

INF5180: Software Product- and Process Improvement in Systems Development

Part 00:
Course Information and Introduction



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Spring 2010

PPP in Software Development

- What are the crucial **Three Ps** in a Software Project?



- P...?
- P...?
- P...?



Software Products

- What are Typical Products in a Software Project?



Software Processes

- What are Typical Processes in a Software Project?



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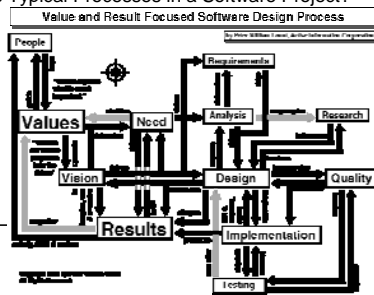
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Software Processes

- What are Typical Processes in a Software Project?



Answer 1

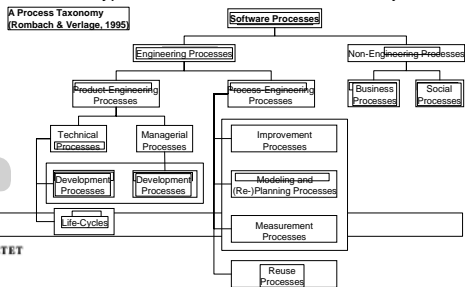


Software Processes

- What are Typical Processes in a Software Project?

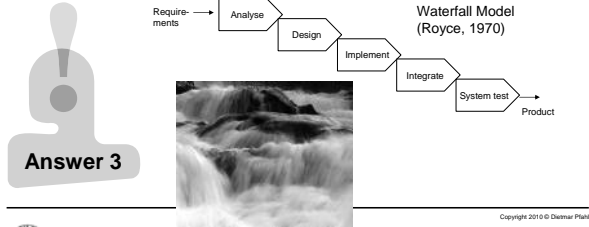


Answer 2



Software Processes

- What are Typical Processes in a Software Project?

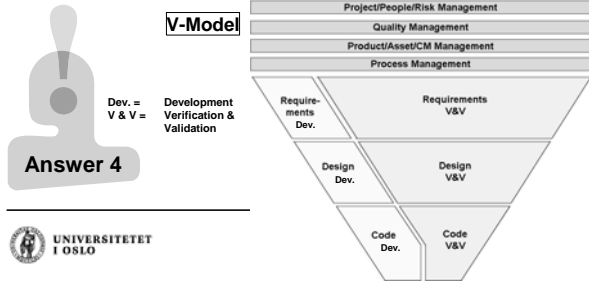


Answer 3



Software Processes

- What are Typical Processes in a Software Project?



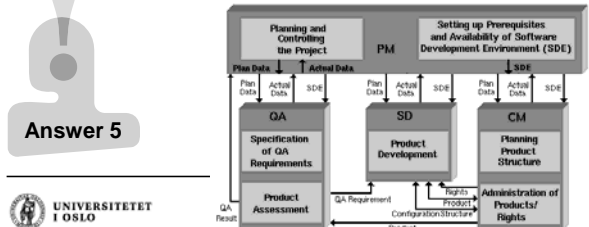
Answer 4



Software Processes

- What are Typical Processes in a Software Project?

German Government V-Model XT for the Planning and Management of IT Development Projects (2006)



Answer 5



... So what about People?



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Product vs. Process vs. People Improvement

- Product Improvement
 - We are talking here about one or more attributes of the products that will be improved. Such attributes typically include
 - Quality-related attributes
 - Examples: Functionality, Reliability, Maintainability ... (→ ISO 9126)
 - But it may also reflect such things as
 - Shorter time-to-market
 - Lower development cost
- Process Improvement
 - Development Process = mechanism that yields the end product
 - Engineering processes
 - Management processes
 - The development process is crucial for the product:
 - If the products are to be improved, improving the process is a pre-requisite.
- People Improvement
 - Experience & Training

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Overview of Lectures (Dates are fixed / Contents are tentative)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Introduction into Process Improvement 2. Processes and Process Modeling 3. Research Methods 4. Problem Solving and Improvement – by Individuals 5. Problem Solving and Improvement – by Groups 6. Student Presentations | <ol style="list-style-type: none"> 7. Measurement-based Improvement 8. Goal-oriented Measurement 9. Learning from Experience 10. Process Assessment 11. Process Assessment (cont'd) 12. Process Improvement Frameworks <p>One lecture will be devoted to review and – if possible – a presentation from industry.</p> |
|---|---|

NB: In most lectures up to 45 minutes will be devoted to guidance and discussion with regard to your project paper

Topics

Introduction into Process Improvement

- Important concepts: process, product, structure and quality.
- The SPO-model will be introduced as analysis instrument.
- Process improvement history (i.e., "Scientific management" and Deming's work).

