Software Quality Management, 2004, pad006

1. General

This course information concerns Software Quality Management - course code PAD006. The course starts in week 45 and ends in week 03, 2005. The course has been given six times before.

2. Examination

The examination includes:

- Presence at all lectures in table 1. If presence is not possible, please contact the course responsible.
- Delivery of mandatory reports before the deadlines, see table 2. Reports delivered after the deadline will be ignored and you will not pass the course. Note also that you must keep your reports within the maximum number of pages allowed (cover sheet and table of contents excluded). You must show your ability to extract the most important knowledge!
- Prescence at lectures, and pass on all the seminars and reports. The requirements for passing each assignment are described in section 8.
- Grades for the course will be based equally much on written reports, presentations, participation in discussions, oppositions/reviews, etc.

The grade for the course will be given:

- according to the Swedish grading system (Fail, Pass or High Pass), and
- according to the European grading system ECTS (A, B, C, D, E, FX, F).

3. General Information

Course responsible is Conny Johansson.

Teachers are:

- Conny Johansson (Conny.Johansson@bth.se), CJH
- Patrik Berander (Patrik.Berander@bth.se), PBA
- Nina Dzamashvili (nino.dzamashvili@bth.se), NDZ

If you intend to follow this course, and want continuous information, you must sign on the mailing list. See instructions at ide-net.

4. Preliminary Schedule

The course schedule for week 44 (2004) to week 03 (2005) in table 1 is preliminary and may be changed during the course. A change is announced via e-mail to the mailing list and at the course home page at ide-net.

Table 1: Mandatory lectures and seminars

Day	Time	Point	Place
Nov. 02	10-12	Introduction to Quality Management, (CJH)	Stora Konferensen
Nov. 08	9-11	Lecture: Quality Issues (PBA)	Stora Konferensen
Nov. 09	10-12	Seminar Philosophy of quality (CJH)	Stora Konferensen
Nov. 16	10-12	Lecture: CMMI, ISO standards* (CJH)	Stora Konferensen
Nov. 22	13-17	Quality Issues meetings (appr 30 minutes for each team) (PBA)	Leda
Nov. 30	10-16	Part 1-3, 5, Zahrans book. (CJH)	Stora Konferensen
Dec. 9	13-17	ISO/CMMI Seminar, Intro Defect Prevention & Quality Techniques (PBA)	Stora Konferensen
Dec. 17	10-12	Defect Prevention Discussion Seminar (PBA)	IPD Conference room
Jan 12	8-17	Quality Techniques Seminar (NDZ)	Stora Konferensen
Jan. 13	13-17	Meetings with the teams. Walk-through of the reports in Quality Techniques (appr 30 minutes) (NDZ)	Luna
Jan 14	9-16	Presentation of articles Course conclusion (CJH)	Stora Konferensen

All lectures are mandatory.

5. Deadlines

5.1 Mandatory reports and report deadlines

Table 2: Mandatory reports and report deadlines

Report	Deadline
Philosophy of quality, (CJH)	2004-11-05, 13.00
Quality Issues (Report), (PBA)	2004-11-15, 13.00
Quality Issues (Reviews), (PBA)	2004-11-16, 17.00
Quality Issues (Updated Report), (PBA)	2004-11-18, 17.00
ISO and CMMI, (PBA)	2004-12-08, 13.00
Delivery of audience reports. (CJH)	2004-12-13, 17.00
Quality Techniques, (NDZ)	2005-01-07, 17.00

NOTE: The reports shall be distributed electronically.

5.2 Other Deadlines

Table 3: Other deadlines

Point	Deadline
Delivery of ppt-slides+notes. (CJH)	2004-11-26, 13.00
Deadline, Selection of side in Defect Prevention discussion, (PBA)	2004-12-15, 13.00
Selection and handshake of articles ready. (CJH)	2004-12-15, 17.00
Quality Techniques, Selection of technique, (NDZ)	2004-12-17, 13.00

6. Reading reference

Point	Reference
Philosophy of quality	None.
Quality Issues	(viii) chapter 1, 2, 3.8, 4, 10, 13, 13.1, 13.2, 14.1.1, 14.1.3, 14.2.1, 14.3, 15.1-15.2, 15.4 + Reference literature list, see course plan
ISO and CMMI	(iii) (iv) (viii) chapter 18, 19, 20.1, 20.3, 21.5, 22 (ix) (x) (xi) + Reference literature list, see course plan
Defect Prevention	(v) page 142-182 + Own literature about defect prevention
Quality Techniques	Selected reading from the following (suggestions): (i) page 941-957, 1359-1376, 1084-1090 (ii) (v) page xi-xxxv (vi) (vii) page 65-81 (iii) selected parts (iv) selected parts + Own material about the technique chosen + Reference literature list, see course plan

General reference for arranging, structuring and referring of formal reports: Chapter-The Formal report and the extract from Dawson .

