COMP 3710
Software Project Management
S2 2003 Lecture 8 - Review

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Lectures and Seminars by Week

1: Subject Outline +
   Processes for Project Management – Planning
2: Project Management Tool
   Personal Software Process
3: Project Scheduling and Quality Assurance + quiz
   Monitoring
5: Integrated and Collaborative projects + quiz
6: No lecture and no formal tutorials
7: Seminar – An invited speaker from industry
8: Subject Review
9: Exam

Tutorial Exercises – Please Note

- No Design Change submission PDC01
- The marks were assigned to PRR a few weeks ago and they were shown on the new marking
  scheme weeks ago on the web
- Tutorial is on re-estimation
- Plan Review Report template has been changed,
  □ Download it again, and look at the linked files

Final Exam

- Date/Time
  □ Tuesday 23 September 4-6 pm
- Location
  □ CLB8 and ????
- Duration
  □ 60 minutes
- Worth
  □ The exam will be worth 40 marks
- Style
  □ Multiple Choice
  □ Theory questions and practical questions

Week 8 Tutorial: Re-estimate your Project

- Difference in “estimates” and “actuals” may be due to:
  □ Estimation error – eg system size, target productivity rate
  □ Measurement error – inaccurate recording of actuals
  □ Quality variation – you delivered better or worse quality
- Using Your Data in MS Project
  □ Evaluate the difference between your estimates and the actuals
  □ Revise the target productivity rate based on the history plus what you now know about your estimation error
- Adjust the size of your product due to any scope creep
  □ Additional entities? Additional Functions?
Reviewing the Tutorial Exercise

You Did a Lot!

- Analysed the requirements for a Project Management Tool:
  - General requirements for all PM tools
  - Specific requirements for a tool to support collaborative project management
- Recorded the effort expended on producing your design work products and carrying out project management
- Regularly reported on your project to your client
- Used your experience to re-estimate the project
- Captured your experience in the Project Review Report

Prepare a Schedule and Cost your project

- SIP (your client) wants you to submit a proposal to deliver the product
- They expect delivery of a beta-test version within 18 months from today
- Allocate project resources to complete the remainder of the project
- Prepare a fixed price quote to complete the project within the client’s expectations
- Add this material to your Project Review Report

What was “Farm Cheese” about?

Your Client’s Business Environment
Every one has a client

- For this exercise, your client was SIP
- SIP specified the requirements
- SIP paid you
- Understanding your client’s business helps you to provide them with better service
- SIP manages collaborative projects
- We gave you “Farm Cheese” as an example of a collaborative project
- The project manager is the chief link between the project and the client
- It is essential to know who your client is and what you need to do to meet their expectations

Why the “Pair Work”?

- Three Fundamental issues in Project Management:
  - What is the most efficient way to use scarce resources?
  - When is it appropriate to trade resources for schedule improvement?
  - When is it appropriate to trade resources for quality improvement?
- Pair Work is a current issue in Project Management:
  - Is “Pair Work” an efficient way to use scarce resources?
  - Is there an improvement in delivery to schedule when people work according to the “Pair Work” method?
  - Is there an improvement in product quality when people work according to the “Pair Work” method?

Why is “Pair Work” an Issue?

- People using Agile and Extreme Programming methods claim that “Pair Programming” is:
  - Work efficient: to create a program
    - Pair effort > 1 * work effort but < 2 * work effort
  - Schedule efficient:
    - Duration < half the time for 1 person to create the program
  - Quality effective:
    - Quality of a program produced by a pair is better
- Is this true for other Phases of the SDLC
  - Eg “Pair Designing”, “Pair Testing”?
- Claims about “Pair Work” have been subject to little scientific evaluation

Your Tutorial Exercises Produced Data

- The amount of Work Effort required to produce your designs
  - The effort you recorded in MS Project
- The Quality of your designs
  - Can be assessed against the ISO/IEC 9126 criteria
- Any comments in your Project Status Reports and in your Project Review Report
- The data from when people worked alone, provides a basis for comparison with “Pair Work”

Research Ethics

We are not allowed to use this data without your permission.
We are not allowed to penalise you if you do not give permission.
Consent Form and Questionnaire

- A consent form will be handed out here and in tutorials
- Please read the form
- If you are willing to have your data used for research, please sign the consent form
- The attached questionnaire seeks additional information about when you worked with a partner
- If you are willing to provide this information, please complete the questionnaire
- Your responses will be de-identified
- Your responses will not affect your marks in this subject

The Quizzes

Quiz 1

- Typical activities of a manager are:
  A) Planning
  B) Organising
  C) Communicating
  D) Monitoring
  E) All of the above