Processes and Process Modeling

- Types of processes
- Descriptive and prescriptive process modeling
- Criteria that help select an appropriate process

Research Methods

- Classification and description of frequently used research methods within studies of system development along the axes of "generality", "objectivity" and "philosophical viewpoint".
- Evaluation of suitability in relation to the goal. Description of different effects which can influence the results, e.g., "theory-loaded observation".
- Use of statistics in process improvement work. Argumentation.



Topics (cont'd)

Problem Solving and Improvement – by Individuals

- System development can be regarded as problem solving. Models for problem solving and how the problem solving process is supported by models, methods, processes.
- Learning. Culture and value in a system development organization in relation to process improvement.

Problem Solving and Improvement – by Groups

- Teamwork. Relationship between trust and collaboration.
- Productivity in groups. Groups as decision makers.

Measurement-based Improvement

- Why Measurement?
- Measurement-based improvement: definitions, basics and pre-requisites

Goal-Oriented Measurement

- Why having a clear goal?
- The Goal/Question/Metric (GQM) model.



Topics (cont'd)

Learning from Experience

- The role of experience in continuous improvement work.
- Experience Factory (EF), Quality Improvement Paradigm (QIP).

Process Assessment

- The Capability Maturity Model Integration (SEI-CMMI).

Process Improvement Frameworks

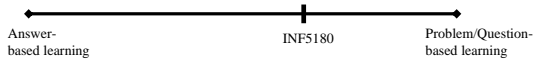
- ISO-standards, CMM-families, TQM, EFQM, etc.



Course Objectives

This course will enable you to contribute to a (your?) company's improvement efforts by:

- Giving insight into challenges that software development organizations are facing
- Conveying basic knowledge contributing to efficient, effective and sustained improvement in software development
- Focusing on both *methods for systematic process improvement* and *specific research & analysis techniques* which help achieve improvement
- Using exercises to practice/apply various process improvement methods and techniques
- Having stimulating and informative discussions on improvement work and related subjects



Literature (Syllabus)

- *PROFES - User Manual*, 1999. Profes Consortium.
 - NB: An electronic copy of this book will be made available to course participants.
- Dybå, Dingsøy, Moe: *Praktisk Prosessforbedring*, 2002. Fagbokforlaget. ISBN: ISBN 8276749143.
- Additionally, the lecture slides are part of the syllabus.
- **NB:** In order to achieve a good project paper & oral exam, self-learning is essential!



Other Useful Literature (Syllabus Support)

- Luke Hohmann: *Journey of the Software Professional*, 1997. Prentice Hall. ISBN: ISBN 0-13-236613-4.
- Chrissis, Konrad, Shrum : *CMMI - Guidelines for Process Integration and Product Improvement*. 2003. ISBN: 0-321-15496-7.
- F. Shull, J. Singer and D. I. K. Sjøberg: *Advanced Topics in Empirical Software Engineering*, Springer-Verlag London (ISBN: 13-978-1-84800-043-8), 2008.
- D. R. Forsyth: *Group Dynamics* (4th ed.). Pacific Grove, CA: Brooks/Cole, 2006.
- B. Boehm and R. Turner: *Balancing Agility and Discipline: A Guide for the Perplexed*. Addison-Wesley Longman Publishing Co., Inc, 2003.
- K. Schwaber: *Agile Project Management with Scrum*. Microsoft Press, 2004.
- A. Cockburn: *Agile Software Development*. Boston: Addison-Wesley, 2001. (2nd edition appeared in 2006)
- A. Andres and D. Rombach: *A Handbook of Software and Systems Engineering – Empirical Observations, Laws and Theories*, Addison-Wesley, 2003.
- P. M. Senge: *The Fifth Discipline. The Art and Practice of the Learning Organization*. Currency Doubleday, New York, 1990.