(i) J J Marciniak (Ed.): Encyclopedia of Software Engineering

(ii) Article: Aurum/Petersson/Wohlin: State-of-the-Art: Software Inspection Turning 25 Years

(iii) Paulk et al.: The Capability Maturity Model, Guidelines for improving the Software Process, (download from:

http://www.sei.cmu.edu/cmmi/ (Capability Maturity Model Integration)
http://www.sei.cmu.edu/publications/documents/93.reports/93.tr.025.html
and http://www.sei.cmu.edu/publications/documents/93.reports/93.tr.024.html)

(iv) The TickIT Guide to ISO 9001:2000

(v) C Jones: Software Quality, Analysis and Guidelines for Success

(vi) Article: Crawford/Fallah: Software Development Process Audits - A General Procedure

(vii) C P Hollocker: Software Reviews and Audits Handbook, page 65-81

(viii) Bergman, B: Klefsjö, B. Quality from Customer Needs to Customer Satisfaction, Second edition.

(ix) Boehm, Barry: Get Ready for Agile Methods, with Care.

(x) Paulk, M, C: Extreme Programming from a CMM Perspective.

(xi) Russo, R: 12 Rules to Make Your ISO 9000 Documentation Simple and Easy to Use.

7. Course Plan

See www.

8. Description of mandatory assignments

The contents of each report is described below. Note that the instructions in this section are used as check-points when the reports are graded!

8.1 General

- In general: Most important is that your statements are well motivated. This means that the statements should primarily be based on facts. Facts in our case are defined as statements from books and articles which are primarily based on empirical research/investigations. Refer to the facts as you analyse and describe your own experiences from project work. In order to get higher degrees, you have to refer to additional sources of literature in addition to the mandatory literature presented in section 6.
- Each report shall clearly state the author/s and their mailing addresses.
- Review the reports! Try to avoid unnecessary spelling errors.
- All reports shall be distributed electronically.
- The maximum number of pages in the reports shall not be exceeded. Do not manipulate with font size, line width etc., in order to not exceed the number of pages (cover sheet and table of contents pages excluded). Remember that the most important thing is the *content*.

8.2 Philosophy of Quality

Managed by: Conny

The goal of this first assignment is to let you think about the concept of Software Quality from three different perspectives. Additionally, you should discuss what pros and cons that are related to quality-related work. You are not supposed to read **any** background material for this assignment. Use your creative thinking and do not forget to relate to your experiences in order to explain YOUR view.

- What does quality in Software Development mean to you?
- What does quality in Software Products mean to you?
- What does quality in Software Processes mean to you?
- What benefits and shortcomings do we get from caring about quality in Software? Discuss and motivate your answers.

Estimated size: 2-3 pages. Work individually.

Seminar/Feedback: A seminar will be held where interesting issues identified in the reports will be discussed.

Note: The grades Fail or Pass are the only grades available for this assignment.

8.3 Quality Issues

Managed by Patrik.

The goal of this assignment is to consider how quality differs between different types of systems and what to think about in different situations. The book Quality - from Customer Needs to Customer Satisfaction by Bergman and Klefsjö (hereafter referred to as Klefsjö) should be read as introduction. The discussions shall be closely related to your own previous experience from software projects.

- Klefsjö mostly discusses quality from a mass-market perspective. How does quality differ between bespoke products and market-driven products? Discuss the differences of how quality is seen, and relate to your own experiences. Bespoke = products developed to one customer under contract, Market-driven = products delivered to a mass market.
- How does quality differ between different kinds of software systems (e.g. web systems, real-time systems, operating systems, business solutions, banking systems, games, nuclear/safety critical, etc.)? Discuss (with help of three examples) how quality differs between different kinds of systems! Discuss the differences of how quality is seen, and relate to your own experiences. Which different requirements regarding quality are put on the different kind of systems? Why? How? Discuss and motivate.
- Klefsjö discusses quality dimensions of goods and services. Provide a similar discussion about quality dimensions of software. Is software more similar to services or goods? Analyse the similarities and differences in quality-related issues between software/goods and software/services respectively. At least three similarities and three differences of each should be discussed. What can we learn from more mature industries like these? Motivate. Clarify the assumptions you are making.
- Klefsjö discusses 7 quality tools and gives examples related to manufacturing. Give at least one example for each quality tool how you (could) have used it in a project you have been a part of. If you have not used a tool and cannot find a suitable application for the tool, argue for why it is not applicable in software development. Argue for if these kinds of quality tools are useful in software development. Motivate. (Just give examples; you do not have to create graphs etc.)
- Klefsjö discusses the supply process for production industry. How does the quality aspects of supply management relate to software development? Relate the discussion to experiences you have made with third party products. How does quality in the supply-process affect the quality of the end-product? What is a rational way of evaluating your suppliers' products? Motivate.
- How does the four phases of the quality movement (discussed in Klefsjö) relate to software quality activities?

