication in the organization.

Analytical aspect's kernel meaning is described as conceptualising, clarifying, categorising and cogitating. An important aspect of a skilled ICT professional is to be an analytical thinker. Students do feel overwhelmed by the world of work, but get used the environment during their WIL period.

Formative aspect (representing history, culture and technology): Students experience positive integration into companies. This causes them to voice not only their understanding of situations, but also making suggestions. Innovation and achievement are then motivated.

Lingual aspect (representing communication): Being able to work effectively as a team member is essential to the fruitful operation of organisations, and a core skill of ICT graduates. Lingual aspects are the way students are able to express record and interpret themselves. Within the ICT sector it is important to have good communication skills (Bentley & Whitten, 2007). A concern is raised by industry regarding communication skills of ICT students.

Social aspect (representing relationship and community): When evaluating social aspects, a closer look is given to social interaction, relationships, and institutions. An integral part of being an ICT professional is to work in teams. Team harmony is therefore of the essence. Some students have clear objectives and responsibilities assigned to them by mentors, while others experience high levels of frustration in this regard.

Economic aspects are influenced by frugality, skilled use of limited resources. The majority of students come from poor backgrounds. After being experienced lived realities of the ICT professional, they are motivated and ambitious towards their future as ICT professionals. Students either await a permanent appointment after graduating, or are already employed permanently at the companies they are working.

Aesthetic aspect (representing interest and fun): Students experience WIL as a very positive towards their personal well-being, as well as professional development. They come over as excited, energised towards life and future careers. Students experienced their training as a vibrant environment with challenges to be faced within a short period of time.

Juridical aspects: With juridical aspects rights and responsibilities are investigated. Some students work without any compensation, or a small salary. Due to financial constraints of students to sometimes do not apply for jobs, as the amount they work for would not cover basic expenses for example accommodation, traveling and food. When studying Maslow's hierarchy of needs this is the lowest level of needs.

Ethical aspects are recognised by self-giving, love, generosity and care. Student attitude is a stated concern by industry. Complaints vary from communication skills, professionalism to poor self-management. There are however reports from industry of positive experiences of student attitude.

The pistic aspect (representing faith, commitment and vision): ICT WIL students mature substantially within the period of training. They are committed, motivated, and believe in themselves. Students are required to work within the boundaries created by the vision of their companies which also influence their vision towards their future careers.

The research team experienced a sense of satisfaction that most of the issues of WIL of the VUT ICT students were discussed during a work session on relating the aspects of Dooyeweerd to this complex situation. It should be noted that the discussion flowed between the needs of the industry partners and the needs of the students.

5. CONCLUSION

The lowest level of Maslow's hierarchy could not be met for ICT WIL students. This corresponds with Dooyeweerd's physical, biotic and economic aspects. This opposes a major supposition of Maslow's philosophy declaring, the following levels can only be addressed if the previous level is fulfilled. Students within an ICT WIL program however did feel safe in their workplaces, they do belong, they do believe in themselves and resulting in they are self-actualised. Thinking about the students in terms of the first aspects of Dooyeweerd led to a bigger understanding of the magnitude of the problems. While reflecting in terms of the aspects, many issues such as the reaction of industry entered the discussion which was not reflected upon during the discussion in terms of the theory of needs of Maslow. The research team felt that the work of Dooyeweerd guided them to a broader understanding of the life-world of the student as part of the ICT industry than was the case during the analysis according to the work of Maslow.

ACKNOWLEDGEMENT

The authors want to thank the National Research Foundation (NRF) of RSA for funding this project and want to state that this work is the opinion of the authors and not of the NRF and that they are not liable in regard thereto.

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Posters

FROM TECHIES TO PROFESSIONALS: TEACHING SSM IN SYSTEM SOFTWARE CLASSES

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ABSTRACT

Students tend to view the world of work only in terms of computers and technology. Our students have to acquire skills beyond just technical knowledge as they are in the future going to be instrumental in designing corporate architecture for networking and other system software applications. As to propose better solutions our students must be sensitive to the wider context of product use in terms of organizational goals, structures and cultures. The systems approach of C. West Churchman provides a perspective of the world in terms of systems, where different role players have different perspectives on problematic situations. Checkland focuses on different worldviews and developed the now mature Soft Systems Methodology (SSM) that guides purposeful action in organizations. The systems approach, in particular SSM, is a vehicle to use as to widen the students' framework of understanding. Currently, the system software module in question, mainly consist of technical knowledge on designing, building and maintaining networks. The strategic operation of system software inside the organisation is at this point outside the scope of the curriculum. We propose giving the students an understanding of systems thinking and SSM, thus supplying them with a tool to approach networking design more holistically in terms of the organization and its goals. We believe that the application of these ideas are the best way to internalize the concepts, therefore the students will be presented with case material to improve their SSM modeling skills. It is very difficult to establish whether such an endeavor is successful, as the stated goal is to widen the perspective of the students in their work-life and to help change them into professionals.

KEYWORDS

Soft Systems Methodology, Systems approach, System software, technology education.

1. INTRODUCTION

Students tend to view the world of work only in terms of computers and technology. They only realize the role of humans when they put their technology to good use. As students enter their world of work their focus change and organizational problems appear (Dahlbom and Mathiassen, 1995). When an IT plan is drafted for and organization, the organization as a whole must be considered, not only in terms of technology, but also in terms of the humans with their differing worldviews. The success of implementation depend on the incorporation of the larger context of the organization (Raymond, 1990). The organizational culture has to be taken into consideration when the successful use of IT resources is evaluated (Bradley et al., 2006).

Our students have to acquire skills beyond just technical knowledge as they are in the future going to be instrumental in designing corporate architecture for networking and other system software applications. As to propose better solutions our students must be sensitive to the wider context of product use in terms of organizational goals, structures and cultures.

The systems approach of C. West Churchman provides a perspective of the world in terms of systems, where different role players have different perspectives on problematic situations. Checkland focuses on different worldviews and developed the now mature Soft Systems Methodology (SSM) that guides purposeful action in organizations. Students are guided to understand SSM by using it.

2. THE SYSTEMS APPROACH

According to Churchman (1968) the systems approach begins with philosophy, in other words, it starts with how one see the world through the eyes of another. Checkland (1999) defines a systems approach as an approach to a problem situation, which takes a wide view, attempts to include all features and focuses on the interactions between all the parts of the problem. The systems approach, in particular SSM, is a vehicle to use as to widen the students' framework of understanding. People with different worldviews who are trying to act purposefully, cause real life problems to be very complex (Checkland and Howell, 1998) and in the world of work our students will find themselves frequently in this complex real life problematic situations.

Checkland and Poulter (2006) describe the SSM process as a four activity learning cycle, which is not a sequential activity, but a forward and backward movement between activities. The learning cycle start with finding out about problematic situation, then modeling, debate and finally the defining/taking action. A case discussion will now follow to explain how a user will progress through the four basic activity learning cycles of SSM.

3. SSM CASE AND BACKGROUND

Engineering students at a university of technology (UoT), must as part of their qualification, do at least one year work integrated learning (WIL). This WIL training must be done in their field of study at a university accredited company. The university assists the students in finding WIL placements as far as possible, but it is ultimately the students' responsibility to find WIL placement. The identification of such companies who offer WIL and the process of getting employed as a trainee at a company are seen as a problematic situation from the students' perspective.

3.1 Activity 1: Exploring the Problem Situation (SSM: Finding Out)

The motive for using a rich picture as in Fig. 1 is the difficulty to express the complex human situations with all its interrelations. A rich picture is an explanation of the problematic situation as a picture. The aim is to capture the entities, viewpoints and structures of the situation. Rich pictures are invaluable as a basis for stating the discussion on the situation. A rich picture is never finish, but become richer as information is gathered. By drawing the pictures students are already motivated to have a wider view of their situation.

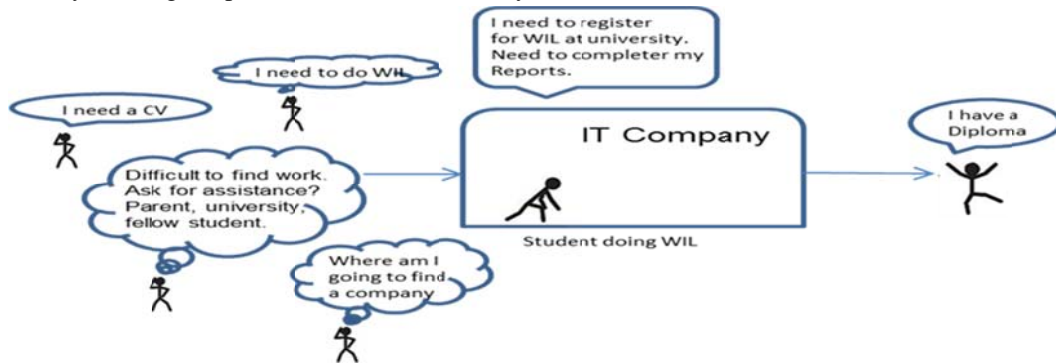


Figure 1. Rich Picture

In terms of SSM, a transformation needs to be identified. In this instance the transformation is: A student without a WIL position (input) is transformed to a student with a WIL position (output). Analysis one consists of thinking about the different roles in the problematic situation, the roles of clients, practitioners and issue owners. The role of each is:

- Client – Students since they are the party who caused the intervention to happen
- Practitioner – Students and lecturers since they are taking responsibility for the action
- Owner - Parents, students, UoT staff, employers who are affected by the situation.

Identifying the role-players forces students to debate the roles and the powers of the people influencing their life-world, such as their parents, sponsors and university staff members.

3.2 Activity 2: Model Building

After the initial identification of the roles, the following definitions, PQR, CATWOE, Root definition, and E1, E2, E3, must be completed before building an activity model.

P (What) - Find WIL position at company.

Q (How) - Identify suitable companies, apply and participate in appointment process.

R (Why) - To gain practical experience, pass WIL and obtain a formal qualification.

It is especially the identification of “R” that widens the perspectives of the students. From this analysis, the following root definition can be formulated: A system, to assist me as a student at a UoT, to identify a suitable university accredited company that offer WIL, to be employed at the company, in order to gain practical experience, which is compulsory to complete my training, as to obtain a formal qualification.

C (Customers) Student, UoT staff, company staff, parents

A (Actors) Student

T (Transformation) Student without WIL position - Student with feasible WIL position

W (Worldview) Students need to find WIL opportunity in accordance to university guidelines

O (Owner) UoT, companies, student, parents

E (Environment) WIL guidelines of the university, availability of WIL positions at companies

Criteria to use as measures of performance, namely efficacy (E1), efficiency (E2) and effectiveness (E3) needs to be determined. Efficacy measure the success of the intended outcome, while efficiency measure the minimum use of resources in the transformation process and effectiveness measure the fulfillment of a long term aim with the transformation process.

E1 Did I get a WIL opportunity?

E2 Did I complete my WIL successfully?

E3 Did I gain experience in my chosen career?

Some of the students are so caught up in their everyday studies that the identification of E3 forces them to have a future view of their careers. An activity model as shown in fig. 2 is based on a declared worldview.

3.3 Activity 3 and 4: Comparing the Models of the Real World

Purposeful activity models are used to structure questions in order to facilitate an orderly discussion about the real situation, as well as discussions about change to improve the situation. The following are typical question that follow an activity: Who does it? When? How? How else could it be done? (Checkland and Poulter, 2006).

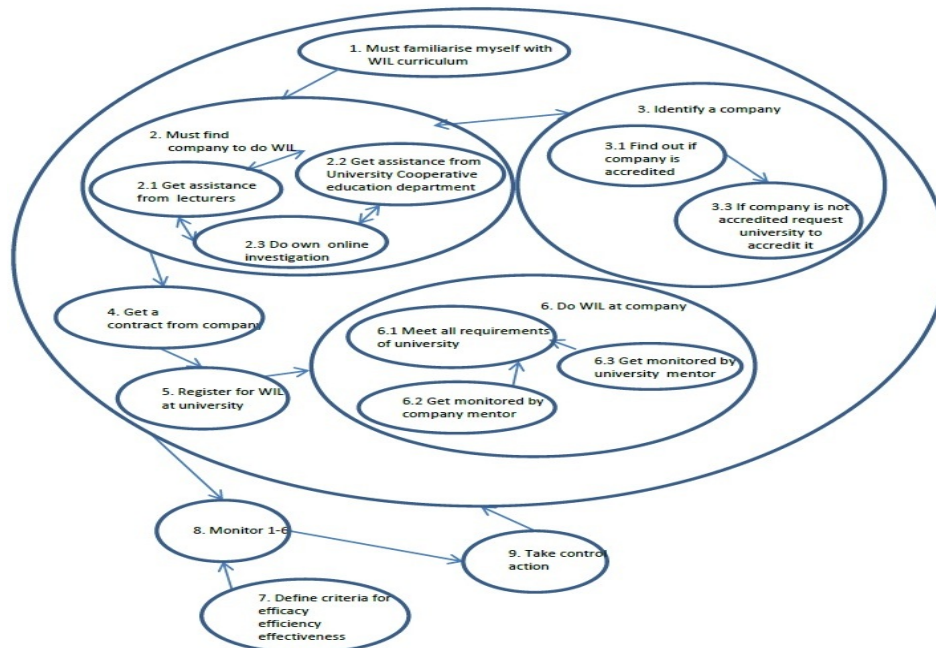


Figure 2. Activity model

4. CONCLUSION

Students have to acquire skills beyond just technical knowledge. We need to give them an understanding of systems thinking and SSM, thus supplying them with a tool to approach networking design holistically. In order to propose better solutions students must be sensitive to the wider context of product use in terms of organizational goals, structures and cultures. We believe that the application of SSM is the best way to internalize the concepts of broader perspectives and different worldviews as promoted by systems thinking in general. This paper reflected on an example to be given to students to gain an understanding of the potential of SSM as methodology to achieve a broader perspective in complex situations.

ACKNOWLEDGEMENT

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PROPOSAL FOR GENERIC AND DOMAIN SPECIFIC CIRCULATING DESIGN APPROACH

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ABSTRACT

The rubric is an assessment tool for evaluating higher order abilities such as critical thinking and creativity and consists of a scale indicating the degree of achievement, and descriptions. It is important that we develop our own domain specific rubrics, using value rubrics as a reference, and that we then integrate these rubrics into our own “META” rubric based on our own context. For this reason, we propose a two-way approach called “Generic and Domain Specific Circulating Design”.

KEYWORDS

Information Literacy, Graduate Attribute, Information oriented society, META Rubric, domain specific level rubric

1. INTRODUCTION

Our globalized, knowledge-based society demands quality assurance in higher education. This means that it wants graduates with a sound mastery of graduate attributes. In the Value Rubric Project in the U.S., graduate attributes were divided into fifteen types, and a general rubric was developed for each type. Fifteen types are as follows; Inquiry and Analysis, Critical thinking, Creative thinking, Written communication, Oral communication, Reading, Quantitative Literacy, Information Literacy, Teamwork, Problem solving, Civic engagement, Intercultural Knowledge and Competence, Ethical Reasoning, Lifelong learning and Integrative and applied learning. The rubric is an assessment tool for evaluating higher order abilities such as critical thinking and creativity and consists of a scale indicating the degree of achievement, and descriptions. The value rubric was developed by VALUE Leadership Campuses which consists of twelve universities selected by the Association of American Colleges and Universities in the U.S. The universities which make up VALUE Leadership Campuses have their own domain specific rubrics such as literature, law, education and technology, and these are collected and integrated as a general rubric. For this reason value rubrics are known as a “META” rubric. The Value Rubric Project recommends localizing and using this “META” rubric for each university.

On the other hand, localizing the “META” rubric is difficult because of the following points:

Firstly, the “META” Rubric is too abstract. It is important to develop not only local domain specific rubrics, but also domain specific performance tasks. Performance tasks are concrete assignments which can be achieved using domain specific knowledge and abilities.

Secondly, value rubrics are based on a U.S. higher education context, which is probably slightly different from Asian or European higher education contexts. This difference is useful for obtaining a deeper understanding of graduate attributes.

It is important that we develop our own domain specific rubrics, using value rubrics as a reference, and that we then integrate these rubrics into our own “META” rubric based on our own context. The comparison between two “META” rubrics should provide us with a clear understanding of graduate attributes. Localizing value rubrics is one approach but it is not enough. For this reason, we propose a two-way approach called “Generic and Domain Specific Circulating Design” (See Fig.1).

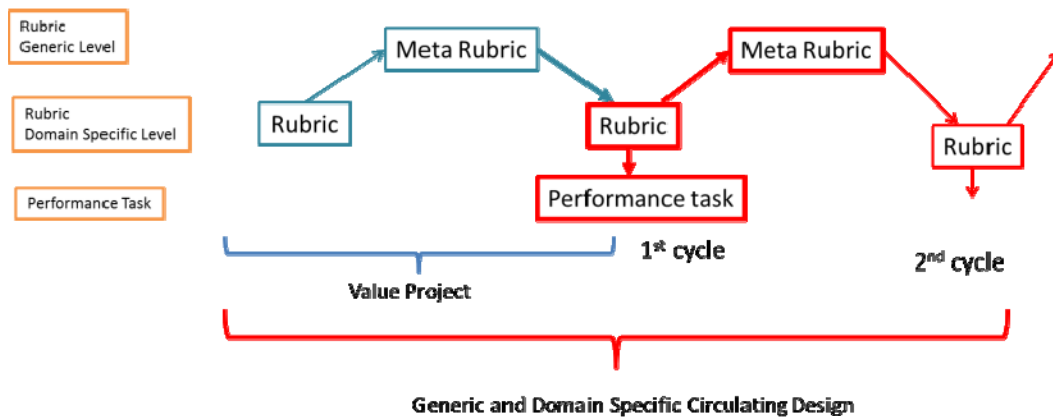


Figure 1. Relationship between Value project and Generic and Domain Specific Circulating Design

This means that the general level rubric also affects the domain specific level rubric and, simultaneously, the domain specific level rubric fundamentally affects the general level rubric. The authors have attempted to implement this approach, focusing on information literacy.

2. METHOD

Eleven university professors (Dentistry, Medical Treatment, Engineering, Agriculture and Teacher Education) took part in the project. The procedures were as follows;

Phase 1: Develop rubric and performance tasks independently, without the “META” rubric,

Phase 2: Revise rubric and performance tasks independently, with the “META” rubric,

Phase 3: Revise rubric and performance tasks collaboratively, with the “META” rubric,

Phase 4: Integrate rubric and performance tasks and develop a new “META” rubric.

The project is currently on-going, and in this paper we focus on Phase 1. The most important aspect of Phase 1 is the matching of domain specific level rubrics and general level rubrics. The information literacy value rubric consists of five subordinate concepts. It appears that the order of priority of these subordinate concepts reflects the Japanese higher education context. All sessions were audio-tape recorded while the Protocol was being developed. MAXQDA10 was used as the tool for qualitative analysis.

3. RESULT

All professors referred to both “Access Required Information” and “Evaluate Information and its Sources Critically,” and the students were expected to use reliable and appropriate information sources such as academic databases or journals.

On the other hand, not all professors referred either to “Determine Extent of Information Required” or “Use Information Effectively to Accomplish Specific Purpose.” This tendency is clearer in terms of “Access and Use Information Ethically and Legally”. As a result, information gathering seems to be given preference over information expression. We would like to promote our research project and clarify our findings in more detail.

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SECTION II

**IADIS INTERNATIONAL CONFERENCE
E-COMMERCE 2013**

part of the

**IADIS MULTI CONFERENCE ON COMPUTER SCIENCE AND
INFORMATION SYSTEMS 2013**

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FOREWORD

These proceedings contain the papers of the IADIS International Conference e-Commerce 2013, which was organised by the International Association for Development of the Information Society and co-organised by The University of Economics in Prague (VŠE), Czech Republic, 24 – 26 July, 2013. This conference is part of the IADIS Multi Conference on Computer Science and Information Systems 2013, 22 - 26 July, which had a total of 948 submissions.

The IADIS e-Commerce 2013 conference is a major international and interdisciplinary event for researchers, academics, industry specialists, practitioners & students interested in the advances in, and applications of e-Commerce. Participants will have an opportunity to present and observe the latest theories, models and results in these areas. This conference aims to cover both technological as well as non-technological issues related to this new business paradigm.

The Conference invites proposals from the introductory through advanced level on all topics related to e-Commerce. Proposals which address the theory, research and applications as well as describe innovative projects are encouraged.

The following five main areas have been the object of paper and poster submissions within specific topics:

- Commerce Technology;
- Global e-Commerce;
- Online Management;
- Online Business Models;
- Regulatory/Policy Issues.

The IADIS e-Commerce 2013 received 44 submissions from more than 18 countries. Each submission has been anonymously reviewed by an average of four independent reviewers, to ensure that accepted submissions were of a high standard. Consequently only 7 full papers were approved which means an acceptance rate of 16 %. A few more papers were accepted as short papers and poster. An extended version of the best papers will be published in the IADIS International Journal on Computer Science and Information Systems (ISSN: 1646-3692) and/or in the IADIS International Journal on WWW/Internet (ISSN: 1645-7641) and also in other selected journals, including journals from Inderscience. Some of the best papers will be eligible to be extended and enhanced as book chapters for inclusion in a book to be published by IGI Global.

Besides the presentation of full papers, short papers and posters, the conference also included a keynote presentation from an internationally distinguished researcher. We would therefore like to express our gratitude to Professor Ashok Ranchhod, Winchester School of Art, University of Southampton, UK, for accepting our invitation as keynote speaker.

As we all know, organising a conference requires the effort of many individuals. We would like to thank all members of the Program Committee, for their hard work in reviewing and selecting the papers that appear in the proceedings.

This volume has taken shape as a result of the contributions from a number of individuals. We are grateful to all authors who have submitted their papers to enrich the conference proceedings. We wish to thank all members of the organizing committee, delegates, invitees and guests whose contribution and involvement are crucial for the success of the conference.

Last but not the least, we hope that everybody will have a good time in Prague, and we invite all participants for the next edition that will be held in Lisbon, Portugal.

Claire Gauzente, IEMN IAE University of Nantes, France
e-Commerce 2013 Program Chair

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KEYNOTE LECTURE

TOUCHING THE E-CUSTOMER

**By Professor Ashok Ranchhod,
Winchester School of Art, University of Southampton, UK**

ABSTRACT

This keynote will look at the key developments in technology that are shaping the way corporations engage with consumers and themselves. The growth in gaming is changing the way in which advertisers are linking up with consumers and engaging them with the products and services on offer. At the same time companies are beginning to use the new tactile technology to get customers to engage with products and services through mobile devices such as touchscreen phones and tablets. These are creating new dynamics for grabbing the attention of individuals in a crowded and global marketplace.

The keynote will illustrate the latest ways of customer engagement, giving examples from work undertaken with organisations at the Games Design Hub at the Winchester School of Art at the University of Southampton and by a range of other companies working within the marketing and media sector.

Keynote Paper

TOUCHING THE ECONSUMER

Prof. Ashok Ranchhod
University of Southampton

ABSTRACT

This paper looks at the current developments related to the use of haptics in devices such as mobiles and tablets and explains how such technology is revolutionizing the way in which customer engagement will change in the future. Marketers will have to embrace new methodologies and ways of engaging with the consumer who will expect to communicate with firms and brands through as many senses as possible when using mobile devices or large scale touch screens at retail outlets.

1. INTRODUCTION

The Human body has evolved in such a manner that touch is an important aspect of the five senses and one through which certain information is gleaned and felt.

It is natural and normal for humans to feel materials, bodies, plants, the earth, stones, metals, wood and a great range of objects both animate and inanimate to gather information about their texture, softness, stickiness, sharpness, prickliness, coolness and a range of other sensations. This together with sight sound and smell allow humans a better understanding of the object that they are sensing or studying. Vignemont and Massin (2013) state that:

According to Johnson(there are an impressive array of receptors where some are dedicated to the perception of mechanical properties such as pressure, vibration and texture, some to the perception of tissue damage, some to the perception of temperature. Each sub-group is itself heterogeneous. The mechanoreceptors include the Meissner and Pacini corpuscles, Ruffini organs, Merkel disks and free nerves endings. All are anatomically and functionally heterogeneous: their location in the skin varies (some in the dermis, some in the epidermis, some – the Ruffini organs – are even also found in the joints); their activation threshold and adaptation rates differ (Vallbo and Johansson, 1984; Kandel et al., 2000, p. 438); they are innervated by different kinds of fibers, myelinated or not. They are classified as cutaneous mechanoreceptors only insofar as they allow us to be conscious of mechanical properties and/or they respond to mechanical stimuli.

From this we can glean that humans respond to various tactile stimuli in different ways and also depending on which part of the body the touch is felt. The term Haptic is used in many areas including computing and it emanates from the Greek word haptikos (from haptesthai, to grasp or touch).

The complex nature of touch is only now beginning to be studied in detail. It has been known for centuries that touch can communicate, feelings of anger or love, empathy, fear or warning of impending danger. The lack of touch can also create psychological problems and damage to individuals. However for the purposes of this paper we are going to concentrate on touch, sight and sound as it relates to computers, tablets and mobile phones. One of the most important aspects of touch is pressure.

In 1846 Weber discussed that touch is essentially a sense of force. Our concepts of force would be very much less well developed were we unable to feel pressure, or to sense competing forces in which an equilibrium is established so that no movements are produced, yet in which the forces can still be felt.

Pressure and its use in tablets:

- a) Pressure is used to “send” emails. Pressure is used to “start” a video
- b) Gentle pressure is used to copy and paste sentences
- c) Pressure and movement when scrolling text
- d) Heavier pressure when typing
- e) Varying pressure when playing games
- f) Applying enough pressure to activate screens or movement
- g) Using lighter or stronger pressure to write and paint

The other aspect of pressure and touch is vibration. According to Katz (1925) the feeling of vibration is created by temporal pattern of pressure on the body or more specifically on the fingers. Vibration is used quite commonly in games, but more specifically to denote the arrival of emails, messages or phone calls when a device is placed on silent mode. Vibration is also very commonly anticipated and used in games and games technology, in order to create a feeling of driving cars or feeling the vibration of guns or other devices.

Touch on screens is now expected, yet it is fairly new and came into being with the iPod touch around 2008. It is now taken for granted and people use touch screens daily in their lives for communication. The two main technologies that dominate the touch screen market are analogue and digital. (Analog approaches measure a change in the value of a signal, such as the voltage, while digital technologies rely on the binary choice between the presence and absence of a signal.) (Intel, 2012). Each system provides different touch sensations for the user.

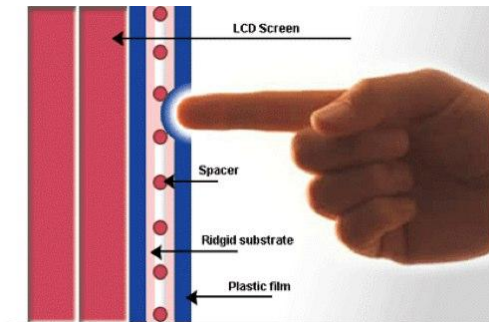


Figure 1. Resistive Touch Screen Technology © Intel Free Press Source: Intel, 2012

In the case of the Resistive touch screen as shown in Figure 1, is based on resistance. Most materials have differing forms of resistance and touch screens have the top layer of plastic and a bottom layer of glass. Every time the plastic layer is touched, it pushes the plastic layer and the resulting pressure forms a circuit. The glass and plastic layers have a thin array of wires. Through touch a voltage is generated activating the screen. As electrical resistance refers to how easily electricity can pass through a material, the panels work by detecting how much the resistance to the current changes when a point is touched. There are a myriad of different technologies competing with each other in order to create the best possible touch interface for the consumer. As touch is an indirect measurement, figure 2 illustrates the different ways in which this can be measured from a scientific point of view.

Touch Is An Indirect Measurement

❖ This is one reason why there are so many technologies

Touch Technology	What's Being Measured
Projected capacitive, Embedded (capacitive)	Change in capacitance
Surface capacitive	Current
Resistive (all forms) & Embedded (voltage-sensing)	Voltage
Surface acoustic wave	Ultrasonic wave amplitude
Acoustic Pulse Recognition & Dispersive Signal Technology	Bending waves
Infrared & Camera-based (all forms), Planar scatter detection	Absence or reduction of light
Vision-based	Change in image
Embedded (light-sensing)	Presence of light
Force sensing	Force

The ideal method of sensing touch has yet to be invented!

Figure 2. Source: www.Walkermobile.com

The other main technology that is in use is the P-Cap using capacitive technology. P-Cap stands for projective capacitance and this is used very effectively by Apple and has set the standard for billions of consumers. Why is this so successful?:

- a) Multiple simultaneous touches
- b) Extremely light touch
- c) A flush surface
- d) Excellent optical performance
- e) Reliable and durable
- f) Fully integrated user experience-effortless and *fun*

The movement is now towards multi-touch screens because they offer the following:

- a) APPLE- with its multi-touch screen has set the standard for “coolness” and people of all ages expect to interact intuitively with digital devices and their interfaces
- b) GAMING- Gaming is perfect with multi-touch technology-how do you play Angry Birds?
- c) Ignoring unintended touches. Screens are likely to become more horizontal in the future
- d) Multi-user collaboration. When two or more people (Tutor and pupil for instance) wish to exchange ideas-learn etc. on a whiteboard. However the technology is still nascent.

Given the fact that these technologies will be really powerful for marketers, especially when used for large screen displays in shops, supermarkets or precincts. The competing technologies offer different possibilities but according to Murray Walker (walkermobile, 2013), the technology that is likely to be dominant over the next five years will be Projected Capacitive as used by Apple, but it will be more refined.

A Prediction of Which Technologies Will Win in the Next Five Years...2

#	Touch Technology	5-Year Prediction
1A	Projected Capacitive	Dominant
1B	Surface Capacitive	Significant Reduction
2A	Analog Resistive	Major Reduction
2B	Analog Multi-Touch Resistive (AMR)	Disappear
2C	Digital Multi-Touch Resistive	Small Niche
3A	Surface Acoustic Wave (SAW)	Moderate Growth
3B	Acoustic Pulse Recognition (APR)	Small Niche
3C	Dispersive Signal Technology (DST)	Disappear
4A	Traditional Infrared	Reduced Large-Format; Increased Small-Medium
4B	Waveguide Infrared (DWT)	Already Gone
4C	Multi-Touch Infrared	Moderate Growth
4D	Camera-Based Optical	Increased Large-Format; Decreased Desktop
4E	Planar Scatter Detection (PSD)	Viable Niche
4F	Vision-Based	Viable Niche
5	Embedded	Significant Growth
6	Force-Sensing	Disappear

Figure 3. Source: www.walkermobile.com

The biggest growth is likely to be in multi-touch technology so that several people can interact with each other on the same screen. Currently there is debate whether the maximum should be five users or eight users so that the technology works smoothly and seamlessly. Another aspect that is likely to make a comeback is an active stylus, so that people can write, draw etc. So it is likely that there will be systems offering both or just one system. Currently the iPad also offers stylus activity for writing and drawing. The other are that engineers at Senseg (Arthur, 2012) are working on are systems, which can actually create textured sensations such as roughness, ridges and channels, called e-Sense. However this technology is still not available on the market. Now, engineers from three different groups are proposing a type of tactile feedback that they believe will be more popular than mechanical buzzing. Called electrovibration, the technique uses electrical charges to simulate the feeling of localized vibration and friction, providing touch-screen textures that are impossible to simulate using mechanical actuators (Greene, 2010). The possibilities that this offers marketers is astounding as marketers rely on all the senses and when one walks into a retail environment, sight, sound, smell, touch and voice are activated in shopping. With haptic technology improving all the time, consumers

will be able to not only “touch” materials but also “see” and them listen to the “sound”. This will create a powerful sensory situation that will allow consumers to “test” and “feel” clothes or certain materials they wish to purchase either online or to understand what they wish to look at specifically in a shop.