Evaluation, Marking, and Grades

Two parts:

- 1) Assignment: Project Report (~20 pages) – 80% of the grade [16 marks]
 - Criteria:
 - Readability and clarity [2 marks]
 - Language and formality (title, captions, referencing, etc.) [2 marks]
 - Structure and flow of argument [4 marks]
 - Contents: completeness, consistency, realism (→ could it be implemented?) [8 marks]
 - Note: There will be a mandatory short presentation and draft outline/draft required (3-5 pages); failing to do the oral presentation or to submit the outline/draft in time will automatically generate a penalty of 2 marks! Not submitting the outline at all will generate a penalty of 4 marks!
- 2) Oral exam (approximately 15 minutes): will be based on your answers to questions about the course and about your project (report) – 20% of the grade [4 marks]
 - Clarity and conciseness [1 mark]
 - Relevance (→ is the answer to the point?) [1 mark]
 - Correctness and completeness [2 marks]

Project Assignment (1)

Task:

- Prepare a (realistic) software process improvement plan for a software/systems development organization

Project Assignment (2)

General information:

- No group submissions, but informal collaboration between students is ok.
- Some lecture time will be devoted to reflection about the project paper.
- The system/software development organization and its requirements may be real or fictitious. In any case, suggested improvement actions must clearly be related to the business problems and goals.
 - It is recommended to contact a software development organization in order to find a real-world problem/challenge/issue. *Note: It is not necessary to mention the organization's name.*
- If you happen to find (or even be involved in) a real-world improvement project, you should not make yourself completely dependent on the reality, because a real-world project might have a longer time-frame than our course.
- In order to be able to develop your improvement plan, you might need to study some materials before they are presented in a lecture. Therefore, in order to find good solutions (improvement actions) it is recommended to study available material ahead of teaching.

Project Assignment (3)

Mandatory! (-1 marks each if not delivered in time)

Deliverables:

- Feb 11: Brief presentation of organization and its problem(s)/need(s)
- April 15: First draft report (3-5 pages)
 - Brief characterisation of the organization
 - Brief description of the organisation's problem(s) and/or goals of the improvement project
 - Initial structure of the improvement plan (What? – When? – Who?)
- May 13: Final submission (maximum 20 pages) containing:
 - Part 1: Description of the problem and goals of the improvement project (max 3-5 pages).
 - Part 2: Improvement plan (5-7 pages): detailed description of measures that will be taken (What and How? – When? – Where?)
 - Part 3: Underlying rationale of the key elements of the improvement plan (7-10 pages).



Project Assignment (4)

Evaluation criteria:

- Consistency between stated problem and improvement plan.
- Thoroughness of argumentation in the reasoning about the improvement plan.
- How realistic/executable is the improvement plan?
- Use of syllabus material and other references.
- Structure and readability, Conciseness!
- Formality (language, grammar, correct referencing, etc.)
 - Formatting rules: font: 11pt Arial (tables might use smaller font, but not less than 8 pt); line spacing: single spaced; top/bottom/left/right margins approx. 2 cm; provide page numbers
 - Provide table and figure captions; proper referencing



Project Assignment (5)

Examples of problems and goals:

- *Customers find too many defects* – Improve software quality.
- *Inaccurate planning / estimates* – Improve planning methods/models.
- *New technologies or standards make their way into the market (e.g., Java, .net, SOA, model-driven development/testing)* – Mitigate risks associated with introducing the new technology.
- *Software is hard to maintain / difficult to evolve* – Improve software architecture.
- *Increasing competition* – Speed-up development, issue releases more frequently.
- *Customer are dissatisfied with deliveries* – Stronger customer participation and more flexible process.
- *"Old-fashioned", heavy development process* – Modernize development processes, methods, and tools.
- *Little diffusion of competence, low motivation* – Improve training and enhance involvement of people.

FIND A REALISTIC APPROACH TO SOLVING A REALISTIC PROBLEM.

MAKE USE OF YOUR IMAGINATION (but choose "probable" problems/goals/solutions).