Estimated size: 6 pages (Work in teams of two students) The intent is that the issues shall be discussed between the two students.

Note: No summary of the chapters shall be done, just references when needed.

Each report shall be peer reviewed anonymously by two fellow course participants. Hence, each report shall be sent to the responsible teacher by e-mail. The teacher will distribute the report to two different reviewers that shall review the report (individually). The reviewers shall write a one-page summary, which describes the opinion about the report. This review shall concentrate on unclear descriptions/ statements and poor motivations. All statements that the authors do shall be clearly motivated, by literature references or references to own experiences. Opinions about strengths in the report shall also be presented. The one page summary (review) shall be handed in to the responsible teacher by e-mail. The teacher will then distribute the comments to the authors. Based on the review, the authors should update their report and send it in before the deadline.

Seminar/Feedback: Each team will receive feedback at scheduled meetings (appr. 30 minutes) with the teacher.

8.4 ISO and CMMI

Managed by Patrik.

The goal of this assignment is to create knowledge about two quality systems often discussed in the software industry, namely the Capability Maturity Model Integration (CMMI) and the ISO9001 (TICK-IT).

- Briefly describe the main characteristics of ISO and CMMI respectively. What is the intention? How does it work? Why is it developed?
- Identify five differences between CMMI and ISO. Discuss the differences.
- Discuss pros and cons with each model. Motivate.
- Which are the three most important process areas in CMMI (will give the highest benefits to process improvement)? Motivate why you think these are the most important ones?
- Which are the pros and cons of models like ISO and CMMI (a general discussion about quality systems is requested)? Motivate.

Estimated size: 4 pages Work individually.

Seminar/Feedback: A seminar will be held where interesting issues about this kind of quality systems will be discussed. Individual feedback of each report will be provided by e-mail.

8.5 Quality Techniques and Models

Managed by Nina

The goal of this assignment is to introduce and deepen the knowledge about different techniques/methods and models relevant for software quality assurance. In this assignment, it is possible to choose whether to focus on a quality technique/method or a quality model. The requirements of the two approaches differ and the requirements of each approach are presented below (Section 8.5.1 and Section 8.5.2). The general requirements of both approaches are presented in Section 8.5.3.

8.5.1 Quality Techniques

- An overview and an evaluation of a selected aspect/technique/method (further on called technique), upon which defect prevention relies. The technique may be used at a company, or described in suitable articles/books (e.g. prototyping, reviews/inspections (incl. pair programming), personal software process (PSP), reuse, test-driven development, training, joint application development (JAD) etc.).
- Write a summary of the technique where you present the concept and the characteristics for the technique.
- Analyse the technique and relate it to the content of the previous assignments, literature and the discussions.
- Discuss strengths and weaknesses of the technique.
- What kinds of defects are suitable to prevent with the technique? Why? Motivate.
- What different kinds of variants are there of the technique? How do they differ? What are the purposes with the variants? Motivate.
- What motivation for using the technique is there? How to motivate people? How to motivate managers? How to motivate the organization?
- What resistance for using the technique is there? How shall we overcome that resistance?
- What do ISO and CMMI say about the technique? Does it align with the requirements of ISO and CMMI? Discuss and motivate.
- What metrics could be used in relation to the technique? Why? Motivate.
- Choose at least three defects from a past project. Describe the defects and give a description of how

your technique could have prevented each defect. Perform a cost-benefit analysis where you estimate how much the defect did cost and how much it had cost to prevent the defect with your technique. Motivate.

8.5.2 Quality Models

This part includes a study of existing improvement models/standard. Examples of models that could be studied are Spice, Trillium, Bootstrap, Six Sigma:

The report shall contain:

- An overview and an evaluation of the selected model.
- You shall identify characteristics for the method. Focus primarily on topics which have been covered in this course. Do not neglect important aspects such as activities, goals, quality assurance aspects, maturity representation etc.
- Why, do you think, does the method have this focus and structure?
- Relate your analysis to the literature, especially Klefsjö and the literature from Section 8.4.
- What are the strengths and weaknesses with this method? What do you think? Base your conclusions on references to literature, own experiences from projects and discussions within the team.
- **The models shall be compared with ISO9001:2000 and CMMI**. Lacks and strengths in relation to these standards shall be analyzed. A careful analysis of the similarities and differences according to these standards shall be presented.

