M-government framework

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2 authors:

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M-Government Framework

Ljupco Antovski
Institute of Informatics
Faculty of Natural Sciences
and Mathematics
Sts Cyril and Methodius University
Arhimedova 5
P. O. Box 162
1000 Skopje, Macedonia
E-mail: anto@ii.edu.mk,
http://www.ii.edu.mk

Marjan Gusev
Institute of Informatics
Faculty of Natural Sciences
and Mathematics
Sts Cyril and Methodius University
Arhimedova 5
P. O. Box 162,
1000 Skopje, Macedonia
E-mail: marjan@ii.edu.mk
http://www.ii.edu.mk

Abstract: *M-government is largely a matter of getting public sector IT systems geared to interoperability with citizen's mobile devices. In this regard, developing a coherent m-government framework in the public sector is an important factor. The basic concept for good framework is that it is principle-driven. A common mobile public services framework must first and foremost incorporate the following five principles: Interoperability, Security, Openness, Flexibility and Scalability. A short survey report for Macedonia is presented, with special attention in bridging the digital divide among developing and developed countries. As the survey in Macedonia has shown, the citizens should be carefully educated in order to feel comfortable with m-government. It involves public campaign and benefits that the citizens can clearly see and understand. Key points of innovative ideas and views for further research and development in this field is sketched in the paper*

Keywords: e-public services, m-government framework, m-citizen, mobile devices, wireless clients.

1. Research Motivation

"We can use new digital channels to deliver better quality services to the citizen – available 24 hours each day, faster, more convenient and more personalised. By doing so, we will also stimulate the market for e-commerce, by encouraging the widespread adoption of technologies and creating new business opportunities". (Blair T, 2000)

2. Introduction

In loose definition, M-government is largely a matter of getting public sector IT systems geared to interoperability with citizen's mobile devices. The authorities must have the capability to use each other's data so that citizens, companies and case officers do not have to provide special interfaces and interoperability standards. It means that the information is to be transferred seamlessly and securely. In this regard, common data definitions and coherence in the handling of security and users is highly recommended. And it means dispensing with technological islands if we are to create a platform for new work practices.

M-government is in its early stage of development and may be defined as a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices

for improving benefits to the parties involved in e-government including citizens, businesses and all government units.

M-Government is an emerging discipline concerning the rise of advanced mobile and wireless communication technologies that would improve the QoS that government services offer to citizens. Lack of standards and optimized data exchange protocols in mobile and wireless environments inhibit the potential of m-government (Arazyan, 2002).

In this regard, developing a coherent m-government framework in the public sector is an important factor. Like a number of other European countries, Macedonia has now placed e-government services development high on its agenda. But even though the initiative is in its peek, the recent survey shows lack of awareness about m-government among the citizens. In this fashion, the development of m-government standard unites innovation of architecture, technology, feasibility and citizen's education and awareness.

2.1. Research Methodology

Due to the fact that m-government is an emerging discipline, in our research we combine one or more research methods in the study. Where no appropriate theory can be found as a basis for research, we undertake exploratory research. This involves open-ended study, unguided by theory and intended to provide a new body of empirical knowledge from which theories might be able to be postulated. In order to validate our assumptions, we refer to triangulation with distinct methods for cross-validation on comparable data.

The mayor obstacles in the research are the recent emergence and the rapid change associated with the mobile technology and Internet that are the backbone of all m-government strategies.

3. Identified Problems

The potential of implementing mobile and wireless technology in e-Government is clearly identified. Several issues identified by recent studies (Lallana, 2004) and our research need to be addressed for broad implementation of m-Government services in Europe:

- Infrastructure development - the information technology infrastructure must be at a satisfactory level. The physical infrastructure refers to the technology, equipment, and network required for implementation of m-Government. Institutional arrangements and software that make m-government transactions possible are also very important.

- Mobile Payments infrastructures - are essential for the success of m-government. A very first obstacle for consumers to buy online is a feeling of mistrust in sending their credit card information over the mobile phone or the Internet. Several solutions for m-payment even offer a greater security that the wired systems (Antovski, 2003).

