Challenging the IT University Education and Innovations in Bulgaria:

Introducing Management Aspects of Software for IT Graduates

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George Sharkov, PhD
Managing Director
European Software Institute
Center Eastern Europe
gesha@esicenter.bg

Dimitar Birov, PhD
Deputy Dean, Prof.
Faculty of Mathematics and Informatics
Sofia University
birov@fmi.uni-sofia.bg

SEMP: SOFTWARE ENGINEERING MANAGEMENT PROGRAM
Sofia University “St. Kliment Ohridski”

- 25K Students
- 2,5K staff
- 15 faculties, departments
The Faculty of Mathematics and Informatics (FMI)

inheritor of the former Physics-Mathematical Department founded in 1889.
1904 the Department was renamed to Physics-Mathematical Faculty
1963 it was separated as an independent faculty at the Sofia University
1986 it exists as a Faculty of Mathematics and Informatics
FMI Sofia University

FMI is responsible for teaching and research in the fields of **Informatics, Computer Science, Information Technologies, Software Engineering, Mathematics, Applied and Industrial Mathematics**,  
- 2500+ students and postgraduates, 63 PhD students (2011)  
- full-time lecturers incl. 70 professors and associate professors and 80+ assistant professors  
- Research and Development Labs
Faculty of Mathematics and Informatics

15 departments

- Computer science departments – 4
  - Computing Systems (Computer Science)
  - Information Systems
  - Software Engineering
  - Computer Informatics

- Classical mathematics departments - 7

- Mathematics and applications - 4
Education and Research

Bachelor programs – 8 (> 2K students)
  o Informatics, Computer Science, Information Systems, Software Engineering
  o Mathematics, statistics, applied mathematics

Master Programs – 26 (> 500 students)
  o Computer Science - 15
  o Mathematics and Informatics – 2 (school teachers)
  o Pure Mathematics - 4
  o Applied Mathematics – 5

PhD School – 63 PhD Students (2010 – 11)
http://e-PhD.uni-sofia.bg
Educational And Research Centers and Labs

Center of Technologies of Information Society

3D Simulation and Business Processes Competence Center
  - KIT University of Karlsruhe
  - BlueGene Supercomputer

Bulgaria Korean IT Cooperation Center
  - E-government, semantic web, historical heritage

University eLearning center for research and education in eLearning, distance learning, longlife learning
Partnership Agreements and Collaboration
Needs to be Addressed

- Lack of systematic content and practice in lecturing “management” subjects for graduate high education courses (bachelors and masters)

- Bridging “research” to “industry”

- Need for internationally recognized and contemporary qualification position (master degree) in ICT engineering and management

- Innovations management deficit – demand for and readiness to absorb effective stimulation environment and research schools in challenging areas of ICT
Major Competence Gaps

Survey for South-Eastern Europe (8 countries, RCI/USAID)

- Strategic Management
- Operational Management
- Project Management
- Software PI
- ICT Services PI
- Information Security
- Vendor specific
- University

Legend:
- Blue: Interested to develop
- Red: Developed
SEMP: SOFTWARE ENGINEERING MANAGEMENT PROGRAM

Challenging the IT education and qualification in Bulgaria

In partnership with

Software Engineering Institute | Carnegie Mellon

Faculty of Mathematics and Informatics
TU - София
American University in Bulgaria

With the support of:

BASSCOM
ICT Cluster

Министерство на образованието, младежта и науката
SEMP Objectives

• Increase IT industry competitiveness

• Modernize IT education through specialized IT management components in 3 areas:
  o Engineering/Technology
  o Processes & Organization Management
  o Business

• Validated by industry profiles
  (e.g. team/project/product managers for CMMI ML2 organizations)

• Change style of teaching in BG, adopt the “student centric approach”
## SEMP Core Areas

### Enabling Technology (engineering)
- Deciding What to Design (Methods)
- Requirements Engineering
- Software Architectures
- Advanced: Secure coding, Cloud computing, Virtualization, etc

### Management (internal processes)
- Organizational (Process)
- Management: SPI, CMMI (DEV, SVC)
- Team/Personal Process Management (TSP/PSP)
- People CMM
- Agile+CMMI
- Quantitative PM
- Six-sigma
- Statistics for IT Managers

### Business
- Strategic management (BSC)
- Business Insight in a Digitized World
- Economic Analysis / Financial Accounting / Markets & Sales
- ICT law
- BI
- Negotiation/soft skills Communication for IT managers

**Academic format**

**Executive (intensive) format**
Are we aligned with the modern trends?

Prof. Mehdi Jazayeri (University of Lugano) – ECSS 2011 Workshop
T-t-T & Qualification Paths

- Academic courses transfers (CMU, ISR): 4-6 (2 completed, in pilot phase)

