

Software Engineering at the ACE Faculty in Craiova.

Teaching Experience and the Connection between Course Outcomes and Regional IT Industry Expectations



Marius Brezovan and Costin Bădică

University of Craiova

Faculty of Automation, Computers and Electronics
Computers and Information Technology Department

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

1

Bridge to the previous presentation Outline

- Faculty of Automation, Computers and Electronics
- Software Engineering in Bachelor curriculum
- Teaching experience

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

2

Faculty of Automation, Computers and Electronics - Location



Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

3

Structure of the ACE Faculty

- ACE Faculty has 2 departments:
 - Computer and Information Technology, 2 groups:
 - Software Engineering
 - Computer Engineering
 - Automation, Mechatronics and Electronics, 3 groups:
 - Automation (Control Systems)
 - Mechatronics and Robotics
 - Electronics

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

4

Soft. Eng. Schedule Overview



- BSc : 4 years (8 semesters)
- Three types of courses:
 - From the main trunk
 - Specific to Software Engineering specialization
 - Specific to Computer Engineering specialization
- Software Engineering course
 - in 6th Semester (3rd Year), in the Software Engineering specialization



Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

5

Software Engineering Course



- It is largely based on the Somerville book
- It contains 2 modules, graded differently:
 - SE course (4 ECTS - European Credit Transfer and Accumulation System points)
 - SE project (2 ECTS points)
- Both modules have a duration of 14 weeks:
 - SE course: 2 h lectures/week (28h) + 2 h lab/week (28h - mandatory)
 - SE project: 1 h project/week (14h)

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

6

Outline of this presentation

- SE outcomes
- Professional competences assured by the outcomes of the SE course
- Possible jobs for students that graduated the CIT specialization, assured by SE professional competences
- IT Industry in Craiova
- IT companies and CIT- related jobs
- Connections between ACE Faculty and IT Companies

Soft. Eng. Outcomes

- Students will be able to:
 - Accumulate software engineering knowledge and skills, and professional issues necessary to begin their practice as a software engineer
 - Work as an individual and as part of a team to develop and deliver quality software artifacts
 - Design appropriate solutions using software engineering approaches
 - Apply current theories, models, and techniques that provide a basis for problem identification, software design, development, verification, and documentation



Soft. Eng. Professional Competences

- SE is the only course in the “Computers” curricula that addresses all the 6 competences related to the CIT area (according to the National Higher Education Registry – RNCIS):
 - Operating with scientific, engineering, and IT fundamentals (C₁)
 - Hardware and software design (C₂)

Bansko, 2013 13th Workshop Software Engineering Education and Reverse Engineering 9



Soft. Eng. Professional Competences

- Continuation ...
 - Solving problems using computer science tools (C₃)
 - Improving performance of hardware and software systems (C₄)
 - Design, life cycle management, integration of hardware and software systems (C₅)
 - Intelligent systems design (C₆)

Bansko, 2013 13th Workshop Software Engineering Education and Reverse Engineering 10

Soft. Eng. - Related Jobs



- Possible jobs for students that graduated the CIT area supported by Soft. Eng. professional competences.
- The 9 computer-related possible jobs included in the Classification of Occupations in Romania (COR):
 - Computer network administrator
 - **Software engineer**
 - **Analyst**

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

11

Soft. Eng. - Related Jobs



- Continuation ...
 - Database administrator
 - **Programmer**
 - **Design engineer for information systems**
 - Design engineer for computer systems
 - IT consultant
 - Systems security engineer

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

12



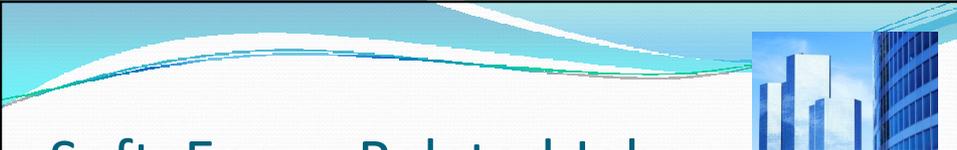
Soft. Eng. – Related Jobs

- The new 7 proposed occupations, related to computers (3 years ago), according to the National Higher Education Registry (RNCIS):
 - Application developer
 - System software developer
 - Computing system architect

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

13



Soft. Eng. – Related Jobs

- Continuation ... :
 - Engineer in software quality assurance and testing
 - Web application developer
 - Web site administrator
 - Design engineer of digital micro-systems

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

14

IT Industry in Craiova



- > 30 IT companies (were not considered companies that produce, or sell computers or computer components)

BATM Systems	Netdania
Blue Software	NetRom
Caphyon	Pirelli
CS Romania	Redline Comunications
Hella	SintecMedia
Integral IT	Softexpert Mobility
IT Six Global Services	StarStorage
Kepler-Rominfo	SyncRO Soft
MuseGlobal	UbiSoft