8.5.3 General about the Assignment

The following rules are valid:

- Only one team per method (FCFS).
- Mail the responsible teacher a one-page summary describing the method and a list of the sources (references) as soon as you have a proposal for a model/method.
- The lecturer must confirm your choice.
- Write with your own words. It is not allowed to copy evaluations already done.
- Include reading references in the report.
- You shall defend your technique/model at the presentation.

Estimated size: 12 pages. Work in teams of 3-4 persons.

Distribute the one-page summary and report to the responsible teacher.

Seminar/Feedback: The assignment includes a presentation/discussion seminar. All reports will be published at the course web page (all groups must send in an electronic copy of their work). Before the seminar, the course participants will be divided into groups. Each group will be assigned to a technique and they are responsible for preparing a number of interesting topics to discuss about the technique. These topics should be chosen so that you challenge the authors about their technique or model (NOTE: It is the technique/model itself that should be discussed, not the performance of the authors). Prepare statements/arguments for speeches at the seminar. Prepare arguments in order to meet the other sides speeches/arguments.

There will be an additional meeting after this seminar. At this meeting, the authors will receive feedback on their reports. At this meeting you will also have to defend your report, good report = short defence, bad report = long defence.

8.6 Defect Prevention

Managed by Patrik

This part of the course is a discussion part and no report shall be written. Instead, the course participants will be divided into two groups where half of the course participants shall argue for the pros of defect prevention, and some for the cons.

- Each course participant shall study the area of defect prevention in literature (articles, books etc.)
- Each course participant shall send an e-mail to the responsible teacher, stating which perspective is wanted (the participant's own choice will be followed as much as possible).
- The responsible teacher will divide into two teams, based on the wishes of the participants.
- Each team shall prepare the argumentation session by discussing pros and cons, and strategies within the group prior to the seminar (at least 2 hours should be spent on discussing defect prevention). Each team should prepare statements and "killer" arguments.
- The responsible teacher will moderate the discussion between the two groups.
- Remember that oral parts of the course are as important as written ones.

8.7 Zahran: Software process improvement

Managed by Conny

8.7.1 Realization

This part concerns Part 1 to 3, and part 5 in the book.

The realization of this part shall be done according to:

1. One or several student/s present one or several part/s. The criteria for the presentations are listed below.
   - A walk-through of the content in the book shall be done.
   - Additional sources of reference shall be studied.
   - How does the content related to your own experiences of process improvement?
   - What is new? (what have you have you not thought about previously).
   - What do you agree and disagree on regarding process improvement? Focus on a reasonable (limited) amount of issues.
   - Which opportunities do exist based on the content in the material.
   - A comparison between American and European (Swedish or other) situations shall be made.
   - Uncertainties, i. e. unclear matters shall be analyzed.

   Part 1 to 3 takes appr 1 1/2 hour each, Part 5 takes 1/2 hour. We prefer that you mix your presentation with discussions continuously. Note that you as a student shall manage (lead) the discussions (see next point), concerning the issues she/he are responsible for.
2. The remaining students shall prepare themselves, e.g. with additional questions at issue, for the presentation according to the aspects described in the previous point.

8.7.2 Graduation

1. The lecturer, (the student), shall hand in slides and notes, preferably according to the Microsoft Powerpoint principle. If the lecturer exclude slides and/or notes, this shall be handshaked with the course responsiblein advance. Slides and notes shall be sent to the course responsible at least two days be-

fore the presentation.

2. The audience shall hand in written reports describing interesting and questionable issues according to section 8.7.1 point 1-2 above. Maximally 3 A4 shall be delivered to the course responsible at the given deadline.

The grade will be judged based on both the oral and the written part for all the points above. The grade is either Fail, Pass or High Pass.

8.7.3 Lecturer schedule

Part 1: Jan, Sebastian, Kai. Part 2: Jean Charles, Jan-Peter, Markus. Part 3: Richard, Jimmie, Kashif. Part 5: Johan, Christian

8.8 Special project

Managed by Conny

Each student shall select 2 articles that concerns a specific topic within **process improvement**. The choice shall be handshaked with the course responsible. The presentation (note: no report for this part) shall last for about 20 minutes.

Important issues to think about are:

- what area, problem domain and scope do the article describe?
- what solutions do they suggest?
- what is the authors foundation for the solution?
- what do you think about the content? Any own proposals?

Hints on finding articles:

- the infocenter archives at Soft Center, e.g. ELIN Blekinge
- ACM digital library: http://www.acm.org/dl/
- Several other places on the Webb - you look for them yourself.