LEADING A DEVELOPMENT TEAM PILOT FOR IT PROJECT MANAGEMENT MASTER'S DEGREE STUDENTS

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SEMP: Software Engineering Management Program

Project implemented by:

Funded by:

In partnership with:

With the support of:
SEMP

- **Goal**: provide contemporary content and training courses on software engineering and IT services management.

- **Focus**: modern training methods and style.

- **Expected result**: an internationally recognized master degree program in partnership with the Software Engineering Institute of Carnegie Mellon University, and with the support of the Ministry of Education, Youth and Science.

- **Means**: students, professors, future employers, government, users and international clients - speak the same language – the language of quality.
# SEMP Focus Areas and Sample Courses

<table>
<thead>
<tr>
<th>Enabling Technology (engineering)</th>
<th>Management (processes)</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Methods, Deciding What to Design</td>
<td>Organizational (Process) Management, Development, IT Services</td>
<td>Strategy management (BSC) Digitized Ecosystems</td>
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<tr>
<td>Requirements Software/IT Architectures</td>
<td>Team/Personal Process Leading Development Teams</td>
<td>Economic Analysis Financial Accounting Markets &amp; Sales</td>
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<td>Advanced Technology: Secure coding Cloud computing, virtualization, etc.</td>
<td>Quantitative Project Management Statistics for IT Managers</td>
<td>Negotiation Communications for IT managers ICT law</td>
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THE CURRICULUM AND SEMP

- **Academic courses** transfer (from Carnegie Mellon, ISR – Institute of Software Research): 2-4 (two completed, in pilot phase)

- **Professional courses** (CMU, SEI – Software Engineering Institute): accredited instructors plus additional academic adaptation (five completed, in pilot phase)

- Augmented/improved or newly developed **local courses** (addressing regional specifics, SMEs focus, EU context, etc.): 6-8 (in pilot phase, mentored by ESI, SEI, CMU)
A NEW STYLE OF TEACHING AND COURSE ORGANIZATION

- Student centric approach

- Synchronized and cross-linked content, terminology (based on world standard), with real practical examples and case studies

- Practicum/project work (studio course): based on the model used at Carnegie Mellon, during the entire program, projects defined by the industry partners
SEMP in Brief

“The SEMP project is an excellent example of integration and synergy between industrial and academic institutions, supporting organizations and donors in order to implement innovative training and educational method in Bulgarian universities educating IT graduates.”

Dr. George Sharkov, Director, “European Software Institute Center Eastern Europe”
Wikipedia:
- Established in 681
- Capital city: Sofia
- Territory: 111K km\(^2\) – medium sized European country
- Population: 7.36 million people
  - Predominantly urban
  - Graduates: 19.6%
- ITC sector
  - Strategic sector since mid-1960s
  - 10% of GDP since 2007
  - Annual growth of 15%
- EU & NATO member

Not in Wikipedia:
- Business climate:
  - 10% flat personal income tax
  - 10% flat corporate tax
NBU

Largest private university in Bulgaria
- Established in 1991 in Sofia
- 15 000 students – BSc, MSc & PhD

Department “Informatics” (Master Programs) at NBU has second highest rating according to Bulgarian University Ranking System of the Ministry of Education, Youth and Science of Republic Bulgaria.
IT PM Master’s Degree Program

- **Introduced** in 2009/2010

- **Lecturers**
  - Department Informatics, NBU
  - Faculty of Mathematics and Informatics, Sofia University
  - Institute of Mathematics and Informatics, Bulgarian Academy of Science
  - Boston University (USA, MA)
  - Companies

- **Goal**: to prepare IT project managers with a wide range of competences to manage projects successfully in a competitive, dynamic and open environment.
IT PM MASTER’S DEGREE PROGRAM

Knowledge and Skills

- creating, developing and managing IT projects;
- analyzing a project development process and react appropriately;
- problem solving and decision making;
- organization and planning;
- managing risk;
- managing technological resources, people and finance;
- building and managing an effective team;
- leadership and conflict resolution;
- ability to work in an international context and with an interdisciplinary team;
- design of information systems;
- laws and regulations for the IT sector.
SEI PSP/TSP Courses

Knowledge and Skills

- **PSP Fundamentals** teaches software engineers the principles, concepts, and benefits of the PSP, a process-based approach for developing software. Students learn how to measure and analyze their personal software process, use process data to improve their personal performance, and apply PSP methods to other structured tasks.

- **PSP Advanced** course teaches software engineers to optimize their process performance.