- Privacy and Security - citizens have a great concern about the privacy and security in m-government. The general issue is the convincement that their mobile phone numbers might be traced, when they send their opinions and inquiries to the government. The government must overcome the mistrust, and assure mobile users that people's privacy is protected and the information will not be sold to third parties. Wireless networks are still considered vulnerable because they use public airwaves to send signals. Because of

interception in all traffic on the Internet, there is a big chance for outsiders to attack on wireless networks to steal important information and temper with documents and files (Antovski, 2003).

- User friendly - the success of mobile government will depend on largely the number of its users, the citizens. Governments need to offer easy access to m-government information in alternative forms, possibly, using video and voice communications, in order to increase citizen participation and provide citizen-oriented services (Kushchu, 2003).

- Legal issues - the European countries have not yet adopted the Law of Fair Mobile Information Practices. In some cases the current legislative does not recognize mobile documents and transactions at all.

- Compatibility and interoperability - one of the technical difficulties might arise from compatibility of the mobile systems with the existing e-government systems. This may get even more serious in the cases of government offices having legacy systems which may not be easy to integrate. The solution lies in implementing open systems using open not propriety standards.

4. Framework pillars

The basic concept for good framework is that it is principle-driven. This means that first the business requirements are analyzed, and then on the basis of this a set of conceptual architecture principles is established for use in organization and technical selection (Sadeh, 2002). The framework must ensure coherence between the requirements and the principles so that the business requirements will be met by a solution that accords with the principles, and that the relevant principles are always grounded in business requirements. The framework principles are established in a multi-level hierarchy. The top level comprises common, general principles that, among other things, reflect the need for coherence across the public sector. The next level comprises principles that normally aim to optimize the IT solutions within the focus of the mobile communication and technology. At the lowest level are principles directed towards a specific system and standard or portfolio of systems and standards in a given institution that offers the service.

The purpose of the general framework principles is to ensure the honouring of the visions and objectives of the e-government initiative in the area of mobile communications. A common mobile public services framework must first and foremost incorporate the following five principles:

- Interoperability
- Security
- Openness
- Flexibility
- Scalability

Our recommendation of a service-oriented model stresses that interoperability is not just based on reading data on mobile devices from other systems, but that there must be functional coherence between the systems.

Interoperability is based on bilateral agreements in which the rules for communication are defined for each new system that is connected. This model works well both in principle and in practice where there are only a few well-defined parties with well-defined, stable needs for exchanging data. If information is to be easily exchanged between authorities, it is necessary for the mobile systems to speak the same language. The core

of interoperability is the stipulation of common data models and common protocols for exchanging data. The protocols must support the data models via so-called metadata (i.e. information about data), which describes and defines data.

The security functions are organized in such a way that the business requirements for security (of both the civil service and citizens) can be met to an extent that is acceptable in the given application scenario. The solution also has to be adjustable for any new requirements, without a large part of the previous investment in security becoming worthless. In many situations, the requirement for security will be seen as conflicting with, for example, interoperability and openness. Here the information will be structured according to sensitivity and to grade access according to the needs of the given parties.

The openness of the system is considered on several levels: open standards, open interfaces, open specifications and open source codes.

In principle, public authorities should use open, formal standards, but where this is not possible or attractive, the advantages and disadvantages of using open de facto standards should be considered. The architecture is conceived in a modular design where main functionalities are developed separately in modules that, when combined correctly, carry out the whole desired process.

Scalability should be built into a system from the start. It is important to be able to maintain both the functionality and efficiency of the solution if the need changes, for example in respect of user numbers, transaction volume or data quantity. Modularity and scalability must also relate to the nature and scope of the work.

The data exchange format is based on the exiting XML standard. The future work is concentrated on two sub-areas:

- Standardization process is to specify standards in XML for exchanging data between public authorities and between public and private institutions over light data exchange format suitable for mobile communication networks. This involves new optimized procedures for exchanging XML data in binary form.

- The info database is a database containing information on the content of public databases and information on how to access this data. Also this system is to act as a discovery directory when a mobile user enters in area where new service is offered.

5. Current state of the art in Europe

At the moment there are several IST projects that treat the issues of m-Government in different fields. The Policy-based Security Tools and Framework (POSITIF IST-2002-002314) project concentrates on development of a suite of security tools. One of the objectives is the development of a lightweight security module (for workstations and mobile devices) to protect them against network attacks, make them part of the security system and permit secure download of new configurations. The enabling users for - Distance-working and Organizational Mobility using Ambient Intelligence service Networks (EU-DOMAIN IST-2002-4420) project will develop a new, innovative European ambient intelligence service platform for automatic, context sensitive offering and contracting of mobile web services across heterogeneous

networks. The EU-DOMAIN service platform will interconnect people, devices, buildings and content in an interoperable network (IST, 2005).