2. PROGRESS IN MATERIALS TECHNOLOGY

Scientists have been working on polymers that are versatile compared to inorganic materials and at the same time being lightweight, plastic, malleable, inexpensive and easy to manufacture. These are called Electroactive Polymers (EAP) that change size or shape when stimulated by the right activation mechanism. These polymers that deform the surface depending on pressure and can also create electromechanic vibrations can be as small as 100 micron per unit only 3 mm in thickness (Printedelectronicsworld, 2013), making them ideal for mobile phones, in not only simulating keyboards but possible also offering a range of textural variations. Applications for larger formats such as Casino tables, laptops, keyboards and games are also underway. Figure 4 illustrates how the user experience can be enhanced and improved.

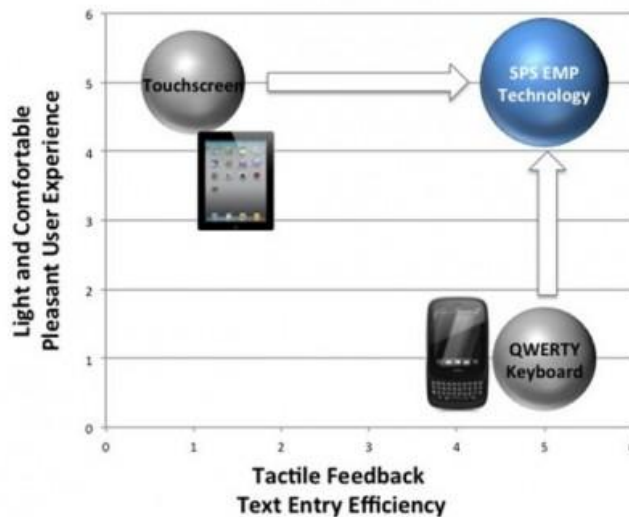
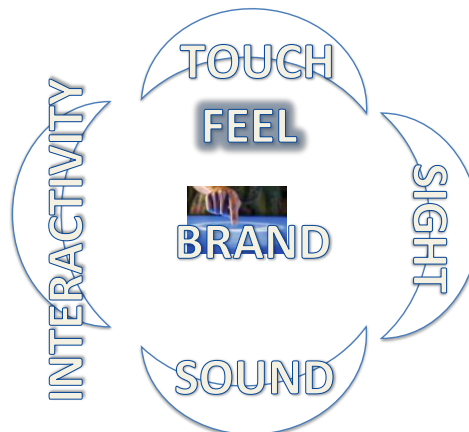


Figure 4. Source: Printelectronicsworld, 2013

3. IMPLICATIONS FOR ECOMMERCE

With consumers becoming increasingly sophisticated and with more than 50% of mobile phones sold around the globe projected to have touch screen capabilities, it is clear that there is an amazing branding and commercial tool in most people’s hands. At the same time touch can be extended to household appliances such as Fridges, washing machines, televisions, cookers and many other products. The new way of understanding consumers will involve touch and data gathering revolving around the key senses as shown in Figure 5. In addition to information and interaction it is expected that greater customer engagement through haptics will also involve advergaming, (Jin, 2010) and engaging in the consumer in “fun” activities with products and services that he/she is interested in. Such engagement can only be enhanced by better film vibration technology as discussed above.



BUILDING RELATIONSHIP MARKETING THROUGH TOUCH

Source: Author

Figure 5

In this manner consumer choices and feelings will be transmitted through databases, informing the customer of best products and choices. The current consumers and new ones (who are currently engaged with touch technology from birth) will be demanding ever more sophisticated communication with their tablets and mobiles leading to a better understanding of their needs. For retailers competing with the Internet, screens become a new way of reviving customer footfall as the screens can be made available on a 24/7 basis. For instance customers can browse through catalogues and look for instant availability. People buying houses can look at them in detail through large screens. Even organisations such as Bloomberg (Jones, 2013) are embracing what is known as “Digital architecture” to enhance the customer experience in a playful manner, but at the same time display data and market information (Figure 6)

Figure 6. Source: Jones, 2013 <http://www.outputmagazine.com/>

In a myriad of ways, therefore, relationships can be built with brands, enabling closer involvement and understanding of the consumer, truly touching the eConsumer in more ways than one.

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Full Papers

WEBSITE FOR ONLINE SELLING IMPLEMENTATION AMONG SMES IN MALAYSIA

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ABSTRACT

Innovation adoption literature has demonstrated that organisational characteristics and perceived benefits of innovations play significant roles in explaining organisational-level decisions to adopt new technologies. However, the extant literature relating to small and medium enterprises (SMEs) website adoption fails to provide an understanding of what determines adoption. This paper reports an empirical study conducted to identify the factors that impact SMEs' involvement with websites. Six factors such as to lower cost, external pressure, to enhance company image, to attract new business, to stay ahead competitors, and to follow the trend, which were found in the literature are used to investigate the level of website involvement. This involvement is examined in terms of ownership of a website and use of the website for selling purposes. A survey of 3535 SMEs was conducted, 522 SMEs responded for the survey; however, only 309 have used website for the purpose of online selling. In addition to the survey, ten SMEs were chosen from 309 for semi-structured interviews. The results suggest that specific factors contribute to the SMEs' involvement with the Internet – enhance company image, following the trend, and customer pressure influence website for online selling implementation. The key contribution of this article to current knowledge is the interpretation of understanding of what determines SMEs website adoption, supported by the literature.

KEYWORDS

Technology adoption, SME characteristics, SMEs, Internet, websites

1. INTRODUCTION

The term website used for online selling has emerged as a significant topic in the literature, especially since the Internet started to be used commercially in the early 1990s and now becoming rapidly, particularly with existence of Web 2.0 applications, such as Facebook, twitter, and blogs. Most organisations adopt website for the sake of letting know to the world that their organisations exist and finally with the hope they can sell their products and services through the websites, i.e. do some transactions online.

Most studies on website adoption focus on the facilitators that may have influenced SME managers to adopt websites (e.g., Poon and Swatman, 1999; Daniel, 2003; Scupola, 2009, Oliveira and Martins, 2011). But, there are still only limited studies on factors such as to enhance company image or following the trend of why SMEs adopt technologies, particularly websites (Corbitt and Thanasakitt, 2002). Thus, there is a need to understand the factors SMEs adopt websites. This paper seeks to address this gap in the current literature.

2. BACKGROUND

2.1 Small and Medium Enterprises (SMEs)

SMEs play an important part in the economic activities of most nations (Storey, 1994). There are numerous examples in the literature that illustrate the weight that SMEs carry in their own national economies. In most European countries, SMEs constitute more than 90% of businesses (OECD, 1998; 2000; Scupola, 2003). In Malaysia, SMEs form the bulk of firms in the country and they play a critical role in the country's industrialisation. They account for more than 95% of total establishments in Malaysia (Malaysia, 2007).

Although SMEs are being faced with a number of constraints because of their size (Curran and Blackburn, 2001) they are more flexible than large firms. Their small size allows for an efficient and informal communication network, they are able to react quickly to any shift in the market place, and their lack of bureaucracy lets them implement change easily (Rothwell, 1991; Storey, 1994). Research in both Europe and the US (Johnson and Cathcart, 1979; Rothwell, 1991) shows that SMEs are more responsive to market needs than large firms, more adaptable to change, and more innovative to meet customer demand.

There are two common ways of defining SMEs found in the literature. One is the definitions based on financial turnover and the other is the definitions based on number of employ (Curran and Blackburn, 2001). Employment size is considered more objective and transparent compared to turnover (Curran and Blackburn, 2001), and also more practical as “information about employment is readily available and ... considered by managers to be less confidential” (Pratten, 1991, p.93; Mohd Osman, 2001). Consistent with Ismail and King (2007), for this study, an SME is defined as a firm employing 10 to 250 employees.

2.2 Website for Online Selling

Online buying and selling are two common components to describe electronic commerce (e-commerce). However, they focus on two different niches. Buying is the activity that relates *to the purchase of goods or services from suppliers, whereas selling is more towards ‘customer-focus’, which is to sell goods and services to customers* (Daniel and Wilson, 2002). In the Internet environment, a firm which wants to sell online needs to invest in it, not only time and energy, but also cost for displaying firm’s information, products and services (Houghton and Winkhofer, 2004). It needs to display and surrender the items, and usually how to make them sellable (Carmon and Ariely, 2000). Buying online, on the other hand, does not need investment but firms need to be connected online to purchase items.

Researchers have investigated various website activities (e.g., Daniel *et al.*, 2003; MacGregor and Vrazalic, 2007). Among those investigated are simple website activities such as having online brochureware and online catalogue (with and without prices) (Pool *et al.*, 2006), or more complex website activities, such as website with customer relationship management and supply chain management facilities (Brown and Lockett, 2004). Consistent with some studies (Daniel, 2003; Scupola, 2009), this study also investigates the extent of website usages in term of website activities explained in Table 1. More complex website activities are not included because they were rarely used by SMEs (Pool *et al.*, 2006).

Table 1. Website activities

Activity	Statement
<i>Online brochure</i>	Online brochureware is a website activity that distributes static company information in one-way broadcasting fashion (Le and Koh, 2002). Through this activity, firms can market themselves by displaying company information on the website (Daniel, 2003).
<i>Online catalogue</i>	This activity is helpful in providing customers with information about a firm’s products and services, news and also company events, at no cost (Teo and Yujun, 2003).
<i>Online enquiries</i>	Firms can also provide information about their companies, and their products and services to customers and potential customers by providing a link on the firm’s website to enable customers to inquire for information (Teo and Ranganathan, 2004).
<i>Online ordering</i>	An order form/page is posted on the website to indicate the seller’s intention to sell items online (Daniel, 2003; Scupola, 2003).
<i>Online payment</i>	Online payment refers to real-time payment embedded on websites. Many firms are advised to make online payment available on their websites so that customers can order and finally pay online (Raymond, 2001).

2.3 Reasons that Influence for Website Implementation

Most studies on e-commerce adoption focus on the facilitators that may have influenced SME managers to adopt websites (Poon, 2000; Daniel *et al.*, 2002; Quayle, 2002; Daniel, 2003; Drew, 2003; Lertwongsatien and Wongpinunwatana, 2003; Michalak, 2003; Scupola, 2003). But, there are still only limited studies on reasons why SMEs adopt technologies, particularly e-commerce (Corbitt and Thanasakitt, 2002).

Corbitt and Thanasakitt (2002) suggest that reasons why SMEs adopt e-commerce are not necessarily factors that facilitate the adoption. The reasons for adoption may simply explain why an SME made that particular decision (Corbitt and Thanasakitt, 2002). In her study of seven SMEs in Italy, Scupola (2003) found that one of the reasons why SME managers adopted e-commerce was unanticipated, an adoption she

termed ‘just by chance’. The ‘just by chance’ adoption of e-commerce is more a reason for the adoption rather than a facilitating factor in e-commerce adoption. In the same vein, the term ‘guts feel’ coined by Quayle (2002) is more applicable as a reason for e-commerce adoption rather than as a factor that encourages e-commerce adoption among SMEs. In their interview of SMEs in Australia, Corbitt and Thanasakitt (2002) found reasons given by SMEs there to adopt e-commerce were ‘it is the way to go’ and ‘to follow the trend. Table 2 shows some potential explanations that can be considered as reasons why SMEs adopt e-commerce found in previous studies. Some of these reasons could also serve as factors of e-commerce adoption. For example, Corbitt and Thanasakitt (2002) found that ‘government pressure’ was the reason why SMEs adopt e-commerce, while Scupola (2003) claimed that it was a factor that facilitates e-commerce adoption.

Table 2. Reasons for SME managers to adopt e-commerce

Reasons to adopt	Reported by
To lower cost	Daniel and Grimshaw (2002), Simpson and Docherty (2004)
To eye new business opportunities	Daniel and Grimshaw (2002)
To enhance company image	Abell and Lim (1996), Poon and Swatman (1998), Quayle (2002)
To follow trend	Corbitt and Thanasankit (2002)
External pressure	Mehrtens <i>et al.</i> (2001), Daniel and Grimshaw (2002)
To stay ahead of competitors	Daniel (2003), MacGregor and Vrazalic (2007)

3. CONCEPTUAL FRAMEWORK

In this study, an extension of the innovation model is proposed. This conceptual framework is based on the seminal work of Rogers (1989), and Tornatzky and Fleischer (1990), and Corbitt and Thanasakitt (2002). The framework incorporates SME managers and SME demographic characteristics (these are discuss elsewhere see, Hashim (2011)) and reasons to website implementation. Figure 1 shows a graphical representation of the study’s conceptual framework.

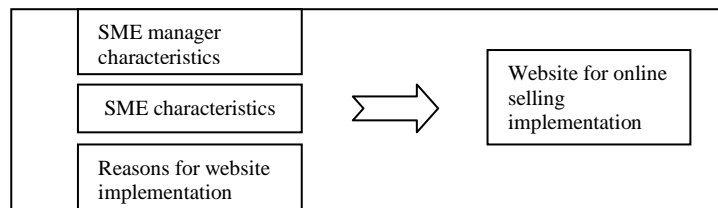


Figure 1

4. METHODOLOGY

The data for this paper has been gathered by means of a large-scale survey to SMEs all across Malaysia. In addition to the survey, interviews were also carried out with SME managers who used website for online selling purposes in their businesses. A total of 3535 SMEs questionnaires were sent directly to the SME owner/managers by post. In the second stage, face-to-face semi-structured interviews with ten SME managers were conducted. These managers were chosen randomly from the list of respondents who returned the survey and have used websites for online selling purposes.

5. FINDINGS

5.1 Respondent Profiles

A total of 3,535 questionnaires were sent to SMEs in Malaysia. 522 SMEs questionnaire were found to be useable for the data analysis. Surprisingly, 514 SMEs (98.5%) have an Internet connection and most of them were using the Internet for the past ten years. Table 3 displays the respondent characteristics.

Table 3. Respondents' characteristics

Position		Age	
Managing Director	40%	21-30	15%
Manager	37%	31-40	26%
Owner	12%	41-50	32%
Others	11%	Above 50	27%
Gender		Education	
Male	73%	Primary	2%
Female	27%	Secondary	18%
Ethnicity		Diploma	20%
Chinese	66%	Bachelor	45%
Malay	27%	Postgraduate	15%
Indian	4		

5.2 Website Adoption

309 of the survey respondents state that their firms have websites. Of these 309, more than four-fifths have had websites more than ten years. Almost 20% rarely update or maintain their websites. Half of the managers interviewed stated that they need not have to update their frequently: "Why bother to update or maintain the website so often? We have included all the information required by our customers about our firm. We only have it updated if it is necessary to do so." (SME managing director from firm IX). "We don't see the relevance of updating our website frequently. We don't have time to do that." (SME manager from firm IV).

Though many of these SMEs have had websites for more than 3 years (almost 90% of those with websites), they are used for little more than providing contact details for the firm and information about the firm's goods and services. Table 4 shows the breakdown of website activities of these Malaysian SMEs.

Table 4. Website activities of SMEs (n=309)

Website activities	Percentage
Online Brochureware	85%
Online catalogue (without prices)	92%
Online catalogue (with prices)	12%
Online enquiries	47%
Online ordering	19%
Online payment	5%

Four SMEs (during the interview), which allow online ordering on their websites require their customers to phone before they proceed with the order. They claim that information on their websites is not detailed enough for customers. They need to explain the product to customers and say when it can be delivered.

Only five per cent of respondents accept online payment. More than half of SME managers interviewed claimed that websites with online payment systems were not appropriate to them: "I don't think our people are ready for online payment yet. So there is no point me investing in the online payment system yet." (SME manager from firm IV). The survey and the interviews show very few SMEs have online ordering, online catalogue with prices display, and online payment facilities installed in their website.

5.3 Factors for Website Adoption

Six factors were used to investigate the level of SMEs website involvement. Table 5 shows the level of involvement.

Table 5. Factors for website implementation

Factors	Percentage
Lower cost	19%
External pressure	13%
Enhance company image	75%
Attract new business	74%
Stay ahead competitors	47%
Follow the trend	31%

Almost three-quarters of these 309 SMEs state that the most important reasons for having a website are to enhance firm image (75%) and to attract new businesses (74%). Almost 9 out of 10 SME managers during the interviews said that website will improve the image of their firms. SME managers were pleased to have a website address on their firm stationery and on their business cards. They claimed that an Internet address would establish credibility in the eyes of actual and potential customers. This, according to the managers, may lead to more business: *“Oh yes, we have our firm website. The website address is written on my business card. We have put all information about our firm on the website.”* (SME manager from firm V).

Many SME managers (during the interviews) assumed that having a website is essential to stay ahead of competitors. They believed firms without websites will be left behind in the marketplace. Managers said they do not want to be left out. Some managers also stated that a website is a first step to going international because customers from other countries can browse their websites and make contact.

The interviews made clear that many SME managers were not sure whether customers, particularly their own customers, are willing to buy online. In addition, they also doubted whether investment in a website will be worthwhile. However, SME managers during the interviews stated that they still needed a firm website because they need to impress their customers and to follow the market trend. *“We need to show the people out there that we have what other people have. Well, everybody says that a website is a must for every business.”* (SME managing director from firm IX). *“I am not really sure whether we should invest in a website. There are so many uncertainties out there. We don’t know whether the investment and the time spent are really worth it. So, we are caught between a rock and a hard place: we need to have it so that we are not out-dated.”* (SME managing director from firm J)

Very few SMEs claimed that having a website reduces firm operating costs (only 19%). According to the managers during the interviews, they have to spend more money to get their firm websites operating. They said they needed to hire someone to design the website, paid for domain names, and also paid for the maintenance of the website, which were major costs for many SMEs. Surprisingly, some the managers during the interview needed to cut off their firms from the Internet because they could no longer pay their bills. *“We had a firm website before, but cancelled it. We can’t afford to hire an IT expert to maintain the firm website. We also can’t afford to pay the service provider because we hardly used it.”* (SME manager from firm V).

SME managers said they scarcely have time to compare their website performance with that of other firms. They did not even have the resources to compete in terms of website sophistication. *“There are so many website packages offered by the websites service providers. We cannot afford to have the most advanced package. We finally opted for the simplest and cheapest package available.”* (SME managing director from firm L)

During interviews, it became plain that many SME managers still felt they have no need for websites, particularly a website with online payment facility. These managers argued that websites do not mean that firms can provide better products and services to the customers. These managers believed they could serve customers better by traditional methods, such as face-to-face interaction, and by facsimile, text messaging or telephone. For them, the most important thing is to provide efficiency and good quality services. *“We survive with our own ways of doing business. We don’t need to do e-commerce. Our priority is giving the best and the fastest service to our customers.”* (SME manager from firm Q). *“A fancy website does not mean excellent service. “We try to satisfy our customers as best as we can.”* (SME managing director from firm O).

6. DISCUSSION

The snapshot of website implementation among SME in this study provides some preliminary insights. The large portions of SMEs have had websites for more than ten years. This may be because there was a big promotion from the Malaysian government for SMEs to have websites over ten years ago (see Hashim, 2011). Many of the websites, although are not updated, are still on the Internet. Thus, many managers claimed that their SMEs have websites in operation.

The results from the survey showed almost 60% of SMEs in this study have websites. But, there is a difference in the way the website is put to use among these SMEs. Many SMEs have a website with online brochureware and online catalogue that display online information about the company, its products and services. However, very few SMEs have engaged in more complex website activities, such as websites with online ordering and online payment. These findings are similar to other SMEs and website implementation

studies (e.g., Pool *et al.*, 2006; Chuang *et al.*, 2007; Scupola, 2009; and Oliveira and Martins, 2011) that found SMEs were comfortable with websites that display information about their firms, products and services; but rarely transacted online. One interesting finding from the survey is that SMEs were not only reluctant to have a website with online payment system installed, but were also hesitant to put prices of their products and services on websites. SME managers claimed that they were concerned that other firms, particularly large firms, might imitate their online prices or undercut them which are similar to Scupola (2009) findings. The interviews also confirmed this finding.

In general, website implementations among SMEs in Malaysia are still in their infancy stage. Analysis from the survey shows that the rate of website diffusion did not seem particularly important among SME managers in this study. Most of the time, SMEs only display their company and products information. Website for online selling is often considered as a stand-alone resource among SMEs, which is in line with Ordanini's (2006) and MacGregor and Vrazalic (2009) findings. Thus, we may speculate that SMEs in this study are yet to exploit all the potential of website activities in their businesses.

Based on the findings, a table of ranking analysis was developed. Table 5 shows SME reasons of having website based on ranking.

Table 5. Factors for having websites by ranking

Factors for adoption	Ranking
Enhance company image	1
Attract new business	2
Stay ahead competitors	3
To impress customers	4
Follow the trend	5
Lower cost	6

It was found that most important factor why SME managers adopt websites was to enhance company image, and the least important was lower cost. Having a website helps SMEs to enhance the firm's image and attract new business. In addition, a website is essential to help a firm stay ahead of competitors, and impress customers. In order to stay ahead of competitors, managers stated that they need to follow the marketing trend, which is to have a website. This was confirmed by SME managers during the interviews. Many other studies have found that SMEs adopt websites because they do not want to be left out (e.g., Rosenbloom, 2002; Ordanini, 2006). They need a website to establish credibility in the eyes of actual and potential customers, which may lead to more businesses (Rodriguez, 2005).

It should be noted that while the study by Tan and Teo (1998) found that cost was cited by non-adopters as a reason for not using the Internet, research by Mirchandani and Motwani (2001) showed that the operational cost of website was irrelevant. The finding was supported by another study (Scupola, 2009; Lin and Ho, 2011). This study also found that lower operation costs was among the least important factors why SMEs adopt websites. This implies that while low operation costs might not motivate businesses to adopt websites, 'perceived' high cost might inhibit businesses from embracing websites (Hashim, 2011).

7. KEY FINDINGS AND CONTRIBUTIONS

Some key findings and contributions of the research are described below:

- A noticeable variation in the exploitation of website activities among SMEs is revealed in this study. At present, many SMEs have websites mainly to promote the company's goods and services, and the company itself. A website with online payment facilities is rare among SMEs in this study. One interesting finding in this study is that SME managers are not only reluctant to trade online, but are also hesitant to put prices on their products and services on websites.
- The study contributes to the existing literature on SME website development by suggesting that SME management faces major decision dilemmas: website for online selling adoption drive. By understanding the holistic issues of website for online selling implementation, the importance of some factors are identified.
- Finally, it is important to highlight that most of the existing studies on e-commerce and SMEs have focused on developed countries. This study focuses on a developing country: Malaysia. Thus, this study brings in a new, possibly fresher, wider and more inclusive perspective on the adoption of websites by SMEs.

8. CONCLUSION

This study has provided important insights into website implementation among SMEs in Malaysia. This study is cross-sectional in nature. Owing to the inherent time constraints in a study of this kind, the adoption decision, which may have required a longitudinal perspective, was not investigated. The study will, however, generate a significant data set that can be examined for potential relationships between factors and website implementation. This can be used to formulate hypotheses for future research.

Building on this research, there are opportunities for further work. The present research could serve as a starting point for more detailed studies, by involving both the adopters and the non-adopters of websites. Future studies should tackle such an assignment using multivariate analysis or case or longitudinal studies. This may give a more comprehensive understanding of these issues, particularly why some SMEs used website comprehensively while others did not.

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SOCIAL MEDIA RELATIONS IN THE GERMAN AUTOMOTIVE MARKET

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ABSTRACT

Nowadays, using Social Media for marketing purposes is common practice for many businesses. At the same time, it is widely unclear if current Social Media strategies address the users' needs. This paper delivers new insights into both aspects by providing an overview of Social Media use in a whole industry branch, the business market of the German automotive industry. The aim is a) to gain insights if and how different actor groups – manufacturers, car dealers and prospective buyers – employ Social Media and b) to assess current practices of businesses (manufacturers and car dealers) by triangulating their perspectives with the perception of the users (prospective buyers). As methods, two surveys and an analysis of the sites of over 1,200 car dealers were employed. Results reveal the current state of Social Media diffusion and could be used as a guideline to improve businesses' Social Media Marketing efforts. Results of the investigation show that Social Media communication relations are widely established between manufacturers and (prospective) buyers and only partially established between car dealers and prospective buyers. In contrast to that, on the business-to-business (b2b) side, Social Media communication is rarely used. Social Online Networks (SONs) are the most popular Social Media channels employed by businesses. Manufacturers and car dealers focus their Social Media engagement especially on Facebook. From the perspective of prospective buyers, however, forums are the most important source of information.

KEYWORDS

Social Media Marketing, automotive market, manufacturers, car dealers.

1. INTRODUCTION

Although the use of Social Media is foremost a leisure based phenomenon of predominantly young users, organizations as well increasingly rely on Social Media to foster internal and external communication (Qualman 2009, Evans 2010, McKinsey 2012). The adaptation of Social Media in professional contexts is probably most advanced and visible in business-to-consumer oriented online marketing. This is hardly surprising if one keeps in mind the central role of the internet in people's everyday life information behaviour. The Social Web enables everyone to communicate his/hers own opinion publicly and offers a plethora of content provided by other users. The importance of user generated content for decision processes of consumers is beyond dispute. E.g. more than 75% of internet users consider ratings and reviews as influencing buying decisions (eMarketer 2013). One can argue that by now businesses often have no longer a choice but to participate in the Social Web. According to the 2012 Social Media Marketing Industry Report (Stelzner 2012), 83% of survey participants assess Social Media as important for their enterprise. Another survey of the Deutsches Institut für Marketing (2012) revealed that nearly 70% of businesses in Germany employ Social Media Marketing as a tool for external communication. The question is if they are doing it right.

According to McKinsey (2012) and Hennig-Thurau (2010) a large fraction of businesses are using social networks, especially Facebook, as a “place” and tool for Social Media activities. In many cases communication patterns often resemble the classical unidirectional information sending paradigm, e. g. the posting of news or product related information. Applications like Social Media Monitoring or Social Commerce are barely used. Most often there is no systematic integration of (prospective) customer's wisdom and engagement as Evans (2010) argued as *Social Business*. At least for the moment, there are manifold missed opportunities for direct as well as indirect value creation. In sum, Social Media Marketing activities

currently can often be judged as premature. The question is, how to do it right? There is no easy answer. The conceptual pinball framework of effects of new media on customer relationships suggested by Hennig-Thurau et al. (2010) illustrates the complexity of the new marketing world. Therefore, an overview of the basic characteristics of the Social Web in particular information and communication markets can be seen as a central precondition for Social Media Marketing to be effective. Here, the following questions need to be addressed: Who are the right addressees (participants)? What are the relevant communication topics? Where are the appropriate places of Social Media communication? Such an approach aims to correlate the expectations and behaviour of different actor groups and therefore compiles an integrated overview of Social Media use and communication relations of a whole branch of business. Results of such an investigation generate a picture of Social Media employment in a (specific) market and deliver insights into the communication relations between different business-to-business and business-to-consumer actor groups. To our knowledge, such a rather comprehensive Social Media relations perspective is barely addressed in the field and therefore of news value, delivering insights into the state of Social Media diffusion of specific branches. From a pragmatic point of view, such an investigation helps businesses to get an impression if their efforts are really worthwhile, e.g. if they are choosing the right channels of communication.

This is the starting point and motivation of this work. We want to get a comprehensive insight into the current state of the art of Social Media Marketing in the automotive industry. The paper is structured as follows. In the next section, the holistic perspective of this investigation is argued from the background of current research in the field. In addition, the specificities of the area under investigation, the German automotive market, are defined. Following that, the research questions and methods are presented. Then the results are presented and analyzed. The paper closes with a discussion of the results and the research approach.

2. THEORETICAL CONSIDERATIONS

Above, we introduced the pragmatic perspective of this investigation. Furthermore, there is a limitation in current scientific research. Market studies are usually limited to specific actor groups, cp. Stelzner (2012), McKinsey (2012), Deutsches Institut für Marketing (2012). Scientific papers often focus on case studies, cp. Krüger, Stieglitz & Tobias (2012), or specific aspects of communication artefacts or their perception or communication processes, cp. Chen, Fay, and Wang (2011), Savolainen (2011), Willemsen (2011). Therefore, to get a comprehensive picture of Social Media adaptation and communication relations we argue for a holistic approach, a perspective that aims at a broad view of specific markets and integrates the views and behaviours of different actor groups.

As Luoma aho and Voss (2010) point out, there is a lack of fitting theories in Social Media research beyond empirical research. The authors argue for the idea of a multiplicity of “issue arenas”, places of interaction where an issue is discussed by stakeholders and organizations as an anchor and starting point for investigations in the field. Here, we follow the argument that corporate communication is broadening beyond traditional channels and stakeholder relations. Social Media communication occurs in many channels and on very different sites. Communication relations may exist within and between different kinds of actor groups. So, in addition to existing micro, meso and issue based research approaches, a macro level perspective that focuses on a whole market is a valuable and probably necessary starting point if one aims to get a comprehensive overview of Social Media communication relations of different branches of business. The investigation here can be seen as a first exploratory study in this area. The goal is to get an overview of communication relations between manufacturers, car dealers and prospective buyers in the sector under investigation. Communication relations within the different actor groups are beyond the scope of this study and are not addressed. The following figure illustrates the Social Media cycle under investigation.