- Professional courses (CMU, SEI) – transfer + academic adaptation: 8 (5 completed, piloting)

- Augmented/improved or developed local courses: 6-8 (piloting, “mentored” by ESI, SEI, CMU)

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Methodology:
- Student centric approach
- Sync content, terminology (world standard), cross-links
- Practical/project work: innovations and entrepreneurship (real industry project, aka start-up)
Implementation Approach

- **Courses/profiles/programs**
  - regular students + “academic” courses
  - executive/intensive courses (or mix)

- **Incremental development**
  - Early pilot courses
  - Needs assessment & content refinement (curriculum first draft)
  - Enhanced Existing Master Programs (validated profiles, >4-6 SEMP courses)
  - SEMP master profile (inter-university)

- **Project-based study**
  - 2/3 integrated content (academic + professional, 3 focus areas)
  - 1/3 practical project (“start-up” spirit, Learn by doing + mentorship)

- **Monitor Quality & Continuous Improvement**
  (incl. professors and students exchange, PhD, R&D) – SEI/ISR, CMU + EU partners
Pilot Courses Feedback

Student opinion
(> 300 students, 3 pilot courses)

- Opinion before attending: 3.4
- Opinion after course: 4.7
- Useful for current work: 4.0
- Useful for future career: 4.6
- When choosing work: 4.0
Institutionalize T-t-T

Universities & Partners

SEMP: Training and Qualification Center

Program content and curriculum development

Train-the-Trainer (professors qualification)

Students advanced training

- academic
- Business/executive profile
- Common: processes, student-centric methodology, pedagogy
- Individual qualification & accreditation paths
- Qualification/accreditation maintenance
- Professional courses (advanced training)
- Practical course (aka “Studio course”) and Internship program
Compliances (1): e-CF, EQF, ECVET...

Dimension 2
36 Competences

Dimension 3
e-Competence proficiency levels e-1 to e-5, related to EQF levels 3-8

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Competences</th>
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<tbody>
<tr>
<td>A. PLAN</td>
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<tr>
<td>A.1. IS and Business Strategy Alignment</td>
<td><img src="http://profilingtool.eocompetences.eu/" alt="Level 1" /> <img src="http://profilingtool.eocompetences.eu/" alt="Level 2" /> <img src="http://profilingtool.eocompetences.eu/" alt="Level 3" /> <img src="http://profilingtool.eocompetences.eu/" alt="Level 4" /> <img src="http://profilingtool.eocompetences.eu/" alt="Level 5" /></td>
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<td>A.2. Service Level Management</td>
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<td>A.4. Product or Project Planning</td>
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<td>A.5. Architecture Design</td>
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<td>A.6. Application Design</td>
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<td>A.7. Technology Watching</td>
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<td>A.8. Sustainable development</td>
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<td>B. BUILD</td>
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<td>B.1. Design and Development</td>
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<td>B.2. Systems Integration</td>
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<td>B.3. Testing</td>
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<td>B.4. Solution Deployment</td>
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<td>B.5 Documentation Production</td>
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<td>C. RUN</td>
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<td>C.1. User Support</td>
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<td>C.2. Change Support</td>
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<td>C.4. Problem Management</td>
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http://profilingtool.eocompetences.eu/
Compliances (2): European ICT profiles

["Towards European e-Job Profiles (2010-2012)", based on the e-CF www.ecompetences.eu]

Increasing complexity and autonomy

Business

Account Manager

IS Consultant

Business IS Manager

Project Manager

Auditor/QA Manager

Systems Analyst

ICT Trainer

Tests Specialist

Multimedia Designer

Service Desk Agent

Technology

Chief Information Officer

IS Manager

Enterprise Architect

Network Specialist

IS Security Manager

Service Manager

IS Security Specialist

Database Specialist

Systems Administrator

Technical Specialist

Developer
Compliances (3):
Personal competences versus organizational models:
the parallel jungle?

ICT Certification in Action (CEN):
Towards a Convergence and Harmonization
• maps of ICT certifications stakeholders
• positioning e-certifications with e-CF (v2) and EQF,
• bridging certifications with education

www.ict-certification-in-europe.eu
Meeting the labor demand

Source: The Employment Policy Foundation, 2005
Foresight study anticipates that the EU labour market may face an excess demand of 384,000 ICT practitioners by 2015.

Other compliances...

Thank you!

**George Sharkov**, PhD
Managing Director
European Software Institute
Center Eastern Europe
gesha@esicenter.bg

**Dimitar Birov**, PhD
Deputy Dean, Prof.
Faculty of Mathematics and Informatics
Sofia University
birov@fmi.uni-sofia.bg
http://iceird2012.fmi.uni-sofia.bg/