The work in the project Usability-drivEn open platform for MobilE GOVernment (USE-ME.GOV IST-2002-002294) is based on a few selected service types with universal applicability and potential impact for different countries and regions (IST, 2005). It most closely addresses some of the objectives of the proposed project. The main outcomes of the USE-ME.GOV project are expected to be:

• Open Service Platform for Mobile Government: satisfying the most critical interoperability and scalability requirements and shared use.

• Comprehensive Business Models for Mobile Government compiling interests and roles of relevant stakeholders and correlating their roles and interests in distinct service and business scenarios.

• Recommendations for Service Planning: providing a thorough and comprehensive service planning methodology covering business planning, implementation planning and an overview of important standardisation and regulatory issues.

Apart form the FP6 IST programme there are several city and state projects as the Mobile City of Bremen project and the M-Government project conducted by the government of Malta that offer several e-government services to the citizens using mobile devices especially mobile phones.

Our research and development goes further in developing a comprehensive platform that will enable access to e-government services over variety of mobile and wireless devices. The idea is to develop a discovery service that will enable a mobile European Citizen to travel from one place to another and discover the services available in that area on demand. The security issue is crucial considering the lack of trust from wide number of citizens when the mobile and wireless devices are in question. The security research will focus on optimised security protocols with light processor power requirements and level of security up to the wired systems.

Using in dept analysis an adaptable future business model will be developed appropriate for the European countries, the accession countries and developing countries in Europe. The developed application solution will be based on the postulates of: Interoperability, Openness, Security, Scalability, Usability and Mobility.

6. Macedonian Case

In order to present a clear picture about the user's readiness to adopt the m-government channels, we conducted an electronic survey about the citizen's opinion in the Macedonian society. Macedonia is a developing European country with medium IT penetration and strong penetration of mobile and wireless technologies.

Benefit	% participants
Better Information	41%
Save time	33%
Better communication	29%
Freedom	23%
Mobility	21%
Democracy	21%
Transparency	16%

Table 1. Survey-Benefits from M-Government in Macedonia

The electronic survey was anonymous. The survey was intended mainly for the employees and the student at the Institute of Informatics in Skopje. Total of 101 participants answered the questions in the survey, 63% males and 37% females. The participants were mainly young people, in the age group 20-35 years old with strong IT knowledge.

According to the results, the major part of the participants were not informed about e-government (66%) and even more 68% did not have a clear picture what is m-government. >From the rest, 55% saw m-government as an addition to e-government and 45% considered them completely diverse.

The participants numbered several issues as benefits from implementing m-government services in Macedonia. The mostly addressed issues are presented in Table 1.

When it comes to the State's strategy about implementing m-government services, the participants clearly identified that it should involve pilot projects, implementation of balanced services with democracy/cost and services that are profitable in nature.

At the end, the participants pointed out that the issues as: lack of knowledge in the government, lack of technical infrastructure, lack of initiative and inexistence of ministry of information technology should be considered as major obstacles when implementing m-government services in Macedonia.

The fact that in Macedonia there are more than 800.000 mobile phone users (>40%) and the number of Internet users is slightly above 100.000 (>5%) is substantial to conclude that in order to bridge the digital divide (Ghyasi, 2004 and Lallana, 2004), the m-government strategy is must for a developing country as Macedonia. The critical number (>35%) is reached and the technology infrastructure exists.

7. M-GOV project

Most of the framework ideas are addressed in the M-GOV project. It is a current research and innovation project at the Institute of Informatics, designed to encourage the access to new mobile and wireless public electronic services. M-GOV is a two-year project in the first year of execution. The project is based on close cooperation between Public Authorities, SMEs and Universities. The vision of the project M-GOV is Mobile European Citizen. All government services should be acceptable by the citizens at any time and anywhere over personal mobile devices like mobile phones, PDAs, laptops, etc.

