DAAD
Deutscher Akademischer Austausch Dienst
German Academic Exchange Service

STABILITY PACT FOR SOUTH EASTERN EUROPE

The Joint Course on Software Engineering: Past, Present, and Future

Klaus Bothe

3rd Workshop Software Engineering Education and Reverse Engineering, Ohrid, Macedonia, 2003

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The purpose of this presentation

- Summary of our past and present activities concerning the joint course
- Summary of the contributions to the course
- Proposals of future work

The Background

Stability pact for South-Eastern Europe

DAAD

(German Academic Exchange Service)

2000

Humboldt University Berlin
University of Novi Sad

2001

University of Skopje
University of Plovdiv
University of Belgrade

University of Kragujevac
University of Nis

Project: JCSE / SETT-Net

Goal:

Development of shared training and teaching recources for a software engineering course

Essential tasks of the joint course

- Introduction of a software engineering course in South Eastern Europe
- Creation of a joint software engineering course
- Development of training and teaching materials: slides, case studies, assignments, examinations, literature …
- Providing a basis of future research cooperation

Workshops

Sep. 2001: 1st Workshop Software Engineering Education and Reverse Engineering, Novi Sad

Sep. 2002: 2nd Workshop Software Engineering Education and Reverse Engineering, Plovdiv

Aug. 2003: 3rd Workshop Software Engineering Education and Reverse Engineering, Ohrid

Past and present:

The general development process of our course materials

Milestones of the joint course on SE

1995: HU starts with a web-based SE course (with the exeption of slides)

Sep. 2001: 1st Workshop on SEE and RE, Novi Sad

Z.Budimac: „Let's take the HU course as a basis of a joint course."

Feb 2002: first German and English ppt-slides

Summer 2002: first SE lecture with ppt-slides at HU (1400 slides)

Sep. 2002: 2nd Workshop on SEE and RE, Plovdiv

Presentations of several topics

Winter 2002: first SE lecture in Novi Sad based on English slides

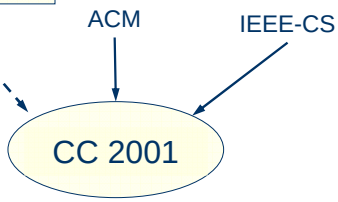
Aug. 2003 3rd Workshop on SEE and RE, Ohrid

Project environment: style guides, update management, copyright, ...

The origins of the course materials

German language software engineering course
(at Humboldt University Berlin)

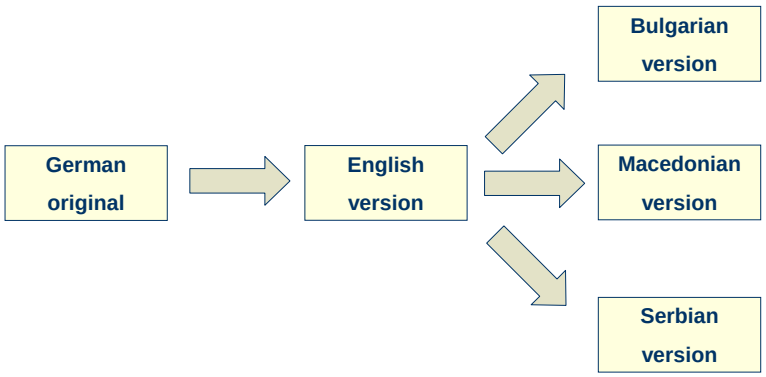
Covers 85% of the core lectures in software engineering of CC 2001
(K. Zdravkova, K. Bothe, Z. Budimac: SETT-Net: A Network for Software Engineering Training and Teaching, ITI, Information Technology Interfaces, Cavtat, Croatia, June 16 - 19, 2003)



„Curricular guidelines for undergraduate programs in computing"

