# ACADEMIC STAFF AND STUDENT MOBILITY BENEFITS AND PROBLEMS, EXPERIENCES FROM TEMPUS SoCD PROJECT

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# ACADEMIC STAFF AND STUDENT MOBILITY BENEFITS AND PROBLEMS, EXPERIENCES FROM TEMPUS SoCD PROJECT

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## 1. APSTRACT

Within the Tempus SoCD project, we conducted several academic staff and students mobility. In this paper, we present our experiences, benefits and problems that we have with mobility and its impact on Bologna process. We provide a comparison of learning opportunities in European countries in contrast to Macedonia as a partner country. We give mainly the students' perspective of mobility and their experience how mobility influenced their knowledge. This tempus project had a great impact on enhancing and synchronizing SoCD master program with its European partner universities through the study programs' improvement and especially with the establishment of new advanced SoCD laboratory.

## 2. TEMPUS SOCD PROJECT OVERVIEW AND INTRODUCION

System-on-chip (SoC) technology is the ability to place multiple function "systems" on a single silicon chip, cutting development cycle while increasing product functionality, performance and quality. An SoC consists of both the hardware, and the software that controls the microcontroller, microprocessor or DSP cores, peripherals and interfaces. With the increasing adoption of SoC design over the years, it has now become the driver for many other improvements in the integrated circuit (IC) industry. In fact, SoC is now a driver for the development and use of industry-wide standards [2][3].

Based on these facts the System on Chip Design project was proposed and accepted for financing by TEMPUS JEP_41107_2006 grant [1]. The project has two EU partners, School of Telecommunication Engineering (ETSIT) at Technical University of Madrid and School of Electronics and Computer Science (ECS) at University of Southampton. Partner country universities involved into the project are Faculty of electrical engineering and information technologies at University SS Cyril and Methodius and Elektronski Fakultet at University of Niš.

One of the main goals of the project was the introduction of new an interdisciplinary Master of Science Programme on System-on-Chip design, which couples hardware and embedded software design principles. The program aims to provide students with competence and skills for designing, analyzing and verifying System on Chip systems by allowing the experience and knowledge form EU partners to be applied in partner country universities. As part of the new master program the new laboratory was established and several academic staff and students' mobility were made.

## 3. ACADEMIC STAFF MOBILITY

In SoCD project academic staff and student's mobility were planned as a tool for enhancing the standards in partner countries.

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During mobility in EU universities the academic staff was educated to implement the new teaching methods. Each of the teachers involved in the project visited the universities in the EU, in order to gain experience, and to transfer and apply it in redesigned courses. During visits, the academic staff had the opportunity to see the hardware and software resources used by EU partners. We also had attended lessons in order to get closer to the teaching methodologies and techniques implemented in their Bachelor and Master programs. We were also introduced to the members currently working on projects, and we had a good opportunity to discuss and exchange experiences on these topics related to System on Chip Design. We found this experience very helpful for implementing it in the courses held at our university and appropriately using the equipment in our laboratory.

## 4. STUDENTS MOBILITY

Maybe a more interesting and challenging task was to organize student's mobility. For a person of student age, making changes is easy and challenging.  Every chance that is given to further learning in his/her field of studying is welcomed, especially when it comes to expanding and acquiring new knowledge in a more advanced country. Students studying in multiple academic settings believe that a series of benefits will accrue from their studies. These individuals may, for example, be interested in strengthening their personal development, increasing their academic opportunities or enhancing their career prospects. Mobile students believe that a diversified education provides them with the increased confidence, maturity, linguistic competence and academic ability. Exposure to other cultural surroundings is also perceived as being important [4]. Within the SoCD project, we had two students mobility with three-month  duration of stay.

The process of selecting students for mobility was a not easy task. As a project leader I speak with the best students from the program. It is interesting, that because there is a shortage of computer engineers in Macedonia and duration of stay was three months, two students with whom I spoke did not accept the possibility of mobility. Finally, I found two students, one of them was employed and another was unemployed. In order this paper to be more accurate and authentic I had asked students to provide me with reports in which they described their experiences from their stay at the EU universities. The following text lists some of their observations and ideas.

When the employed student received the proposal, his main hesitation was whether to leave his job position for three months, because he was in the middle with an ongoing project. After he got permission from his superiors and an extra planning of the time left until the anticipated leaving term, he decided to accept the offer. The projected amount of money for the ticket was high enough, so he didn't have any problems finding and buying an appropriate one. Additional relief during the preparations was the visa liberalization for our country. Because the anticipated period of stay was 90 days, he could allow himself traveling without a visa. He didn't have any problems of that kind during the journey.

According to him, the public transport in Madrid is very well organized, so he could reach places of interest without a problem, just with a little previous research about their placement. Reaching the university campus was not a problem at all, because of the very good traffic infrastructure, with very frequent bus and metro lines going towards it.