- **Leading a Development Team** course is designed to teach software managers or team leaders how to manage projects quantitatively in order to complete projects on schedule, within budget, and with all requirements met. The course covers the knowledge and skills leaders need to effectively lead development teams.

http://www.sei.cmu.edu/training/find/courses.cfm?category=TSP
PSP/TSP EMPOWERS

Knowledge and Skills

- creating, developing and managing IT projects;
- analyzing a project development process and react appropriately;
- problem solving and decision making;
- organization and planning;
- managing risk;
- managing technological resources, people and finance;
- building and managing an effective team;
- leadership and conflict resolution;
- ability to work in an international context and with an interdisciplinary team;
- design of information systems;
- law regulations for the IT sphere.
# IT PM 2011/2012

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
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<tbody>
<tr>
<td>IT PM 1</td>
<td>IT PM 3</td>
<td>Modern Technologies for Managing IT Production</td>
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<tr>
<td>IT PM 2</td>
<td>Architectures of Software Systems</td>
<td>Estimating Risk in IT Projects</td>
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<tr>
<td>Workshop on IT PM</td>
<td>Analysis and Design of Information Systems</td>
<td>Statistical Methods</td>
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<tr>
<td>Law Regulations of Projects</td>
<td>Software Testing and QA</td>
<td>Data Mining</td>
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<tr>
<td>Information Society Law</td>
<td>Software Estimation</td>
<td>Data Warehouse</td>
</tr>
<tr>
<td>Leading a Development Team</td>
<td>Personal Software Process – Fundamentals</td>
<td>Personal Software Process - Advanced</td>
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Software Engineering Management Program
LEADING A DEVELOPMENT TEAM PILOT

Leading a Development Team course is designed to teach software managers or team leaders how to manage projects quantitatively in order to complete projects on schedule, within budget, and with all requirements met. The course covers the knowledge and skills leaders need to effectively lead development teams.

http://www.sei.cmu.edu/training/find/courses.cfm?category=TSP
TRAINING SCHEDULE

SEI-CMU Leading a Development Team is a professional course planned to be presented in two days and a half. The academic scheme of the Master Degree courses of the New Bulgarian University is 30 academic hours per course of 3 credits.
STUDENTS’ BACKGROUND

Education

- 26% IT Bachelor or Master
- 74% Non IT Bachelor or Master

Educational Background of the Students in IT PM Master Degree Program

Current Occupation

- 10% Developer
- 24% Support (QA, Tester, IT Admin)
- 31% Team Leader Involved in Development
- 35% Project Leader

Current Occupation of the Students in IT PM Master Degree Program

Organizational Background

- 45% Knowledge Workers
- 55% Managers

Organizational Background of the Students in IT PM Master Degree Program
Students’ Understanding of the Course Content

Leading a Development Team major topics

- TSP Team Leader
- TSP Overview
- Team Launch
- Process Discipline
- Managing the Plan
- Managing Quality
- Reporting to Management
- Leading the Team

Quality management, earned value tracking and the basic principles of reporting to the management were met with a very high level of understanding.
**TEAM LEADER CHALLENGE**

- The managers:
  - on schedule
  - within budget
  - with all requirements met

- The team members:
  - work on a successful project
  - be part of a “great” team
  - do interesting technical work
  - feel secure in their jobs

In this **first discussion** students gave evidence that their professional experience, as well as the Project Management I and II part lectures form a solid background for the Leading a Development Team curriculum.
**LEADING vs MANAGING**

- Managers - not eager to delegate responsibilities related to project schedule, budget or scope to the developers

- Developers - not eager to take responsibilities for their own work.

- Agile $\Rightarrow$ TSP

The TSP/PSP do not restrict the software technology and methodology that is used for the development of the software product but add personal and team level measurable processes.
PROJECT ROLES

- Developers
  - apply for more development work if it is challenging or if it is of some kind of professional interest
  - avoid getting involved in any non-technical activities

- Managers
  - are not eager to delegate the entire project planning phase to the developers
  - while declaring willingness to delegate some of the responsibilities to the team, they would prefer to avoid any activities that actually will let the team to manage and organize their work.

Managers ⇔ Developers trust

TSP/PSP data gathering and analysis concept as a rock solid ground for trust.
PROCESS DISCIPLINE

- Students realize the need of some kind of organization that would improve the overall success rate of software projects.
- Developers see discipline as a restriction to the creative process of finding solutions.
- Students doubt the concept can be implemented in their work environment.
- Predominant opinion: the ability and capability to follow a disciplined process (or rather, lack thereof) is a national trait.

PSP teaches disciplined process via development. The concept proves itself using the students’ own data.
LDT / PSP

PSP details are missing and the students speculate and fill in the gaps with practices from their own professional experience.

The students are not impressed by the statistical results that show dramatic decrease of schedule deviation and the number of defects/KLOC.

The adoption of the TSP/PSP by the industrial leaders is the measure of the success of the framework.
STUDENTS’ RESULTS

The grading system encourages active participation of the students during the lectures and exercises.

The students are graded on their final submissions.
Academic Challenge - IT Professionals

- Teach PSP/TSP in Master’s Degree Programs
  - Teach PSP principles, concepts, and benefits, teach how to measure and analyze processes and use data – **PSP Fundamentals**
  - Teach software engineers to optimize their process performance – **PSP Advanced**
  - Teach how to manage projects quantitatively in order to complete projects on schedule, within budget, and with all requirements met. Teach how to lead development teams. – **Leading a Development Team**
ACADEMIC CHALLENGE - IT BEGINNERS

- Teach PSP/TSP in Bachelor’s Degree Programs
  - First term in IT BSc programs

Teach PSP along the first programming language (C/C++)

- Insist using PSP in each C/C++ project during BSc.
Thank you!

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