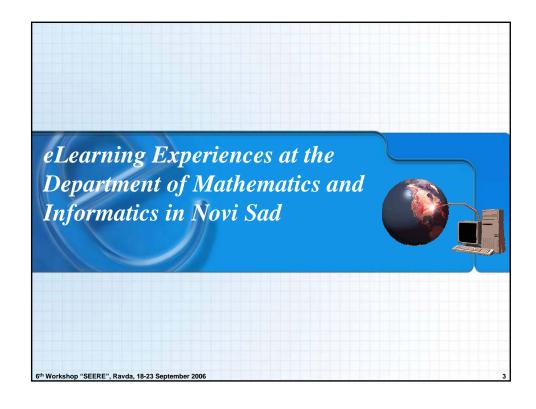


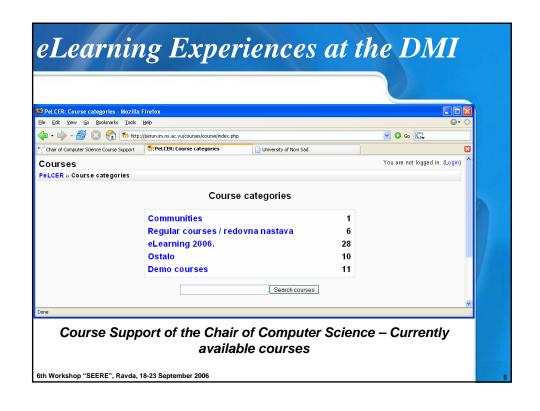
# Topics:

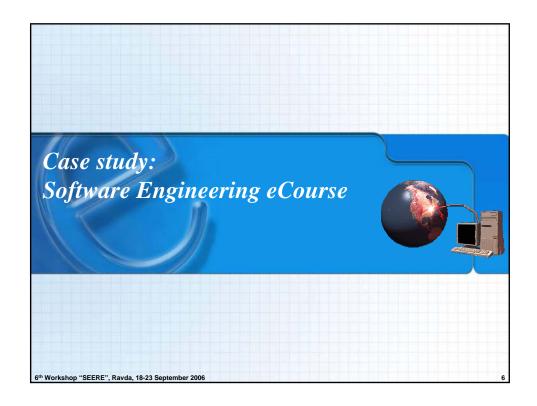
- eLearning Experiences at the DMI
- Case study: Software Engineering eCourse
- eLesson Prototype: Software Metrics Topic
  - Planning
  - Design
  - Implementation
  - Demonstration
- Quality criteria for SE eLessons
- Goals



# eLearning Experiences at the DMI

- Supporting regular courses with their e-equivalents
  - Course Support of the Chair of Computer Science
  - <u>http://perun.im.ns.ac.yu/courses/</u>
  - currently driven by Moodle
  - 6 regular courses
- An elective eLearning course
  - offered to students in their third and fourth year of studies
  - promising reactions
  - succeeded in creating their own eCourses
  - various topics, mainly selected from regular courses in Operating Systems and Software Engineering





# Software Engineering eCourse

Simple website – lecture downloads



 Moodle course - loads of downloadable lectures, formulated assignments, sample tests, polls, forums, chats, glossaries etc. supporting regular classes



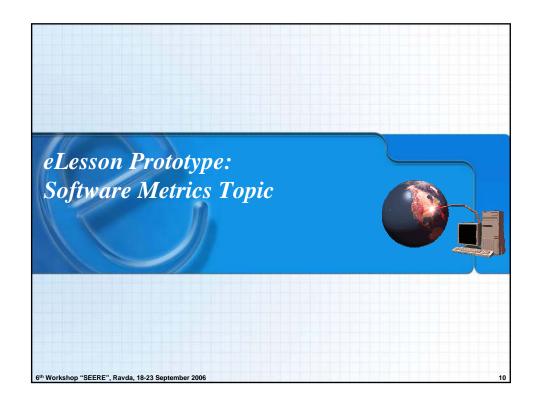


 Complete eCourse - complete eLessons instead of pdf lectures, more specialized tasks for students, improved collaboration, diversity and more reusability of teaching material



# Software Engineering eCourse

- Each topic of the regular course presented in a separate section of the eCourse
- Tasks:
  - Adding more challenging, flexible activities (Especially carefully prepared eLessons)
  - Introducing adaptivity
    (With adaptive eLessons students can explicitly choose different paths through lessons (where available) or can be directed to different parts depending on their answers.)
- Implementation in Moodle (Latest release, with navigational and other useful extensions)



# eLesson on Software Metrics

- Topic 21 of the current Software Engineering course
- Very important and interesting topic
- Rather complex
- Chosen to be transformed into an eLesson prototype to be used during the later development of all the other eLesson equivalents of regular topics.
- The main goal creating a flexible eLesson, out of presentation slides.
- Contents of each slide (or sometimes several slides that are naturally connected) is transformed into a question page within the eLesson
- A question page is here considered to be the basic learning object - LO.