About the university campus, he described it as very "student-friendly", covered with signs pointing to different institutes, placed on a larger area with parks and sport courts between them. The care taken about the sport activities of the students was one of the things he liked. Speaking about the practices that were used at the institute for electronics where he was participating, he expressed his satisfaction of the opportunity to be included in the whole process, starting from research of some very fresh standards and technologies and at the end realizing the research in practice, which will certainly be one significant point in his CV. He thinks that the main advantage of the university he was working in, over his home university, is the amount of finances that are spent for up-to-date equipment, which students can get easily in

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touch with. And a number of laboratories are available where they can use the equipment, working on their projects during the studies. Another thing to emphasize is that the teaching assistants were very often present in the laboratories to check how are the students advancing and helping them with some issues or discussing about the study they were working on.

The monthly incomes he received during his stay were enough for paying his accommodation and having a normal student life. Practicing a new foreign language and living in an apartment with students from different countries, was a great chance for representing his own and learning new things about the education system of the host country and other EU countries. Living and studying in a city with that size and so well organized was a great experience for him.

The student that visited University of Southampton was unemployed and was pleased to accept this possibility. According to her report, the University of Southampton is located on a large complex which has a student center, library, a lot of restaurants, canteen and cafe bars. The School of Electronics and Computer Science is in a new building with a modernistic architecture made of glass and interesting colors and shapes. There are clean rooms, clean laboratories, optical and technical laboratories, research and office areas, social space and seminar rooms, major plant space, and an atrium reception. The School of Electronics and Computer Science is the leading university department of its kind in the UK, with an international reputation for world-leading research across computer science, electronics and electrical engineering. There are a lot of research groups and opportunities and PhD research. The students can work on their projects alone or in a group in one of the computer areas, unlike in Macedonia, where the students have to do their projects at home. The students of the TEMPUS project work in one of the research labs and are provided with desk, internet access, printers and other utilities. In the lab work other research students, making the work experience more friendly and interesting, which is another opportunity for making friends, exchanging ideas and experiences. They have highly equipped laboratories, public rooms with a lot of computers (Linux, Mac, Windows) and library equipped with a huge diversity of books and available spaces for studying, says much about how the Macedonian university should make more improvements to facilitate learning.

She had been feeling that the city is a student friendly, which means that everything is, connected and accessible to the students. There is a special bus line, which connects the university with the halls and the city centre, and works during the weekend night. The standard in England is higher than the other European countries, especially the Macedonian. The money awarded by the project is just for paying the accommodation (in halls), transport and food, and maybe something for additional costs. To sum up, if given the opportunity any student should not miss this experience.

Other aspects are student's research activities. In order students to have benefits in developing their research skills we made detailed planning of their mobility. First based on EU professor's research interests and our research interest, we made a plan about the scope and topics that will be covered during students stays in EU universities. After the plan was made, one month before they went to the EU universities, students get reading materials in order to get involved into the research topic. When they started their mobility, they have some basic knowledge about the research topic, and they successfully joined EU research teams.

### 5. NEW SOCD LABORATORY

As a major step towards raising the standards of our university to those of our EU partners, was the creation of a suitable laboratory. This laboratory would help in providing similar conditions, which are in the EU universities.

Within the budget that had been available (total budget for equipment was 19 870 Euros) to make laboratory, we build SoCD laboratory for computer engineering students and laboratory for classes and for research. The core of laboratory are several different FPGA development boards, starting from OpenSPARC Evaluation Platform, then four different Xilinx Spartan-3E

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FPGA development boards and one Network Development System with Xilinx Virtex-II Pro. We also buy 8051 Trainer board, Micro. Net Development platform and ZigBee Development Kit. For testing purpose three Digital oscilloscopes were purchased. Because we wanted to have a practical approach, we get many different sensors and peripheral modules like Temperature sensors, Infrared Reflective Object Sensor, Infrared Light Detector, Video Decoder Board, and Robotic Starter Kit. We also purchase many different displays, wire kits and connectors.

However, it is interesting to mention that based on the suggestion of our EU partners in accordance with their latest research activities in the field of parallel processing with graphical cards, we buy computers with graphics cards that have embedded multicore GPUs. So we got a laboratory in which we have a server with GPU with 480 cores and a dozen of workstations with 32-core GPUs. This approach allowed us to grasp the plug with research trends and to obtain extremely powerful processing power that can be compared with some supercomputers.

## 6. CONCLUSIONS

In this paper, our experience with mobility within SoCD TEMPUS project was given. We evaluate these visits as very helpful and important for a future collaboration. We found very useful making comparison of the teaching programs at EU partner's universities and our university.

Students are very satisfied with their mobility, and they had the opportunity to see how similar studies are organized in EU. Based on this experience we are expecting that they will benefit in their future careers, and that they will transfer their experiences to their colleges in Macedonia. One of the problems with mobility is that at UKIM the credit transfer is not regulated yet, and our students cannot  directly have an incentive from their mobility. However, because the SoCD study program is synchronized with our European partners the students while their stay learned very similar topics with their domestic master program. So based on this fact we make equivalence, and we recognize parts of some subjects.

From our point of view, and also from student's opinions, one of the main steps to lower the gap between EU and partner universities is creating an advanced laboratory. In our case, we think that we have succeeded to get best price performance for our new SoCD laboratory. Based on recommendations of ours EU partners besides SoCD laboratory we also get laboratory that can be used for parallel processing.

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