Social Media Cycle

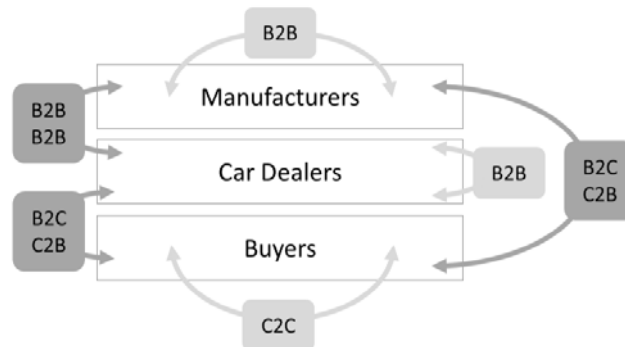


Figure 1. Social Media Cycle in the automotive market

3. SPECIFICITIES OF THE GERMAN AUTOMOTIVE MARKET

This study focuses on the business market of the German automotive industry. This includes all companies that produce and/or sell cars and/or offer maintenance or repair services. On the customer side, the focus is on (prospective) buyers of new cars. The automotive branch is one of the most important industries worldwide and especially in Germany (Statista 2012). From the customer's point of view, buying a new car can be assessed as a high involvement decision associated with a thorough information process. According to AutoScout 24 Media (2011: 15), Social Media play an important role in the research process that precedes the decision of buying a new car. Corporate websites of manufacturers are used to research prices, models and car configuration. Car dealers' websites are searched for special offers, configuration and car dealers' addresses and other dealer specific information. Research in Social Media is focused on other users' opinions, reviews and experience reports for brands, models and car dealers. That means, uncertainty reduction is the primary role of Social Media in the information process that precedes buying a new car. If one takes into account the diminishing brand loyalty and the long lasting indecisiveness of prospective buyers, the pertinence of Social Media becomes very clear (Autoscout 24 Media: 2011). Online forums or forum based communities serve as primary information hotspots. In addition, according to Gillies (2011) Social Media are relevant for brand recognition and brand building of manufacturers and car models. Corporations often fear being criticized and rather follow a sender based model instead of a communication model in their Social Web activities. Manufacturers are using Social Media intensively, car dealers rather scarcely. Currently, the Social Web is only partially diffused in the German automotive industry.

4. RESEARCH DESIGN

The purpose of our investigation is to get insights concerning:

- State of Social Media diffusion: The goal is to get an overview of Social Media use of dealers and manufacturers with respect to used channels, places and characteristics of communication.
- Actor groups' judgment of Social Media: The aim is to get insights into the assessment of Social Media by businesses and users. On the one hand, we want to get an impression of the reasons for using or not using Social Media and goals of businesses. On the other hand, expectations and needs of prospective customers are to be explored.
- Evaluation of Social Media employment: The study tries to give an estimation of how far Social Media employment of manufacturers and car dealers correspond to the needs of (potential) customers. Research methods combine an online analysis of businesses' online activities with surveys of the different actor groups.

4.1 Online Analysis

In the online analysis, the Social Media presences of the 10 most popular car manufacturers in Germany (measured in market share in 2011) were checked. These were: Volkswagen, Mercedes, BMW, Audi, Opel, Ford, ŠKODA, Renault, Toyota and Fiat. Their use of channels was verified on the Social Online Networks Facebook, Google Plus, XING, LinkedIn, the micro blogging platform Twitter and also on the Content Sharing sites YouTube, Flickr and iTunes. In addition, the existence of corporate blogs was investigated. Car dealers' channel use was verified by an analysis of integrated Social Media or links to Social Media sites on the homepages of 1,200 merchants, which were randomly selected from a database.

4.2 Online Surveys

For each actor group, an online survey was prepared. The aim of two businesses' surveys was to evaluate the goals, hindrances, employed resources and self-estimation of success of current Social Media use by manufacturers and car dealers. The goal of the user survey was to get an estimation of expectations and needs of prospective buyers. Survey participants were recruited by e-mail and postings in online forums. Of 21 invited manufacturers 6 took part in the survey (response rate: 28.6%). All 1,200 car dealers that had been considered in the online analysis were invited to take part in the online survey. 42 replied (response rate: 3.5%). Buyers were contacted in 53 forums, 199 took part in the survey. Here, the response rate is rather low if one keeps in mind that over two million users subscribed as members to the forum motor-talk.de alone.

All investigations were executed between July and September 2012. Methods and results are comprehensively described by Müller (2012).

5. ANALYSIS AND RESULTS

The following analysis first explains the data in regard to the three actor groups. Following that, results are combined and related to the research interests a, b and c as mentioned in the section research design.

5.1 Manufacturers

Social Media are widely used by car manufacturers. The following figure gives an overview of channel and site use.

	Facebook	Google+	XING	LinkedIn	Twitter	YouTube	Flickr	iTunes	Blog
Volkswagen	G	G	-	E	-	E	-	-	-
Mercedes	G	E	BG	-	G	G	BG	G	BG
BMW	G	G	BG	E	E	G	-	G	-
Audi	G	G	G	G	G	G	-	G	G
Opel	G	G	-	-	G	E	G	E	G
Ford	G	E	G	G	E	G	G	-	E
ŠKODA	G	E	E	E	E	E	-	-	-
Renault	G	E	-	E	G	G	E	-	G
Toyota	G	E	-	E	E	G	-	-	E
Fiat	G	E	-	-	G	G	-	-	-

Figure 2. Social Media use of manufacturers. G indicates an official presence in German language. E indicates an official presence in English language. BG indicates a presence of the whole business group. A dash indicates no presence.

All manufacturers are active in Social Online Networks (SONs) and Social Sharing sites. Facebook and YouTube are the most frequently used sites. Facebook is at the core of Social Media activities as the survey results show that manufacturers use Facebook daily. It is also the only site that is used by all manufacturers in the local language. On YouTube, which serves as the second most important site, three manufacturers do not provide a channel in German language. Two thirds are using forums, mainly motor-talk.de. Survey data

shows that prospective customers are the primary target group of Social Media activities. In addition, one third of the manufacturers explicitly aim at journalists and influencers. Although manufacturers predominantly think that Social Media communication with car dealers would boost the probability that those would recommend their brand, only one of the manufacturers aims its Social Media activities at car dealers, too.

The most important goals of Social Media use are branding but also customer support which are mentioned by all manufacturers. Furthermore, cooperation with customers to enhance and expand the product portfolio is also mentioned as an important goal by 75% of the manufacturers. This is an interesting point, since it indicates that there is an awareness of Social Business aspects of Social Media activities. In contrast to that, resource allocation for Social Media is rather low. With one exception that allots more than 5 employees to Social Media Marketing, all manufacturers limit their Social Media workforce to 2-5 employees. Nevertheless, two thirds of the manufacturers assess their Social Media activities as successful.

5.2 Car Dealers

In contrast to the manufacturers, the diffusion of Social Media Marketing is rather sparse on the side of the car dealers.

The online analysis of 1,200 car dealer websites revealed that 17% of them integrated Social Media or linked to external Social Media Sites. The sub-sample that also answered the survey can be considered as a rather Social Media affine subset of the basic population as 56.1% of the respondents employ Social Media. Those who use Social Media most often focus on SONs (95.6%), 30.5% employ Social Sharing sites. 17.4% of the car dealers are using forums. Again, Facebook and YouTube are the most popular channels. Whereas motor-talk.de is the most important forum for manufacturers, autoplenum.de is the most popular forum for car dealers.

The primary target group is (prospective) customers. Similar to manufacturers, only one car dealer explicitly addresses manufacturers as a target group. Social Media engagement aims at acquiring new customers, customer care, promoting special offers and also to improve the visibility in search engines. Communication focuses on products and services and also on handling of complaints and critique respectively incitation and appraisals. There is no awareness of Social Business aspects of Social Media communication.

Resource allocation and corresponding Social Media activity frequency is significantly lower in comparison to manufacturers. 74.6% of active car dealers invest 1-5 hours per week in Social Media activities. Only two car dealers invest more than 5 hours per week. Again, SONs are used as the most frequently employed channel. Almost half of all of car dealers (46.7%) use them daily. Other channels are employed much more scarcely, largely on a monthly schedule basis.

Car dealers' view their Social Media activities quite critical. Only 30.4% assess their Social Media activities as successful. The most prominent explanations mentioned for the lack of success are: too little engagement (34.7%), missing strategy (26.1%), and using Social Media just by necessity (21.7%). One interpretation of this finding is that the Social Media engagement of these mostly small businesses lacks a strategic perspective and does not reach the threshold necessary for success.

In contrast to this rather negative view on the Social Media activities of car dealers, a substantial fraction of one third of those car dealers currently not engaged in Social Media Marketing consider Social Media engagement nevertheless as important. So what are the hindrances to Social Media adaptation? Apart from named factors like "no interest" (27.8%), "too costly" (11.1%), half of the car dealers that currently do not use Social Media explain that by lack of know how. The data of the online survey definitely indicates a perceived lack of competency for Social Media on the part of the car dealers.

5.3 Buyers

As stated above, buyers for our survey were recruited via postings in online forums. That fact indicated that apart from being an internet affine subset, our sample consists specifically of forum users, which again present a subset of internet affine car buyers. So our sample is not representative for all car buyers. On the one hand, it is a rather special group. On the other hand, there are millions of internet users who subscribe as members to pertinent forums - motor-talk.de alone has over two million subscriptions. That means, our

sample is based on a very large and therefore significant user base. The group can be regarded as early adopters of technology and may indicate future trends. The sample consists of 187 (94%) male and 8 (4%) female users, 4 users did not mention their gender. Two thirds of them use Social Media (65.8%) on a daily basis. With respect to channel use, it is not surprising that forums are the most often used channel (81.4%). As explained, the popularity of forums is probably partly caused by the recruiting process. The most popular forum is motor-talk.de (31.7%), followed by auto-motor-sport.de (12.1%). Autoplenum.de reaches the third place (6.03%). Only 13% of the sample do not use SONs and roughly half of them (53.3%) use them daily. Again, Facebook is the most popular SON. Social Sharing sites come next and reach a daily use level of 17.6% (weekly usage equals a fraction of 25.6%). YouTube, is the most popular sharing site. Other channels like Blogs and Microblogs fall far behind.

With respect to provided content on businesses' Social Media presences, buyers evaluate product and service related information more often as positive as company related information. This is an indication that Social Media presences are primarily seen as an additional product information resource and not as a brand related information hub. The majority of users evaluate Social Media presences in Facebook and YouTube as positive. In contrast to that, buyers are often indifferent or even dislike Social Media presences on other channels and sites. E.g. only 13.2% explicitly agree that they perceive Social Media presences on Twitter as "good", whereas 37.9% explicitly disagree and 48.9% are indifferent. That means, using more channels is not always better. Perceived quality of businesses' Social Media content is predominantly "good" or "average", both for manufacturers and car dealers. Only a minority of roughly 10% for both actor groups explicitly state that content quality is "low".

Open feedback to questions how manufacturers and car dealers could improve their Social Media activities yields some interesting qualitative insights. With respect to enhancements on the side of manufacturers, there were 70 remarks. Social Media activities of manufacturers are often perceived as advertising in a one-way communication style. "Please provide not only the usual advertising and self-admiration and allow criticism and discussion". In addition, some respondents suggest a stronger focus on online forums, which is in line with a demand for real reciprocal communication. Finally, there were some fears that Social Media use could lead to a fragmentation of information sources and cannibalize traditional channels, namely corporate websites. In relation to the Social Media presences of car dealers there were 42 remarks. Although some entries also suggest more interaction in communication, the strongest focus is on providing relevant information, e. g. special offers and news.

Finally, survey data reveals some interesting findings concerning the information behaviour of buyers and the role of Social Media during the information process that precedes buying a new car. A vast majority of the survey participants used the internet as an information source when buying in the past (80.4%) and nearly everyone plans to do so in the future (95.0%). In contrast to that, Social Media use for this purpose has been rather sparse (30.7%) and only a minority plans to employ Social Media in the future (46.2%). In addition, the presence of manufacturers and car dealers in the Social Web is judged differently. Whereas 26.6% of buyers assess Social Media activities of manufacturers as important, only 18.1% evaluate Social Media activities of car dealers as significant.

In regard to the importance of specific information resources, businesses "classic" websites outclass Social Media presences by far. 92% of buyers answer that they would use the homepages of manufactures as an information resource and only 24.1% answer equally with respect to Social Media presences of manufacturers. In regard to car dealers, data shows a similar picture. 51.8% would use the homepages of car dealers and only 9% would use corresponding Social Media presences. So far, results indicate that a) classic Web resources are more often used as an information resource than Social Media presences and b) car dealers play a second-tier role in the information process.

According to these results one may ask the question if involvement in Social Media makes sense at all for buyers. A wider look at the channels of the Social Web delivers some interesting results, cp. following table.

Table 1. Answers to the question: Which Social Web channels would you use as an information resource when you plan to buy a new car?

Channel	Usage probability
Social Online Networks	31.7
Social Sharing sites	15.1
Microblogging	2.0
Blogs of businesses	19.1
Forums	72.4
Social Bookmark services	1.5
Other	2.5

Whereas SONs and Social Sharing sites are used to some extent, forums are the most important information source with a usage probability of 72.4%. Microblogging and Social Bookmarking services are insignificant. These results are widely in concordance with the data of Autoscout 24 Media (2011) and strongly indicate that current Social Media practices of channel use may not be the best fit to potential buyers' information needs. Apparently, the construction of "Social Media castles" and a "window dresser communication approach" are not appropriate for Social Media Marketing.

6. DISCUSSION AND OUTLOOK

This investigation provides a comprehensive view of Social Media diffusion in the German automotive market. As a first result, it shows that the Social Media cycle (as illustrated in figure 1) is widely established between manufacturers and potential buyers and partly diffused between car dealers and buyers whereas there are almost no relations between manufacturers and car dealers. One may argue that there is no need for such vertical business-to-business relations as there are many touch points between manufacturers and car dealers that are already efficiently handled on established one-to-one and one-to-many communication channels. As one of the car dealers survey respondents mentioned, communication needs may be too complex to be handled through "superficial" Social Media. Although one can easily imagine added value of Social Media based business-to-business communication, e.g. efficiency gains for manufacturers and a stronger voice and learning (from others) for car dealers, apparently only a very small fraction of the businesses involved in the study feel the need for an additional Social Media based communication layer. At least for the moment, Social Media Marketing and communication is a matter restricted to business-to-consumer and consumer-to-business communication.

With regard to relations between consumers and businesses, our investigation yields some interesting results. For both (business) actor groups SONs, especially Facebook, serve as the central hub for Social Media Marketing. Other channels play a rather supplemental role. Concerning manufacturers the diffusion of the Social Web is advanced. All manufacturers employ Social Media for external communication purposes. Still, our study reveals that there is room for improvement. Although manufacturers themselves assess their engagement predominantly as successful, the data of the user survey leads to a rather skeptical estimation concerning the use of channels and the characteristics of communication behaviour. SONs or rather Facebook may be the most popular channel and site but is not the most relevant Social Media based information resource for users. Forums are far more important. In addition, qualitative data indicates that current Social Media communication behaviour is often perceived as a kind of uni-directional advertising. This is in contrast especially to the Social Business goals as stated by companies. As a result, we recommend a stronger focus on forums and reciprocal communication behaviour. Starting with listening to the (prospective) buyers' voice and needs, a change of view concerning the perspective on and goals of Social Media engagement as proposed by Hoffmann and Fodor (2010) would be helpful. Manufacturers should not engage in Social Media Marketing with an approach that asks how Social Media use can directly foster the business goals but rather with a perspective on how to employ Social Media to meet customers' needs. The same can be suggested for car dealers. However, one has to keep in mind here that for this actor group the diffusion of the Social Media has only just begun. This is also true with respect to the reception of car dealers' Social Media engagement on the side of (prospective) buyers. A large portion of car dealers do not consider Social Media as an important tool to communicate with prospective buyers. For those who estimate Social Media Marketing as relevant, missing know how seems to be the main obstacle for adapting Social

Media. Even the majority of those who are actively engaged in Social Media are rather skeptical in assessing their success. Finally, seen from the perspective of potential buyers, Social Media, especially the channels most central in the current marketing practices of businesses, play a rather subordinated role in the information process that precedes buying a new car. Forums are important, but still less often used by users than information provided on traditional web sites. In sum, it is to conclude that currently there is a mismatch between consumers' needs and Social Media practices in the German automotive industry. There are substantial differences in channel use and also with regard to users' expectations on and businesses' perception of their communication behaviour. If we put this investigation in the wider research context as presented in chapter 2, we believe that our results are of scientific novelty and helpful for businesses, too. The broad view of this investigation is both an advantage and a problem. On the one hand, it enables a combination and integrated view of a whole market. On the other hand, the methods employed measure general facts and the judgements of respondents. Therefore, for the most part the study is restricted to a descriptive level. Nevertheless, results pave the way and serve as a starting point for manifold research questions that should be highly relevant from a practitioner's perspective. For example, we plan an in-depth investigation of the influencing the hesitant/slow Social Web adaptation of smaller enterprises with a specific focus on perceived or real missing know how. The aim is to find solutions that facilitate Social Web adaptation and foster the efficiency of Social Media Marketing activities.

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INFLUENCE OF PERSONALIZATION CONSTRAINTS ON CORPORATE COMMUNICATION PROCESSES

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ABSTRACT

Personalization activities are increasingly a major factor for the commercial success of businesses that operate in e-Commerce. In any case, personalization activities do not come without serious technological and organizational constraints, which businesses need to overcome to successfully personalize their offerings for their customers. Ideally, these limitations of the personalization process are managed during the planning phase of the corporate communication process. Businesses need to assess, if they have enough capabilities to execute personalization activities, if it is technological and organizational possible to do personalization and if such activities are in the long run profitable for the company. Depending on the stage of the planning process of corporate communication, different assessments are ideally carried out. This contribution normatively analyses the various stages of the planning process of corporate communication and provides recommendations, which assessments are at least necessary to handle the most general personalization constraints.

KEYWORDS

Personalization constraint; corporate communication; classification scheme; standard types of personalization

1. INTRODUCTION

Corporate communication processes require extensive decisions of businesses in the marketing mix [Meffert, Burmann & Kirchgeorg, 2012]. The judgment of the responsible officer has widespread implications for the success of a marketing activity and thus the revenue and profit of a company. Decision making is further complicated by the recent emergence of ubiquitous digital communication technology and continuous technological improvement of communication [Petrovic, Harnisch & Puchleitner, 2012]. Additionally, technological advances enable customers to retrieve product information independent of time and place [Goodman & Hirsch, 2010] and hence access an immense product and service knowledge base of previous customers. This knowledge base is able to shift their buying intentions.

In such business environments, where customers are facing tremendous information via digital communication channels, corporations started to implement personalization activities. Personalization aims on providing relevant information for customers, which exactly fits their individual needs and preferences [Roberts, 2003]. The matching of relevant information and individual preferences intends to raise the value of the information for the customer. Personalization is hence utilized to attract and retain customer in e-Commerce [Ansarai & Mela, 2003; Tam & Ho, 2006]. As an essential element of the online marketing mix [Kalyanam & McIntyre, 2002] these activities are additionally classified as competitive advantage [Porter, 1985; Ulph & Vulkan, 2000; Murthi & Sarkar, 2003] in e-Commerce.

Although personalization activities seem to provide simple possibilities to enhance the success of corporate communication processes, such technological activities do not come without several downturns, which need to be managed. Previous work [Harnisch, 2013a; Harnisch, 2013b] yielded results, which indicate that corporations face technological as well as organizational constraints of personalization. Business need to manage and overcome these personalization constraints before a successful corporate communication process, aided by personalization technology, seems possible. Depending on their business area, they act within a certain business or personalization environment that reduces or raises the complexity of this management process.

The aim of this paper is to connect the classification scheme of personalization constraints with a standard model of corporate communication processes and normatively analyze the implications of technological and organizational personalization constraints for the planning and execution of corporate communications in four different environmental business settings. Based on the analysis, recommendations for the management of corporate communication processes are given. They support businesses in mastering their specific personalization issues and furthermore in the successful planning and implementation of corporate communication activities.

In the first section the nature of the problem, as well as purpose and contribution of this paper is described. Subsequently, the second section gives a short summary on the findings of previous work by depicting the classification scheme of personalization constraints as well as the four standard types of personalization. The third section introduces a standard model of the corporate communication process based on a literature review. Afterwards, the implications of the four standard types and the classification scheme for the model of corporate communication process are analyzed. The fifth section then summarizes the findings of the normative analysis to some concise recommendations, which represent the main contribution. Finally, the paper is concluded and limitations of the analysis are outlined.

2. CLASSIFICATION OF PERSONALIZATION CONSTRAINTS

In a previously conducted multi-case study analysis – containing 32 cases – two theoretical models in regard of personalization constraints were developed [Harnisch, 2013a; Harnisch, 2013b]. On the one hand, a ‘*Classification Scheme of Personalization Constraints in Digital Business Environments*’ was created to classify the various technological and organizational constraints that businesses face when implementing personalization technology. On the other hand, four ‘*Standard Types of Personalization Environments*’ were created to describe the differences in personalization environments. The foundation of the study was a comprehensive literature review, whereon the theoretical models were established. A morphological box [Zwicky, 1966] helped to locate and select suitable cases to subsequently proof the developed models in a multi-case study analysis [Yin, 1984; Eisenhardt, 1989].

Table 1. Classification Scheme of Personalization Constraints [Harnisch, 2013b]

	data collection	matchmaking	delivery	measurement
technological	internal / external	internal / external	internal / external	internal / external
organizational	internal / external	internal / external	internal / external	internal / external

The classification scheme (see Table 1) consists of three dimensions, which are named *subject* (technological, organizational), *origin* (internal, external) and *time* (data collection, matchmaking, delivery, measurement). The subject of personalization constraints can either be a technological or an organizational issue. *Technological constraints* refer to all problems related with the used information system, the underlying algorithms or the technical devices that are used by the customer. *Organizational constraints* include all issues that are interrelated with the organization, especially the processes, of the business, their employees or customers. The origin of the personalization constraints can either be internal or external. *Internal constraints* on the one side refer to problems that can be solved within the organization. *External constraints* on the other side are personalization constraints that are depending on the behavior or the technical equipment of a subject that is not part of the business, e.g. the customer or a supplier. The time dimension of personalization constraints refers to the stage of the personalization process [Adomavicius & Tuzhilin, 2005], when the identified issue occurs, e.g. if the business is able to collect data about the customers preferences and match specific offerings to the individual preferences but is not able to deliver the offerings to the customer, delivery constraints are realized.

Beside the classification scheme, four standard types of personalization environments were developed and termed ‘*Risk*’, ‘*Performance*’, ‘*Dependence*’ and ‘*Flow*’ (see Table 2). Each type distinguishes a different set of business environment, where personalization activities of business take place. The environments are categorized according to the impact of internal and external constraints on the success of the company. If a company, for example, faces external and internal constraints of personalization that both have a significant

influence on the business, it operates in the ‘*Risk*’ environment of personalization. A detailed planning of all personalization activities in advance is hence advisable, because the consequences of wrong decisions are severe. If internal constraints are high but external constraints are low, businesses operate in the ‘*Performance*’ environment. It describes a situation where companies need to mobilize their employees to develop a solution for the personalization constraints. The success depends on the performance of the own employees. If the company, on the other side, faces high external constraints but only low internal constraints, they are fully dependent on the performance of other institutions or individuals and hence act in the ‘*Dependence*’ environment. Thus, the success of a personalization activity is not controllable by the company itself. Finally, if companies act in the ‘*Flow*’ environment, they are not heavily limited by personalization constraints in their activities. Internal and external personalization constraints have only a low impact on the success of the company.

Table 2. Standard Types of Personalization Environments [Harnisch, 2013a]

		External constraints	
		high	low
Internal constraints	high	Risk	Performance
	low	Dependence	Flow

The depicted classification scheme of personalization constraints as well as the four standard types of personalization environments will be the foundation of the normative analysis in section 4.

3. CORPORATE COMMUNICATION PROCESS

Corporate communication is seen as one of four elements of the marketing mix [Meffert, Burmann & Kirchgeorg, 2012; Bruhn, 2010a; Esch, Herrmann & Sattler, 2006; Olbrich, 2001]. Extensive research has been conducted on the description of corporate communication models and processes [Mast, 2010; Bruhn, 2010b; Goodman & Hirsch, 2010; Bruhn, Esch & Langer, 2009]. A suitable summary on the main aims of the corporate communication process were described by [Meffert, Burmann & Kirchgeorg, 2012]. What they term a ‘*paradigm of communication*’ and is also known as the Lasswell-formula [Lasswell, 1967] includes the questions: *who* (corporation), communicates *what* (communication message), under which *conditions* (external factors and competition), on which *channels* (communication instrument), in which *way* (design of the communication message), to *whom* (target group), with which *effect* (communication success)?

All of these questions are also relevant when corporations communicate in digital business environments and if businesses are active in e-Commerce. Nevertheless, several insights were gained since the development of the Lasswell-formula in 1967. What we learned is that it describes an ideal process of communication, where all individuals are equally contacted and affected [Emrich, 2008]. However, we know that individuals are not equal in their needs and preferences and hence require an individualized approach to place a marketing message and subsequently raise the buying intentions.

Personalization is such an approach, which is able to address the individual needs and preferences of potential and existing customers based on the corporate communication process. Based on this insight, personalization has already been described as an essential element of the online marketing mix [Kalyanam & McIntyre 2002] and thus as crucial part of e-Commerce. But although it is a different or extended approach to affect customers, it raises similar questions as described for the corporate communication process. Due to the strong interdependency between the personalization process and the corporate communication process, decisions in one of the areas are affecting the other area significantly. Thus, the picture of a standard corporate communication process needs to be highlighted first, before an analysis of the interrelationship between the corporate communication process, the personalization process and possible constraints of personalization can occur.

The described corporate communication process by [Bruhn, 2010a] will be emphasized in this contribution, although there are various other processes described in literature, which could already be the basis of the analysis. [Bruhn, 2010a] describes six consecutive steps of the corporate communication process (see Figure 1).

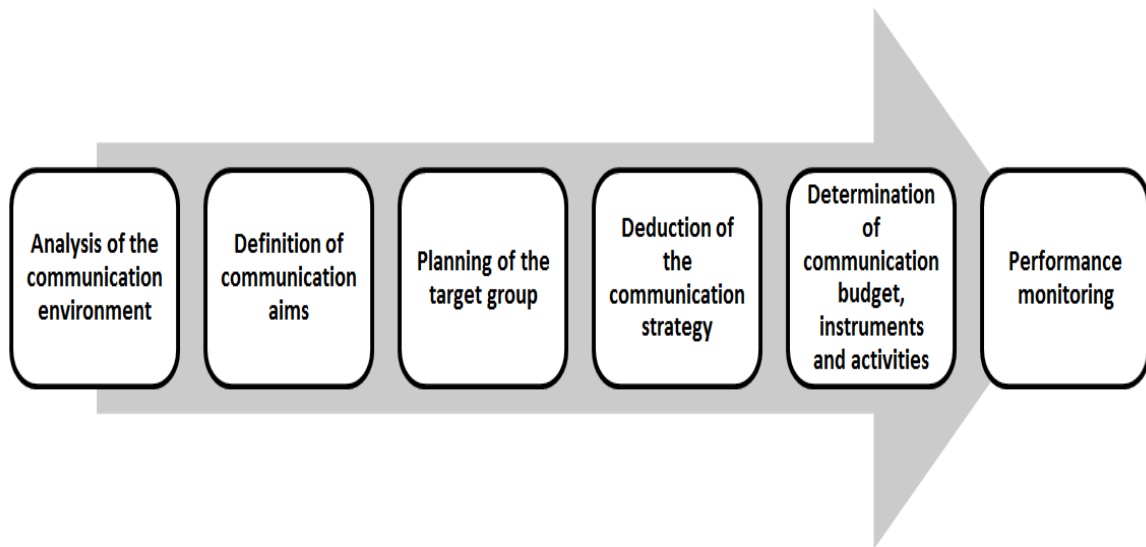


Figure 1. Corporate Communication Process [Bruhn, 2010a]

As a starting point, an *analysis of the communication environment* has to take place. This includes especially a communication-oriented SWOT-analysis, which covers external threats and opportunities as well as internal strengths and weaknesses related to communication. The *definition of communication aims* is the second step in the process. The communication aims are depending on the pre-defined marketing aims and can include economical and psychological aims. Subsequently, the *planning of the target group* occurs as a next step in the corporate communication process. The relevant target groups need to be identified, described and analyzed regarding their accessibility. As a fourth step of the corporate communication process, a *deduction of the communication strategy* occurs. The communication strategy describes the core areas of the corporate communication activity and selects the main communication instruments. The fifth step encompasses the *determination of the communication budget*, the *communication instruments* and the *communication activities*. The communication budget is divided on the selected communication instruments and the communication message is designed. The final step is the *performance monitoring* of the communication activities. The analysis, if an adaption of the planned process in regard of instruments, message or activities is necessary, is conducted in this sixth step.

4. PERSONALIZATION CONSTRAINTS AND COMMUNICATION

In this section, the developed models of a ‘*Classification Scheme of Personalization Constraints*’ as well as the four ‘*Standard Types of Personalization Environments*’ are analyzed regarding their influence on the emphasized corporate communication process.

4.1 Methodology

A normative analysis [Hevner et al., 2004] is utilized to generate results, which describe how businesses are generally able to manage constraints of personalization activities. The general results are then transformed into a list of recommendations in the next section. The list of recommendations for businesses is an ‘informal, textual description of “best practice” approaches’ [Hevner et al., 2004] – a method – to solve the underlying problem of personalization constraints in corporate communication processes. It combines three models to create a new artifact of IS-research [Hevner et al., 2004], which is relevant for practitioners.

4.2 Analysis of the Influence of Personalization Constraints

In the first step of the corporate communication process '*analysis of the communication environment*' the four standard types of personalization are important. Before the start of the planning process, it is vital to learn about the personalization environment, the business operates in. Relevant questions in this step of the planning process are if the business operates in a sensitive environment in regard of data privacy; if the way of conducting business is complex and includes a wide range of different products; if the preferences of the customers can be very widespread or if the personalization of products respectively information is difficult to do and could be a technical or organizational problem for the company. By answering these and similar questions in the first step of the planning process, the business is able to assess in which of the four standard types of personalization environment it operates, which is influencing the required depth of the planning process.

The second step of the corporate communication process '*definition of communication aims*' is highly interrelated with the definition of personalization aims. Corporate communication naturally has the same aims as personalization activities. On the one hand, economic aims, which are the increase of revenue and profit, are the target of personalization and corporate communication activities. On the other hand also psychological aims, like the attraction of customers by the provision of individual relevant information are relevant.