SE: 31 out of 280 core lectures

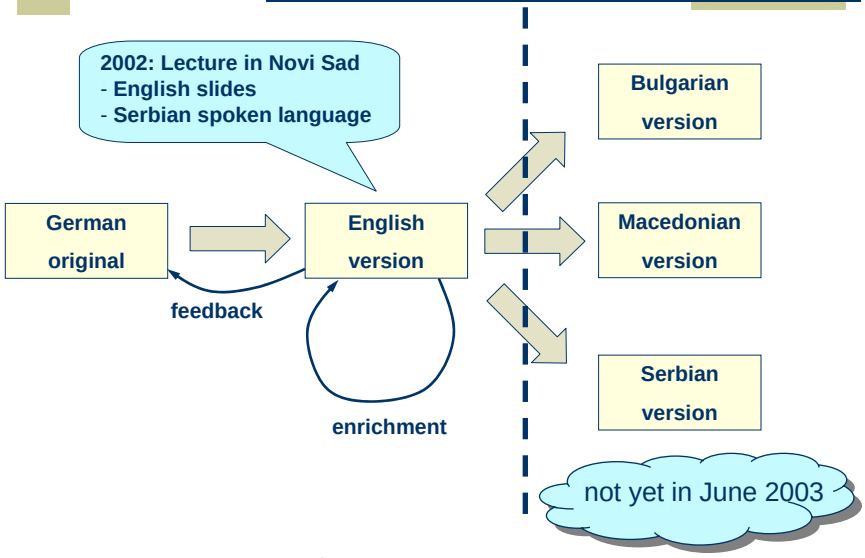
The development process: as planned in 2001



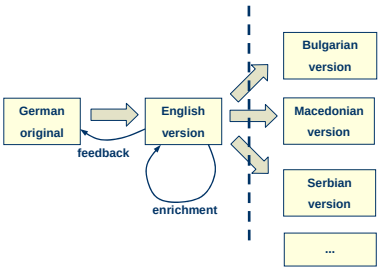
→ rather straightforward and simple ...

plan (2001) and reality (2003) ?

The development process – plan and reality in 2003



The development process: English version vs. national versions



The case for the English version:

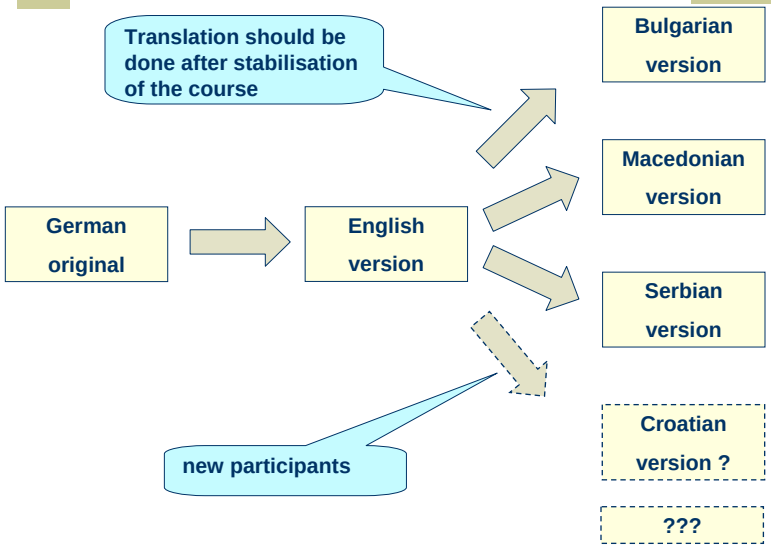
- Less maintenance effort
- Students cope with English
- Enforce higher quality of English slides
- More attractive in international cooperations

Do we need national versions?

The case for national versions:

- National educational laws
- Ability of the students
- Ease of presentation for the lecturer

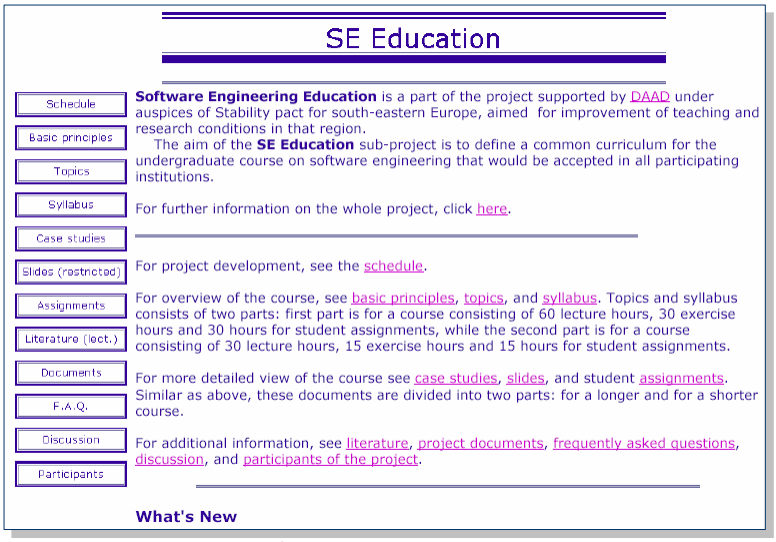
An outlook concerning national versions



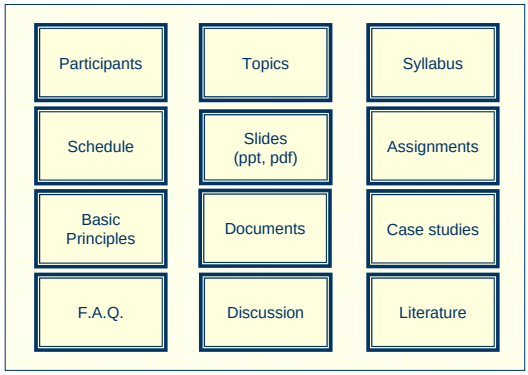
Past and present:

Overview of involved course materials

The joint course website



Overview of the project materials
(adapted from the course website)



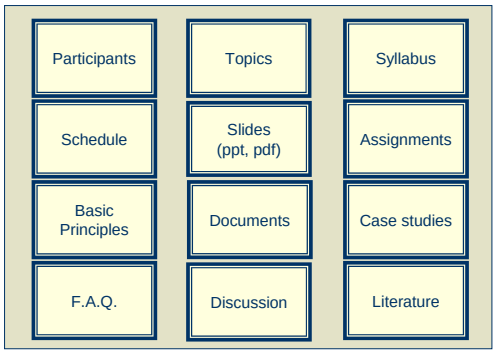
Project materials are much more than a pool of slides

Project materials: extentions

Lecture notes

Copyright policy

Duration of the lectures



Slide usage guides

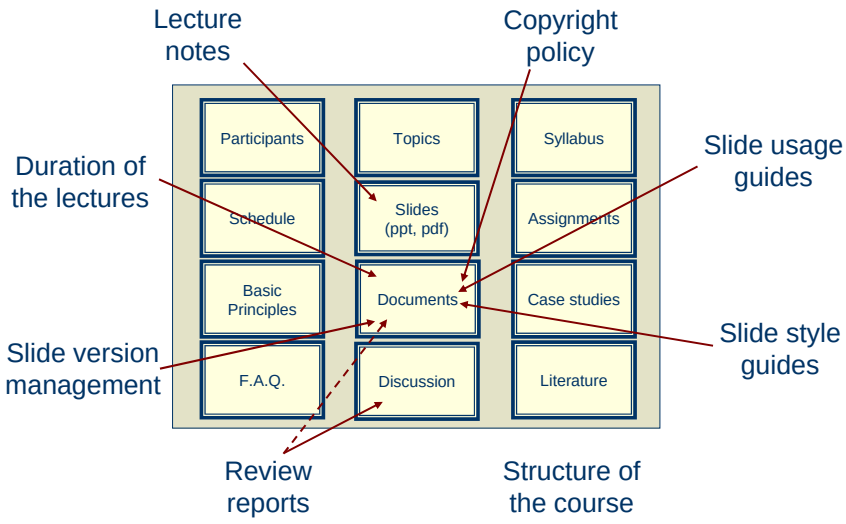
Slide version management

Slide style guides

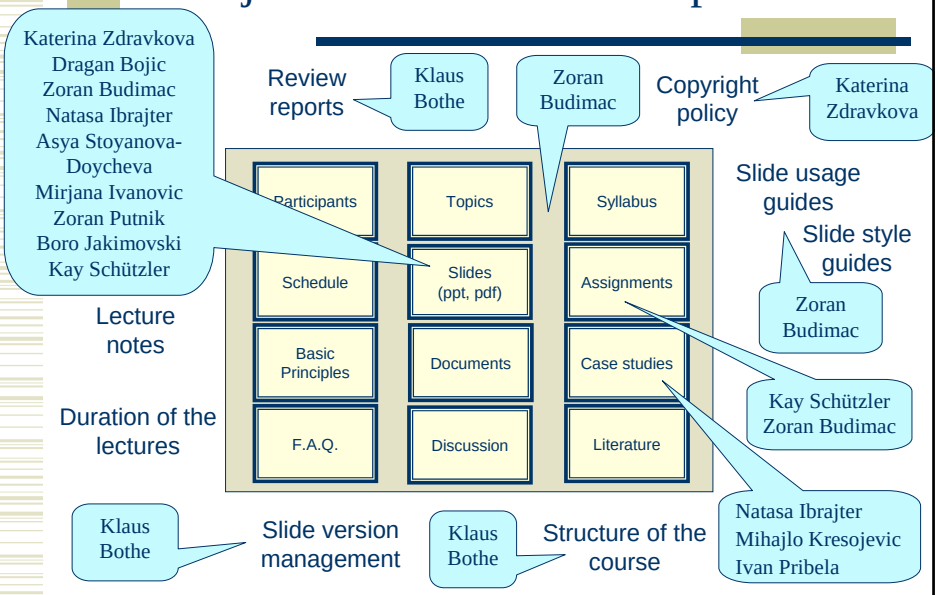
Review reports

Structure of the course

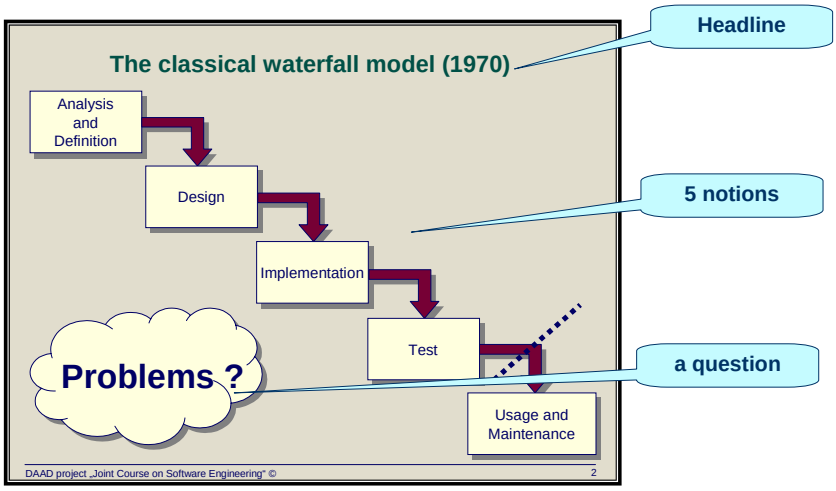
Project materials: location of the extentions



Project materials: workshop lectures



Lecturers need additional information about the slides



Lecture notes: Slides and instructions for the lecturers

1

Topic 3: Lecture Notes
(instructions for the lecturer)

Author of the topic: …
English version: ...
Author of the lecture notes: …

About the subject of this topic: …

To do: …

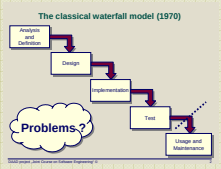
Slides that could be improved and replaced: …

Duration of the lecture: …

History of changes: …

General information for a title slide

2



Contents: …

Methodology: …

Remarks: …

Answer to the question ‚Problems?': …

Specific information for ordinary slides

Project materials: current and planned extentions

Students review sheets *)

Examinations *)

Review reports

Tool information *)

Course adaptation guidelines *)

Lecture notes

Publications

Copyright policy

Slide usage guides

Slide style guides

Demo Topics (ppt, pdf, doc) *)