Which of these would NOT be a Project Management Process Area in the CMMI model:
  A) Project Planning
  B) Project Monitoring and Control
  C) Requirements Management
  D) Supplier Agreement Management
  E) Risk Management

Quiz 1

- Which of these would NOT be an input to the specific practice of “Determine Estimates of Effort and Cost” according to the CMMI Process Area definition for Project Planning:
  A) Judgmental estimates provided by an expert or group of experts
  B) Size estimates of work products and anticipated changes
  C) Skill levels of managers and staff needed to perform the work
  D) Life-cycle cost estimates
  E) Lines of code or function points

Quiz 1

PSP is:

A) Software used to measure, track and analyse productivity and defect injection rates in programming
B) A process to measure, track and analyse your work
C) An individual process used by all expert programmers
D) A method used to predict productivity in team programming.

Quiz 1

Estimating techniques are used for:

- Guessing how long a project or task will take
- Providing a fuzzy idea of the expected effort
- Improving your guess on how much effort will be involved in a project
- Translating a measure the size of a project into a measure of effort required for the project.
- C and D
1. When you have identified a risk, it is important that the risk:
   A) Is recorded in the document management system
   B) Is managed at the appropriate level of management
   C) Is related to the objectives of the project
   D) Has a high probability of occurring

2. The purpose of a Line of Balance plan is to:
   A) Establish a set of defined processes that everyone involved with the project can follow
   B) Use and contribute to the organization’s standard processes
   C) Contribute to a shared vision of the system to be developed
   D) Ensure that relevant stakeholders receive regular project briefings

3. If your project is running behind schedule you can re-plan by:
   A) Extending the planned duration of the project
   B) Extending your resources and plan construction tasks
   C) Increasing the effort per day contributed by the resources
   D) All of the above

4. Earned value is best described as a method to:
   A) Analyze the value of your plan
   B) Estimating of progress on the plan
   C) Track your task completion day against the plan
   D) Verify your task completion day against the plan

5. The purpose of a Project Management is to:
   A) Establish as a set of defined processes that everyone involved with the project can follow
   B) Use and contribute to the organization’s standard processes
   C) Contribute to a shared vision of the system to be developed
   D) Ensure that relevant stakeholders receive regular project briefings

6. The purpose of Integrated Project Management is to:
   A) Enable extremely large projects to be undertaken
   B) Establish a set of defined processes that everyone involved with the project can follow
   C) Use and contribute to the organization’s standard processes
   D) Contribute to a shared vision of the system to be developed
   E) Ensure that relevant stakeholders receive regular project briefings

Quiz 2 – Results

Quiz 2 – Problem Questions
1. The purpose of a Network Plan is to show:
   A) How to network resources across the company
   B) How to balance your cost against resource
   C) How to balance your work effort between different inception projects
   D) How to balance your work effort between different resource projects
   E) How to balance your work effort between different project phases

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Quiz 2 – Problem Questions
7. Your Quality Assurance Document should provide:
   A) Metrics of your design
   B) Goals for your design
   C) Metrics of your Project Management process
   D) Goals for your Project Management process
   E) All except C

8. Earned value is best described as a method to:
   A) Analyze the value of your plan
   B) Estimating of progress on the plan
   C) Track your progress on a task
   D) Verify your task completion day against the plan

9. The most important task involved in setting up the Project Plan was:
   A) Entering data
   B) Estimating effort involved in each task
   C) Learning Project Management
   D) Understanding the design problem
   E) None of the above

Quiz 2 – Problem Questions
11. When you are scheduling a project, it is a good idea to base it on:
   A) 90% of the Estimate of work to be done
   B) 100% of the Estimate of work to be done
   C) 100% of the Estimate of work to be done and insert buffers where required

12. When you have identified a risk, it is important that the risk:
   A) Is recorded in the document management system
   B) Is managed at the appropriate level of management
   C) Is related to the objectives of the project
   D) Has a high probability of occurring

Feedback from Quiz 2
1. Students have learnt the topics covered in these questions well (70 - 100 PCT Correct)
   Question Numbers: 1 3 6 9 11 13 15 16 17

2. Students are less familiar with the topics covered in these questions (50 - 60 PCT Correct)
   Question Numbers: 2 4 5 7 10 12 14 18

3. Students have performed poorly and may be misinformed on the topics covered in these questions (30 - 50 PCT Correct)
   Question Numbers: 8 19

4. Good students are confused on the topics covered in these questions:
   Question Numbers: 2 6 8
**Planning Process**

**Goals of Project Planning (CMMI)**

**SG 1 Establish Estimates**
Estimates of project planning parameters are established and maintained.

**SG 2 Develop a Project Plan**
A project plan is established and maintained as the basis for managing the project.

**SG 3 Obtain Commitment to the Plan**
Commitments to the project plan are established and maintained.

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**Project Planning Activities**