The '*planning of the target group*' is a main step in the planning process of corporate communication activities. In this step of the process, the classification scheme of personalization constraints is utilized for the first time. When the planning of the target group occurs, various questions regarding the limitations of personalization activities arise. The most significant ones are if it is technically and organizational possible to collect the relevant data to segment the customers in different target groups and if they can be matched to a certain group of products respectively information. These problem areas include *internal organizational constraints* and also *external organizational constraints*. Such constraints can be the inability to define certain characteristics to segment the customers (internal) or the reluctance of customers to provide any information e.g. due to privacy reasons (external). Beside these organizational constraints, also technological constraints can be relevant in this step of the planning process. *Internal technological constraints of data collection* are for example the availability of a system to retrieve the relevant customer data for segmentation. If the company operates in a business field, where such systems are not common or where such a system is not available, personalization activities are becoming more difficult. Additionally, also *external technological constraints* can be conceivable, for example that customers block the collection of relevant data for segmentation. Generally, if the business is not able to collect the relevant data that is necessary to segment the customers, the provision of personalization information or products is not possible, which has to be recognized in corporate communication. Beside constraints of data collection, also constraints of matchmaking are relevant in this step of the planning process. If the segmentation and assignment of products or information to certain groups of customers does not seem to be possible, constraints of matchmaking occur. They come in various forms, like internal organizational constraints of personalization. If it is not possible for the business to define certain characteristics of the offered products to match them with a predefined target group, *internal organizational constraints of matchmaking* are fulfilled. Such matchmaking constraints can also appear *externally*, e.g. if a customer did not disclose the relevant information about his preferences yet. Additionally, *internal technological constraints of matchmaking* can occur, for example if the data collection of the preferences of a customer is possible, but the customer uses the system for the first time (cold start problem) [Schein, et al., 2002]. If the company acts in a market, where preferences of the customers are changing so fast or are so unpredictable that the technical system is not able to correctly match the products respectively information to the preferences of the customers, *external technological constraints of matchmaking* occur. If the business operates for example in the fashion industry and trends are changing every half year, but the customer is only buying a product once a year, some personalization systems are possibly not able to correctly match the offerings of the businesses with the specific individual preferences of the customer. The business needs to imply all the gained insights in the planning process.

The fourth step of the corporate communication planning process is the '*deduction of the communication strategy*'. In this step of the planning process, personalization constraints of delivery are likely to appear. The constraints are reaching from *internal technological constraints*, like the inability to deliver the relevant

information on a specific communication channel over *external technological constraints of delivery*, like the technological inability of the customer to retrieve the communicated message to *internal organizational constraints of delivery*, which cover e.g. the necessity of the authorization of a time-sensitive message. Additionally, also *external organizational constraints of delivery* are conceivable, for example if legal constraints are prohibiting the provision of personalized offerings or information.

In the next step of the planning process '*determination of communication budget, instruments and activities*', the personalization officer has to summarize, if the business is able to collect, match and deliver all relevant data and information within the possible personalization activities. In this step of the process, the elimination of personalization activities, which are not able to fulfill the aim of personalization, because of technological or organizational reasons, has to be done. This decision is based on the assessment of the already conducted precedent steps of the planning process. Additionally, the process of how the personalization activity is carried out has to be planned. Finally, all activities, which are not able to provide profitable personalization results, have to be eliminated for the further process. The result of this step is a list of personalization activities and underlying processes, which are profitable, can be applied in the given personalization environment and which the business is able to set up and manage.

The final step of the planning process includes the '*performance monitoring*'. While at this point of the planning process, all personalization activities, which will not yield a benefit for the company or which are not able to be conducted in the given personalization environment, are eliminated, problems of measurement still have not been addressed. The circumstance that a personalization activity is presumably profitable and that the company is able to carry it out in the given personalization environment is not a guarantor for the possible measurement of personalization effects. Constraints in the measurement of the effects of personalization activities range from the inability to *internally and technically measure* the impact of an executed personalization activity on the company's profitability. Also, *external technological constraints of measurement* are conceivable, for example if the customer blocks all measurement activities of the company. Additionally, if the definition of measurement indicators is not possible, *internal organizational constraints of measurement* are met. Finally, *external organizational constraints of measurement* are fulfilled if the business is not able to measure the impacts of the executed activities because of legal constraints or because of inabilities of business partners to provide the relevant measurement data. Measurement constraints are generally not a barrier for the implementation of personalization activities. Nevertheless, the reasoning for the costs of certain personalization activities is becoming more difficult, if it is not possible to measure the success rate.

5. RECOMMENDATIONS FOR BUSINESSES

The analysis of the corporate communication planning process in relation with the models of personalization constraints yielded several recommendations for businesses, which plan personalization activities. As a starting point, businesses need to identify in which of the described personalization environments they operate and if they have enough knowledge to solve upcoming problems of personalization. Subsequently, they have to define relevant characteristics of customer groups and assess if the business is able to retrieve the relevant data for segmentation. Additionally, the definition of the attributes of the provided products and information has to occur as well as the assessment if the business is able to match the personalized product or information with a specific target group. A definition of all relevant personalization activities has to occur early in the planning process, with a special focus on which of them are applicable in the given personalization environment. The determination of the process how the matched message is communicated to the customer and an assessment if the message will be recognized as relevant by the customer is just as relevant for businesses which plan personalization activities, as the definition of the channel for future communication and the assessment if the business is technically and organizationally able to provide relevant messages on all selected channels. The assessment of the overcompensation of the imposed costs of personalization activities by the expected future benefits is another important issue, which businesses naturally need to address before they execute personalization activities. Finally, businesses need to assess, if they are able to retrieve all the relevant data for the monitoring of the success of a planned personalization activity and if such a measurement is necessary for the decision if a personalization activity is carried out.

6. CONCLUSION

After analyzing the implications of the two developed models of personalization constraints on the planning process of corporate communication, a list of recommendations for businesses has been generated. Businesses, which act in digital environments and are active in e-Commerce need to assess various issues of personalization before the execution of personalization activities in relation with corporate communication is advisable. The recommended assessments range from evaluations of the existence of adequate skills within the company, over possible constraints that are imposed by other parties of the personalization process, to the possibility to measure the success of a personalization activity. Businesses should only go about doing personalization activities if they are sure that they have the right skills to manage all constraints, which the planned activities inherit in the specific personalization environment. The described models as well as the list of recommendations can aid the corporations in assessing the situation and planning their activities.

The conducted normative analysis results in general recommendations for businesses, which plan personalization activities. The provided framework of recommendations covers frequently experienced constraints but can only lead to successful personalization activities, if an extended individual analysis of the situation and environment, in which the company operates, is conducted in any case.

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INVESTIGATING THE ROLE OF FLOW EXPERIENCES IN USERS' INTENTIONS TO REUSE RECOMMENDATION AGENTS

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ABSTRACT

Online recommendation agents can help users decrease information overload and reduce search complexity and, in turn, help improve decision quality. Studies related to human-computer interactions have shown that flow experiences can increase users' reuse intentions. However, few studies address the issue of users' flow experiences during interactions with online recommendation agents. This study focuses on the interactive process between users and recommendation agents. It provides a research model based on flow theory, as well as an information adoption model. We considered the influence of users' perceptions of operating processes and information content on flow experiences and the effects of flow experiences on information usefulness and reuse intentions. We conducted a 2*2 factorial laboratory experiment and derived three principal findings. First, flow directly influenced reuse intentions and indirectly influenced reuse intentions mediated by information usefulness. Users with flow experiences provided positive valuations of suggestions provided by recommendation agents. They were also willing to reuse these suggestions. Second, process similarity directly and positively affected flow experiences. Third, provision of explanation facility and consumer reviews influenced users' flow experiences. Provision of consumer reviews positively influenced flow experiences. However, provision of explanation facility negatively influenced flow experiences. Several theoretical and managerial implications are proposed.

KEYWORDS

Flow, Process Similarity, Explanation Facility, Consumer Reviews, Intention to Reuse Recommendation Agents, Information Usefulness

1. INTRODUCTION

Unlike real world shopping experiences, online users are unable to consult with salespeople (Kim and Yoo, 2000). Therefore, users may struggle to evaluate products and make appropriate selections. With the assistance of properly designed recommendation agents, users might more easily choose appropriate products/services, particularly with respect to complex products (Grenci and Todd, 2002). One research stream proposes that users can rationally evaluate the capabilities of recommendation agents based on virtual interaction processes similar to those used in the real world, as well as on consequences examined from a utilitarian view. When users believe they have derived benefits from their use of recommendation agents, they will repeatedly patronize those recommendation agents. However, we wondered whether playful interaction processes induced users' feelings of satisfaction, agreeableness, and trust toward recommendation agents.

Flow experiences have been widely examined in the context of online activities, such as information searching, web surfing, online chatting, online game, etc. When users enter into flow experiences by conducting online activities, they become immersed in these activities, can centre on the focus of their awareness, experience a sense of time transformation, and, ultimately, integrate these experiences within cyberspace. Flow experiences may be associated with satisfaction, diagnosticity, usefulness, trust, positive purchasing attitudes and intentions. E-tailers could increase users' positive feelings, attitudes, and intentions towards the use of recommendation agents and shopping websites by guiding users into flow states. A high balance of skills and challenges can induce users' flow experiences. Therefore, the design of a

recommendation agent that could raise users' skills to fit in with challenge levels would be a worthwhile exercise. Recommendation agents could provide informational and affective cues that might increase users' abilities to select appropriate products. When users interact with recommendation agents during online shopping, they may become immersed in these processes and gain benefits from these interactions with recommendation agents. Finally, these interactions may increase the likelihood that users will reuse recommendation agents. Therefore, we will attempt to answer four research questions in this study.

1. *Do users' flow experiences during their use of recommendation agents increase their intentions to reuse recommendation agents?*

2. *Do users' flow experiences during their use of recommendation agents directly affect their intentions to reuse or indirectly affect their intentions to reuse as mediated by perceived information usefulness?*

3. *Will improvements in users' skills in the use and understanding of recommendation agents induce flow experiences that will increase their reuse of recommendation agents? What factors might increase users' skills in the use and reuse of recommendation agents?*

Recommendation agents are classified into three types: content-filtering, collaborative-filtering, and hybrid (Xiao and Benbasat, 2007). Content-filtering recommendation agents generate recommendations based on consumers' desired product attributes. Collaborative-filtering recommendation agents produce results that are similar to 'word-of-mouth' (Xiao and Benbasat, 2007). Hybrid recommendation agents combine features of content-filtering with features of collaborative-filtering. This research will focus on the application of hybrid recommendation agents.

2. LITERATURE REVIEWS AND RESEARCH MODEL

2.1 Flow Theory

Csikszentmihalyi (1977) defined 'flow' as 'the holistic sensation that people feel when they act with total involvement'. When people enter into flow states, they feel deep enjoyment, happiness, and exhilaration (Csikszentmihalyi, 1990). During flow states, people become immersed in activities, fully control their actions, centre their focus of awareness, and lose their self-consciousness. This concept has been applied in the computer-mediated communication environment (Csikszentmihalyi, 1990; Hoffman and Novak, 1996) that includes web surfing, content navigation, browsing for information (e.g. Skadberg and Kimmel, 2004), online chatting, online gaming (e.g. Choi and Kim, 2004), and shopping in online shopping environments (e.g. Koufair, 2002), and so on. Hoffman and Novak (1996) defined flow as 'a seamless sequence of intrinsic enjoyment facilitated by interactivity with computers, which is accompanied by loss of self-consciousness.'

2.2 Consequences of Flow Experiences

In general, flow experiences are considered affective states that primarily influence users' emotions (e.g. playfulness, enjoyment, or positive feelings). Flow experiences also induce users' positive behaviours and intentions. For example, several studies have indicated that flow experiences may induce positive feelings, attitudes, and intentions (e.g. loyalty and usage) (Choi and Kim, 2004; Mathwick and Ridgon, 2004; Zhou and Lu, 2011), purchasing attitudes and intentions (Luna et al., 2002), learning intentions (Ho and Kuo, 2010; Pilke, 2004), as well as information usefulness and diagnosticity (Agarwal and Karahanna, 2000; Jiang and Benbasat, 2005). Hoffman and Novak (1996) indicated that, if users enter into stronger flow experiences, then they will feel greater satisfaction. They might be more willing to learn. Agarwal and Karahanna (2000) explored flow experiences. The results of their study revealed that flow experiences might influence users' perceived usefulness and perceived ease of use. Jiang and Benbasat (2005) proposed that a positive relationship exists between flow and perceived diagnosticity. Therefore, we propose:

H1: Users' flow is positively associated with their perceived information usefulness toward recommendation agents.

H2: Users' flow is positively associated with their intentions to reuse recommendation agents.

2.3 Information Usefulness

Rabjohn et al. (2008) stated that the reasons why users intend to adopt technology, ideas, or information are based on their beliefs about and valuations of the consequences of adoption. The information adoption model was proposed by Sussman and Siegal (2003). This model states that the likelihood that users will adopt information depends on their perceived benefits of the adoption of that information (i.e. information usefulness). Further, they stated users' perceived benefits derive from their evaluations of argument quality and source credibility. This information adoption model can also be applied to investigations of users' intentions to adopt recommendation agents. If users believe recommendations are useful and if users experience comfort during the interactive process, they will be more willing to reuse recommendation agents. Therefore, we propose:

H3: Users' perceived information usefulness is positively associated with their intentions to reuse recommendation agents.

2.4 Antecedents of Flow Experiences

'Flow' is experienced only when users believe their skills are sufficient to meet specific levels of effort required to achieve challenges (i.e. 'a balance of skills and challenges'). Thus, they will become more willing to engage in repeated use of recommendation agents. If a recommendation agent could provide users with suitable assistance they could employ to increase their skills in the utilization of recommendation agents, then users could enter into states of flow. We propose that recommendation agents could provide two kinds of assistance, including informational and affective cues. Informational cues include detailed descriptions that include the meaning and objectives of product attributes, as well as information related to other consumers' choices. Studies have shown that a positive relationship exists between the provision of explanations and users' understanding and development of positive attitudes toward products, users' shopping enjoyment, as well as flow (e.g., Jiang and Benbasat, 2005, 2007). Affective cues derive from users' perceptions of similarities of the decision processes that operate between users and recommendation agents because perceived similarity induces users' identification with recommendation agents. Therefore, we must discuss explanation facilities, consumer reviews, and perceived process similarities.

2.4.1 Explanation Facilities

Explanation facilities can make the whole mechanism of recommendation agents more transparent to their users by providing users with detailed information and explanations about why recommendation agents ask certain questions and about how these agents process information to reach their conclusions (Gregor and Benbasat, 1999). They are considered one of several effective methods that can be used to communicate decision processes to their users (e.g. Al-Natour et al., 2008; Wang and Benbasat, 2007). Users could increase their understanding of recommendation agents and, as a result, compare differences that exist between recommendation agents and themselves. The provision of additional information might increase users' abilities to make decisions. This would include evaluating the recommendation agents' competence, and obtaining additional product information. This might result in improvements in users' abilities to more easily enter into flow states, from the perspective of flow theory. Therefore, we propose:

H4: The existence of explanation facilities is positively associated with users' flow experiences with recommendation agents.

2.4.2 Informational Cascade

An informational cascade occurs when the influence of others' decision outweighs the influence of decision makers' own information (Bikhchandani et al., 1992). Consumer reviews are generated from customers' spontaneous behaviours. These reviews aim to share consumers' experiences and perceptions of the purchase and use of products. Consumer reviews serve as supplemental information sources, along with other information such as product descriptions and attributes (Mudambi and Schuff, 2010). Studies have demonstrated that consumer reviews serve as important cues that can assist users to make better and easier choices (Dabholkar, 2006; Huang and Chen, 2006). Studies have demonstrated that consumer reviews could save users significant amounts of effort (Smith et al., 2005). Users may be attracted by online consumer

reviews. They might spend additional time on web sites and, in turn, enter into flow experiences (Mudambi and Schuff, 2010). Therefore, we propose:

H5: The existence of consumer reviews is positively associated with users' flow experiences with recommendation agents.

2.4.3 Perceived Process Similarity

Users are usually attracted to others when they believe those others are similar to themselves (Al-Natour et al., 2008). Byrne et al. (1967) stated that similarity may be attractive because two interactive partners may share similar beliefs. This will reduce conflicts and disagreements between the partners. Berscheid and Walster (1978) stated that perceived similarity may create pleasurable and enjoyable interactions, easy communication, predictability, and positive attitudes. We believe that users perceive similarities with others and experience pleasure and enjoyment. Enjoyment is a factor that occurs during flow experiences (Zhou and Lu, 2011). Therefore, we propose:

H6: Users' perceived process similarity is positively associated with their perceived flow experiences with recommendation agents.

The proposed research model is shown in Figure 1.

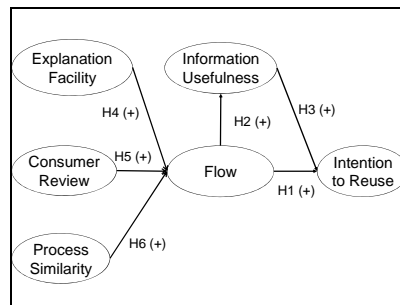


Figure 1. Research model.

3. RESEARCH METHOD

3.1 Operationalization and Instrument Design

The instruments used for constructs were adapted from related literature. All items were anchored on five-point Likert scales that ranged between strong disagreement and strong agreement. A short interview with several colleagues and experts and a pre-test were conducted to ensure face validity and content validity for the compliant questionnaires. Explanation facility was performed by describing the meaning and the importance of each attributes and the importance (Wang and Benbasat, 2007). We followed the presentation format employed by Duan et al. (2009) to demonstrate the situation involved in the 'informational cascade'. It was based on consumers' ratings that ranged from one star to five stars for one product. Based on Al-Natour et al. (2006), we designed two recommendation agents' decision strategies for the provision of shopping suggestions, including additive compensatory (AC) and elimination by aspect (EBA) strategies. The AC Strategy is most closely aligned with normative strategies. Individuals who employ the AC strategy evaluate alternatives based on their assignment of weights and scores for each attribute (Al-Natour et al., 2006; Bettman et al., 1998). The EBA strategy is most closely aligned to heuristics strategies. Individuals who employ the EBA strategy compare attributes' values against user-specified threshold levels across all alternatives (Al-Natour et al., 2006; Bettman et al., 1998). The design of decision strategies is used to measure users' perceived process similarity.

3.2 Experimental Design and Data Collection

To examine the effects of explanation facility and informational cascade on flow, a 2×2 factorial experimental design was employed. Explanation facility and informational cascade were employed in the experimental treatment on two levels: with and without descriptions. The design of the manipulation of perceived process similarity was based on decision strategies described in Al-Natour et al. (2008).

For this experiment, an artificial recommendation agent was designed to provide recommendations for digital cameras based on participants' preferences and requirements. We designed a scenario for participants and asked them to choose an optimal alternative based on requirements in the scenario. Participants were randomly assigned into one setting of four combinations of explanation facility and consumer reviews. When participants chose products based on recommendations, we provided descriptions and consumer reviews of those products selected by participants, as well as the decision recommendations that were most appropriate to the scenario. We explained reasons derived from the AC or EBA decision strategies. Participants could repeatedly operate the recommendation agents until they found qualified products. Upon completion of the tasks, participants were asked to complete self-administered questionnaires that included measurement items related to process similarity, flow, information usefulness and intentions to reuse.

We performed a pilot test to insure the appropriateness of experimental procedures. We posted invitations to participate on the BBS of Chang Gung University during a one-week period. However, they were required to have experience with the use and purchase of digital cameras. During this period, 183 participants were recruited for the experiment. After examining data, only 166 records were used for the data analysis.

4. DATA ANALYSIS AND RESULTS

4.1 Measurement Model

The measurement model was assessed by the use of a confirmatory factor analysis that used LISREL 8.8.

Table 1. Reliability, convergent validity and discriminant validity.

	Composite Reliability	Average Variance Extracted	Cronbach's Alpha	Process similarity	Flow	Information Usefulness	Intention to reuse
Process Similarity	0.91	0.76	0.80	0.87	—	—	—
Flow	0.89	0.74	0.80	0.72	0.86	—	—
Information Usefulness	0.93	0.82	0.84	0.61	0.85	0.90	—
Intention to Reuse	0.97	0.88	0.92	0.61	0.85	0.88	0.94

Note: Diagonal represents square root of AVE of each construct

Factor loadings of indicators were all above the acceptable level of 0.5 and were significant ($p \leq 0.01$) after the deletion of three measurement item related to the construct of 'flow'. The fit indices were all above the threshold. These results reveal the acceptability of the construct validity. Reliability and convergent validity were acceptable when compared with the threshold: 0.7 and 0.5 respectively, as shown in Table 1. The discriminant validity was acceptable based on the rule that the correlations between any two distinct constructs were lower than the square root of the average variance extracted from these constructs (Fornell and Larcker, 1981), as shown in Table 1.

4.2 Hypotheses Testing

Two steps were performed to test hypotheses. First, H4 and H5 were examined by the performance of an ANOVA test. Second, H1, H2, H3, and H6 were examined based on the Structural Equation Model. H1, H2, H3, and H6 are supported and presented in Figure 2. Flow directly and indirectly enhanced users' intentions to reuse recommendation agents. Information usefulness served as an important mediator between flow and

reuse intention. Process similarity positively influenced flow. The results revealed that process similarity only affected information usefulness mediated by flow. The explained variances of intention to reuse recommendation agents, information usefulness, and flow were 82%, 72%, and 53%, respectively.

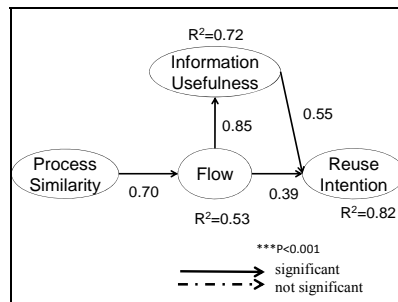


Figure 2. Structural model – Main effect (SEM).

The results of H4 and H5 are shown in Table 2. The existence of explanation facility and consumer reviews influenced users’ perceived flow experiences under 0.05 and 0.1 significant levels, respectively. However, users perceived higher flow experiences in the situation that did not include explanation facility than they did in the situation that included explanation facility. This relationship was opposite to our expectations. Users perceived higher flow experiences when they were provided with the number of purchasers, rather than when they were not provided with this information. Thus, H4 was unsupported. However, H5 was supported.

Table 2. ANOVA results for Flow.

Flow		Mean	S.D.	N	F value	Sig.
Explanation Facility	With	3.144	0.090	83	4.728	0.031
	Without	3.421	0.090	83		
Consumer Reviews	With	3.394	0.092	79	3.071	0.082
	Without	3.171	0.088	87		

5. DISCUSSION AND IMPLICATIONS

5.1 Conclusions and Implications

We determined three main findings based on results of dataanalysis. **First**, flow, which is usually discussed from the hedonic viewpoint, is important for users’ intentions to reuse recommendation agents. Flow does not solely exert direct influence on reuse intentions. It also indirectly affects reuse intentions mediated by information usefulness. In general, prior studies investigated antecedents of reuse intentions from a utilitarian viewpoint. Users develop positive feelings towards recommendation agents. Then, they consider utilitarian benefits, such as usefulness. Hence, explorations of the antecedents of flow might provide valuable results. **Second**, increasing users’ abilities to face challenges and utilize recommendation agents to make good decisions will induce users’ flow experiences. Users who perceive process similarity and read consumer reviews could enter into states of flow. In turn, they might be more willing to consider the usefulness of suggestions and reuse recommendation agents. Users’ identification with the decision process employed by recommendation agents may induce their willingness to devote time and effort to interact with recommendation agents. Users’ efforts to read other users’ product reviews may provide affective hints and contribute to users’ confidence in their choices. Explanation facility may depress users’ positive feelings. Users may feel overwhelmed by the amount of detailed information that provides descriptions of product attributes. This may detract from feelings of ease and pleasure users experience during interactive processes. Pu and Chen (2007) found that recommendation agents that provide detailed explanations of product attributes decrease users’ cognitive efforts during decision-making. **Third**, process similarity is more

important than explanation facility and consumer reviews during the interactive processes. When users agree with the decision processes of recommendation agents, they may be more willing to interact with recommendation agents. They will then value the suggestions made by recommendation agents. Hence, understanding users' recognition of inference logics that occur during decision-making is very important.

Based on these findings, we can offer two academic implications. **First**, the results support the application of flow theory with respect to users' intentions to reuse recommendation agents. Recent studies have emphasized the contents of and inferences included in recommendations. However, this study highlights the importance of users' attitudes and feelings during the interactive process. **Second**, prior studies investigated the influence of process similarity on usability of and trust in recommendation agents. However, this study highlights the fact that process similarity also exerts emotional influences, such as the inducement of flow experiences. Users perceive similarity between their reasoning processes and the reasoning processes of decision aids. They may become interested in the ways that recommendation agents operate and, as a result, become devoted to the interactive processes involved.

5.2 Managerial Implications

Our findings imply three suggestions for managers. **First**, managers could attempt to increase users' absorption in the use of recommendation agents. If users experience time distortion and solely concentrate on recommendation agents, they will be more willing to consider suggestions as valuable information. Thus, they will reuse recommendation agents again in the future. **Second**, managers could treat similarity as a critical factor that might indirectly increase users' reuse intentions. Managers could attempt to increase users' agreement with decision-making procedures used by recommendation agents. This may induce users' flow experiences with recommendation agents. **Third**, the provision of hybrid recommendation agents can improve users' positive feelings and increase their reuse intentions by providing consumer reviews and suggestions based on users' preferences.

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INTEGRATION OF THE SHIPMENT INTO THE LAST-MILE LOGISTICS INFORMATION FLOW

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ABSTRACT

Based on new communication technologies and changes in the society, logistics providers are enabled to advance their business processes. Especially the enhancement of the information flow between all involved parties of the physical transportation process supports such developments. An important element of the end-to-end information flow is the shipment itself, which can be integrated into various applications by utilizing technologies like printable codes, NFC or Bluetooth. The integration of the shipment opens new potentials for E-Commerce and is in this regard especially relevant for the sender, which stretches the informational control over the shipment deep into the physical transportation process of the logistics provider. The logistics provider is also able to gain new business value due to the informationalization of the shipment. The increased information flow can be transformed into value added services and help to increase the service quality and reduce the costs of physical delivery through efficiency optimization.

KEYWORDS

Last-mile logistics; mobile communication; E-Commerce; information flow

1. INTRODUCTION

Logistics providers, in terms of traditional postal service providers of letter and parcel delivery, are constantly affected by various developments and changes which come from societal or technological areas. These developments are especially relevant, when the focus falls on the last-mile of the delivery process. As in telecommunication, the last-mile in logistics processes is responsible for the better part of the total costs. Studies show, that up to 75% of all costs related to logistics are attributable to that last-mile [Onghena, 2008; Gevaers, Van de Voorde & Vanelslander, 2010]. It is thus relevant to analyze if the developments are utilizable in last-mile logistics processes to increase service quality, raise the delivery success rate and thereby enhance the efficiency by reducing costs.

On the one hand societal changes are significantly influencing the way logistics providers operate. The analysis of the delivery success rates with respect to the younger generation shows that people are more on the move compared to the situation thirty years ago or compared to the older generation nowadays. Often, both adults in a household are working in full-time employments, which makes it difficult for the deliverer to hold or raise the first attempt delivery success rate. Beside the rise of employment in households, also former traditional family structures with two and more generations in one home decrease. Additionally, the number of shipments surges [Esser & Kurte, 2012] as a consequence of growing E-Commerce revenues [Khan, 2011] as well as due to an increased usage of home deliveries by the older generation [Dijkman, 2008].

Technological changes on the other hand are considerably altering the way of communication [Petrovic, Harnisch & Puchleitner, 2012]. There are various critical factors, which facilitate these developments [Goodman & Hirsch, 2010]. Two of them are the independency of place and time when communicating. The usage of mobile devices like smartphones, tablet computers or notebooks allows individuals to communicate location- and time-independent. Such mobile devices are apparently widespread. The utilization of these

communication possibilities could enhance the last-mile logistics process and aid in the increase of efficiency and cost reduction.

The purpose of this paper is to depict the emerging opportunities for the last-mile logistics process, which arise due to the various developments in society and technology. Especially the utilization of generated information due to the usage of mobile communication technology is a main area of the paper. The utilization of information is able to generate different improvements of efficiency in various applications of the last-mile logistics process. We will depict the possibility for enhancements of the process based on the integration and thus informationalization of the shipment itself. Additionally, new sensor-based technologies allow shipments to take an active role within the communication process.

The paper will be structured as follows: After a short introduction into the topic in section one, the three phases of utilization of information in logistics are described. Subsequently in section three, the benefits of an integration of shipments into the described end-to-end information flow and emerging opportunities for the last-mile logistics processes are highlighted. Finally, several practical approaches to integrate the shipment are illustrated in section four and a conclusion is drawn in section five.

2. INFORMATION IN LAST-MILE LOGISTICS

The process of the physical transport of a shipment from the sender to the recipient by a logistics provider has experienced various alterations throughout the last decades. At the beginning, the physical transportation itself was the main core of the service and also of the focus of innovation [Manheim, 1979]. But this focus has been enhanced by the creation and utilization of information.

2.1 Bits and Atoms in Last-Mile Logistics

Before we highlight the details of the utilization of information in the logistics process, the analogy of bits and atoms [Negroponte, 1995] is advantageous. Atoms on the one hand, describe every physical element related to the process. For example, the shipment itself is classified as atom. Whereas on the other hand, bits are virtual or non-physical elements related to the process. Data streams, generated by a track & trace mobile application of the logistics provider, are for example classified as bits.

Atoms, represented by physical elements within the transportation process, describe the traditional way of conducting business and represent the fundament of the process. The number of atoms is naturally fixed. Businesses need to manage and deliver the number of shipments they take over from the senders but cannot increase them in terms of adding additional shipments on their own. Business development opportunities in terms of atoms are rare and are mainly focusing on efficiency improvements of the delivery process. Nevertheless, the atoms are the service with which the logistic providers generate their primary revenues. [Baya, Gruman & Parker, 2013]

Bits, represented by all virtual elements within the transportation process, are very contrary to the described atoms, as their number is not fixed within the business. The underlying process can be enhanced by the creation of additional information (bits) which can be utilized in new applications. When such applications are introduced into the traditional delivery process, they can enhance service quality, reduce costs or improve efficiency. Thus, bits provide the opportunity for further business development. The created information is able to aid and improve the physical services in generating the revenue and support the business to set the provided service apart from other competitors. [Baya, Gruman & Parker, 2013]

2.2 The Three Phases of Information Utilization

The creation and utilization of information in logistics processes can be divided into three phases, which are depicted in Figure 1. What has been seen in the first phase of information utilization of logistics was the integration of computer systems between the sender and the logistics provider. This was especially relevant for senders, which offered postal-shopping opportunities for their customers. Senders were enabled to provide the delivery information of their shipments at an early stage in the process (remittance advice [Loar, 1988]). By the early transmission of the remittance advice, the logistics provider gained the opportunity to plan the incoming shipments and improve efficiency of the logistics process.