Participants	Topics	Syllabus
Schedule	Slides (ppt, pdf)	Assignments
Basic Principles	Documents	Case studies
F.A.Q.	Discussion	Literature

Duration of the lectures

Slide version management

Structure of the course

*) not yet

Possible future project website structure

Project management

- Participants
- Project schedule
- Basic Principles *)
- Discussion & Review reports
- F.A.Q.
- Documents
- Responsibilities (roles)
- Slide style guides
- Slide usage guides
- Publications
- Slide version management
- Copyright policy

*) Requirements specification

?

Course materials

- Contents
- Syllabus
- Slides (ppt, pdf)
- Lecture notes (doc)
- Structure of the course
- Assignments
- Case studies
- Literature
- Examinations
- Duration of the lectures
- Tool information
- Demo Topics (ppt, pdf, doc)
- Students review sheets
- Course adap-tation guides

Past:

Contributions to the course materials

Contributions to the joint course on SE: mainly sorted by history

- Design of original slides
- Translation to English
- Additions of new slides
- New topics
- Lecture Notes
- Review reports
- Slide style guides
- Use of slides in lectures

Novi Sad	Z. Budimac
	N. Ibrajter
	M.Ivanovic
	Z. Putnik
	M. Kresojevic
	I. Pribela
Skopie	V. Ajanovski
	A. Misev
	K. Zdravkova
Belgrade	D. Bojic
	D. Tosic
Plovidv	E. Doytchev
	M. Georgieva
	A. Stoyanova-Doytcheva
	S. Stoyanov
	B. Botev
	R. Gospodinov
HU Berlin	K. Bothe
	U. Sacklowski
	K. Schützler
	S. Joachim
Kragujevac	N. Grujovic
	R. Slavkovic
Nis	M. Ciric