The main goal of M-GOV is to contribute to a development of a new cost-effective open public service platform for mobile citizens. The new platform will support usability, openness, interoperability and

scalability. It will introduce the business model of close cooperation among the service providers, public authorities and citizens. The main M-GOV innovation is the Service Discovery Directory. It will enable discovery and instant consumption of new and available M-Government services in the current location of the mobile citizen wherever in Europe.

The M-GOV project aims to meet the following objectives: New models specifying how mobile services for multiple ambiances will be coupled, integrated, assembled and offered by various service providers; New communication platform that can support highly personalized mobile services, while adapting to different networks and protocols; Plug and Play environment for new mobile services; Implementation of optimized interfaces among the service providers, public authorities and citizens; and Innovative Service Discovery Directory.

The research and innovation component in the project is addressed in the following tasks:
• Research on the feasibility of implementing mobile and wireless services in e-government.
• Specification of Service related components (for service integration)
• Specification of Content related components (Metadata)
• Development of Interoperability Framework

A research group is working on the specification of the content, more specifically the essential data and its format (Metadata) that is interchanged in the system. The basic idea is to use a flexible XML format called Mobile Government Extensible Language (MGML) in binary form (optimized for mobile environment). The flexible format will enable implementation of new services with different content. The format of the new service will be reported in the salutation phase with the service discovery directory.

The main objective and innovation component of the project is to define an interoperability platform, service discovery directory and interfaces to external systems.

The interoperability is achieved through the use of Message Oriented Middleware (MOM) and a specialized set of messages for this domain. This middleware enables the exchange of messages between components as well as between different systems.

The Service Discovery Directory (SDD) is based on the philosophy of Web Services UDDIs. The client connects to the SDD over his/her mobile device. In the area of the citizen's presence, the SDD identifies the available public electronic services. The citizen's mobile client and the SDD exchange the MGML data formats and the electronic addresses of the available services. Then the client could continue communicating with the desired service. If the service is not available for the specific client, the SDD acts as an interface among the different environments. This enables the accessibility of merely all the known electronic services for citizens over theirs mobile and wireless devices.

Existing databases will be wrapped using semantic wrappers and their data will be made accessible through the use of web services. These web services will communicate in the language used in the MOM. This interoperability architecture allows communication with other systems and makes use of their data.

At the end of the project, the team will present the platform specification. It will consist of the service, content, interoperability and service discovery directory specification. This platform will enable the vision of European citizen. The paradigm enables accessing the local mobile electronic public services in the place

of stay in the European Union, wherever the citizen is at the moment (not merely in his place of permanent residence).

8. Conclusion

As the survey in Macedonia showed, the users should be carefully educated in order to feel comfortable with m-government. It involves public campaign and benefits that the citizens can clearly see and understand. When implementing new technologies, governments should not force citizens to upgrade their current devices, but rather smart small with applications using current technologies and current bandwidth for data transfers or services. Starting small, but thinking big – basic m-government applications should be cornerstones of wireless strategies for governments worldwide. On the other hand, such systems should be open to handle new technologies and the strategy should have a clear, long-term vision for the provision of the service and information relating to it.

Governments should prepare a complex strategy in close cooperation with the public and private sectors. The implemented solution as discussed above should be based on Interoperability, Security, Openness, Flexibility, and Scalability. The development of mobile public services must be based on sound framework based on the above emphasized principles.

We feel that the impact of mobile technologies on government administration is huge as this will have implications for the success of widely adopted M-Government applications. In order to consume the benefits a sound standardized solution is to be defined.

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About the Authors

LJUPCO ANTOVSKI was born in 1977. Since 2001 he is with the Institute of Informatics in Skopje, Macedonia. Currently he is a PhD student and a teaching/research assistant at the Institute. He is an active member of the Wireless Application Laboratory. He graduated in electrical engineering at the Faculty of Electrical Engineering in 2001, major in computer science and automation. Mobile payments were the field of both his research and Master Theses. He has published several papers concerning the aspects of m-payments, e-banking and m-government.

MARJAN GUSEV was born in 1961. He is regular professor at the Institute of Informatics at the Faculty of Natural Sciences and Mathematics, St Cyril and Methodius University in Skopje, Macedonia, and manager of Wireless Application Laboratory. He completed his PhD studies in Loughborough, UK and Ljubljana, Slovenia in the field of parallel processing. He has published many papers in the field of parallel processing, e-business and mobile applications.