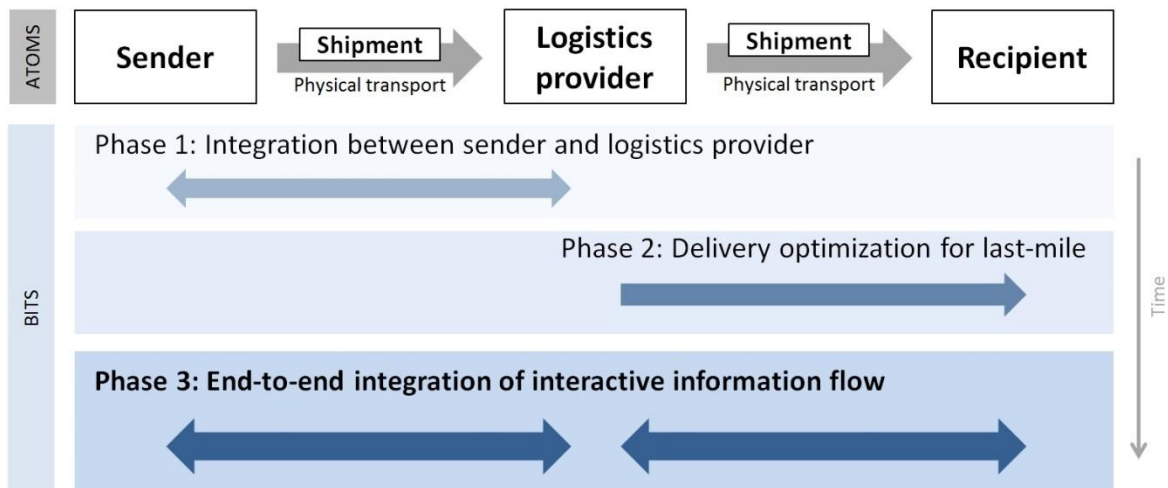


Figure 1. Utilization of information in logistics [Petrovic, Harnisch & Puchleitner, 2013].

In the second phase of information utilization the focus fell on the interaction between the logistics provider and the recipient. The physical transportation of the shipment was already well developed but the creation and utilization of information that arose in this part of the delivery process was rarely used. Thus, logistics providers started to exploit additional information to optimize the delivery process and established a communication channel with the recipient. The focus in terms of dynamic route optimization includes for example the integration of traffic or weather information into the route planning [Kritzinger et al., 2012; Taniguchi & Shimamoto, 2004]. For recipients new interactions with the logistics provider and thus new forms of delivery services were established. One example is the fixed delivery time window a recipient is able to arrange with the deliverer.

The last phase of information utilization in logistics is based on an end-to-end interactive information flow between the sender, the logistics provider and the recipient. The information flow is independent of place and time and enabled by mobile communication technology like smartphones. By using such mobile devices, recipients are enabled to open an interactive communication channel not only with the logistics provider, but also with the sender of the shipment. This interactive communication channel also opens opportunities for other business areas, because the generated data can be utilized in other business models too.

3. INTEGRATION OF SHIPMENT INTO THE INFORMATION FLOW

Beside the established interactive communication channel between all parties of the transportation process, also the shipment itself as object of the physical transportation can play a vital role within the information flow. The interaction with the shipment could be relevant for the recipient, as well as for the logistics provider and also the sender.

For the sender the integration of the shipment into the information flow is first and foremost a possibility to gain more control over the shipment. This is especially relevant for legal issues which include for example the transfer of ownership, insurance guarantees or the proof of timely dispatch. Additionally, the increase of control over the shipment is strongly interrelated with an increase in trust. Naturally, an enhanced control mechanism allows also the improvement of transport efficiency by the analysis of gathered transportation data. Finally, the sender is able to gain a competitive advantage if he integrates the shipment into the information flow, because innovative applications are possible and information is gathered, which would not be available with traditional transportation processes.

The integration of the shipment into the information flow could be a value added service provided by the logistics provider. Due to the cost factor of sensor solutions (see section four for details) up to now, only leasing options for cost-intensive sensors are commercial possible. The provision, administration, redemption and reconditioning of used sensors could be provided by the logistics provider as service operator. As the

owner of the communication infrastructure throughout the whole transportation process, the logistics provider is the guardian of communication. This enables the logistics provider to gain a competitive advantage due to the control over the communication and information flow. If the logistics provider sets up an additional communication service, it could lead to various lock-in effects [Petrovic, Harnisch & Puchleitner, 2013], which could be exploited subsequently.

The recipient has of course the advantage to gain more information about a shipment. On the one hand needs of control are served, on the other hand planning purposes can be fulfilled more efficiently. As for the sender, the additional information can aid to resolve legal issues more easily. Since the proliferation of smartphones, the active interaction of the recipient within the information flow of the transportation process is easily possible. This circumstance is also expandable for the efficient integration of and the interaction with the shipment.

4. APPROACHES FOR THE INTEGRATION OF THE SHIPMENT

In the last-mile of logistics the shipment represents the only indispensable connection between sender and logistics provider as well as logistics provider and recipient. The flow of information in both cases is mandatory as shipping requires the exchange of delivery information but the integrative communication between all three is optional to enhance and optimize processes. The shipment on the other side is not alterable and therefore stays constant at every transition. Independently of the communication exchange between all parties the shipment itself may act as channel of communication with an ensured transmission in a working supply chain. It is therefore of great interest for sender, recipient and logistics provider to gain as much information regarding the shipment as possible, regardless their difference in interests and usage.

4.1 Enabling the Communication of Shipments

In contrary to the in the transportation process, involved persons or businesses, the shipment as physical object is generally not equipped with a logic or systems for information exchange. The shipment is therefore not able to initiate a communication process nor can it enrich the process by generating or adding additional information on its own. However, late developments in information technology allow the integration of the shipment into the communication process by external enablers. These enablers open a communication channel with the shipment as essential part within the information exchange.

Various technologies exist to facilitate this integration but applications vary depending on the field of operation. Already wide accepted technologies that allow the linking between physical and virtual world are printable codes. Barcodes or different kinds of Quick-Response-Codes (QR-Codes) [Uitz & Harnisch, 2012] are used in many fields of application as also for the identification of transported goods. Whereas in warehouse logistics the professional utilization of printed identifiers is already well established, also E-Commerce customers now benefit of the emerging availability of devices to read and interpret these codes. Due to the low production and distribution cost of labels, their application predestines for mass transportation purposes. Every shipment is labeled with a unique tag to identify the shipment, which thereby allows a reading device, as simple as a smartphone with camera and a corresponding application, to initiate communication processes and thus integrate the shipment into the information exchange. The unique label simplifies the otherwise manual entering of an identification code and hence increases the accommodativeness of services and additionally reduces error rates.

Besides visible code technology, also contactless radio transmitting technologies are gaining popularity due to the availability of mobile devices with integrated transmission technologies. Near-Field-Communication (NFC) [Harnisch & Uitz, 2013] is a build-in feature in many new distributed smartphones and is therefore a technology with increasing acceptance also for E-Commerce customers. Where printable codes require some environmental conditions to operate like direct visual contact to the label, NFC is based on radio frequency identification, to enhance the fields of application. According to a study by ABI Research [Dyer, 2013] 500 million mobile phones will have an integrated NFC-chipset in 2014, which highlights the importance of NFC as an upcoming technology for end-customers. Depending on the type of tag used, various options of application emerge. For simple identification purpose, passive tags permit reading and

overwriting of information without any need for an additional power supply, which keep these tags inexpensive and therefore also predestines for mass E-Commerce shipments.

Table 1. Comparison of technologies available for shipment integration [Vazquez-Briseno et al., 2012].

	Printable Codes	NFC	IrDA	Bluetooth
Set-up time	Manually (< 5 s)	< 0.1 ms	~ 0.5 ms	6 s
Range	10-20 cm	Up to 10 cm	Up to 5 m	Up to 30 m
Dissemination	Every smartphone	Selected smartphones	Selected smartphones	Selected smartphones
Costs for tag	Low	Medium	High	High
Usability	Easy but multiple actions required	Human centric, easy, intuitive, fast	Data centric, easy	Data centric, medium
Consumer experience	Taking photo and using application	Touch, simply connect	Easy	Configuration needed

Active NFC elements allow a wide field of applications as they are able to actively initiate and manage communication, but they are more expensive and also require an additional power supply. Therefore connecting two active elements opens a bi-directional communication channel where an extensive information exchange can be performed. Another but similar form of communication is achieved by already widespread Bluetooth or Infrared (with its specification by the Infrared Data Association - IrDA) systems. Like the connection between two active NFC elements also Bluetooth and Infrared require two active elements with their own power supply. While NFC was intended to simplify short distance information exchange, Bluetooth, depending on the specifications, allows data exchanges over longer distances. Table 1 gives an overview of enabling technologies which act as enabler for the integration of the shipment into the information flow.

4.2 Using Sensors to Generate Information within the Last-Mile

Developments in engineering had a huge impact on the production of microprocessors. Not only did the costs for manufacturing drop but also sizes of microchips decreased. These developments also infected application fields where sensor technologies are applied and even gave way for new forms of utilizing these technologies. Smartphones for example integrate various sensors to measure indicators. Some examples are accelerometers to indicate the movement of devices or gyroscopes to detect the current orientation or GPS sensors to determine the current position [Lane et al., 2010]. Most sensors require an external power supply and are combined with a microprocessor, which implements the logic to operate and analyze the provided data. To transfer the processed data an additional communication interface is required. As these sensors are also intended to take an active part in the communication process, supporting technologies like NFC, IrDA or Bluetooth are eligible for such purposes.

Cost reduction, reductions in size and power consumption, as well as the increasingly efficient power management enhances the application fields in logistics from professional business usage only to new business opportunities for E-Commerce merchants as well as customers. Sensors allow the permanent monitoring of the shipment and therefore extend the variety of shippable goods in business-to-business (B2C) and customer-to-customer (C2C) markets with high influence even for existing business models. New fields of application emerge which can be confirmed by the following use cases with high relevance for E-Commerce merchants, their customers and last-mile logistic providers.

4.2.1 Product Damage Recognition while Transportation

One of the most appearing issues in E-Commerce is damaged products at the point of takeover from the customer. While the handover in stores enables customers to check the condition of the product or at least the package, this action is postponed to the handover from last-mile logistics provider to the recipient if products are sold via E-Commerce. In case of product damages, each of the three involved parties demands proof for their responsible actions. Sensors in shipments measure the movement and acceleration of the content and so identify package drops that may cause product damages. The product development firm Cambridge Consultants developed a simple product to identify each dropping during the transportation process. The

sensor system called DropTag [Cambridge Consultants, 2013] consists of a low-cost sensor with an integrated Bluetooth connector. Every partner within the transport chain is able to check if a drop happened by checking the mobile application via smartphones. Even some parameters like the sensitive of the sensor can be adjusted to adapt the sensor for specific needs.



Figure 2. DropTag allows the identification of product damages [Cambridge Consultants, 2013].

4.2.2 Access to the Shipment Position at Any Time

Most E-Commerce merchants already offer their customers functionalities to trace the current state or location of their awaited shipments. Again improvements in technology allow the utilization of active GPS senders in packages to permanently monitor their location. While the GPS technology is already applicable for packages with higher value further progress in the manufacturing of these sensors will reduce costs to make them more achievable for packages of private customers too. Devices as light as 60 grams (less than 2 oz.) with an already integrated two-way telecommunication sender and power supply for several days, allows an application in manifold ways [GTX Corp., 2013]. The route of transportation is thereby directly linked to the package and can be tracked by the customer at all times.



Figure 3. Permanent tracking of shipment location [GTX Corp., 2013].

4.2.3 Connecting Multi-Sensor Systems with Online Services

In case of high importance shipments where a need for detailed insights in the packages state is necessary, multi-sensor systems aggregate data from several sensors and therefore provide detailed analysis of all measured data. SenseAware by FedEx supports various sensors and integrates them in a simple box, which is then placed into the shipping package [FedEx, 2013]. Due to network functionalities, the collected data can instantly be exchanged. Besides the independent information produced by each single sensor, these sensors also work as a collective. By interpreting the results of two or more sensors additional states can be predicated. This sensor-based logistics solution is supported by an online platform to monitor all shipments. Customers have full control over their shipments, which acts as a strong competitive advantage for E-Commerce merchants as well as last-mile logistic providers.



Figure 4. Multi-sensor system with connected online platform [FedEx, 2013].

Multi-sensor systems do of course show most beneficial for all involved parties but shipping prices are the relevant factor especially in the last-mile. As all costs for the generation of information by sensors and their integration into the customer's communication space [Puchleitner & Harnisch, 2012] are added to the total shipping costs, E-Commerce customers will request such services only when they show advantageous or are low in price. The here described services show beneficial for customers and therefore creates potentials for competitive advantages when integration into the E-Commerce merchant's service offerings occurs.

5. CONCLUSION

The integration of the shipment into the information exchange between sender, recipient and last-mile logistics provider is an upcoming trend in E-Commerce. While some ways of integration are already established within supply chain processes, the availability of new communication technologies brings these and additional services to end-customers as well. By utilizing technologies like printable codes, NFC or Bluetooth the linking between physical and virtual world is made possible to integrate shipments and hence to add information regarding the state of the shipment into the communication process. Depending on the types of communication tags used, shipments can also take an active part in the communication process, which even widens the field of applications. The shipment as active part within the information exchange thereby acts as a fundament for various additional services. Sensor systems allow the continually monitoring of the package's state to ensure the appropriate handling of its content. Use cases were depicted to demonstrate the feasibility of sensor-based logistics systems. While costs for some services may currently exceed customers request for low shipping costs, developments in sensor technology and the further spreading of smartphones to link these sensors will lead to higher demand for innovative value adding services. Additionally several new business opportunities may occur due to the extension of products offered, like temperature dependent products or like food and special medicine, which require a consistence of the cold chain. Communicating shipments with integrated sensors therefore allows customers as well as merchants to gain insights into the content's condition with the opening of new potentials in E-Commerce.

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BUSINESS MODEL – WHAT IS IT FOR A SOFTWARE COMPANY? - A SYSTEMATIC MAPPING STUDY

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ABSTRACT

Although business model is a decades old concept, it has been a part of scientific research especially after the burst of the dot-com bubble. Business model is an abstraction of the firm's business logic. It describes the basic revenue stream, value propositions, customers and key resources. This article presents a systematic mapping study of the research on software business models; how the concept is applied in literature. We found out that the business model concept is not well-defined. The definitions of business models include varying relations to other similar concepts, like revenue model, business logic and business process. We also found out that there is very little, if any, research done in the industry level to see how companies utilize business modeling. These issues require further research.

KEYWORDS

Business model, software business, success factor, systematic mapping study

1. INTRODUCTION

Software companies are doing business by providing value to their customers. As technology itself has no value (Luoma et al. 2012; Chesbrough 2007), companies need to be able to create and capture value through an effective business model. The concept of business model describes, for example, company's value proposition, its activities, customer relationship, revenue logic and resources (Osterwalder 2010; Valtakoski and Rönkkö 2010) and it is a critical thing to the success in the digital world (Schief and Buxmann 2012; Johnson et al. 2008). Business models are required when establishing new companies, but also when existing companies are expanding to an unknown market territory (Johnson et al. 2008). Companies can even go with different business models during their life-cycle.

As start-ups are discussed at present in public debate, we wanted to study how software business models are studied and how the actual concept of *business model* is defined and how we could in future help start-ups business. We found out in the early stages of the study that the extent of research on this topic is limited and, for example, no systematic literature reviews or mapping studies have been conducted. This systematic mapping study analyzes existing literature on software business models, builds a systematic map and gives an overview of the topic to establish a solid base for future research.

2. RESEARCH PROCESS

The research process followed the guidelines given by Kitchenham and Charters (2007), Engström and Runeson (2011) and Petersen et al. (2008). The aim of a systematic mapping study is to identify a research gap and, as Petersen et al. (2008) advice, to classify and map the found articles. Petersen et al. (2008) suggested the systematic mapping study to follow the process presented in Figure 1.

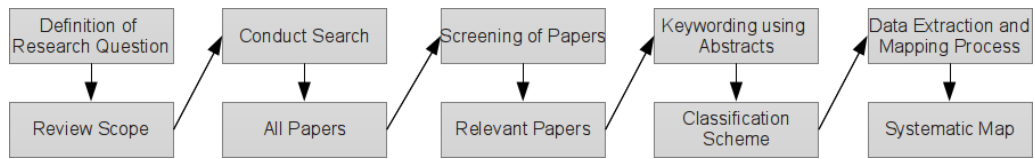


Figure 1. The Systematic Mapping Process (Petersen et al. 2008)

The process starts with the definition of research questions and based on them the search keywords are created and the actual search conducted from selected databases, journals or conferences. After that articles that do not meet the research question are filtered out. Articles are classified based on keywords found mainly from the abstract. Based on the data extracted from the articles, a systematic map with, for example, figures and tables is built to illustrate the results. (Petersen et al. 2008)

The main motivation for this systematic mapping study is to get insight on how widely business models of software companies have been studied and from what point of view. We have also noted that in literature (Hienerth et al. 2011; Chen & Wang 2010) success factors have been discussed in such extend that we decided to use them as a part of the research questions as they can help management of a company, for example, to monitor business (Soini et al. 2006).

Based on these reasons the following research questions were set:

- RQ1: *How is the use of business models in software business studied?*
- RQ2: *What is the relation of success factors and a business model of a software company according to the literature?*

We used the following six scientific databases: ACM DL, IEEEExplore, Science Direct, SpringerLink, EBSCO, and ABI/Inform. These databases gave a very representative and relevant set of articles related to software business models. They include both engineering and a business-related perspective to published research.

We used the following selection criteria for the articles: 1) the article has to be software business related, 2) the article has to be peer-reviewed, 3) the article has to be written in English, and 4) the article has to be available in full text (not only abstracts).

All the selections were done by the first author of this paper and all the searches were conducted between 2012-11-15 and 2013-02-15.

3. SEARCH

The actual search was started by deciding the search keywords. Searching Google scholar with keywords *software business model* reveals over 2 million results, but only 317 for "*software business model*" (notice quotation marks). This lead us to select a search phrase with quotation marks because they can produce a compact set of search results from the databases that can be checked quickly. It was also possible to experiment with different keywords and then find a better combination for the next search round.

As expected, the results of the first search provided only 114 papers (see table 1). Their title, abstract and keywords were analyzed and only 12 papers were considered as relevant. The rejected papers did not discuss software business, were too technical or otherwise they were not relevant to the research questions.

The second search was then done with the search phrase *software business "success factors"* in title, abstract, or keywords and it produced 88 results (see table 1), but only 3 of them were considered as relevant after reading the title, abstract and keywords. The rejected articles covered topics like health care, management and technical enterprise resource planning implementation and these were not seen as relevant. We considered this as a step back and decided to continue by developing the first search criteria.

The third search phrase was formulated as *software "business model"*. The search was done from title and abstract. The keywords part was dropped out as not all papers had author based keywords or they were not available in the database. This search produced the widest range of articles (see table 1). 29 out of 375 were considered as relevant, based on the title and abstract.

Table 1. Results with search keywords round 1 (R1) "*software business model*" from all fields, (R2) *software business success factors*" from title-abstract-keywords and (R3) *software "business model"* from title-abstract

	ACM DL	IEEEExplore	Science Direct	SpringerLink	EBSCO	ABI/Inform	Σ
(R1) Accepted / Found	1/9	4/23	1/16	4/40	1/15	1/11	12/114
(R2) Accepted / Found	0/9	1/32	2/25	0/2	0/2	0/18	3/88
(R3) Accepted / Found	4/31	16/199	6/75	1/11	0/15	2/44	29/375
Σ	5/49	21/254	9/116	5/53	1/32	3/73	44/577

Table 2 shows how the searches produced overlapping results. In the end we had 38 unique relevant papers in the set.

Table 2. Matrix showing the overlapping of the three different searches

Search number	1	2	3
1	12	0	5
2	0	3	1
3	5	1	29

After these searches 577 titles and abstracts were read and 38 papers were selected to be read through entirely. These 38 papers were categorized as listed in the table 3.

Table 3. Data collected in the articles used in this study

	Accepted	Not accepted	Σ
Data collected from industry	16	2	18
Data gathered indirectly	5	2	7
No data	7	6	13
Σ	28	10	38

28 of the papers read entirely were accepted. Most of these papers include some empirical part with new data collected from industry or from the publicly available information.

Not all the articles were accepted in our study. The reasons for rejection of an article are listed in the table 4. 10 out of 38 articles were considered as not useful in this study.

Table 4. Rejected articles

Reason	Number of articles
Not related to business models	5
Not relevant to this study	5

Half of the rejected papers were rejected because they were not related to software business models. Business modeling may also be related to more technical areas, such as database design or requirements engineering, but we did not see these areas relevant. The second half of the rejections were done because papers were considered not suitable as, for example, the article described a study that was still in progress or were not relevant to the our research questions.

Five out of 38 papers were written before year 2000 (see Fig. 2). The publication year was not limited by any criteria. Publication years of the papers indicate the same that was mentioned by Lai et al. (2006) and Wirtz et al. (2010): most of the research around business models has been carried out after the burst of the dot-com bubble. In this sense we are studying a subject that is quite new as a research topic.

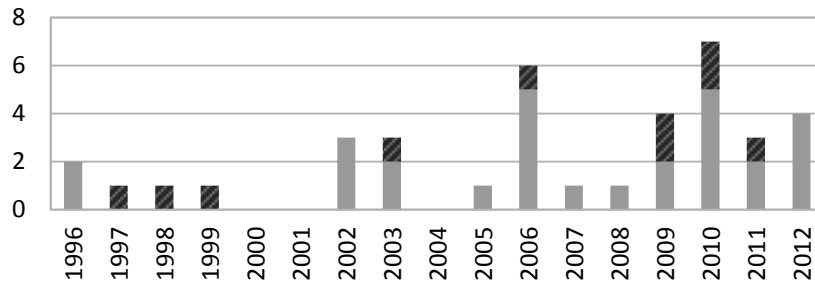


Figure 2. Accepted and rejected papers per year. Solid light gray indicates accepted and hatched dark gray equals rejected paper

10 articles out of 28 accepted ones had authors with a Finnish origin. This was rather surprising as they cover circa 36% of our accepted papers.

4. FINDINGS

Articles found had topics varying from success factors and globalization to modeling with UML and transition from a software product to a service. None of the articles were systematic literature reviews or mapping studies, which lead us to argue that, according to our knowledge; this is the first systematic mapping study on software business models. The following table (Table 5) includes all the accepted articles and gives their basic information.

Table 5. Accepted articles

Main issues studied	Research method	Data collected	Type	Reference
Designing a framework to support the design of business models	Constructive research	From industry	Conference article	(Weiner and Weisbecker 2011)
Top management views on monitoring internal success factors	Empirical survey	From industry	Conference article	(Soini et al. 2006)
Exploring the open source and proprietary software and presenting “both source” business model	Exploration and constructive research	No	Journal article	(Hemphill 2006)
Using UML for business modeling	Constructive research	No	Conference article	(Tyndale-Biscoe et al. 2002)
Finnish software companies' business models and entry models	Multiple case study	From industry	Journal article	(Ojala and Tyrväinen 2006)
Built a business model framework and confirmed it with 10 software companies	Constructive research	For validation only	Conference article	(Schieff and Buxmann 2012)
Categorization of critical risk factors	Case study	From industry	Conference article	(Nahar et al. 2012)
Links between business models, strategy and processes are critical to competitiveness	Empirical survey	From industry	Conference article	(Kontio et al. 2005)
Clustering software-as-a-service (SaaS) and application service provider (ASP) firms based on business model elements	Cluster analysis	From industry	Conference article	(Luoma et al. 2012)
Business models in Finnish software industry, why others succeed better than others	Cluster analysis	From industry	Conference article	(Valtakoski and Rönkkö 2010)

Open source business models and industry's view towards openness	Empirical survey	From industry	Journal article (Bonaccorsi et al. 2006)
User-centric business and its success factors	Multiple case study	From industry	Journal article (Hiernerth et al. 2011)
Success factors in Austrian software business	Empirical survey	From industry	Journal article (Bernroider 2002)
Globalizing US firms to foreign countries	Empirical survey	From industry	Journal article (Roberts and Senturia 1996)
How two ASP companies failed to differentiate their products and services	Multiple case study	From industry	Conference article (Desai et al. 2003)
Article discusses open source and proprietary software and proposes a model to evaluate the profiting conditions	Discussion paper	No	Journal article (Pykäläinen 2007)
Re-engineering software from old version to new one	Experiment	From the implemented project	Conference article (Tsangaris et al. 1996)
E-content price modeling	Discussion paper	No	Journal article (Jagannathan and Almeroth 2002)
Discussion of SaaS from both business and technical point of view	Discussion paper	No	Conference article (Liao 2010)
Software business research and software innovation	Discussion paper	No	Conference article (Käkölä 2002)
Investigation of the role of open source in the business models of two companies.	Multiple case study	Only from official company statements and published economy literature	Conference article (Munga et al. 2009)
Business model driven pattern	Constructive research	No	Conference article (Li and Mou 2010)
Discussion whether or not software business is its own research discipline	Discussion paper	No	Conference article (Rönkkö et al. 2010)
Characteristics of business models	Constructive research	No	Conference article (Asfoura et al. 2008)
Business model elements and success factors	Delphi study	From industry	Journal article (Chen and Wang 2010)
Investigation of relationship between a firm's capability to react to industry wide trends and its service business model	Empirical survey	From industry	Conference article (Rajala and Westerlund 2012)
Revenue logic of software companies on strategic level	Exploratory study	From industry	Journal article (Sainio and Marjakoski 2009)
Transition from software product to service	Case study	From industry	Conference article (Olsen 2006)

The most surprising finding was how the concept of business model has yet not been defined in such an extent that researchers would use it similarly. Now every research article defines in detail what is a business model, what parts are included and what are excluded. Some researchers define business model with just one sentence (e.g. Valtakoski and Rönkkö 2010), while others find even 20 elements in five groups (e.g. Schief and Buxmann 2012). Clearly there is room for a more standardized definition.

Despite of being defined in many ways, the actual meaning of business model has also been interpreted in many different ways. Käkölä (2002) mentioned the term *business model* in the title, but the article itself stated that it outlined *business strategies*. Weiner and Weisbecker (2011) describe how a business model is an abstraction of business logic. In addition, Osterwalder and Pigneur (2002) describe three levels of business: strategy, model and process. In contradiction Schief and Buxmann (2012) put strategy inside the business model concept. Sainio and Marjakoski (2009) state that the revenue logic is a strategic part and the revenue

model is operational. In addition, it is stated that the revenue model equals a pricing strategy and the revenue logic is mentioned being one element of a business model. It seems that the concepts of business strategies, models, processes are mixed and researchers are using these terms in a disordered way.

It is argued that business model is not such a thing that can be developed and left as it is (Olsen 2006; Hienert et al. 2011). In a way, a business model is in the state of a constant flux as changes, for example, in technology or legislation, can make current business models obsolete and open a room for new ideas, companies and business models (Olsen 2006; Tsangaris et al. 1996; Hienert et al. 2011; Valtakoski and Rönkkö 2010).

Cloud computing and software-as-a-service are also covered in the articles: Nahar et al. (2012), Luoma et al. (2012), Liao (2010) and Olsen (2006). Valtakoski and Rönkkö (2010) present a discussion how different business models perform in different circumstances, how the service and product-based business differ (Kontio et al. 2005; Luoma et al. 2012) and what happens when transitioning from a product to a service (Olsen 2006). The change from the product-based software business to the service-based is not just new protocols, processes and techniques. Besides these technological parts it is also a jump to new markets and learning to take the basic steps there (Olsen 2006). This requires a different business model and an understanding of how to build a business model to generate both value to customers and revenue to the owners. Luoma et al. (2012) argue that a more holistic business model is required when software-as-a-service is studied.

Open source business models are also discussed in several articles: Hemphill (2006), Bonaccorsi et al. (2006), Pykäläinen (2007), Munga et al. (2009) and Rajala and Westerlund (2012). Open source business models are being taught even in universities and their commercial use is increasing (Munga et al. 2009). As the open source phenomenon has reached commercial interest, also hybrid business models have been discussed in the literature (Bonaccorsi et al. 2006; Hemphill 2006; Pykäläinen 2007). This means that software developers use both open source and proprietary pieces of software (Pykäläinen 2007). A software company can also license its products with a dual license model where the same product is available as open source (as free and libre) and also as a commercial software that one can buy (Hemphill 2006).

We also noticed that there has been discussion whether the software business itself should be one research discipline (Käkölä 2002) or not (Rönkkö et al. 2010). These kind of conflicting views indicate that the software business has drawn researchers' attention.

The research includes also a discussion whether software development differs from conventional manufacturing, like building ships or cars. Ojala and Tyrväinen (2006) argued that software differs as it is intangible and has a short product life-cycle. In addition, Jagannathan and Almeroth (2002) noted that the cost of replication of software is almost zero.

To summarize all the articles in one table (Table 6), or *map*, we decided to categorize the articles from two points of view: the type of the article and the topic it covers. The type was based on the empirical approach in the article, whether the article included data gathered from industry. The classification of topics include the business model in general, success factors, expanding business, tools and concepts, pricing and costs and also one paper was a pure scientific discussion.

Table 6. Matrix showing how the articles are related to different topics

Type \ Topic	Business model in software development	Success factors and features of software companies	Expanding business	Tools and concepts to model business	Pricing and cost structure	Scientific discussion
Industry data driven article	<p><i>Cloud computing:</i> (Luoma et al. 2012; Olsen 2006)</p> <p><i>Open source:</i> (Hemphill 2006; Bonaccorsi et al. 2006; Rajala and Westerlund 2012)</p> <p><i>Other:</i> (Valtakoski and Rönkkö 2010; Desai and Currie 2003)</p>	<p><i>Cloud computing:</i> (Nahar et al. 2012)</p> <p><i>Other:</i> (Soini et al. 2006; Kontio et al. 2005; Hienert et al. 2011; Bernroider 2002)</p>	(Ojala and Tyrväinen 2006; Roberts and Senturia 1996)	(Weiner and Weisbecker 2011)	(Sainio and Marjakoski 2009)	

Theoretical article validated within industry / Data gathered indirectly from industry	(Tsangaris et al. 1996)	<i>Open source:</i> (Munga et al. 2009) <i>Other:</i> (Chen and Wang 2010)		(Tyndale-Biscoe et al. 2002; Schief and Buxmann 2012)		
Theoretical article	<i>Cloud computing:</i> (Liao 2010) <i>Other:</i> (Käkölä 2002; Li and Mou 2010; Asfoura et al. 2008)			<i>Open source:</i> (Pykäläinen 2007)	(Jagannathan and Almeroth 2002)	(Rönkkö et al. 2010)

The research of business models in the field of software covers articles that describe a business model or models and how they are used in the software business. Desai and Currie (2003), for example, compared two companies and their problematic entrance to the application service provider (ASP) business. Rajala and Westerlund (2012) studied how changes in the industry are managed with different business models. Valtakoski and Rönkkö (2010) studied how various business models perform differently in different scenarios. In general the articles in this topic group argue that business model matters (Tsangaris et al. 1996; Valtakoski and Rönkkö 2010).

