Experience of a long-term multilateral educational project in software engineering

based on the DAAD programme “Academic Reconstruction of South-East Europe”

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Workshop

Cooperation at Academic Informatics Education across Balkan Countries and Beyond

Primošten, Croatia, 3rd – 7th September 2018
Contents

• Introduction

Outcomes and success factors:
• I: Joint teaching materials and more
• II: Guest lecturing
• III: Joint papers
• IV: Workshops
• V: DAAD funding and programme development
(Simple) success indicator:

group photos 😊
Group photo in 2016 (Jahorina)
Group photo in 2001 (Novi Sad)

Novi Sad, Skopje, Belgrade, Plovdiv, Nis, Kragujevac, Berlin
Group photo in 2002 (Plovdiv)

Novi Sad, Skopje, Belgrade, Plovdiv, Nis, Kragujevac, Berlin
Group photo in 2003 (Ohrid)

Novi Sad, Skopje, Belgrade, Plovdiv, Nis, Berlin
+ Zagreb, Sarajevo, Banja Luka, Timisoara, Tirana
From DAAD reviewing our project in 2016

(another success indicator)

- DAAD 2016: one of the top-3 projects in the programme (out of 40 projects)

- Reviewer 2016: „With minor funds, fundamental outcomes reached – based on personnel efforts and motivation“
The project must have had a value
What counts as value (a feature, an activity, an outcome) in our DAAD project?

- Workshops annually
- Joint teaching materials
- Teacher exchange (guest lecturing)
- Joint papers

- Influence on local curricula
- Other projects: EU Tempus
Outcomes and success factors
Joint teaching materials

... not main subject from the very beginning
Fields of cooperation 2001 - 2003

Distributed reverse engineering:
XCTL
Software system used in experimental physics

Joint course on software engineering:
JCSE
Network for software engineering training and teaching
In the beginning 2001:

Only the general aim of DAAD programme: „Academic reconstruction of South Eastern Europe“

→ Search for common interests
  (Reverse engineering project – SE course)
JCSE: the core outcome
<table>
<thead>
<tr>
<th>Location</th>
<th>Language</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novi Sad</td>
<td>English</td>
<td>2002-04: 2 times, English, 10 particular participants, 2004-16: ordinary students, Serbian slides</td>
</tr>
<tr>
<td>Skopje</td>
<td>English</td>
<td>Materials used in 2 different courses since 2004; in 2007 the first real delivery of the JCSE in Skopje</td>
</tr>
<tr>
<td>Plovdiv</td>
<td>Bulgarian</td>
<td>2 different curricula, 100 participants, since 2003, textbook in 2006</td>
</tr>
<tr>
<td>Kragujevac</td>
<td>Serbian</td>
<td>Since 2003</td>
</tr>
<tr>
<td>Zagreb (Dubrovnik)</td>
<td>Croatian</td>
<td>1 topic</td>
</tr>
<tr>
<td>Timisoara</td>
<td>Romanian</td>
<td>1 topic</td>
</tr>
<tr>
<td>Berlin</td>
<td>German</td>
<td>4 times (transparencies) + 6 times (ppt), 80 participants</td>
</tr>
<tr>
<td>Belgrade (Faculty Elec.Eng.)</td>
<td>Serbian</td>
<td>2005 - 2016, Serbian slides, 12 topics, 133 participants in 2005</td>
</tr>
<tr>
<td>University of Tirana</td>
<td></td>
<td>2007, some topics used in a Bachelor course</td>
</tr>
<tr>
<td>Polytechnic University Tirana</td>
<td></td>
<td>2007 - 2016, course delivered by guest lecturers and local teachers in a Master’s study</td>
</tr>
<tr>
<td>Rijeka</td>
<td></td>
<td>Since 2010, selected topics by guest lecturing since 2014</td>
</tr>
<tr>
<td>Sarajevo</td>
<td></td>
<td>Selected topics, in 2012 - 2016 by guest lecturing</td>
</tr>
<tr>
<td>Tetovo</td>
<td></td>
<td>Since 2014, selected topics by guest lecturing</td>
</tr>
</tbody>
</table>
JCSE: basis of different activities

- **Localization:**
  - *National versions* in Serbian, Croatian, Bosnian, Macedonian, German, Albanian, Bulgarian, Romanian …
  - *Multi-lingual dictionary* in SE
  - *S-Bahn-Tool* (*tool-support for localization*)

- **Textbooks** in Bulgarian, Serbian

- **eLearning:** Tool AHyCo

- **Project management of JCSE**
  (lecture notes, slide style guides, …)
Textbook released in Bulgarian language in 2006
Common interests evolved from Software Engineering to … (many other fields)
DAAD project website: The whole project is represented