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# eLesson on Software Metrics

- Wherever is possible, a question is added at the end of that content, and answers are offered or just expected from the student (depending on the type of the question).
- The questions do not just prove that students read something from the screen but that they understood it.
- Second phase implementation of cycles and different paths through the eLesson based on student's answer.
- Some answers could return students to previously read material, some can lead to additional explanations, while some could lead to skipping some parts of the lesson.
- Lessons are mostly sequential, which sometimes causes production of additional material - explanations, background etc. or connecting the current contents with LOs from other eLessons.

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## eLesson on Software Metrics

- Before creating an eLesson, it is a good idea to draw a lesson flowchart.
  - SM eLesson flowchart
  - Basic structures that could be identified in eLessons
- Lessons require rather advanced planning.
- With the potential for branching on each page, advanced planning is critical before the beginning of development.
- The key to minimizing the number of pages is to reuse as many as possible.

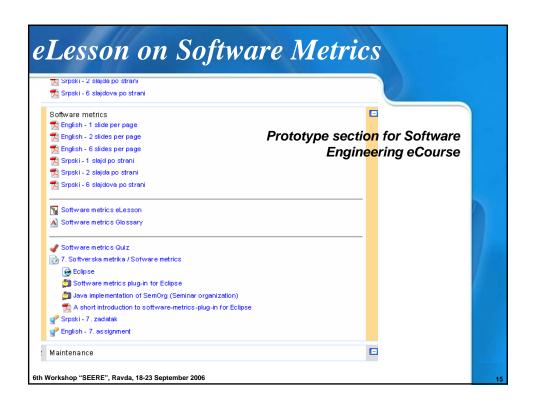
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# eLesson on Software Metrics

- With a scheme like that, it is much easier to transform existing material (slides) into meaningful eLessons, add questions where planned, and stay focused on implementing explored learning paths.
- Course creator should, while doing all that, always keep in mind a set of quality criteria determined for eLessons - the general ones as well as the specific ones.
- This procedure was strictly followed during development of Software metrics eLesson.
- Section 21 in SE eCourse consists of downloadable resources, glossary, quiz, assignment, forum, and of course a well designed and carefully prepared eLesson.

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#### Quality criteria: Content

### - Accuracy

- The course provides accurate information, knowledge and skills; following the pattern set in lecture slides and notes.
- The content is credible with sources identified.
- The content does not violate existing copyrights.

#### Completeness

 The content is sufficient in depth and breadth for learners to meet learning objectives, given the support of online facilitator and other offline learning activities, where provided.

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### Quality Criteria for SE eLearning Courseware

#### - Clarity

 Presentation of the content is clear. Text is well written. Learners find it easy to understand the materials.

#### Appropriateness

- Content is appropriate to the level of knowledge, skills and experience of learners.
- Tone and language are proper.
- Case studies, scenarios, simulations, examples or problems are credible and relevant to learners.
- Practice activities and assessments are designed with appropriate level of difficulty.
- <u>Up-to-date</u> (every change in lecture slides, notes, assignments, etc. must be reflected in eLessons).

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#### - Organization

- Content is <u>structured into meaningful sections</u> each course topic is converted into an eLesson, which consists of various learning objects (LO).
- Before constructing an eLesson a great deal of planning is required in order to define and granulate LOs. The final result of such planning effort should be a drawn scheme of connected LOs, representing all possible paths for following the lesson's contents.
- Usual duration of SE lectures is 2-3 hours and the materials provided for them are quite sufficient.
- This amount of material is to be transformed into an eLesson whose scheme should be drawn on maximum one page (size A4).