The second topic group contains articles that are focused on success factors. These may be important inside the company (e.g. satisfaction of employees) (Soini et al. 2006) or may also have effect outside the company (e.g. user-centric design) (Hienerth et al. 2011).

Two articles covered expanding the business. Ojala and Tyrväinen (2006) described how 8 small Finnish companies expanded their business to Japan through different entry modes related to their business models. Roberts and Senturia (1996) compared 19 US firms that went overseas. They underline that the business model is important for the globalization strategy of the company.

Four articles introduced tools and concepts to be used when modeling business. Weiner and Weisbecker (2011) designed software for building business models, Tyndale-Biscoe et al. (2002) used UML to model business and Schief and Buxmann (2012) built their own framework for designing, describing or analyzing a business model of a software company. (Pykäläinen 2007) proposes a model for describing profit conditions. The model consists of three factors: ideology, type of technology and complementary assets.

Two articles covered pricing and cost issues. Sainio and Marjakoski (2009) found out that the more established the software company is, the more independently it can carry out its business model and benchmark its revenue logic and revenue models. Jagannathan and Almeroth (2002) argue that an Internet business model should include the following determinants: transaction model, pricing strategy, customer behavior, distribution resources and competition. Their article discusses how these determinants affect revenue and how models of conventional markets cannot be applied in the Internet but more dynamic pricing is recommended.

Rönkkö et al. (2010) argue that software business is not its own research discipline. The purely theoretical article is a part of an academic discussion and it gives an overview of how the software business is studied.

5. DISCUSSION

In the beginning we set two research questions: RQ1 - *How is the use of business models in software business studied?* and RQ2 - *What is the relation of success factors and a business model of a software company according to the literature?* After reviewing literature we have found out that the software business models have been studied only on a high level and we did not find articles describing how companies utilize business modeling. Few studies (Kontio et al. 2005; Valtakoski and Rönkkö 2010; Rajala and Westerlund 2012) report how companies utilize and design business models, but from our point of view it seems that this information could be even more industry driven. Also none of the studies focused on how companies are able to improve and analyze their business models.

For the second research question we found studies (e.g. Soini et al. 2006; Hiennerth et al. 2011; Bernroider 2002; Chen and Wang 2010) describing success factors in the software business. For example, Chen and Wang 2010 describe six elements of a business model and 20 related critical success factors. In their study they categorize different success factors under different business model components. Soini et al. (2006); Hiennerth et al. (2011); Bernroider (2002) all describe internal success factors in their studies and they argue that “soft” factors (e.g. employees) seem to be more important than “hard” ones (e.g. monetary). Based on this we may conclude that there is a relation between success factors and the business model, but the relation is still unclear and requires more research.

We found out that the present scientific literature has no consistent definition of what is included in a business model. We also saw the term used in different contexts and in numerous ways with other similar terms, like business logic and business strategy. These concepts require further research on how we can use them in a more unified manner, for example, what is the relation between a business model, business logic and business strategy. We also need to deepen the knowledge on how companies may benefit from business models in their strategic business development activities.

6. LIMITATIONS

In our study we collected articles from six scientific databases. This does not, however, cover all articles published, and therefore we might have missed some useful information. We tried to select the databases covering both engineering and business sides to get a selection of articles as wide as possible. We concentrated only on peer-reviewed journal and conference articles. This excludes books, white papers and other non-peer-reviewed articles.

Our search keywords were limited to software business and for example content creation and gaming business were not searched. Also we only searched for *model*, not for *modeling* (or *modelling*), which might have limited the search results as we don't know exactly how search engines in different databases work.

7. CONCLUSION AND FUTURE RESEARCH

We found out that we are working on area that has no clear picture of itself. The concept of business model has not yet been defined in such an extent that researcher community would use a uniform definition for it. Our study found out that discussing business model can mean discussing business strategy or business logic.

We also found some evidence how company success factors are related to business model and how different business model produce different results in companies' competition on, for example, against each other or changing nature of economy. We also noted that there was very little research done with software industry to gain knowledge on how companies are modeling their business.

These results mean that we still need to define the concept of business model thoroughly to be able to position the research in correct category. This study also showed that the business model and its design are relevant issues when software companies are doing business.

In our future research, we are going to interview software companies and study how they utilize business models and model their business. Another target we aim at is to establish a common way to define business model concept, its relatives and their connection based on existing literature.

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A CANONICAL DATA MODEL FOR E-BUSINESS SCHEMA INTEGRATION – AN ITERATIVE PROCESS FOR EFFORT REDUCTION

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ABSTRACT

Over the last decades, a great number of B2B standards emerged. Each standard tried to cover a broad range of requirements from various industries. This led to a great overhead within the different standards resulting in huge integration effort for companies. This work introduces an approach to reduce this effort based on a canonical data model (CDM). In an iterative process, companies are supported in their integration concerns according to their requirements. The CDM is dynamically built based on a knowledge base that incorporates best-practice information. We evaluate our approach based on real-world B2B data to proof a significant effort reduction.

KEYWORDS

Canonical Data Model, B2B message exchange, e-Business standards

1. INTRODUCTION

One of the main problems in B2B integration is the great overhead in B2B message templates. Companies that want to exchange messages need to customize a standard message template. These templates are published by standardization organizations like the UN/CEFACT (UNECE, 2012). They contain thousands of fields trying to reflect all the business needs of one industry domain or even across industries. For the creation of a new message (also called message guide) only a small amount of fields from the standard template is used. Creating a message guide means customizing the standard template: redundant fields have to be removed and missing fields have to be added. This manual process is time consuming and error prone.

In case two business partners want to exchange messages using different standards or subsets of standards, a mapping between these messages is required. The mapping maps each field of the source message to the corresponding field of the target message guide. Creating a message mapping between two standards is also a time consuming process. Companies often hire consultants to create these mappings because expert knowledge of the involved standards is required.

In summary, there is a lot of potential to reduce the effort in terms of guide creation and mapping creation. These integration cost still make up around 40% of companies' IT budgets (Kastner and Saia, 2006). We examined concrete standard business document templates of 7 different message types from 15 different e-business standards of different industry domains, and their interpretations from 50 different companies. Our analysis revealed that on average more than 60% of the structure and the elements of each schema are semantically comparable. However, only 5% are syntactically similar. Our approach incorporates message guides and mappings into a knowledge base to compute a canonical data model (CDM) as the single point of view.

There are several related research approaches, like the MOMIS tool (Beneventano et al., 2001), the Porsche approach (Saleem et al., 2008), the Xyleme project (Delobel et al., 2003), and the BInXS approach (Mello and Heuser, 2005). Besides the existing research, several approaches have found their way into the industry, for example the Contivo solution from Liasion (Liaison, 2012) or Boomi AtomSphere (Boomi, 2012). However, all related works only partly tackle the problems presented in our work. The central data

model is mostly manually modeled and none computes the most common structure. This means that especially cross-standard communication remains a big issue for companies.

In our work, we cover cross-domain as well as cross-standard communication. Our approach is quite different from existing endeavors, which rather focus on the mapping task. However, the core problem is the heterogeneity of the schemas, which leads to high mapping costs. Our approach maintains an evolving canonical data model which consolidates the current knowledge of the correspondences of existing schemas. As can be seen in **Figure 1**, we increase homogeneity by applying the knowledge in the CDM. With that, the mapping effort is instantly reduced.

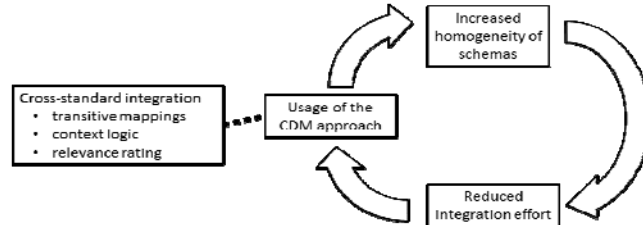


Figure 1. Overview of the approach

Participation can only be stimulated if constraints are minimal and benefits are substantial and well distributed. Companies are not forced to any standard but can continue using their implementations. The effort reduction in our approach is produced by the following features, which become possible through the CDM, and which each address a key challenge in contemporary B2B integration.

1. **Relevance rating:** identifying relevant fields for a new message guide
2. **Context logic:** proposing best practices for specific business domains
3. **Transitive mappings:** deriving new mappings based on existing ones
4. **Cross-standard integration:** considering domain specific and independent standards
5. **Iterative improvement:** reuse iteratively reduces heterogeneity of the schemas and thus mapping effort.

An overview of the situation, the implied problems and the different features that tackle these problems is given in Table 1.

Table 1. Relation of Situation, Problem and Approach

Situation	Problem	Approach	
Overhead in B2B standards	High guide creation effort	Relevance rating	Iterative
Domain-specific requirements		Context logic	
Reinventing the mapping wheel	High mapping effort	Transitive mappings	
Uncontrolled growth of heterogeneity		Cross-standard integration	

The remainder of the paper is the following: In section 2 we depict the current situation in B2B integration and derive the corresponding problems in section 3. In section 4 we tackle these problems with our approach that incorporates all key features. A comprehensive evaluation is presented in section 5. Finally, a conclusion and an outlook complete the paper.

2. SITUATION

In this section we give a brief overview of the current B2B situation according to Table 1. Different companies have different requirements. In order to cover all the requirements, standardization organizations focus on the completeness of a standard. That means a standard is underspecified and the message templates contain a lot of fields used by only a few companies. In contrast, there exist only a few fields that are used frequently. From examining the EDIFACT structures¹ of various message guides created from the template D.96A S3 we see that from 2838 different fields, only 5 fields occur in all of the guides. On the other hand, 1973 different fields only occur in one of the 33 guide.

¹ <http://www.stylusstudio.com/edifact/frames.htm>

Domain-specific requirements: Companies from different industry domains require different, industry-specific fields in their message guides. An approach towards the reduction of this overhead is the creation of industry specific subsets. From the EDIFACT standard emerged several substandards like ODETTE (Odette, 2012) for the automotive sector or EDIFICE (EDIFICE, 2012) for the high-tech industry. However, there is also a need for communication across industries. It can be the case that fields that are mandatory in one subset are not contained in another subset. Comparing for example a purchase order from the ODETTE subset with a purchase order from the EDIFICE subset, there is only a small overlap in the different elements.

Reinventing the mapping wheel: The whole purpose of creating a message implementation guide is B2B communication. As companies use different standards and subsets of standards, guides have to be mapped to other guides. The main task of creating a mapping for B2B communication consists of understanding the companies' interpretations of the respective fields. If a company *A* communicated already with two companies *B* and *C*, then the mapping between *B* and *C* should be easy because through the indirection via *A*, it should already be known, what fields of *B* and *C* share the same interpretation. In reality, mapping knowledge is rarely reused. This includes the incorporation of transitive mapping knowledge into the schema matching process as proposed by (Aumueller et al., 2005). The expertise a consulting company such as Accenture or Seeburger accumulates from selling mappings to many customers is an unstructured way of reuse.

Uncontrolled growth of heterogeneity: "The nice thing about standards is that there are so many to choose from" (Andrew S. Tanenbaum, 2002) This quote by Andrew S. Tanenbaum sums up today's B2B standards dilemma. A great number of standards have emerged from industry-independent to industry-specific. However, still a large portion of enterprises have proprietary solutions implemented. In Germany, for example, this is the case for about 50 percent of companies (Joachim Quantz and Thorsten Wichmann, 2003). Integration among those companies, even with a company that utilizes a standard, is costly. The case of competing standards is similar. If a company wants to exchange messages with partners across different standards, the company has to interface with every partner differently. Even if business partners use the same general-purpose standard like EDIFACT, they might be implementing different subsets managed by different standardization subgroups like EDIFICE and ODETTE. The consequence is that either fields within of message implementation guide are misused because not all requirements are covered or proprietary schemas are implemented. In this work, we associate with the term "standard" either a classical B2B standard or any other consistent set of schema definitions. Especially, we also cover proprietary schema definitions under that term because for our purposes the difference in terms of introducing heterogeneity is marginally.

3. PROBLEM

In the previous section, we illustrated the situation in current B2B message exchange scenarios. In this section we focus on the problems that arise from these scenarios. We elaborate a running example to demonstrate the high guide creation and mapping effort: For simplicity, we denote a guide as a set of fields, e.g. $G_1 = \{a_1, b_1\}$. Each field is of a certain type T , for example the fields *Buyer* and *Seller* are both of type *Party*. Each field is assigned to a type, e.g. $a_1, a_2 \in A$. We denote the set of types that are used in a guide G_1 as $T_{G_1} = \{A, B\}$.

High guide creation effort: We start from the users' requirement to create a guide for a specific business purpose. In our model, the user requires certain fields to be contained in the guide. This desired guide is expressed as the set of types T_D in the desired guide D . We will elaborate on the three cases:

- (1) Deriving a guide from a B2B standard template.
- (2) Deriving a guide from an existing guide.
- (3) Creating a guide from scratch.

In every case, we estimate the guide creation effort (e_G) by the number of add and remove operations needed to adapt the standard or guide taken as a starting point to the company's requirements. Mathematically, a removal is necessary for every type that is present in the available schema (T_A) but not in the desired guide (T_D), and vice versa for add operations:

$$e_G(A, D) = |T_A \setminus T_D| + |T_D \setminus T_A|$$

However, in case of (1), the remove operations themselves outnumber the number of desired fields by about one order of magnitude in any case. Therefore we expect the user to create a new standard, for example in XML Schema, starting either from (2) an existing guide or (3) from scratch.

For our running example, we consider the following three guides:

$G_1 = \{a_1, b_1, f_1, g_1, h_1\}$, $G_2 = \{a_1, c_1, i_1, j_1, k_1\}$, and $G_3 = \{a_2, d_2, l_2, m_2, n_2\}$. For integration, a fourth guide D is desired that contains the interpretations $T_D = \{A, B, C, D, E\}$.

We choose G_1 as a starting point to build the desired guide $D = \{a_1, b_1, c_3, d_3, e_3\}$. We use the existing fields a_1 and b_1 to indicate that these fields are taken over from G_1 . The remaining interpretations are added as new fields. With the previous formula, the guide creation effort is $3 + 3 = 6$. If the desired guide was built from scratch, all fields would be new as in $\{a_3, b_3, c_3, d_3, e_3\}$ and the effort is $0 + 5 = 5$.

Our examples are small but impose the realistic properties related to guide creation effort named in Table 1. (1) *Standards are much larger* than the actual guides. (2) To represent *domain-specific requirements*, a few fields (those of type A in our example) are common to many guides, some fields are domain-specific (like B , C , and D), and many are rarely used even in their respective domains (like F, G, \dots, N). (3) *Heterogeneity* shows in the syntactically different fields a_1, a_2 , and a_3 transporting the same semantics represented by type A ; likewise do both b_1 and b_3 mean B . Even from our small example, guide creation effort is huge compared to the number of desired fields. Taking an existing standard as a baseline, adaptation needs to look at a multiple of the number of desired fields. That leads to durations of standard implementation projects estimated in months, see for example (Tom Duke, 2005). When starting from an existing guide, one could expect effort below the size of the desired guide on the first sight. However, due to the many rarely used fields in reality, that produces an effort around or slightly larger than the size of the desired guide in our example. The number of necessary operations for creating the desired guide from scratch always equals the size of the desired guide. Part of the evaluation later in this paper will estimate the necessary add and remove operations quantitatively.

High mapping effort: Mapping effort can be estimated by the number of desired mapping elements between two given guides G_1 and G_2 . In our model, that corresponds to the size of the intersection of types of the source (T_{G_1}) and the target guide (T_{G_2}). No effort is considered for a type whose source and target field already have the same syntax. With that, the mapping effort can be estimated by:

$$e_M(G_1, G_2) = |T_{G_1} \cap T_{G_2}| - |G_1 \cap G_2|$$

In our example from the previous section, the new, desired guide D must be mapped on the three existing guides G_1 , G_2 , and G_3 . Considering the desired guide D was derived from the standard containing the substandards of G_1 and G_2 , we estimate mapping D to G_1 and G_2 as no effort because a_1 , b_1 , and c_1 were taken from the same overarching standard and therefore the correspondence is clear. The total mapping effort in our example is $e_M(D, G_1) + e_M(D, G_2) + e_M(D, G_3) = (2 - 2) + (2 - 2) + (2 - 0) = 2$.

If D was built from G_1 , mapping to G_1 is trivial: the effort is $(2 - 2) + (2 - 1) + (2 - 0) = 3$.

Building D from scratch, the mapping effort would have been $2 + 2 + 2 = 6$ because no correspondences to existing guides would be known. In summary, the total mapping effort multiplies with the number of guides to integrate with. In fact, no correspondences are known if the desired guide was built from scratch. The mapping effort of 6 in our example corresponds to creating a full mapping to every partner. In terms of Table 1, and if we assume that a mapping between G_1 and G_2 is known beforehand, the mapping wheel was reinvented when mapping D to G_2 because it was already known that a_3 corresponds to a_2 . Further, the mapping effort depends on the amount of heterogeneity between the existing guides as also indicated in Table 1. The mapping effort is only 3 in our example if the desired guide was built based on an existing guide from a frequently used standard. Mapping effort is the lowest if many partners apply the same standard as the desired guide. We see that mapping effort greatly varies, in our simple example already by a factor of 3, depending on the choice of which standard or existing guide to start from. Finally, we see a connection between the efforts that arises from building the new cross-domain guide and from mapping to the existing guides. Starting from a complete standard is the worst option in our example. Although mapping effort would be the lowest, guide creation effort would be a multiple of the desired fields massively contributing to a huge overall effort. If no standard is taken, reusing as many fields of an existing guide as possible increases the guide creation effort slightly, in our example from 5 to 6 operations, but may be outweighed by the decrease in mapping effort, in our example from 6 to 3. That finding is a cornerstone for our approach with the central idea that the heterogeneity of guides is one of the main drivers for mapping effort and both should be tackled jointly by facilitating reuse through a common canonical data model.

4. ITERATIVE EFFORT REDUCTION USING A CDM

In (Hohpe and Woolf, 2003), a canonical data model is presented as an enterprise application pattern that “provides an additional level of indirection between application's individual data formats”. Such a CDM is presented in (Jens Lemcke et al., 2012) as an approach to join different message guides to tackle the challenges of B2B integration. A CDM correlates existing guides, like the two simplified purchase orders shown in Figure 2 based on existing mappings. The aim is to capture the structures of the different guides in a single graph, like the one shown in Figure 2. Computing the CDM is actually a difficult task since the structures of different guides can conflict like in the purchase order example. The complete procedure is not part of this paper but explained in detail in (Jens Lemcke et al., 2012).

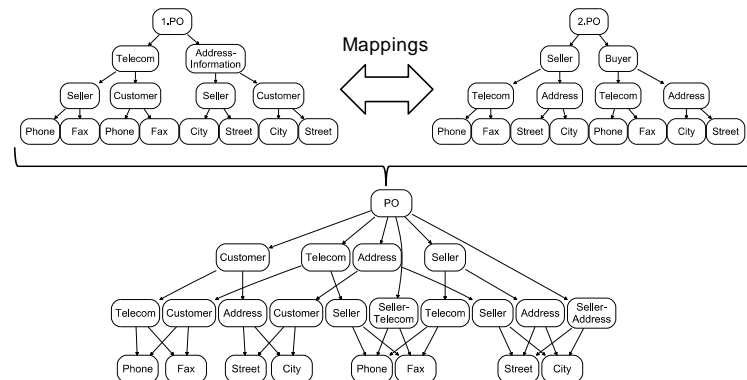


Figure 2. Basic CDM Creation

As can be seen at the bottom of Figure 2, the fields are referenced by multiple internal nodes. These are exclusive alternatives for the structure. A set of compatible alternatives is the structure of a possible guide that can be shown to the user. Which alternative is chosen is determined by relevance rating and context logic depending on the specific request of a user. The whole CDM-centered process is depicted in Figure 3.

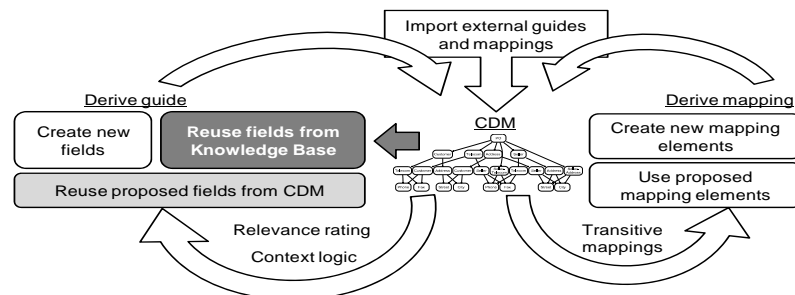


Figure 3. Iterative CDM Generation Process

Initially, the CDM is empty. As indicated in Figure 3, external guides and mappings can be constantly imported. This information is used to build the initial CDM. The CDM unifies all fields from all guides in the system. Every node in the CDM is the unique representation of the semantically equivalent fields from the different guides. The CDM supports the user to derive a new guide based on the condensed knowledge in the system as can be seen in the left side of Figure 3. As a first step, a relevance rating takes place to identify the most frequent fields in the CDM. Additionally, a view is created via context logic tailored to the specific business context of the user. The domain-specific CDM is the base for deriving a new guide. For every field, the user has three options when deriving a guide:

1. **Reuse proposed fields from CDM:** With generating the proposal for a new guide based on the domain-specific CDM, we raise the chances that many of them are appropriate for the new guide.
2. **Reuse fields from Knowledge Base:** If the user's requirements are not fully covered by the CDM proposal, additional fields can be taken from guides already contained in the knowledge base. That means that fields used by others productively can be reused in the new guide.

3. **Create new fields:** If a desired field is neither contained in the CDM nor in the knowledge base, the user has the possibility to create a new field in his guide proposal. With this flexibility, we reduce the need to misuse existing fields.

The newly derived message guides are again stored within the CDM. Every field of the new guide that was taken from the CDM or the knowledge base is implicitly assigned to the semantics of the respective CDM node.

Similar to the message guide derivation, it is also possible to derive a mapping proposal between two guides based on the CDM as depicted on the right side of Figure 3. For each mapping element, the user has the following options:

1. **Use proposed mapping elements:** For every pair of fields that are unified in the same CDM node, the system proposes a mapping element for connecting these fields.

2. **Create new mapping elements:** In case a mapping element is incorrectly or a desired mapping element is not proposed, the user can create new mapping elements.

Again, newly derived mappings are stored in the CDM combining mapping elements that are transitively related.

Our approach incorporates the techniques described in Table 1 to tackle the high creation and mapping effort. In the following, we briefly sum up these features:

Relevance rating. The task of relevance rating is to tackle the great overhead in B2B standards and the implied guide creation effort by proposing a message guide that contains only frequently used fields. The challenge is to determine a CDM that contains those fields and structures that represent the best practice among the productively used guides in the system. In order to get rid of the infrequent nodes, we define a frequency threshold. The resulting proposal represents the most frequently used guide from best practice.

Context logic. Our approach uses the idea of the context driver principle (Stuhec, 2005). In the context driver, business context is organized in context categories. Possible categories are “geopolitical”, “industry domain” and “business process”. The categories and the possible values are commonly used and established.

The aim of enriching knowledge with business context is to foster the usage of frequently used nodes to reduce heterogeneity among new guides.

Transitive mappings. Reducing huge mapping effort caused by continuous reinvention of the mapping wheel is reached by using transitive mappings. In our approach, the knowledge about correspondences between the guides is constantly integrated by assigning all guides’ fields to CDM nodes. In particular, correspondence knowledge is reused when reusing CDM nodes during guide creation and when mapping two fields to each other.

Cross-standard integration. The main purpose of the CDM is to reduce the uncontrolled growth of heterogeneity that leads to an increased mapping effort by the misuse of fields of the introduction of proprietary standards. The CDM makes the best features of various standards available for by creating a new guide. In our approach, the aspect of cross-standard integration does not only apply to the proposal of mapping element, but also to the derivation of a message guide. That means that if a user decides to reuse fields stemming from initially distinct B2B standards, we cannot generate a standard-compliant message implementation guide. Rather, our system exports the new guide, which internally is stored like all guides as a generic hierarchical schema, for example as a new XML Schema. With that, our approach leaves the path of classical B2B standards which force companies to a fix structure and set of fields. The task of the iterative generation of a CDM containing the common core of the domain-specific best practices is to keep the heterogeneity low which could otherwise be a result of the new flexibility. In fact, we expect that heterogeneity may even drop as we will see in our experiments discussed later. Through the CDM being built context-agnostic in the iterative approach in the first place, companies are helped to focus on the best practice not only with their current, direct business partners, but especially within a domain and worldwide, which will increase their ability to integrate in the future.

On the one hand, our approach does not force a company to a fixed set of fields like in the traditional standards approach. On the other hand, our approach guides the community to align around a central set of frequently used fields. In that sense, our work can also be seen as a standardization approach. In contrast to traditional approaches, the decision about the common, important fields is guided by the users on a per-use basis and not so much by a separate standardization team or organization. Additionally, our approach allows for deviations from the recommendation, but only collects those peculiarities in the standard, which become commonly adopted in the community.

5. EVALUATION

We implemented a simulation to validate our expectations and to assess the effort reduction potential of our approach. In our simulation, we create a parameterized number of message guides per iteration cycle. The message guides contain randomly created fields based on a real-world field distribution.

Throughout the evaluation, we compare the efforts induced by the CDM-based approach to the efforts induced by the traditional approaches: (1) Deriving a guide from a B2B standard template, (2) Deriving a guide from an existing guide and (3) Creating a guide from scratch. We first evaluated the single features individually before we assessed the approach as a whole. Each of the aspects showed a significant reduction regarding either guide creation or mapping effort respectively. In Table 2, we break down the guide creation and mapping effort reductions by the different key features.

Table 2. Effort reduction

	Reduction guide creation effort (standard-based / guide-based / from scratch)	Reduction mapping effort
Relevance rating	94% / 42% / 23%	-
Context logic	95% / 57% / 43%	-
Transitive mappings	-	20% - 80% (with increasing mappings from 196 - 605)
Cross-standard integration	-	6% - 100% (with increasing homogeneity)

Combining all features, our approach improves through synergies between the features. In Figure 4, we depict how the effort is further reduced over time due to our iterative approach. For the graph, we parameterized our simulation to produce 32 distinct guides per cycle within 32 domains in order to start with a high heterogeneity. Every cycle, a new CDM is computed based on the data in the knowledge base.

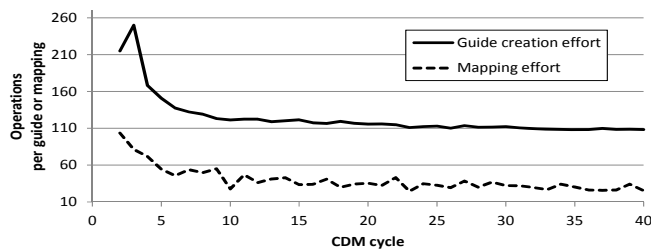


Figure 4. Iterative Guide Creation + Mapping Effort

Due to the high heterogeneity in the first cycle, no fields appear in the CDM. Therefore, the guide creation effort (solid line in the figure) equals to the effort for creating the guides from scratch. The simulation was parameterized such that a field was taken with a probability of 90% from the CDM if it was proposed and with 50% from the knowledge base in the other case. In the remaining cases, a desired field was newly created. Together with the 32 mappings that are created every cycle, the reuse results in enough homogeneity to produce a small CDM with on average 15 fields per domain. Therefore, we see an increased guide creation effort in the second cycle. After that, both guide creation and mapping effort continuously decrease. After ten cycles, the improvement is 44% compared to the effort of creating a guide from scratch. From this point, the synergies start to unfold with respect to guide creation effort which drops below the savings of the individual features shown in Table 2. After 34 cycles the synergies reach their full potential. The effort converges towards 108 operations per guide. This equals a total improvement of around 50%.

A similar observation can be made for the mapping effort reduction (dashed line in the figure). In the first few cycles, the effort reduces quickly. After five cycles, the effort is cut in half. After another five cycles, it reduces by further 22%. The effort converges towards 27 mapping elements to create manually per desired mapping between two guides in the long run. The oscillation is due to the noise imposed by the random differences in the guides. Notably, the mapping effort gets as low as for the completely homogeneous scenario reported in the evaluation above due to synergetic effects. However, with our system, we do not strive at total homogeneity because that would lead to increased guide creation effort through a larger CDM.

6. CONCLUSION

We presented a comprehensive iterative approach involving a canonical data model to reduce the effort in B2B integration. Initially, four main issues in current B2B integration scenarios were identified: The great overhead in B2B standards, domain-specific requirements for certain industries, reinvention of the mapping wheel and the uncontrolled growth of heterogeneity. These issues result in a high effort regarding creation of message guides and mappings between the guides. In our approach, we combine several features to reduce the effort: By a relevance rating, only frequently used fields from best practice are used to build guides. This fosters homogeneity between the message guides and thus reduces the creation effort by at least 23%. By applying the context logic principle we leverage the effect that certain fields are only used in a certain context. Together with relevance rating, 43% effort reduction was gained. Regarding mapping effort, we use transitivity to achieve a higher level of mapping reuse and thus foster an effort reduction of already 20%. Finally, a canonical data model that incorporates all these features and enables cross-standard integration further drives the mapping effort reduction of at least 6% for a completely heterogeneous scenario and close to 100% for the homogeneous case. We evaluated our approach in a prototypical simulation based on real-world data. The outcome proves that combining all features further significantly reduces the guide creation effort down to 50% compared to traditional approaches. Finally, we observed that already the choice of a user to take a proposed CDM field in at least 60% of the cases leads to more savings than in the traditional approaches. In summary, this work can be seen as a proof of concept to apply the CDM in real-world B2B scenarios. In future work, we will evaluate the prototype with business experts working with real-world financial data. Furthermore, deployment is not restricted to B2B message exchange scenario but can also for example be applied to the finance sector to compare different financial reports.

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Short Papers

THE EFFECT OF MULTIMODAL SOCIAL INTERACTION ON E-COMMERCE APPLICATIONS

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ABSTRACT

Multimodal Social Interaction in e-commerce environments has drawn substantial attention in business and academia. This survey study focuses on the way in which social presence and multimodality affect users of e-commerce interfaces. Specifically, this paper examines the influence of both social media and multimodality on the aspect of purchase intention of end-users as customers. The survey was performed with an opportunistic sample of 50 users. The results of the survey demonstrated the importance of social presence and multimodality for users in e-commerce applications. Together, social presence and multimodality account for a considerable and rather significant amount of variance in continuous use and purchase intention.

KEYWORDS

Social presence, multimodality, e-commerce, social media, social interactive e-commerce, e-retailing.