Project - "Software Engineering: Computer Science Education and Research Cooperation"

DAAD | Stability Pact Sponsored by Germany

Subprojects
Software Engineering
OOP with Java
Software Project Management
Compiler construction
Data structures and algorithms
Multi-lingual dictionary
S-Bahn tool
E-learning
Reverse engineering XCTL

Introduction

The project started in 2001 when it was supported by DAAD (German Academic Exchange Service) under auspices of Stability Pact for South Eastern Europe. The main goal of the project has been to cooperatively develop a joint web-based course in software engineering, the materials of which are now in use by several partner universities. The second main focus of the project was a cooperative research project on distributed software reengineering of a technical system in experimental physics.

In 2004 the project continued under support of DAAD and auspices of Stability Pact for South Eastern Europe. It has 17 participating institutions from 10 countries. The leader of the project is Prof. Klaus Bothe, Institute of Informatics, Humboldt University, Berlin, Germany.

Currently project deals with:

- creation of new educational topics in joint course of software engineering and new case studies for usage in lectures;
- creation of joint teaching materials in "Object-oriented programming in Java", "Compiler construction", "Software project management", "Data structures and algorithms";
- continuation of the work on cooperative research on distributed software reengineering of a technical system in experimental physics;
- work on localization of produced material and building of appropriate specialized tool(s);
- transforming parts of existing teaching materials into an e-learning and distance learning environment

The activities and results of the projects are reported and reviewed on annual project workshops. Besides that, since the year 2003, there are also annual project coordination meetings. Results and reports on project activities have been reported in numerous papers published at international and national conferences.

© 2001 - 2015. For details of the project please contact Klaus Bothe. For the site contents contact Zoran Budimac.

http://www2.informatik.hu-berlin.de.swt/intkoop/daad/
Cooperation in Subprojects

**JCSE**
Berlin, Novi Sad, Belgrade, Plovdiv, Skopje, Timisoara, Zagreb, Tirana, Sarajevo, Rijeka, Tetovo

**OOJava**
Timisoara, Novi Sad, Skopje, Belgrade (ETF), Belgrade (Sc), Berlin, Plovdiv

**SW PM**
Novi Sad, Berlin

**Compiler**
Belgrade (ETF), Novi Sad, Berlin

**RE XCTL**
Berlin, Belgrade (ETF), Plovdiv, Novi Sad

**National versions**
Skopje, Novi Sad, Plovdiv, Timisoara, Zagreb, Tirana, Belgrade (ETF), Sarajevo, Kragujevac, Berlin

**S-Bahn Tool**
Development & use: Berlin, Novi Sad, Skopje, Plovdiv, Belgrade (ETF)

**E-Learning**
Rijeka, Novi Sad, Plovdiv, Skopje, Berlin

**Curriculum development**
Sarajevo, Berlin, Novi Sad, Plovdiv, Skopje, Timisoara, Belgrade (ETF)

**TEMPUS**
Berlin, Novi Sad, Skopje, Belgrade (ETF), Nis, Plovdiv, Timisoara
II

Guest lecturing

… on the basis of JCSE, Tempus, and others
Guest lecturing for JCSE, Joint Master SE, Robotics, Research Methods

As guest and host:
Skopje, Novi Sad, Berlin, Tirana, Sarajevo, Tetovo, Rijeka, Plovdiv, Timisoara
III

Joint papers
Educational Cooperation across Countries by Shared Course Materials: More than 10 Years of Experience

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Abstract—At the beginning of the new century, we started with an educational project aimed at the joint development and shared use of teaching materials for software engineering education. The aim was to transfer knowledge, as well as to save expenses. Over the years, our cooperation did not only cover the development of the course, but also its delivery, e.g. by guest lecturing. This paper reports on the experience gained in a multi-country project. Both success factors and problems are outlined.

Keywords—Software engineering; shared teaching materials; multilateral cooperation

universities. This has led to novel aspects for our project: its multi-lateral character and a plethora of interesting contributions from different educational environments. These unique elements impacted on both the nature of the course material and the management of the project.

This paper addresses issues concerning the particular course materials to be produced in such an environment and the unforeseeable project management. The original main objective was the introduction of an SE course for Southeast European universities based on materials and experiences of the German universities and to provide a novel approach in this direction.
Reviewer's remarks concerning ...