- Website design
- Website administration
- Assignments
- Copyright
- Case study ‚Seminar organisation‘: translation, implementation
- Translation to national languages
- Topic presentation at a workshop

The joint course on SE: contributions (1)

1 Design of original slides
- K. Bothe
- U. Sacklowski
- S. Joachim

2 Additions of new slides
- Z. Budimac
- V. Ajanowski
- K. Zdravkova
- D. Bojic
- K. Bothe
- K. Schützler

Novi Sad	Z. Budimac	**2 3 4**
	N. Ibrajter	
	M.Ivanovic	
	Z. Putnik	**4**
	M. Kresojevic	
	I. Pribela	
Skopie	V. Ajanovski	**2 4**
	A. Misev	
	K. Zdravkova	**2**
Belgrade	D. Bojic	**2 4**
	D. Tosic	
Plovidv	E. Doytchev	
	M. Georgieva	
	A. Stoyanova-Doytcheva	
	S. Stoyanov	
	B. Botev	
	R. Gospodinov	
HU Berlin	K. Bothe	**1 2 4**
	U. Sacklowski	**1**
	K. Schützler	**2 3 4**
	S. Joachim	**1**
Kragujevac	N. Grujovic	
	R. Slavkovic	
Nis	M. Ciric	

3 New topics
- Z. Budimac
- K. Schützler

4 Lecture Notes
- Z. Budimac
- Z. Putnik
- V. Ajanovski
- D. Bojic
- K. Bothe
- K.Schützler

The joint course on SE: contributions (2)

5 Translation to English
- Z. Budimac
- Z. Putnik
- K. Zdravkova
- D. Bojic
- A. Stoyanova-Doytcheva
- K. Bothe
- K.Schützler

6 Review reports
- Z. Budimac
- K. Zdravkova
- D. Bojic
- S Stoyanov
- K. Schützler

7 Slide style guides
- Z. Budimac
- K. Bothe

Novi Sad	Z. Budimac	**5 6 7 8 9**
	N. Ibrajter	**9**
	M.Ivanovic	**9**
	Z. Putnik	**5 9**
	M. Kresojevic	
	I. Pribela	
Skopie	V. Ajanovski	**5 9**
	A. Misev	
	K. Zdravkova	**5 6 9**
Belgrade	D. Bojic	**5 6 9**
	D. Tosic	
Plovidv	E. Doytchev	
	M. Georgieva	
	A. Stoyanova-Doytcheva	**5 9**
	S. Stoyanov	**6**
	B. Botev	
	R. Gospodinov	
HU Berlin	K. Bothe	**5 7 8 9**
	U. Sacklowski	
	K. Schützler	**5 6 9**
	S. Joachim	
Kragujevac	N. Grujovic	
	R. Slavkovic	**8**
Nis	M. Ciric	

8 Use of slides in lectures
- Z. Budimac
- K. Bothe
- R. Slavkovic

9 Topic Presentation
- Z. Budimac
- N. Ibrajter
- M. Ivanovic
- Z. Putnik
- V Ajanovski
- K. Zdravkova
- D. Bojic
- A. Stoyanova-Doytcheva
- K. Bothe
- K. Schützler

The joint course on SE: contributions (3)

10 Website design
- Z. Budimac

11 Website administration
- U. Sacklowski

12 Assignments
- Z. Budimac
- K. Schützler

13 Translation to national languages
- -

Novi Sad	Z. Budimac	**10 12 15**
	N. Ibrajter	**14**
	M.Ivanovic	
	Z. Putnik	
	M. Kresojevic	**14**
	I. Pribela	**14**
Skopie	V. Ajanovski	
	A. Misev	
	K. Zdravkova	**15**
Belgrade	D. Bojic	**15**
	D. Tosic	
Plovidv	E. Doytchev	
	M. Georgieva	
	A. Stoyanova-Doytcheva	
	S. Stoyanov	**15**
	B. Botev	
	R. Gospodinov	
HU Berlin	K. Bothe	**15**
	U. Sacklowski	**11**
	K. Schützler	**12 14 15**
	S. Joachim	
Kragujevac	N. Grujovic	
	R. Slavkovic	**13**
Nis	M. Ciric	

14 Case study ‚Seminar organisation': translation, implementation
- N. Ibrajter
- K. Schuetzler
- M. Kresojevic
- I. Pribela

15 Copyright
- Z. Budimac
- K. Zdravkova
- D. Bojic
- S. Stoyanov
- K. Bothe
- K. Schützler

Summary: 15 colleagues and students from 5 universities contributed to the course

Present:

Project publications and related work

Publications

- K. Zdravkova, K. Bothe, Z. Budimac:
  SETT-Net: A Network for Software Engineering Training and Teaching,
  ITI, Information Technology Interfaces, Cavtat, Croatia, June 16 - 19, 2003
- K. Zdravkova, K. Bothe, Z. Budimac:
  The structure of SETT-Net, Eurocon 2003, Ljubljana, Slovenia, Sept. 22 - 24, 2003
- K. Bothe, K. Schuetzler, Z. Budimac, K. Zdravkova, D. Bojic, S. Stoyanov:
  Technical and Managerial Principles of a Distributed Cooperative Development of a Multi-Lingual Educational Course,
  1st Balkan Conference in Informatics, Thessaloniki, Nov. 21 - 23 2003

Related projects

Fields:

- SE course export
- Joint SE course material
- Offer for distance education in SE

Related projects: SE course export – presented at ITI 2003 (Cavtat)

- Saunders, B.: „Delivering an undergraduate course to a cross-cultural market using the world wide web“

London Metropolitan University → pool of modules (courses) → University of Hong Kong

- Crnkovic, I. et all: „On the teaching of distributed software development“

Mälardalen University, Sweden → course „Distributed SW development“ → University of Zagreb

Related projects: Joint SE course material

SWENET project:

- CSEET 2003, Madrid:
  - Software Engineering Course Maeterials Workshop
- Participants:
  - Rochester Institute of Technology
  - Georgia Institute of Technology
  - Texas Tech University
  - Milwaukee School of Engineering
  - Drexel University Philadelphia
  - Embry-Riddle Aeronautical University
- Goals:
  - Create, collect, and share SE course materials
- Supported by NSF Grand EEC-0080502

„As software engineering educaters, we are all too aware of how difficult it is to start from scratch. In particular, the lack of examples, teaching materials, and exercises can significantly impede the inclusion of software engineering concepts into undergraduate courses.“

www.swenet.org

SWENET

Home Search Log-In

- General Information
- Overview of Software Engineering
  - What Is Software Engineering?
- Software Design
  - Introduction to Design Patterns
- Software Engineering Process
  - Introduction to Software Engineering Process
- Software Quality
  - Software Quality Concepts
  - Formal Reviews
- Software Requirements
  - Introduction to Software Requirements: Informal Requirements
  - Elevator Model in Z

SWENET – The Network Community for Software Engineering Education – is a project to produce and organize high-quality materials supporting software engineering education. As a first step in this process, a framework will be developed which serves as a high-level taxonomy for the areas of knowledge comprising software engineering. The framework will not be developed ab initio, but rather will build on the work of the ABET program criteria for software engineering education and the classification proposed by the Software Engineering Body of Knowledge (SWEBOK) project sponsored by the IEEE Computer Society and the Association for Computer Machinery. Four areas of particular importance to undergraduate software engineering – design, quality, requirements, and process – have been singled out as the most appropriate starting points for developing curricular materials...

A Joint Project Of:

R·I·T, Georgia Tech, Drexel University, Embry-Riddle Aeronautical University, MSOE

Sponsored In Part by Grant EEC-0080502

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Click here to vote, add a comment or view the threads for this module

The current rating for this module is: (This module currently has no ratings)

What is Software Engineering?

Module	ISE1 - Overview of Software Engineering: What is Software Engineering?	
Version	Version 0.1 - 8/7/02	
Author	Thomas B. Hilburn, hilburn@erau.edu	
SWEBOK Areas	Software Requirements (RE, RA, RS) Software Design (BC) Software Testing (BC) Software Maintenance (BC)	
SEEK Areas	REQ.fd DBS.con CON VAV.fnd EVO.pro.1	Requirements Fundamentals Software Design Concepts Construction (introduction only) V&V terminology and foundations Basic concepts of evolution and maintenance
Prerequisite Knowledge	Although there is no specific prerequisite knowledge, it would be helpful if students were taking or had completed an introductory programming class.	
Abstract	This module is designed to introduce the discipline of software engineering to students new to computing. Through reading, research, reporting and class discussion, students learn about the discipline - its content, its major problems, its goals, and the principal activities of software engineers.	
Size	Lecture: 60 min Exercise: 3 hours	
Learning Objectives	**Bloom Level**	**Educational Objective**
	Knowledge	Define the term "software engineering".
	Knowledge	Describe the problems in software system development and evolution.
	Knowledge	Identify the activities associated with software engineering as applied in the development of a software system.
Topics	1. What is software engineering? 2. What are the problems with software development and why is it so hard? 3. What do software engineers do? 4. How does software engineering differ from basic programming?	
Module Materials	1. Teaching tips for the ISE1 module (MS/Word) (PDF) 2. OSE1 exercise booklet (MS/Word) (PDF) 3. Key to OSE1 exercise (MS/Word) (PDF)	
Resources & References	1. http://www.sei.cmu.edu/about/overview/whatis.html 2. http://www.omse.org/whatis.htm 3. http://www.gamasutra.com/features/19991216/mcconnell_pfv.htm 4. http://www.bls.gov/oco/ocos267.htm 5. http://www.swebok.org/ 6. Gibbs, W. "Software's Chronic Crisis." *Scientific American* 271, 3 (September 1994): 86-95. 7. Bourque P. and Dupuis R., eds. *Guide to the Software Engineering Body of Knowledge*, IEEE CS Press, Los Alamitos, Calif., 2001.	
Author Comments	This module is designed for use with first year students in computing (computer engineering, computer science, information systems, information technology, software engineering). It could also be used in a high school programming course to introduce the software engineering discipline.	