1. INTRODUCTION TO SOCIAL MEDIA

Social media provides communication and interaction processes that typically involve sharing, exchanging and creating content between people in virtual communities. Kaplan and Haenlein, (2010) defines it as “*a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content*”. Furthermore, social media often provide highly interactive platforms through which individuals and communities distribute, co-create, discuss, and edit user-generated content. It introduces substantial and pervasive changes to the form of communication between individuals, communities, and organisations (Steinberg et al., 2011; Yang and Huang, 2011 and Weijun and Lin, 2011). Social presence in e-commerce environments can help increase sales and improve consumer trust (Glaeser et al., 2002; Gefen and Straub, 2004). Social interaction can be broadly categorised to *user-to-user* interaction and *user-to-resources* interaction. User to user interaction occurs when users communicate with each other in activities such as ask, invite, discuss, confirm, approve, offer, tweet and send. On the other hand user to resources interaction occurs when users interact with the resources of a system by adding, creating, editing, exploring and rating the resources (Steinberg et al., 2011). Traditional marketing approaches primarily involve one-way communication channels. Socially interactive marketing provides a two-way communication that benefits from active consumers that contribute to online forums, product and services reviews, blogs and posts (Weber, 2009). Social media not only allows customers to communicate with companies but also to facilitate customer-to-customer interaction. This makes social media a hybrid factor of the promotion mix (Mangold and Faulds, 2009). Furthermore, word-of-mouth also becomes highly relevant on the Internet (Goldenberg et al., 2001). All these contributing factors enable companies to compete and gain a long-term relationship with existing or new customers (Weber, 2009; Yang and Huang, 2011).

This paper describes the results of a survey study with 50 users. It was primarily contacted to obtain an overall user viewpoint with regard to the utilisation of social presence and multimodal metaphors in e-commerce interactive environments. Examples of multimodal metaphors include avatars with face and full body animation and speech output. Another aim was to explore the views of users on usability, credibility and likeability aspects of a system that involves social interactive metaphors and multimodal features. The users were requested to answer anonymously questions relating to personal habits, on-line retailing experience, social presence and multimodal metaphors.

2. MULTIMODAL COMMUNICATION

Multimodal computer interfaces involve more than one interaction modality in order to utilise the different human senses in the interaction process. Multimodality improves the interaction between the user and the system in the input process such as touch screens, handwriting and speech. Multimodality also generates responses for the output process such as speech, text, graphics, audio files, and animation for the Graphical User Interface (GUI) in a multimodal manner (Kumaran and Nair, 2010). For example, visual interaction utilises text, graphics and colour to provide a rich visual interaction with the user. Jaimes and Sebe, (2007) remarks that *“much of the research reported supports the importance of visual metaphor strategies in teaching and the production of great results”*. Visual metaphors in user interfaces improve the usability and interaction process between the user and the system but the downside is the visual overcrowding that often results in user information overload. In these circumstances, the user attention needs to be focused on the visual representations that take most of user’s concentration and effort (Jaimes and Sebe, 2007). Solving this problem of information overload can be, for example, to use auditory metaphors. The mere introduction of additional communication metaphors reduces visual overloading (Marchionini, 1997).

Sound provides a unique way to capture user attention on specific interface events particularly when the user is visually engaged in another task. Sound can be broadly divided into speech and non-speech metaphors. Speech as an output in an interface is used in a wide range of applications. In addition, communicating using auditory metaphors for either input or output has shown to be useful for application such as e-commerce, e-learning and social media. Speech can be natural or synthesised. Natural speech is recorded using digital technologies that can form a set of pre-recorded spoken messages for use by the system. Non-speech includes earcons and auditory icons. Earcons are short sounds of musical nature. Synthetic tones that can be used in structured combinations to create sound messages to represent parts of the interface. Tuuri et al., (2007) described earcons as *“non-verbal audio messages that used in the user-computer-interface to provide information to the user about some computer object, operation, or interaction”*. Earcons are created from short series of musical notes to express information. Earcons is a combination of note and pitch, with the use of sound attributes such as rhythm, pitch, timbre, dynamics, tempo, and intensity that create different types of earcons. Auditory icons are non-speech sounds from the surrounding everyday life such as glass breaking sound or any sound that recorded from the environment. These sounds are linked with actions or events in the computer interface. The limitation of earcons or auditory icons is that in some cases does not express a meaningful association with the data it represents and that requires user training with these associations (Garzonis et al., 2009). However, it is widely accepted that enriching the computer interface with earcons and auditory icons could be one of the best options for user interfaces designers (Brewster, 2002).

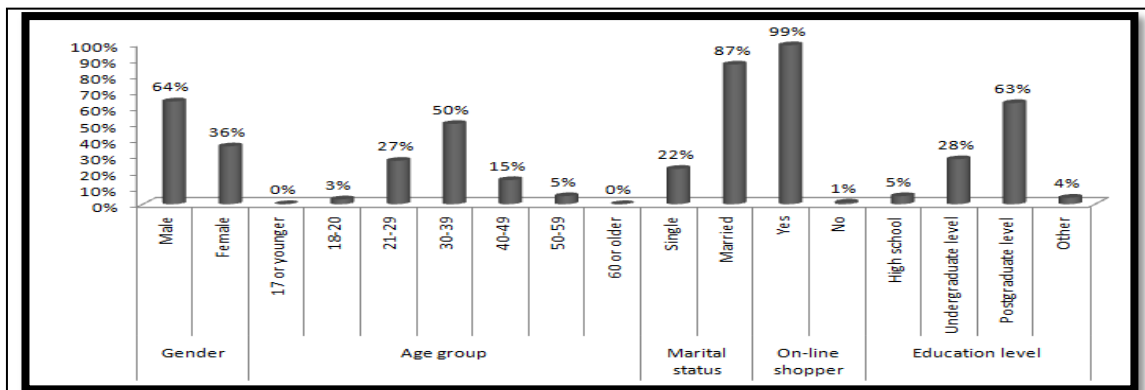
Audio-visual interaction is a combination of audio and images such as avatars with facial expressions and body gestures. One type of audio-visual interaction is avatars which are cartoon-like or real life interactive characters with animation. Avatars are a multimodal interaction metaphor that combine the auditory and visual channels. Verbal communication refers to the use of speech and written messages whereas nonverbal one can be attained by facial expressions and body gestures (Beskow, 1997). McLaughlin et al., (2010) categorised avatars according to their form; abstract, realistic and naturalistic. Avatars or symbolic avatars usually represent the real users to remain completely unknown and this typically represents cartoon-like interactive characters with limited animations (Gazepidis and Rigas, 2008). This type is not often recommended as it does not provide a user friendly environment that enriches user experience expected from multimodal communication. For example, the Microsoft help avatar is a good example of abstract avatars. Realistic avatars provide a real simulation of a person that is represented with still or video captured images. In addition, the naturalistic avatar is humanoid in a way they look like real person. Naturalistic avatar commonly utilised in collaborative virtual environments to embody the users (Rigas and Alharbi, 2011).

3. SURVEY

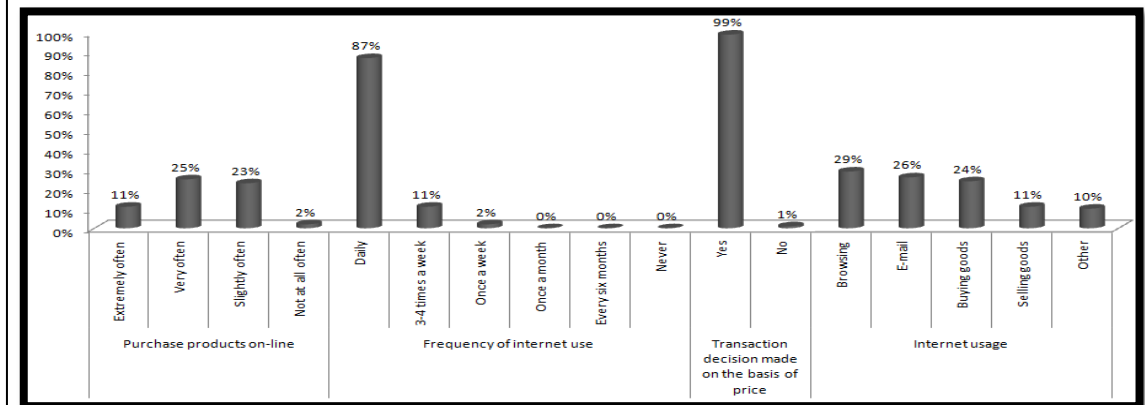
The evaluation used an opportunistic sample of 50 computer users with online retailing experience to perform the survey. The survey involved an anonymous and optional self-administered questionnaire. The users were mostly postgraduate University students in different age groups. The questionnaire was designed

based on the reviewed literature in order to measure each of the constructs of this study. Users were requested to rate their view of each statement on a five-point Likert scale ranging from one to five. The survey obtained an overall user viewpoint for the use of social presence and multimodal metaphors such as avatar, speech output, face and full body animation in e-commerce interactive environments. The survey also elicited views on issues such as usability, credibility and likeability aspects of a system that uses social interactive aspects and multimodal features. The data was collected anonymously and consisted of personal information (other than name), shopping experience and views on multimodal metaphors. Once a questionnaire was completed, there was no way that could be linked back to a specific person. The personal information consisted of gender, age, marital status, education level and internet use. The sample profile was 99% on-line shoppers. The gender distribution was slightly biased towards male users (64% male and 36% female). Figure 1 (a) shows the overall sample profile. Users were from different age groups and a range of education back grounds.

Figure 1 (b) shows the sample’s e-retailing characteristics with 87% of the sample used the internet daily on activities such as browsing, e-mail, and trading goods. 75% of the users regularly purchased products from on-line environments. 99% of the users preferred to purchase online when the price was cheaper but only 1% would purchase online even when the price was the same locally.



(a) The profile of the sample.



(b) The e-retailing characteristics of the sample.

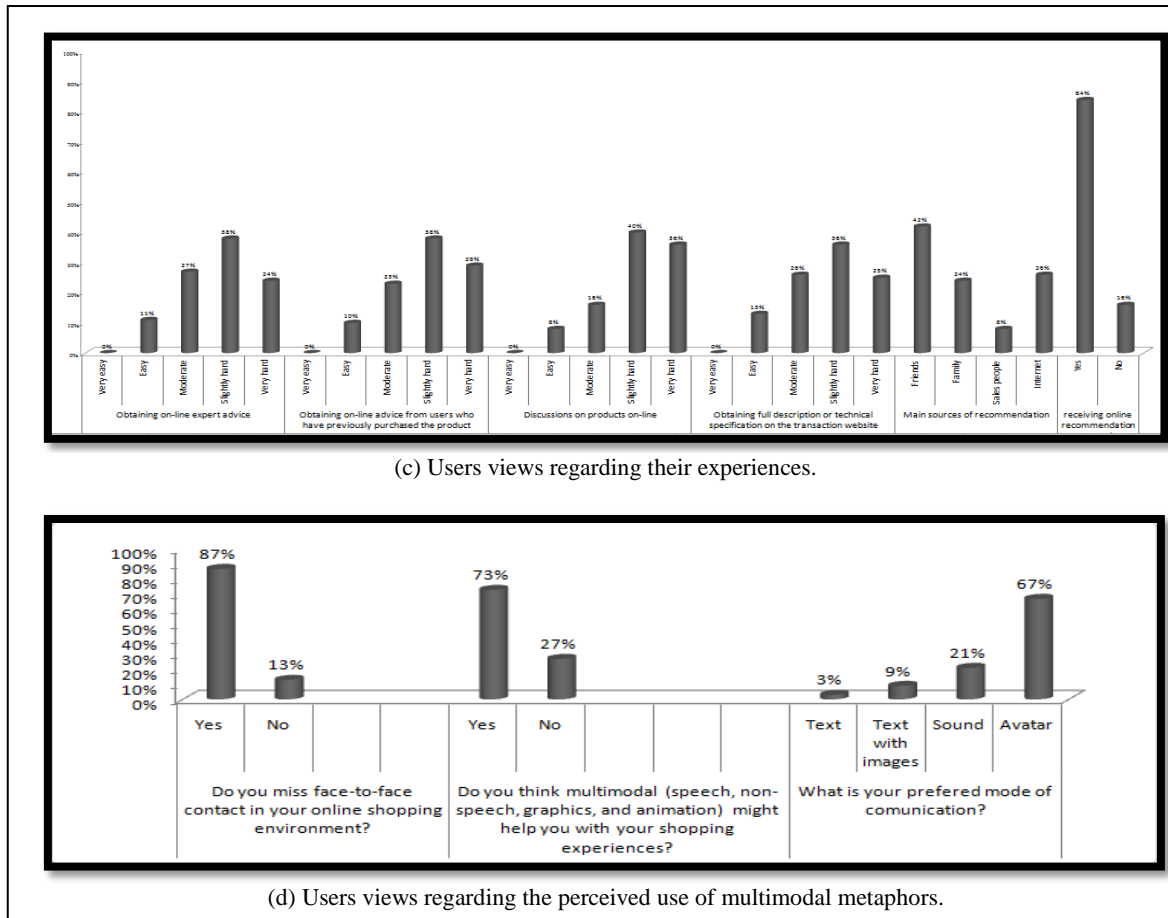


Figure 1. The results of the survey.

Using the Likert Scale with 1 being very ease and 5 very hard, users were then asked to rate the interface. Figure 1 (c) shows that e-buyers find advice from on-line shoppers as hard to seek for products in on-line environments from participants by about 89%. On the other hand 11% reflected on this statement as easy to find advice. Also, 67% of users reported difficulties with the presented on-line information of a product. Also with regard to specific product description, 87% of users reported difficulties with product descriptions or specific information of the product characteristics. 76% of users reported difficulties in reading opinions for a specific product on-line as the transaction and 84% wanted to know the opinions of people who have already bought the product but most of them would prefer to hear the opinions of people that they personally know. Interestingly, 80% of the users identified the lack of face-to-face interaction as a problem during on-line shopping and 73% thought that multimodal metaphors may improve their on-line shopping experiences, 67% of the users preferred avatar as the interaction mode for communication.

These results demonstrate that users understand the importance of social presence and multimodal metaphors but the same time respondents highlighted the difficulties involved with the effective use of these technologies in a way that is beneficial to them in the transaction process and to help the development of user trust. The results also show that incorporating multimodality metaphor to create socially interactive e-commerce environments can improve the usability of e-commerce applications on overall.

4. CONCLUSION

This paper presents a case, based on the results of the survey, for incorporating social presence into e-commerce environments. According to these results, there is a prima facie case that social presence and multimodal metaphors on overall influence on-line decisions of customers. This study demonstrates the need

for systematic empirical research in identifying the opportunity presented via these technologies and the potential for enhancing the on-line buying experience. These results also highlight the potential for designing effective experimental strategies to investigate the issues further based on different levels of social interactivity under the angle of social presence and that of the multimodal communication metaphors. This survey also encourages the further integration of speech, video, and avatar in the context of an environment with social presence in order to improve usability, user trust and enjoyment of e-retailing applications. A systematic empirical programme that investigates these issues is currently under way.

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ANTECEDENTS AND CONSEQUENCES OF CUSTOMER SATISFACTION IN ONLINE GROUP BUYING ECO-SYSTEM

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ABSTRACT

In recent years, online group buying has become one important channel for many customers to shop due to convenience and competitive price. In an online group buying eco-system, customers need to interact with both agents and vendors during the course of a transaction, thus, their services or products influence customer satisfaction. This research work aims to investigate the antecedents and consequences of customer satisfaction in online group buying eco-system. The American customer satisfaction index (ACSI) was used to measure the causal relationships among six constructs: customer expectations, perceived quality, perceived value, customer satisfaction, customer complains, and customer loyalty in this particular context. The responses from 388 customers were processed by structural equation modeling technique. Research findings provide parties of online group buying valuable insights into how to retain customers.

KEYWORDS

E-commerce, online group buying, customer satisfaction, ACSI, structural equation model.

1. INTRODUCTION

Along with widespread adoption of information and communication technologies, diverse types of online businesses have being developed since mid-1990s. Nowadays, e-commerce becomes a noticeable sales and consuming channel to many enterprises and people around the globe. Among others, online group-buying emerged as a new business model and received attention in recent years, leading companies include Groupon, BuyWithMe, and TeamBuy. There are 3 kinds of participants in an online group buying eco-system: agents, vendors, and customers. An agent mainly plays an intermediary role between individual customers and vendors providing services or products. Agents build Web-based information systems for soliciting and managing both vendors and customers; broadcasting promotion messages on behalf of vendors; processing payments; and delivering vouchers to customers. Once customers receive electronic vouchers in which identification or tracking numbers are embedded, they can consume paid services on sites or bring paid products back, either way, vendors need to interact with individual customers eventually.

The niche of online group-buying agents is that they provide two-facet advantages for vendors as well as consumers. From vendors' standpoint, bulk transactions could be made through group-buying agents collecting large groups of individual customers who would not have gathered without a common agent. In addition, advertisements and other promotion activities offered by agents could reach more customers. From customers' viewpoint, lower priced products and services become available due to the discount for bulk transactions. The typical procedure of an online group-buying transaction comprises a number of steps. At the beginning, customers get messages from agents via either agents' Web sites or emails. After thinking over, customers complete the required payment to obtain a voucher. Once customers obtain vouchers, they possess the rights of consuming the purchased items or services at pre-specified locations, date, and time, which were stated in the sales' terms and conditions. Interaction between vendors and customers occur during redeeming processes.

Obviously, in this particular context, customers encounter agents and vendors at different phases and places, which include virtual and brick-and-mortar places. Accordingly, it is more complicated but interesting to investigate customer satisfaction issues in online group buying eco-systems. This research work applied the ACSI model and SEM technique to find out how customer satisfaction are affected and the corresponding consequences in online group buying eco-systems. Research findings brought both vendors and agents insightful strategies for retaining their customers.

2. CUSTOMER SATISFACTION AND THE ACSI

According to prior studies, customer satisfaction plays key role in improving revenue (Terpstra et al., 2012, Clara Xiaoling, 2009, Babakus et al., 2004) and increasing profit (Pickle et al., 1970, Gault, 1993, Fongemie, 1999). Furthermore, because it also positively affect stock investment return (Aksoy et al., 2008, O'Sullivan et al., 2009), smart investors incline to those enterprises with higher customer satisfaction. In view of its significance, enterprises concerned about how to satisfy their customers, in effective and efficient ways.

The American customer satisfaction index (ACSI) (Fornell et al., 1996), is a benchmark for measuring customer satisfaction with the quality of products and services available to household consumers in the United States. The ACSI periodically reports customer satisfaction scores ranging from 0 to 100 on four different levels: national, 10 economic sectors, 47 major industries, and more than 230 companies/agencies, according to perceived experience of consumers. To collect data, roughly 70,000 customers are randomly picked and surveyed annually. Actually, the quarterly-updated national ACSI benchmark has been found to be correlated with Gross Domestic Product (GDP) growth (Grigoroudis et al., 2008) and Personal Consumption Expenditure (PCE) growth (Fornell et al., 2010).

By using the ACSI, profitability and firm value in the hospitality and tourism industry were proved to be related with customer satisfaction (Sun, 2011). The reliability of ACSI was studied and confirmed in different industries of other countries (Terblanche, 2006). Antecedents of aggregate customer satisfaction were investigated by analyzing the relationships between cross-country economic indicators and national customer satisfaction data (Ogikubo et al., 2009). Overall speaking, the ACSI methodology have been proved to be a reliable and valid instrument for gauging customer satisfaction in multiple levels.

3. METHODOLOGY

This section details how the research work was conducted, including the research model, hypothesis, instruments, participants, and the procedure.

3.1 Model and Hypothesis

Responses from surveyed customers are fed into the ACSI model, which is a multi-equation econometric model developed by the University of Michigan's Ross School of Business, American Society for Quality, and the CFI group in 1994. The ACSI model is a cause-and-effect model with three constructs for representing antecedents of customer satisfaction on the left side: customer expectations, perceived quality, and perceived value; construct of customer satisfaction in the center; while two constructs for representing consequences of satisfaction on the right side: customer complaints and customer loyalty (Anderson and Fornell, 2000). Customer loyalty consists of the re-purchase intention and the price tolerance; the former gauges customer's professed likelihood to repurchase from the same supplier in the future, while the latter one gauges customer's likelihood to purchase a company's products or services at various price points. Customer loyalty is a critical construct in the model since it is a key determinant of firm profitability.

Each construct is a multivariable component, which could be measured by several questions that are weighted within the model, and the questions assess customer evaluations of the determinants of each construct. Since the present study adopted the typical ACSI model to investigate the antecedents and consequences of customer satisfaction. Being consistent with prior studies adopting the similar model, the following 9 hypotheses are made about customers' perceptions in the context of online group buying:

- H1: Customer expectations (CE) will have a positive impact on perceived quality (PQ).
- H2: Perceived quality will have a positive impact on perceived value (PV).
- H3: Perceived quality will have a positive impact on customer satisfaction (CS).
- H4: Customer expectations will have a positive impact on perceived value.
- H5: Customer expectations will have a positive impact on customer satisfaction.
- H6: Perceived value will have a positive impact on customer satisfaction.
- H7: Customer satisfaction will has a negative impact on customer complains (CC).
- H8: Customer satisfaction will has a positive impact on customer loyalty (CL).
- H9: Customer complains will have a negative impact on customer loyalty.

3.2 Instrument

To verify the hypothesis model, a field study technique was employed through a survey. A structured questionnaire was used to survey customers' perceptions. The questionnaire contains total 24 items; each construct (dimension) have 4 corresponding items reflecting the manifest variables. The items basically came from the methodology report of the ACSI (2001), all these question items were devised according to the relevant studies and theories. All items in the survey were on a seven-point scale, ranging from strongly disagree (1) through neutral (4) to strongly agree (7). A pretest of the survey was conducted to check if there exist any ambiguous loadings before administration of the survey.

3.3 Participants

The survey was distributed to a total of 1,000 Internet users, and 388 responded effectively. The subjects whose responses were considered to be effective must have experience in using online group buying service at least once. Out of total 388 effective respondents, 32.2% of the respondents had purchased products or service via online group buying agents during the past 3 months, while 23.2% had redeemed their paid service/product during the same time period. Among all effective respondents, 46.4% were full-time employees, 18.8% were students, others are retired or un-employed. Regarding the gender distribution of participants, 63.1% of the effective respondents were male. Respondents were aged between 18 to 63 year-old, and their average age is 45.2.

4. DATA ANALYSIS AND FINDINGS

The preliminary analysis of collected data was conducted with the SPSS. After that, an advanced statistics method - structured-equation model (SEM) was employed to carry out the subsequent analysis by applying the LISREL version 8.54. The LISREL takes into account all co-variances in the data set and thus allows users to simultaneously examine the correlations, shared variances, the casual relationships between constructs (hypothesis), and the significance level and coefficient of the lines.

Reliability of the questionnaire, which comprises six constructs, composite reliability (CR) of all constructs were above 0.8, except the customer complains (CC), which composite reliability value is 0.76. The variance extracted (VE) of all constructs were close to 0.6, except the customer complains (CC), which VE is 0.5. Besides, other measurement model fit indices all exceed the common threshold values recommended by domain experts (Hair et al., 1998, Nunnally and Bernstein, 1994). The figures also indicated that all items load significantly on their corresponding construct demonstrating adequate convergent validity.

Discriminant validity was assessed according to the Holmes-Smith (2001) stating that variance extracted estimates should exceed square of the correlation between the two constructs. In this work, correlation matrix approach and factor analyses were applied to examine the convergent and discriminant validity. The smallest within-factor correlations are adequate. Besides, each smallest within-factor correlation was considerably higher among items intended for the same construct than among those designed to measure different constructs. These data suggest that adequate convergent and discriminant validity of the survey. The eight common goodness-of-fit indexes exceed their respective common acceptance levels, suggesting that the research model exhibited a good fit with the collected data .

The LISREL was used to calculate the coefficients (factor loadings) indicating the extent to which the latent variables affect the measured variables. In summary, Figure 1 shows the standardized LISREL path coefficients. They show that 7 out of the 9 original hypotheses (the corresponding relationships between construct nodes) are significant, except the two lines: one is between customer satisfaction and complaints; another is between customer complaints and loyalty.

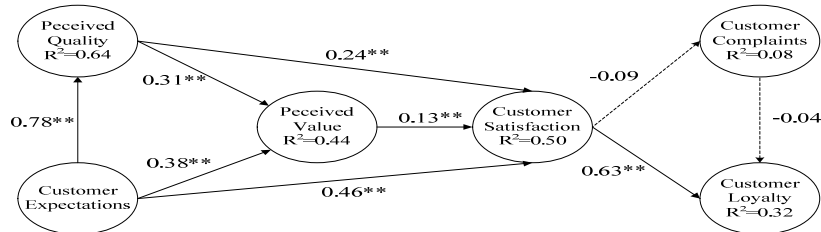


Figure 1. Standardized LISREL solution(*:p< 0.05 ; **:p< 0.01)

5. CONCLUSIONS

The online group buying industry has experienced fabulous growth in past few years, but participants including agents and vendors in this industry eventually will face more intense competition from increasing number of contestants. Consequently, it is a critical issue to retain existing customers by increasing their satisfaction, while customers are interacting with agents and vendors. In view of the issue's significance, this work investigated the antecedents and consequence of customer satisfaction in the context of online group buying. The results indicated that 7 out the 9 hypotheses are accepted, the two exceptions are customer satisfaction will influence complaints negatively and customer complaints will influence loyalty negatively. The noticeable findings and the related managerial implications are:

(1) Customer satisfaction does not influence complaints negatively. That means unsatisfied customers might not express their negative feeling by sending complaints formally, but satisfied customers might still complain sometimes. This is not consistent with general cases found by many prior studies. The subsequent discussion focuses on those who do not satisfy because they tend not to repurchase from the same agent/vendor. Two rational explanations about this are first, customers can not precisely identify the accountable party; i.e., sometimes, they cannot attribute the dispute or dissatisfaction to agent or vendor, so are forced to leave it behind. The second reason for explaining the abnormal phenomenon is that the selling price of service and products purchased through online group buying agents usually is much lower below the normal price ranges. Under this circumstance, customers tend to forgive minor mistakes, in other words, they tend to have bargains at the cost of tolerating slight dissatisfaction.

(2) Customer complaints does not influence loyalty negatively. That means customers who complained about a agent/vendor during the course of a prior transaction still might shop with the same agents/vendors in the future, or they will not incline to the same agent/vendor that they did not complain about. This phenomenon is not consistent with most cases found by many prior studies. The rational explanation about this abnormality is that if customers can not precisely identify the accountable party while they have some complaints to express, they will not know the exact target they should blame and avoid in subsequent purchases. On the other side, if customers can not precisely identify the commendable party when they appreciate the service/product, they will not know the exact target they should be loyal to.

Obviously, this and the previous abnormalities arise from a feature in this research context: the ambiguous accountability; customers need to know the exact target when they intend to complain or show loyalty. However, they cannot clearly attribute something bad or good to a specific party in the online group buying eco-system sometimes. Many disputes in this eco-system arise from mis-communication between agents and vendors, thus it is hard to make a clear cut while clarifying accountability.

Although it is unrealistic to expect customers to precisely identify the accountable or commendable target, agents and vendors in this industry need to keep in mind is that customer satisfaction still have significant impact on customer loyalty, and which is a key factor affecting company's performance.

(3) Research findings point out that customer expectations, perceived quality, and perceived value will influence customer satisfaction, but at different scales. Among the 3 antecedents, the expectations influence

satisfaction most significantly, which means if customers can not receive what they expected, they will be unsatisfied. Accordingly, the advertisements, terms and conditions of a service or product should be as accurate and complete as possible, which can minimize unrealistic expectations and make customers' actual experience meet or even exceed their initial expectations.

This work could be extended by adopting a more delicate research model that take dimensions that are associated with this particular eco-system, such as Web site usability, service encounter, and trust into consideration.

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FRAMEWORK TO EVALUATE INTERNET USE AND DIGITAL DIVIDE IN FIRMS

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ABSTRACT

This article illustrates a framework that aims to examine and analyze Internet use and the resulting Digital Divide in firms. The framework is based on the extraction of .it domain names registered by Italian companies. The analysis includes a phase of automatic gathering of information of the firms registering a domain name and a quantitative and qualitative evaluation of firms that are starting to use the Internet. This approach provides a tool that can support the improvement of Digital Divide analysis, referring both to the territorial area of competence of the firms concerned, and to their socio-economic characteristics. This methodology can also be applied to other countries for the benefit of the scientific community, government institutions and the public.

KEYWORDS

Digital Divide, Internet use, Firms, domain names.

1. INTRODUCTION

As in the rest of the world, Europe has also recognized the Internet as an exceptional catalyst of reference for the growth of creativity, collaboration and innovation. Not only individuals but also companies are starting to use the Web to exploit the great potential of the Internet. The advantages for businesses provided by the Internet are not only linked to the sale of products and services (direct advantages), but can also be indirect (Hansons, 2000). For example, among the most important of these are reduced costs, image consolidation, greater customer loyalty, and a wider diffusion of products offered by the company. They are referred to as "indirect" since they do not lead directly to sales and do not generate immediate profits. However, they are important since they will probably be the greatest benefits to businesses offered by the Internet. Based on these arguments, in this article we propose a framework that aims to optimize Internet use analysis and the potential Digital Divide, referring to the socio-economic characteristics of individual companies and the territorial area in which they operate. The Digital Divide can be defined as the difference between those who possess the material and cultural conditions to exploit the new technologies, and those who do not, or those who lack the crucial ability to adapt to the rapid continual change that characterizes the Internet today (Warschauer, 2001). The Digital Divide can occur either as a "local" (within a given country) or "global" (between developing and industrialized countries) phenomenon. So the Digital Divide can be considered at three levels of analysis: - the individual level, the organizational level, and the global level (Dewan and Riggins, 2005). Therefore, this paper proposes a methodology to analyze Internet use among businesses and the resulting Digital Divide (at organizational level), by using as an endogenous indicator the number of domain names. Using endogenous indicators (such as Internet hosts or domain names) compared to other exogenous indicators (such as questionnaires) has several advantages. First of all, the collection of data, being carried out in an automatic way, ensures that the examined sample is huge and therefore representative of reality. In addition, endogenous indicators allow good geographical characterization of the phenomenon because they are based on data that enable differentiation of users on a national, regional and provincial level (Diez-Picazo, 1999).