... the paper at „Informatics Education Europe“, Freiburg, November 2009

General Remarks:

- The results of the paper should be relevant to almost all universities in the future.
- The paper is a good experience report about a running project with experience. Nice results, high diversity of project partners.
- This paper illustrates a good experience of the sharing of teaching material across institutions and countries. It illustrates how the material can be used as both a complete course and as a selective topic choice.
- It is impressive that it was possible to use the materials for so many classes in all the different countries!
Dear Prof. Bothe,

read about the joint course on Software Engineering that you are running with other European universities (e.g. Serbia, Bulgaria, etc.).

I am very much interested to have a similar cooperation to implement the joint course on Software Engineering in my university (Department of Computer Science, University of Botswana). If it works well, it could be extended to other universities in this side of the world.

Let me know if this idea is feasible from your side.

Best regards,
Yirsaw

***********

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IV

Workshops
Workshops:
central events to exchange ideas on software engineering and other fields of informatics
Workshops: about 700 presentations

E.g. Jahorina: 57 presentations

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Duration</th>
<th>Chairperson: Costin Badica</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00:00</td>
<td>09:30:00</td>
<td>00:30:00</td>
<td>Klaus Bothe: Opening talk</td>
</tr>
<tr>
<td>09:30:00</td>
<td>09:50:00</td>
<td>00:20:00</td>
<td>Novica Nosović: Who can (not) call him/herself a SW engineer?</td>
</tr>
<tr>
<td>09:50:00</td>
<td>10:10:00</td>
<td>00:20:00</td>
<td>Patrizia Poščič: Aligning Study Programmes with Occupational Standards and Qualifications Standards in the Field of Informatics Based on Croatian Qualifications Framework</td>
</tr>
<tr>
<td>10:10:00</td>
<td>10:30:00</td>
<td>00:20:00</td>
<td>Betim Cico, Besnik Selimi, Klaus Bothe: Doctoral School at SEEU: challenges and future directions after 3 years</td>
</tr>
<tr>
<td>10:30:00</td>
<td>10:50:00</td>
<td>00:20:00</td>
<td>Anas Mishev: Software quality by design</td>
</tr>
<tr>
<td>10:50:00</td>
<td>11:10:00</td>
<td>00:20:00</td>
<td>Boštjan Šumak: User Experience Design and Evaluation in Software Engineering</td>
</tr>
<tr>
<td>11:10:00</td>
<td>11:40:00</td>
<td>00:30:00</td>
<td>SHORT BREAK</td>
</tr>
<tr>
<td>Midday session:</td>
<td>Chairperson: Stanimir Stoyanov</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:40:00</td>
<td>12:00:00</td>
<td>00:20:00</td>
<td>Elinda Kajo Mece, Vanjela Pine, Sibora Theodhor: Software engineers, the transition from student to employee in the Albanian job market</td>
</tr>
<tr>
<td>12:00:00</td>
<td>12:20:00</td>
<td>00:20:00</td>
<td>Tijana Vislavski: Crossing the line: from student to student instructor</td>
</tr>
<tr>
<td>12:20:00</td>
<td>12:40:00</td>
<td>00:20:00</td>
<td>Marco Polo, Betim Cico, others: New Trends in Information Technologies and Their Integration in University Curricula: a Brief Study in the Context of the FETCH European Thematic Network</td>
</tr>
<tr>
<td>12:40:00</td>
<td>13:30:00</td>
<td>00:50:00</td>
<td>LUNCH BREAK</td>
</tr>
<tr>
<td>Afternoon session:</td>
<td>Chairperson: Krešimir Fertalj</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:30:00</td>
<td>13:50:00</td>
<td>00:20:00</td>
<td>Hans-Dieter Burkhard: New Experiences with RoboNewbie Software</td>
</tr>
<tr>
<td>13:50:00</td>
<td>14:10:00</td>
<td>00:20:00</td>
<td>Amelia Badica, Costin Badica, Florin Leon, Ionut Buligiu: From Business Process Models to Agent Programs</td>
</tr>
<tr>
<td>14:10:00</td>
<td>14:30:00</td>
<td>00:20:00</td>
<td>Jovana Ivković: Maintaining and improving academic software</td>
</tr>
<tr>
<td>14:10:00</td>
<td>14:30:00</td>
<td>00:20:00</td>
<td>Tihana Galinac Grbac: Virtualisation technologies in software engineering management</td>
</tr>
<tr>
<td>Total Duration</td>
<td>05:50:00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the afternoon: Organizational Issues
People reached by our DAAD 2000 – 2016/18