Module description in SWENET

Related projects: Offer for distance education in SE

ISEUC project:

- CSEET 2002, Kentucky (K. Modesitt)
- International Software Engineering University Consortium
- 35 members from Australia, Canada, U.K., USA
- Online courses for distance learning
- Primary market:
  - Corporations that employ software professionals

www.iseuc.org

UofM CIS Dearborn

Computer and Information Science

International Software Engineering University Consortium (ISEUC)

- **Collaboration** Proposal (The University of Queensland in Brisbane, as a sample of collaborator) - click download to get the file
- **Photos** from some ISEUC member visits
- **ISEUC** Catalog of Courses - click download to get the file
- **ISEUC** Taxonomy of Courses - click download to get the file
- **ISEUC** Calendar of Courses for 2001 - 2002 - click download to get the file
- **ISEUC** Tuition
- **"Academic** Software Engineering: What Is and What Could Be? Results of First Annual Survey for International SE Programs" [presented at the International Conference of Software Engineering in Toronto on May 16, 2001] - click download to get the file
- **Software** Engineering Consortium
  Request for Proposal "International Software Engineering University Consortium (ISEUC)"
  To: Select Institutions of Higher Learning
  From: Business, Industry and Government Who Develop Software - click download to get the file
- **Lessons** Learned: based on input from universities visited - click download to get the file
- **ISEUC** Member Universities and Industry Development Sites
- **Prospective** Members of ISEUC, based on Software Engineering Survey of Universities World-Wide, and funded by ACM and IEEE-CS

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The future

Joint Course on Software Engineering: the future

Established groups:

HU Berlin

Plovdiv

Skopje

Novi Sad

Belgrade

Kragujevac

New groups:

Nis

Sarajevo

Zagreb

Banja Luka

Timisoara

Tirana

Joint Course on Software Engineering in 2003

Are there open problems?

What has to be done?

Contributions – the near future: enrich the course

The best way to become familiar with the project and to contribute to the project is to offer a SE lecture.

Usage of the course: usage reports

Extend topics / add new topics : *)
- Design patterns
- Extreme programming
- Rational Unified Process
- PSP (Personal Software Process)
- Component based SW development
- Architectures of embedded systems
- Architectures of distributed web applications

Add new case studies

Joint Course on Software Engineering

Review reports

Translation to national languages

Extend topics to a new course: *)
→ see next slide

*) Extended material:
- the lecturer can select slides
- more flexibility to offer courses

→ Plovdiv: SE as part of Bachalor and Master

Software engineering in special courses

Part I: Introduction to SE
Part II: Requirements engineering
11. Basic concepts of state-oriented view
12. Basic concepts of scenario-based view
13. Object-oriented analysis
14. Formal specification and program verification

Part III: Design
17. Object-oriented design

Part IV: Implementation and testing
19. Systematic testing

Part VI: Advanced problems
21. Software metrics
23. Reverse engineering
24. Quality of software development process and its standardization
24. Software ergonomics
25. Project management

- **Requirements Engineering** (SEI, Pittsburgh, USA)
- **Petri nets** (Reisig, HU)
- **Objectoriented SW development (with UML)** (Fischer, HU)
- **Formal methods of SW development** (SEI, Pittsburgh, USA)
- **Software architecture** (SEI)
- **Software test methods** (Spillner, Bremen)
- **CAME-Tools** (Dumke, Magdeburg)
- **Software reengineering** (Koschke, Stuttgart)
- **PSP** (SEI)
- **CMM** (SEI)
- **Software ergonomics** (Wandtke, Inst. of psychology, HU)
- **Project Management** (SEI, Pittsburgh, USA)

Contributions – the middle future: new courses

Only in case of sufficient capacity!