The proposed framework therefore includes: 1) extraction of the firms with their intrinsic features in a specific territory; 2) verification that firms have or have not registered a domain name through the identification of their VAT number or numerical tax code (data that companies are obliged to provide upon registration of a domain name), and 3) analysis of these data and quantitative and qualitative evaluation of the

individual profile of the firms that register a domain name. Our study aims to obtain for the first time, automatically, a global characterization of the companies that register a domain name. To achieve this objective a definite improvement is necessary in the provision of data, in order to overcome the limitations due to non-availability of comprehensive data. The availability of data, such as the legal status, the number of employees and the corporate capital of firms that register a domain name will make it possible to carry out a research capable of providing an analysis of the phenomenon and an interpretative framework. This can be a basis for reflection, consultation and intervention for the scientific community, government institutions and the public. However as it is not possible to identify precisely the characteristics of the firms that register domains automatically (businesses at the time of registration of a domain name are not required to give information about their characteristics, such as social capital, etc.), it is necessary to consider access to appropriate information coming from other sources. Consequently, during the first phase all information concerning the companies located in a specific area must be extracted in an automatic way so that the sample is exhaustive and also representative of reality. The identification of companies that are part of a specific territory by means of their VAT number or numerical tax code makes it possible to establish if these companies have registered a domain name. In this case, from the institutional databases, it is also possible to obtain a direct automatic extraction of the features of such firms, without the use of questionnaires, which would limit the provision of data, resulting in a distortion of the results. The last phase involves the analysis of Internet use and the potential Digital Divide, taking into account not so much the socio-economic features of the territories, as in previous studies (Serrecchia et al., 2007), but primarily the individual profile of the single companies, related to the social context in which they operate.

Our framework has been tested by evaluating the companies of the Italian state by extracting the list of firms from the database maintained by *Infocamere* (Infocamere is the informatics company of the Italian Chambers of Commerce that manages all information pertaining to companies in Italy) and the list of domains registered in the database of the ccTLD ".it" Registry managed by the Institute of Informatics and Telematics (IIT), of the CNR in Pisa. Access to these databases (Infocamere and .it Registry) allowed us to obtain a complete list, respectively, of all the firms and of all firms that register a domain name.

2. RELATED WORK

The web can help businesses grow. The Internet expands and diversifies business opportunities, allowing expansion in international markets. According to the "Internet Factor" report of the Boston Consulting Group ([http://www.fattoreinternet.it/pdf/Fattore% 20internet-2011.pdf](http://www.fattoreinternet.it/pdf/Fattore%20internet-2011.pdf)), companies active online achieved a turnover increase of 1.2%, compared to a decrease of 4.5% for offline companies. 34% of small and medium-sized enterprises (SMEs) that are online registered an increase in their staff, while 65% reported benefits in terms of productivity thanks to the Internet. If we look at exports, 14.7% of online SME turnover comes from international markets. On the contrary, offline firms have an international turnover of only 4%. Martins and Oliveira (2008), by using a data set for Portuguese firms, showed that the significant drivers of intra-firm diffusion are: firm size, work skills, technological capacities and outsourcing partner usage. Tan and Ouyang (2004) examined the diffusion and the impacts of e-commerce in China based on the results of a large-scale survey conducted in 10 countries, including China. The survey focused on three sectors -manufacturing, wholesale/retail, and banking/insurance-. Their results showed that the three surveyed sectors, manufacturing, wholesale/retail, and banking/insurance, appear to follow quite different paths in adopting e-commerce. There are also differences between large firms and SMEs regarding e-commerce diffusion strategies and impacts. Greenstein and Price (2007) analyzed the rapid diffusion of the Internet across the United States over the past decade for both households and firms. They highlighted different economic perspectives and explanations for the Digital Divide, that is, unequal availability and use of the Internet. In a previous study (Serrecchia et al., 2007) we analyzed Internet diffusion considering .it domain names registered by the firms in Italian regions and provinces. We verified the existence of a Digital Divide in terms of geography (Macro-areas, regional and provincial) and an initial interpretation of this phenomenon was made. This was done by focusing on the factors that determine the Digital Divide at the regional level by taking into account economic, cultural, demographic, technological and related to education variables in the provinces and regions of reference.

3. OUR APPROACH

The objectives of the framework proposed in this article can be summarized as follows: 1) create an experimental methodology for the evaluation of Internet use and Digital Divide in firms, 2) provide a tool for analyzing the behavior of single firms in the use of the Internet and their characterization in terms of geography, and 3) provide a tool for the monitoring of firms using the Internet and those who do not use it, 4) give a support to actions aimed at reducing a possible Digital Divide. To achieve these goals three basic steps were followed: the extraction of all the firms to be analyzed, the association of these data with the data available in the Database of the .it Registry and the analysis of these data in order to produce a quantitative assessment of the firms who are new to Internet. Domain names registered under the ccTLD “.it” are extracted from the Database of registrations managed by the IIT-CNR of Pisa, using automatic and semiautomatic procedures. The .it Registry subdivides the domains into seven categories (individuals, firms, professionals, non-profit institutions, public bodies, other institutions and foreign entities). Particular attention was paid to the registration of domain names by firms. Furthermore, these institutions were classified according to their geographical location (at the level of macro area, regional and provincial areas). However, to study the socio-economic characteristics of the firms that register a domain name, it is necessary to integrate the data available at the IIT with specific data of the single firms. These data are not always extractable automatically from the database managed by IIT. In the past, this problem was partially solved by using semi-automatic and/or manual procedures through the use of the Telemaco Database, run by Infocamere. Through the Telemaco Database, it was possible to trace only the legal status of firms by using the VAT number and/or the name of the organization, data that companies provide the IIT with at the time of registration of their domains. However, this procedure was time-consuming and led to the analysis of only a small sample of firms who register domain names, causing possible distortion in the results. In this study, however, in order to automatically obtain the greatest amount of information on registering firms, the data provided by Infocamere were cross-checked with the information on firms available on the databases managed by IIT. In fact, IIT has information such as VAT number and/or the social security number of companies registering a .it domain name. Infocamere on the other hand, in addition to the VAT number and/or social security number of all businesses in the territory concerned, provides IIT with other information such as corporate capital, the business sector in which they operate, number of employees, legal status, the province in which the company operates, the current company activity status (active, in liquidation, bankruptcy, suspended, inactive). Through the numerical tax code and/or VAT number, all the additional information provided by Infocamere was then associated to the companies that register .it domains. The analysis was carried out by monitoring the companies registered with the Italian Chambers of Commerce in the provinces of Milan, Naples and Florence. This monitoring activity is carried out not only to learn about the socio-economic characteristics of companies, but also to know if there are inequalities concerning the registration of a domain name between firms that reside in one province or another.

3.1 Quantitative Evaluation of Data

Once a new database has been obtained, resulting from the association of information extracted from the two Infocamere and .it Registry databases, we subdivided the firms that register domain names according to their size, legal status and field of activity. For size we used as a proxy corporate capital and number of employees. In addition, businesses were subdivided also according to legal status in order to ensure that only companies are considered in the analysis, thus eliminating public bodies and non-profit organizations (i.e. associations, foundations, committees, etc.). Finally, the firms that register domain names were divided according to their economic activity, in particular according to the ATECO 2007 code. The ATECO code is an alphanumeric identifier which ranks companies according to their economic activity. The new classification of economic activities, ATECO 2007, was adopted by ISTAT (National Institute of Statistics, the Italian public research institution) from January 1 2008. In this study, firms that register domain names were divided according to the following ATECO 2007 codes: **C** - Manufacturing Activities, **I** - Service activities of Accommodation and Catering; **J** - Information and communication services; **K** - Finance and Insurance, **M** - Professional, Scientific and Technical services, **N** - Rental Activities, Travel Agencies, Support Services to Companies

4. RESULTS

In this study, more than 700,000 data items related to the provinces of Milan, Florence and Naples were analyzed. Inactive firms, in bankruptcy and those suspended from their activity, were eliminated from our research. In this analysis, therefore, only active firms in the three provinces indicated above were considered. Table 1 shows the results of the evaluation of Internet use and the resulting Digital Divide, measured as the difference in the registration of domain names by firms. This evaluation was measured for each field of activity analyzed.

Table 1. Internet use and Digital Divide in active firms in the provinces of Florence, Milan and Naples

Fields of economic activity (ATECO Codes)	Firms in the province of Milan (% .it registered domains)	Firms in the province of Florence (% .it registered domains)	Firms in the province of Naples (% .it registered domains)
C	21.32%	14.76%	8.26%
I	9.92%	15.06%	6.61%
J	31.86%	25.57%	22.68%
K	12.58%	6.78%	6.87%
M	26.63%	21.17%	18.34%
N	18.33%	15.14%	13.87%

Table 1 shows that among the fields of activity that were analyzed, the companies that use the Internet the most are those that carry out activities of Information and Communication services, ATECO code **J** (this category includes companies that engage in publishing activities, film, video and television program production, companies working in the field of telecommunications and related activities, companies that produce software). This trend occurs in all three provinces, even if the companies of the province of Milan emerge as the most innovative (almost 32% of the companies operating in that field registered a domain name). The second field that uses the Internet more is the field of Professional, Scientific and Technical activities, ATECO code **M**. This area comprises the companies engaged in legal and accounting activities, of architecture and engineering, business consulting services, companies engaged in research and development).

The companies in the province of Milan, sector **M**, register 26.63% of domain names, followed by companies in the province of Florence with 21.17% and companies in the province of Naples with 18.34%. An interesting result that we obtained concerns sector **I**, Accommodation and Catering activities. Taking into consideration this field, we expected a higher percentage of registration of domain names. However, this lower percentage could be explained by the wide category that characterizes sector **I**. In fact, this area includes not only hotels, but also restaurants, bars and bakeries. In addition, unlike the other sectors analyzed, the firms in the province of Florence register several domain names (15.06%) compared to the firms in the provinces of Milan (9.92%) and Naples (6.61%). This result could derive from the fact that the province of Florence is considered a more attractive tourist destination compared to the provinces of Milan and Naples, therefore companies working in the field of accommodation and catering are more inclined to appear on the Internet in order to exploit both direct and indirect advantages.

The analysis shows that there is a difference in all areas in the registration of domain names in the three provinces. In general, except for the last mentioned case, the firms of the province of Milan, are more inclined to use the Internet, compared to those of Florence and Naples, with a wider difference in the case of Naples. This result once again confirms the results obtained in previous studies (Martinelli et al., 2006), in which the South appears to be less inclined to use the Internet than in the North and Centre.

5. CONCLUSION

This paper introduces, for the first time, an experimental methodology for the evaluation of use and the resulting divide between firms, taking into account not only the geographical distribution of users, but also their individual profile. Internet use and the resulting Digital Divide were analyzed using as a proxy the endogenous indicator of domain .it names. These data were extracted from the database of the ccTLD .it Registry managed by the IIT. However, in order to have a greater availability of information, as data are not

always extractable automatically from the database managed by IIT, we used the database of Infocamere, which contains all the information of Italian companies. In this analysis, the methodology was applied by taking into account active companies in the provinces of Milan, Florence and Naples.

The association of the information contained in the .it Registry database with those of the Infocamere database enabled us to have, for the first time, and automatically, an exhaustive sample of the firms that register domain names. This means a greater consistency and accuracy in the survey results. For the quantitative assessment of Internet use among firms according to their individual profile, we classified firms that register .it domain names according to legal status, corporate capital, number of employees and field of economic activity. There are six sectors considered, the first concerns manufacturing, while the others regard service activities. Results show that firms engaged in the six surveyed sectors appear to vary quite differently in adopting the Internet. Furthermore, for all sectors considered the firms of the province of Milan are more inclined to use the Internet, compared to those of Florence and Naples, with a wider divide in the case of Naples. This result once again confirms a Digital Divide at the territorial level, as previously reported for individuals. This approach, which aims to measure and analyze the use of the Internet, using data extracted on an automatic basis, could be a useful reference for other similar government agencies, which can use the same methodology for the evaluation of the use of the Internet among businesses, using as a proxy the endogenous indicator of domain names. This methodology aims, therefore, to consider the various aspects of Internet diffusion and the resulting divide, that is to say the phenomena underlying its territorial distribution. These are phenomena determined by the effects that information technology and communication have on the economy and society, and thus represent the relationship between the Internet, the economy and the society, which is ultimately the object of this research. In the future, the research aims to carry out a detailed analysis of the factors that determine the Digital Divide, taking into account not only socio-economic characteristics of the territories, as in previous studies, but also the individual profile of the companies.

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Posters

TOWARDS SHOPPING CART RECOMMENDATION WITH SNIPPETS

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ABSTRACT

We introduce a prototype of a content-based shopping cart recommender system which presents products together with snippets extracted from product descriptions. The snippets serve as an explanation of why the product is relevant in a particular context and encouragement to consider purchasing the product to complement the item that the user already has in their shopping cart. The system consists of two components: a product category relation finder, which computes a degree of association between product types, and a snippet finder, which extracts and scores snippets from product descriptions. We discuss challenges inherent in creating such a system, as well as its potential advantages such as increasing recommendation serendipity.

KEYWORDS

Recommender systems, recommendation technology, serendipity in recommendation

1. INTRODUCTION

Collaborative filtering systems have been the dominant approach in product recommendation. However, in recent years, researchers have pointed out that the effectiveness of different methods may vary depending on the recommendation context, and that there are other aspects besides accuracy, such as serendipity or diversity, which affect the overall quality of the recommendations (McNee et al, 2006, Ge et al, 2010).

We present a recommender system prototype built specifically for the purpose of shopping-cart recommendation, i.e. the situation where a user of an e-commerce site already selected one or several products that they intend to purchase. In our attempt at building such a system, we decided to begin by addressing two challenges, which we believe are important in the shopping cart context.

First, if the user has already decided to purchase product A, such as *cereal*, rather than displaying other products very similar to A, we aim at suggesting products in associated categories, which might be used or consumed together with A, or which somehow supplement A, for example *nuts* or *dried fruit* that can be mixed with morning *cereal*. For that purpose we explore relations between different categories in the product ontology.

Second, instead of focusing on prevailing co-purchase patterns between related items, we would like to help the user discover new products which they can enjoy together with their purchase, i.e. we aim to increase the number of serendipitous recommendations. We do this by providing snippets automatically extracted from product descriptions, which explain the relation between the recommended product and the product in the shopping cart. For example, in the case of *cereal* and *nut mix*, the snippet would state: *This nut mix can be a great addition to your morning cereal*. The presence of an explanatory snippet allows us to display less obvious suggestions. For example, we can recommend *maple syrup* with *herbal tea* accompanied by a snippet which explains that maple syrup can be used instead of honey to sweeten the tea.

Our proposal of recommendation with snippets is similar to the idea of providing snippets with search engine results to explain their relevance with regards to the query (Tombros and Sanderson, 1998). It is a novel approach in recommendation, where the explanatory functions previously concentrated on providing information about how the selections are made by the system (Herlocker et al, 2000), or displaying select features shared between products (e.g. movies by the same director) (Tintarev and Masthoff, 2007).

In the following section, we introduce the first version of our system.

2. SYSTEM DESIGN

In our design, we explore textual data from product descriptions to discover associations between different types of products in order to display related items and provide an explanatory snippet which explains why a given product is relevant. The data consists of a snapshot from the product database of the Japanese e-commerce site Rakuten Ichiba. (A version of this data is available for research purposes as part of Rakuten Data Release program.) Each product is assigned to a category in Rakuten's product ontology and the textual information about the product includes a title and description provided by the merchant. For the initial version, we limited the system to the food and kitchen domain containing approximately 5 million products.

2.1 System Overview

The system consists of two main components as shown in Figure 1. The first component is a product category relation scoring module, which computes the degree of association between product types, and the second is a snippet module, which extracts and scores snippets from product descriptions (see section 2.2 for more details).

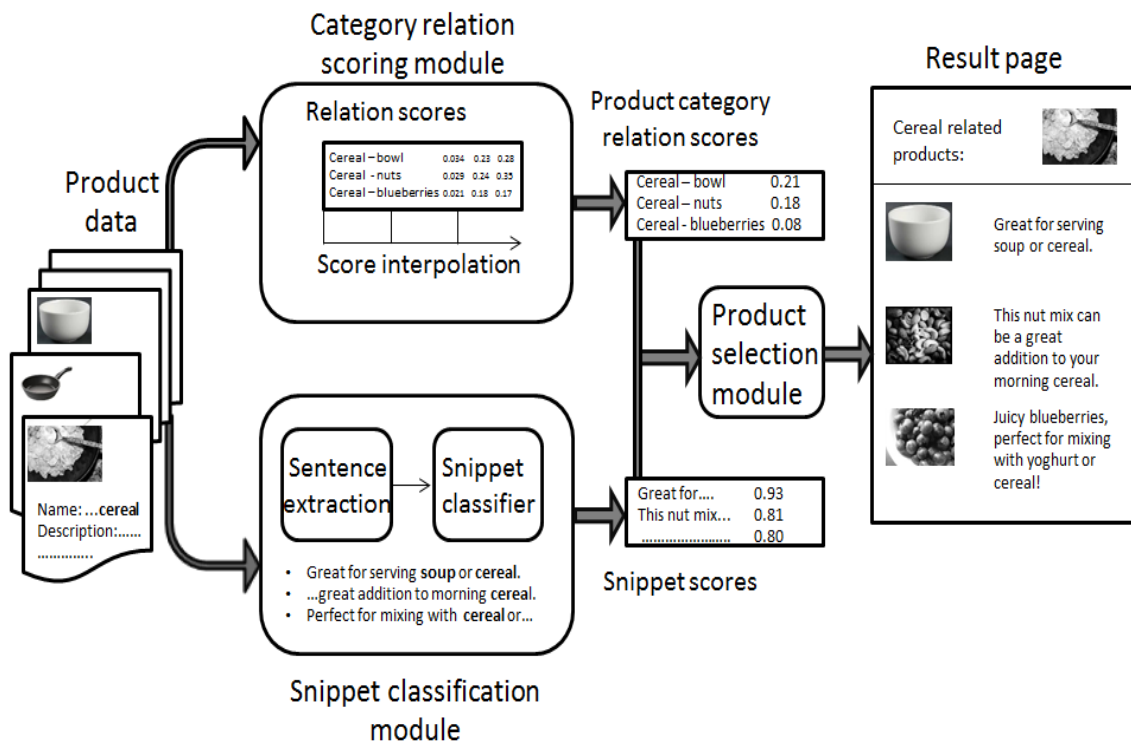


Figure 1. System overview

At the moment, the system prototype is purely content based, and it was designed to return suggestions for a single product in the cart based on its product category. For example, as shown in Figure 1, for a *cereal* product, we obtain its relation scores to other product categories in the domain, as well as extract candidate sentences from product descriptions which refer to cereal, and assign a score based on their textual features. For the initial version of the system, we opted to select products from categories with the highest relation scores, which contain the top scoring snippets.

2.2 Category Relation Scoring

As mentioned in the introduction, we use the category relation information to be able to display products associated with those that have been already purchased. The category relation finder assigns a score to each category pair, which is an interpolation of three different measures: associative similarity based on topic model results (Stankiewicz and Sekine, 2012), category name co-occurrence (based on similarity distance formula defined in Cilibrasi and Vitanyi, 2007) and an average score of the snippets in a given category as assigned by the classifier described in 2.3.

We compared the three relation measures and the final composite score with an average human relatedness rating based on 1-5 scale responses from 5 annotators. For 1765 category pairs, the correlation coefficient was .26 for the co-occurrence based score, .27 for the topic model based score, .31 for the snippet based score and finally .34 for the score based on all three measures. We selected the composite score with the highest correlation for use in the first version of our system.

2.3 Snippet Classification

The snippet module consists of snippet candidate extraction and snippet classification. At present, we are using product descriptions, however, snippets could be extracted from other textual data such as product reviews. As candidate snippets we select the sentences which refer to the category of the product for which we intend to recommend related items.

The role served by the recommendation snippet is twofold. First, it provides encouragement for the user to click on the product to find out more or add it to their cart. Second, it fulfills an explanatory function by offering reasons why the product is relevant in a given context, or providing instructions on how the product could be used together with the item that the user already has in their cart. Thus, to select the best snippet we train a classifier using a combination of features which reflect general linguistic properties of “encouraging” sentences, such as *perfect for*, *great with*, as well as the degree to which the snippet is informative given the target product and the recommended product type.

Table 1. Snippet classifier results

Feature set	Precision	Recall	F-measure
Base sentence features	70.45%	55.86%	62.31%
Base + entity type	69.70%	62.67%	65.10%
Base + unigram	84.05%	53.13%	65.11%
Base + unigram + entity type	79.85%	85.29%	82.48%
Base + unigram + category info	85.14%	57.77%	68.83%
Base + unigram + category info + entity type	91.95%	37.33%	53.10%

Snippet classification is the only component in the system which uses supervised learning, with L2-regularized linear SVM as the classifier. The classifier data consists of a 4800 item training set and 799 item held-out test set, labeled by a single annotator. In Table 1 we report the results on the held-out set. Base sentence features consist of sentence length, sentence final word bigram and sentence final punctuation. Entity type features refer to the type of product category that the snippet comes from, based on the category ontology (the types include general classes such as “ingredient”, “dish”, “utensil” etc.). Unigram features consist of 200 words which were selected as best performing unigrams across different product categories represented in the training data. Finally, the category information feature consists of top 5 within-category TF-IDF scores for words in the snippet sentence.

As seen in Table 1, the classifier trained on base sentence, unigram and entity type features produced the highest recall and F-measure. However, in the initial system version we decided on the classifier with the highest precision on the held-out set (using a combination of all the features).

2.4 Preliminary Results

Before conducting a broader evaluation of the system, we began with a pilot survey with 5 participants. For products from 10 categories we selected top 4 results from the system, as well as top 4 manually chosen items which served as a human upper bound. The participants were first given a version where only the product category and product image were visible, and asked to rate on a 5 point scale whether they would be interested in clicking on the suggested item. A few days later they were shown the same data set with the snippets included and asked to rate it again.

These preliminary results cannot be interpreted statistically due to the limited scale of the pilot and the fact that the two conditions were presented in fixed order. However, they indicate that when the recommendation items are displayed together with a snippet, they are rated more favorably than the items for which no snippet is available. The average increase in rating per item when the snippet was present was 0.45 point (both manual and system selection). The average increase for the human upper bound was 0.48 point, whereas for the system results it was a 0.41 point difference.

Comments from the participants suggest that the difference is most noticeable with serendipitous recommendations, where the responders were able to gain new information about a product by reading the snippet. In the future we plan to conduct a larger scale survey with between subjects design, in order to quantitatively analyze the difference between the no-snippet and snippet condition.

3. CONCLUSION

We introduced a shopping cart recommender system which displays recommended products together with snippets extracted from their descriptions, which illustrate why the recommendation was made. At the moment, the system prototype is purely content based and it was designed to return suggestions for a single product in the cart. However, it can easily be extended to multiple products and integrated with user behavior-based methods in a hybrid approach. Furthermore, we plan to conduct more evaluations focusing on the system's accuracy and serendipity and continue improving the system. One of the advantages of the recommendation snippets is that we can analyze the user test results to provide feedback to the merchants on how to make their product descriptions more effective, which can in turn lead to increased coverage.

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TWO-STAGE WATERMARK SYSTEM FOR INCREASING COPYRIGHT POTENCY IN IMAGE MEDIA

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ABSTRACT

Although digital watermarking can help protect copyright of image media, merely embedding one image within another does not ensure authenticity. To address this deficiency, we propose a two-stage watermarking system (TSWMS) that requires registration of the image medium to a trusted third party (TTP). Whereas conventional TTP exposes authentication clues to all actors, including attackers. TSWMS keeps clues related to registered media in the owner. In this paper, we describe the techniques used in TSWMS and how they help to bolster copyright protection.

KEYWORDS

Watermarking authentication embedding encryption protocol

1. INTRODUCTION

To ensure the authenticity of digital watermarking, in which copyright information is embedded directly in image media, we have proposed a system that “outsources” embedding information to a detector service [Ohzeki 2005]. Focusing more squarely on the protection of digital copyright, we have since expanded the proposed outsourced services to include registration and preservation of copyright information. The resulting two-stage watermarking system (TSWMS) [Ohzeki 2009, 2012] provides greater protection of registered information by, among other things, restricting subsequent authentication services to queries associated with alleged copyright violations, thus preventing unwarranted access to embedded watermark information.

The conventional watermarking system is disadvantageous for owners and rather advantageous for attackers. Table 1 shows a comparison of advantage for owners and attackers. As for embedding, the owner should embed his watermark as one and fixed action. However, an attacker can change his watermark at any time. He can try to embed his watermark an many times as he wants. In total, the owner should keep rule consistently, however the attackers are free to change rules and try embedding and detection until he succeed.

Herein, we discuss the configuration and functions of TSWMS, and how it differs from conventional registration systems.

2. TWO-STAGE WATERMARKING SYSTEM

Figure 1 provides a block diagram of TSWMS. Image media registration is performed in the first stage. $Enc_A(.)$ denotes an encrypting function using owner A’s key. The proposed method registers and saves the data encrypted by owner A to the certificate authentication server (CAS). Because owner A retains the decryption key, the data remains confidential even if registration information is leaked. Note that, subsequent to registration, the system does not perform authentication in response to inquiries from unspecified parties, as more conventional system do.

In the second stage, owner A’s decoding key, Dec_A , is encrypted using the server’s encryption key, Enc_S , and sent to the server. This prevents exposure of authentication-related data, and represents an improvement upon conventional TTP [Cheung 03], which exposes watermark information and raw HASH values to open inquiry and analysis.

Figure 2 provides an example of an interaction between the server and an owner. The use of electronic signatures for data exchange prevents anonymous attacks, and ensures that other attacks (i.e. those carrying signatures) can be tracked even after the fact. In the second stage, where a copyright dispute has arisen, operations are structured to process a complaint from one party against another. To demonstrate the authenticity of his media, the owner encrypts his decryption key using the server's public key, and sends it to the server, so that it can decrypt the saved data and verify the authenticity claim. Because verification is carried out at one location over a limited span of time, it can be kept relatively confidential.

Note that TSWMS continues to protect registered copyright even when disputes have not arisen. When a dispute occurs, the system can perform comparative verification to prevent an unauthorized accusation from an attacker. While the owner does not intend anything, when others have infringed copyright (spoofing), the system has the advantage to prevent these damages.

The most significant vulnerabilities in TSWMS occur during registration. In the real world, registration systems permit false registrations, leak registered data, and introduce exploitable structures to attackers. These are natural side effects of open registration. For TSWMS, the most serious of these side effects is false registration, which can effectively usurp the copyright of the true owner. The only way to prevent this problem is to verify true ownership at the point of registration. Simple declaration of ownership by an applicant, even under legal strictures, is not sufficient. A “smart” registration server should also check for other registered images, similar to the one claimed.

Table 1. Comparison of advantage for owners and attackers in conventional watermarking system.

Actor	embedding	detection	attacking
Owner	Owner embeds a fixed watermark by a fixed complex embedding method for only one time.	Owner detects a fixed watermark by a fixed complex detection method for only one time.	none
Attacker	Attacker embeds a variable watermark by a simple embedding method for as many times as he wants.	Attacker detects a variable watermark by a simple detection method for as many times as he wants.	Attacker can remove embedded watermark by trying as many times as he wants.

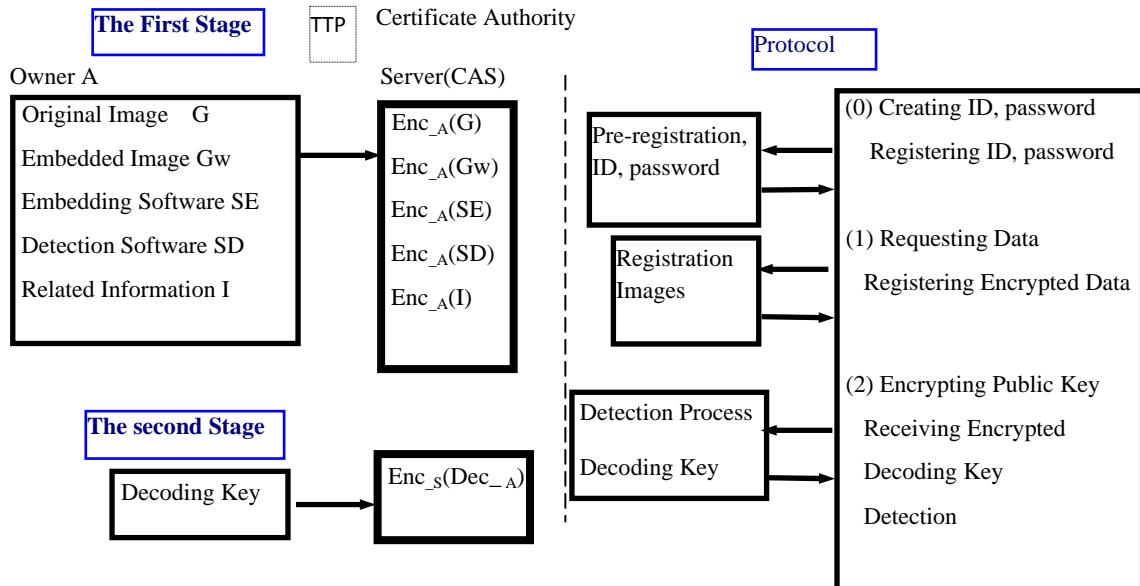


Figure 1. Two Stage Watermarking System (TSWMS) Figure 2. Protocol for registering and detection

Practical watermarking Most image media are still alive to keep copyright in the practical world. Some parts of media are infringed. Let a probability of keeping copyright by the conventional watermarking be “p”, and a probability of keeping copyright by registration without a strict registration examination be “q”. A

comparison model between the conventional watermarking and registration methods is shown in Table 2. An example of the strict registration is performed by the government copyright organization. It is performed in strict manner, but it takes cost and many procedures. Non-governmental certificate authority is required for media circulation in web. The reduced private registration, such as honor system will be increased. A relation of $p < q$ is needed for reduced registration system.

Table 2. Comparison model between a simple watermarking method without registration and TSWMS with registration.

watermarking method		probability of keeping copyright	probability of copyright infringement	loss of copyright
A simple watermarking method		p	1-p	(1-p)*(media value)
TSWMS	with a reduced registration	q	1-q	(1-q)*(media value)
	with a strict registration examination	1.0	0	0

To test the viability of this kind of image checking, an arbitrary image was used as the basis for an internet image search. Signal to noise (S/N) ratios for several indicated images are provided in Table 3. Here, noise is defined as the simple difference between the base image and the indicated image. Note that WM_1, WM_3, and WM_5 are watermarked images produced by embedding the watermark at different levels of the base image. JPEG is a simple JPEG-compression of the base image. Google_1, Google_2, and Google_3 are images returned by Google Image Search [Google, 2013] for the base image alone (no keywords were used). Unfortunately, search performance remains unsatisfactory for our purposes—S/N ratios for the returned images were quite low.

Table 3:SNR for watermarked images, JPEG compression, and searched similar images.

items	WM_1	WM_3	WM_5	JPEG(1/27)	Google_1	Google_2	Google_3
S/N[dB]	55.8	46.7	44.0	42.2	16.8	14.8	16.8

3. CONCLUSION AND FURFER STSUDY

TSWMS has the potential to significantly enhance copyright protection in the digital age. With tightened authentication and query policies, and improved registration mechanics, TSWMS service can prevent or deter most common attacks on protected media. Detailed protocol items are described for a registration stage.

To prevent attacks involving false registration, further improvements in online image search will be needed. The current image search services provided as web freeware are far from searching system of the similar image.

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