- 221 different workshop participants
- Students in Joint Master in SE (Tempus: Novi Sad - Skopje)
- Students in Robotics (H.-D. Burkhard at Plovdiv, Sarajevo, Skopje, Rijeka, Tetovo),
- Students in Research Methods (Novi Sad in Tirana)
- Students by guest lecturing JCSE
- Students by local teachers using JCSE, Project Management …

More than 1000 people (staff + students) reached

  e.g. Tirana: 342 Master students
Polytechnic University Tirana: intensive course JCSE since 2007

342 students in 12 years + …

<table>
<thead>
<tr>
<th>Year</th>
<th>From</th>
<th>To</th>
<th>Students</th>
<th>Semesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>19 – 24 March</td>
<td>2007</td>
<td>17</td>
<td>4th semester Master</td>
</tr>
<tr>
<td>2007</td>
<td>21 – 26 April</td>
<td>2008</td>
<td>32</td>
<td>1st semester (15) Bachelor</td>
</tr>
<tr>
<td>2007</td>
<td>22 – 27 June</td>
<td>2009</td>
<td>17</td>
<td>2nd semester Master Tirana (11)</td>
</tr>
<tr>
<td>2007</td>
<td>31 May – 5 June</td>
<td>2010</td>
<td>14</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2008</td>
<td>24 – 29 June</td>
<td>2011</td>
<td>25</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2008</td>
<td>4 – 9 June</td>
<td>2012</td>
<td>28</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2009</td>
<td>3 – 7 June</td>
<td>2013</td>
<td>40</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2009</td>
<td>2 – 6 June</td>
<td>2014</td>
<td>42</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2010</td>
<td>22 – 27 June</td>
<td>2011</td>
<td>25</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2011</td>
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<td>2012</td>
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<tr>
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<td>2 – 6 June</td>
<td>2014</td>
<td>42</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2014</td>
<td>31 May – 5 June</td>
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<td>2015</td>
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<td>2nd semester Master Tirana</td>
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<td>32</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2016</td>
<td>31 May – 5 June</td>
<td>2017</td>
<td>35</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2016</td>
<td>24 – 29 June</td>
<td>2017</td>
<td>40</td>
<td>2nd semester Master Tirana</td>
</tr>
<tr>
<td>2017</td>
<td>31 May – 5 June</td>
<td>2018</td>
<td>40</td>
<td>2nd semester Master Tirana</td>
</tr>
</tbody>
</table>
Workshop participants

- Novi Sad, YU, 2001 23
- Plovdiv, BG, 2002 26
- Ohrid, MK, 2003 27
- Zagreb, CRO, 2004 30
- Baile Herculane, RO, 2005 31
- Ravda, BG, 2006 35
- Risan, MNE, 2007 40
- Durrës, ALB, 2008 47
- Neum, BiH, 2009 42
- Ivanjica, RS, 2010 52
- Ohrid, MK, 2011 62
- Opatija, CRO, 2012 65
- Bansko, BG, 2013 62
- Sinaia, RO, 2014 53 *)
- Bohinj, SLO, 2015 65
- Jahorina, BiH, 2016 53 *)
- Primošten, CRO, 2018 44 *)

*) reduced budget

Stable participation - and healthy fluctuation

221 different participants 2001 - 2018
Participants by participation (workshops until 2018)

Total number of different participants: 221

Graph of participation

4 people took part in 10 workshops
Workshop locations:

impressions of different regions of Balkan countries and beyond
Workshop: social program and atmosphere
Workshop:

social program and atmosphere
Last – but not least …
DAAD funding

... and creative programme development
Stability of the program: long-lasting
Stability of DAAD funding:

• Long-lasting for 16 years

• Our project received in 16 years: about 1,000,000 EUR
DAAD winter/summer school for young colleagues and students at Munich

e.g. participants of our recent workshop 2018: took part at Munich (Gordana Rakic/Novi Sad, Goran Banjac/Banja Luka)
DAAD conferences of all projects in the programme (exchange of ideas)

e.g. Tirana October 2012

DAAD Newsletter of „Academic …“
Summary

- Outstanding programme of DAAD: 16 years of funding
- By motivated and creative partners in our project, a lot of useful outcomes
- JCSE as a positive example of multilateral educational cooperation (reviewers of conferences)
- Many professional advancements of colleagues during that time (from Student to Staff to Professor)
- Personnel contacts in our project did not lead to stability at the Balkan, but in our project 😊
My benefits

→ I enjoyed the project, since …
... I met motivated and creative colleagues
... I met open-minded and interested students
...I got insight into the every-day life and culture of the region
… I enjoyed a beautiful nature and …
… and exciting history
... open-minded and interested students
... open-minded and interested students
Thank you for your attention