- Fewer than in Bucharest, Timisoara, Cluj-Napoca, Iași, but more than in other cities in Romania

IT Industry in Craiova



- Foreign IT companies (or with foreign capital):
 - NetRom
 - IT Six Global Services
 - CS Romania
 - UbiSoft
 - MuseGlobal
 - Hella Romania
 - NetDania
 - Pirelli (Pirelli Centro Servizi IT)

IT Industry in Craiova



- Romanian IT companies:
 - SyncRO Soft
 - Caphyon
 - SintecMedia
 - IntegralIT
 - SoftExpert Mobility
- There are more foreign IT companies in Craiova than Romanian IT companies
- Some Romanian IT companies were founded by our students (e.g. SyncRO Soft, and Caphyon)

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

17

IT Industry in Craiova



- These companies:
 - Range from 20 to 180 employees
 - Cover all occupations related to the CIT area
- Most of these companies (> 85%) are totally IT companies. The others have a predominant IT component (predominant IT component > 50%)
- Salary for an IT position range from 1000 EUR to 3000 EUR

Bansko, 2013

13th Workshop Software Engineering Education
and Reverse Engineering

18

IT Industry in Craiova



- Many companies develop important software projects:
 - NetRom, a Dutch company (180 employees) :
 - Healthcare: Software for medical ambulances
 - Industrial domain: Software for the company that made palm-shaped island in Dubai
 - IT Six Global Services, an American company, (120 employees):
 - Mobile domain: Mobile applications for QA Telecom, an American company
 - Banking & Finance: Web-based online financial application for an American Company

IT Industry in Craiova



- Continuation ... :
 - CS Romania, a French company (100 employees):
 - Aeronautics: Software for companies like Airbus, Thales Avionics, and Hispano-Suiza
 - Energy: Software for companies like Electricité de France, Hidroelectrica S.A.
 - Transportation: Software for companies like Faiveley Transport, Sanef ITS

IT Industry in Craiova



- Continuation ... :
 - Hella Romania, a Romanian research office, part of the HELLA Group from Germany (80 employees):
 - Automotive: Produce software for auto trip computers for BMW Company
 - SyncRO Soft, a Romanian company (30 employees):
 - Provides services and software tools in the XML and Java domains
 - Author of the <Oxygen/> XML Editor & Syncro Subversion Client

IT companies and CIT-related jobs



- The professions mostly needed by the IT industry from Craiova are related to the Soft. Eng. professional competences (percent of total jobs):
 - Programmer, Software engineer (40%)
 - Engineer in software quality assurance and testing (30%)
 - Application developer (15%)
 - Analyst, Design engineer for information systems (10%)
 - System software developer (5%)

Connections between IT Companies and the ACE Faculty



- We have initiated regular meetings between leading IT companies in Craiova, and a representative group of professors from the Faculty ACE, CIT Department:
 - Updating curricula to maximize the companies' needs in terms of employees' competences
 - Creation of partnerships between IT companies and the ACE faculty regarding:
 - IT practical stages for students
 - Graduation projects with double coordination: faculty-company

September 6, 2012

12th Workshop Software Engineering Education and Reverse Engineering

23

Trends in the IT Industry in Craiova



- Is a continuous increase in the number of companies
- This implies:
 - (1) Increasing the number of graduates in the CIT domain
 - (2) Diversifying the competences of the graduates
- Solving the problems:
 - (1) No solution at this moment (allocation of student numbers is rigid – depends on the Government, the Rector and faculty leadership)
 - (2) Revision of the actual curricula in order to meet the requirements of the IT Companies

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

24



Conclusions

- SE course was introduced in “Computers” curricula 5 years ago, according to the needs of the IT industry in Craiova at that time
- The SE competences of the graduated students increased since 2008, because the IT industry has grown
- The MSc level in the ACE faculty in the CIT area should continue to increase the SE competences:
 - A specific MSc program, “Software Engineering”, should be totally related to the SE competences
 - We have a “Software Engineering” MSc program that not meet very well, at this time, the requirements of the IT Industry

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

25



Conclusions

- The type of the IT companies from Craiova has diversified in the last years, and their number increase continuously (in 2005 were about 10 IT Companies)
- There is a need to:
 - A revision of the BSc curricula
 - To modify the SE course in the BSc curricula
 - To move the SE course to the main trunk
 - To better adapt the content of the SE course according to the need of the IT industry

Bansko, 2013

13th Workshop Software Engineering Education and Reverse Engineering

26

Conclusions



- A partnership between ACE and IT companies is already started, in order to:
 - Assure IT practical training of the students in the IT companies
 - Allow student already employed to achieve diploma project completion within companies
- There is a problem that cannot be solved at this moment:
 - The need of the companies to increase the number of their employees (the number of graduates in the CIT domain remained unchanged for many years)

*Thank
you*