Build up a pool of computer science courses

- Software Engineering
- Multi-agent systems
- Functional Programming
- ...

?

New courses: two offers

Build up a pool of computer science courses

- Introduction to object-oriented programming using Java (K. Bothe, HU)
- Compiler Construction (K. Bothe, HU)

- 800 slides (xdiv, latex, pdf)
- Pool of sample Java programs
- Pool of exercises

?

- slides (xdiv, latex, pdf)
- case study:
  - sample compiler for a Pascal sublanguage
  - target language: virtual P-code
  - implementations in C and in Java
  - visualising compiler: visualisation of the work of the compiler
  - visualising interpreter for P-code

Extend the SE course in all of its parts: Topics become modules

Build up a pool of Software Engineering modules

- Software testing
- OO analysis and design
- Software architecture
- Configuration management
- Project management
- ...

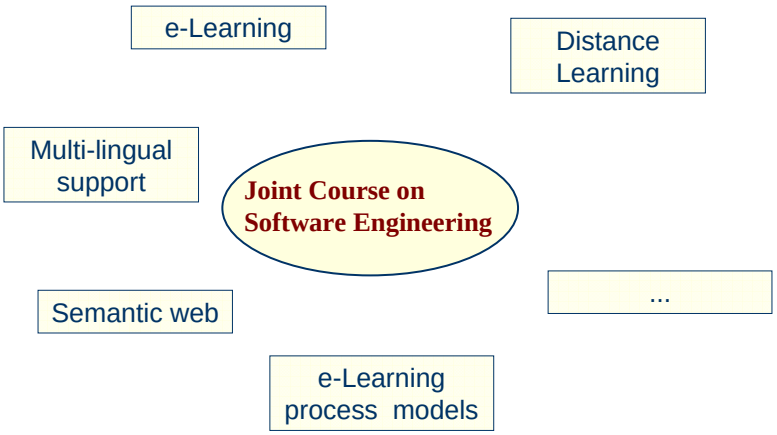
Extend our topics

Module in SWENET: a unit from 1-8 lecture hours

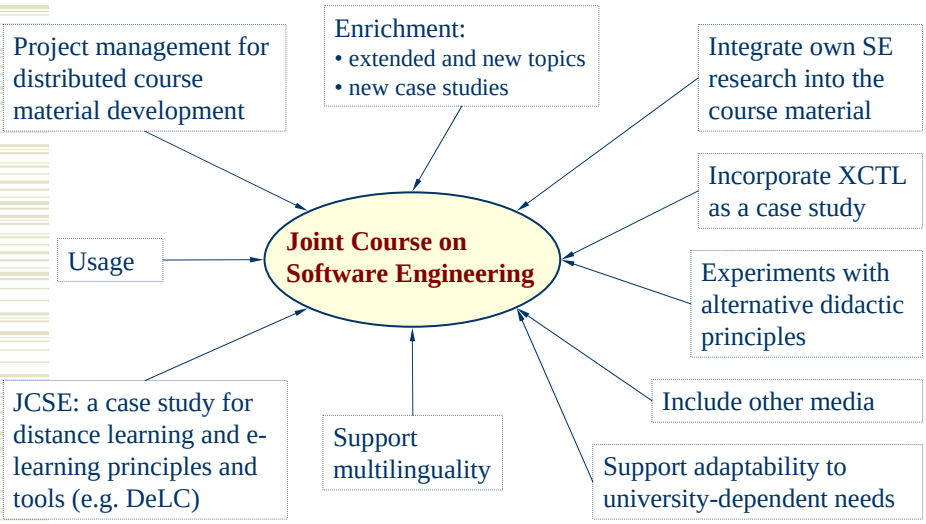
What belongs to the knowledge of SE?

- SEI SE curriculum modules
- CC 2001 from IEEE-CS & ACM
- SWEBOK Software Engineering Body of Knowledge
  - from IEEE-CS & ACM
  - http://www.swebok.org

Contributions – the future vision



The future: an alternative summary (1)



The future: an alternative summary (2)

Collection of SE course materials

- SWENET
- ISEUC
- MuSoft (11 people for 3 years)
- JCSE / SETT-Net (we ☺)

Experiments with SE course materials: didactics, new media ...

Advantage to have own copy-right-free materials!

Include own SE research into the course materials

Research in distance learning and e-learning