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### Quality Criteria for SE eLearning Courseware

- Quality criteria: Usability
  - Interface
    - Font Consistency (the same as in lecture slides)
    - Text Consistency
    - Element Placement Consistency (following the pattern set in lecture slides and notes)
    - Presentation Consistency
    - Texts or graphics are surrounded by sufficient space
    - <u>Text is distinct from background</u> (black text on white background, titles in green, important definitions, (parts of) sentences, examples etc. in blue/magenta)
    - Font size: 12 pt
    - Links change colour when clicked

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#### Navigation

- All pages have a title to identify the location
- Course menu is readily accessible
- Moving forward / backward
- Moving to the main menu
- Fxi
- Main menu allows navigation to any part of the course

#### Technology

- Bandwidth constraints of learners
- Compliance of current technology standards
- Scalability
- Hyperlink error
- Programming error
- Image / Multimedia error

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### Quality Criteria for SE eLearning Courseware

#### Learner Support

- Hardware requirement
  - Connection speed; Audio and video capabilities
- Software requirement
  - Minimum browser; Operating system requirement
- Instructions for acquiring hardware and plug-ins
- How to resolve commonly encountered technical problems
- Where to get help when technical problems occur
- <u>Discussion / Chat functionalities (where appropriate)</u>
- Glossary (the specific ones for each topic + the main one for the whole SE course - entries from all topics)
- Resources
- Search tool

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- Quality criteria: Instructional Design
  - The eLesson:
    - transfers knowledge or skills through effective presentation.
      - The instruction methods are appropriately selected according to their suitability in helping learners achieve the particular learning objective.
      - Where appropriate, the eLesson uses a variety of methods in presenting the knowledge and skills, including explanations, examples and demonstration.
      - The eLesson stimulates learners' recall of prior knowledge and experiences to facilitate learning.
      - The eLesson adequately explains and clarifies the important and the difficult learning points.

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2

## Quality Criteria for SE eLearning Courseware

- provides effective practice activities to reinforce new knowledge /skills.
  - The eLesson contains a variety of practice activities that are helpful for learners to achieve the particular learning objective.
  - The practice activities are adequate.
  - Apply the newly acquired knowledge and skills.
  - Demonstrate the newly acquired knowledge and skills.
  - Reflect on or discuss the newly acquired knowledge and skills.
  - Explore new ways to use the newly acquired knowledge and skills.

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- · includes adequate and reliable learning assessment
  - Assessments are presented to students throughout the eLesson. There are various convenient forms:
    - » Simulation of interaction/discussion with the student (i.e. questions and comments from the lecture slides).
    - » Questions after (each) LO.
    - » After the whole eLesson a quiz, an assignment, or both.
    - » Not all the available questions are to be used for practice – there should be a collection of that can be used for grading purposes.

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2

### Quality Criteria for SE eLearning Courseware

- Where appropriate, the course includes both pre and post assessment for evaluation of learning effectiveness.
- The assessment adequately covers learning objectives of the course.
- Moodle keeps a record of learners' assessment results.
- The course provides instructions on how to take assessment, where assessment results are stored, and how to retrieve assessment results, where appropriate.

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- uses appropriate engagement techniques to gain attention, sustain interest and provide motivation.
  - Role-plays
  - Stories
  - Games
  - Simulations
  - Case studies
- selects appropriate media and makes effective use of media to enhance learning experience.
  - Graphics to focus learners' attention
    (all graphics from lecture slides should be used either directly in LOs, or if the graphic is too large to be incorporated into contents of a single page, it should be offered to the student to see it in a new window, or in some other location).

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2

### Quality Criteria for SE eLearning Courseware

- Graphics should be carefully introduced, i.e. not all the original material should be converted into graphics (tables can be easily reconstructed), especially not as the whole slides.
- Video clips to demonstrate complex concepts
- Animations to sustain interest. Beware the distraction they might cause.
- Audio narration to enhance learning
- uses appropriate collaborative tools to facilitate learning.
  - Discussion groups
  - Notice board
  - Chat room
  - Audio conferencing
  - Videoconferencing

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- is able to adapt learning activities according to individual performance and learning needs
  - Learners should be kept interested in the material presented, acquiring new knowledge at their own pace, without wasting time on information already known to them.

#### - Learners:

- are made aware of the learning objectives for each unit of the course
- receive effective feedback on their performance
  - Timely, relevant and positive (feedback for incorrect answers offers an explanation / hints / futher attempts).

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## Goals

- Complete Software Engineering eCourse
- Other (joint) eCourses OOP, OS, CC, etc. ?
- Further testing, upgrades and evaluation
- · Ideas?
- Questions?

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