- **Project Scoping**
  - The project includes all the work required
  - The project includes only the work required

- **Work required depends on:**
  - The scope of the problem as specified by the client
  - The level of quality of the solution required by the client
  - The product delivery process

- **Estimation**
  - Effort – the amount of work to be done
  - Duration – the time it will take to do the work with the resources available

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**Project Planning Activities**

- **Resourcing**
  - Allocating people to do the work
  - Training people so that they can do the work
  - Acquiring materials and tools for the people to use
  - Acquiring components for integration into the product

- **Scheduling**
  - Get the best use out of scarce resources
  - Reflect the Task Precedence
  - Ensuring that resources are available when required

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**Project Planning Activities**

- **Budgeting**
  - Time – Meeting “Time-to-Market” requirements
  - Project Budget – Effort and Materials
  - Opportunity Costs – Flow of benefits to the client

- **Quality Assurance**
  - How the client’s quality requirements will be met
  - How to know if the quality requirements are being met

- **Risk Analysis (or Plan Sensitivity Analysis)**
  - What can go wrong?
  - What are the consequences if it does go wrong?
  - What must be done if something goes wrong?

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**Project Control – Goals (CMMI)**

**SG 1 Monitor Project Against Plan**
Actual performance and progress of the project are monitored against the project plan.

**SG 2 Manage Corrective Action to Closure**
Corrective actions are managed to closure when the project’s performance or results deviate significantly from the plan.
**Project Control Activities - Check**
- **Scope**
  - Has the amount of work to be done changed?
- **Effort**
  - How much work is actually being done?
  - How much effort is being consumed to do that work?
- **Duration**
  - Is the project on schedule?
- **Project Budget**
  - Are the costs as expected?
- **Product Quality**
  - Are the Client’s Quality Requirements being met?
- **Risks**
  - Have threats to the project success been identified?

**Project Control Activities - Act**
- **Scope**
  - Size the Client’s new requirements
- **Effort**
  - Re-estimate effort required based on actuals
- **Duration**
  - Re-allocate resources
  - Re-negotiate schedule
- **Project Budget**
  - Re-cost, report and negotiate
- **Product Quality**
  - Identify root causes and change process
- **Risks**
  - Monitor, Mitigate and Manage
  - Reduce probability and consequence of threat

**Project Control Activities - Communicate**
- **Stakeholder Analysis**
  - Who has an interest in the success of the Project?
  - What information can they supply?
  - What information do they need?
- **Regular reporting**
- **Project status reports**
- **Project Reviews**
  - Formal reviews at planned milestones
  - Informal reviews when necessary
  - Project completion – to capture and communicate the experience

**Project Management**

**Skills, Techniques, Resources and Tools**

**Skill #1 – Ability to Work with People**
- **Software is produced by SocioTechnical systems**
  - People working with technology to accomplish goals
  - Too often the “Technical” overwhelms the “Socio”
  - “Technical” is more fun and more controllable
- **SocioTechnical systems are dynamic and volatile**
  - Things change frequently in unpredictable ways
- **People adapt more quickly than technology**
- **People care about the success of the project**
- **People will help the Project Manager**
  - If they want to!

**Skill #2 – Flexibility**
- **Sod’s Law and its corollaries**
  - SOD’S LAW, ALSO KNOWN AS MURPHY’S LAW: If anything can go wrong, it will.
  - O’TOOLE’S COMMENTARY ON MURPHY’S LAW: Murphy was an optimist.
  - THE FIRST COROLLARY TO SOD’S LAW: Anything that is to go wrong will do so at the worst possible moment.
  - NON-RECIPROCAL LAWS OF EXPECTATIONS: Negative expectations yield negative results. Positive expectations yield negative results.
  - HOWES LAW: Every man has a scheme which will not work.
  - NINETY-NINETY RULE OF PROJECT SCHEDULES: The first 90% of the job takes 90% of the time, the last 10% takes the other 90%.
- **Plans are only a way to identify deviations from expectations**
- **Plans are not sacred – always be prepared to revise**
- **Mike’s Law of “Creeping Commitment”**
  - Never do today what you can do tomorrow
Skill # 3 – Manage your own work

- A Project Manager cannot plan and track everything at a micro-level.
- Every team member needs to micro-plan and track their own work.
- Personal Software Process (PSP)
  - PSP is a measurement and analysis framework to help you characterize and estimate your process.
  - It is also a defined procedure to help you to improve your performance.

Techniques – eg PSP for a Programmer

- Estimate
  - Lines of Code (LOC)
  - Time to code each segment
  - LOC/hr
  - Measure programming by phases
  - Lines of Code (LOC)
  - Time taken in each phase
  - Defects injected and removed by phase
- Analyse
  - Accuracy of estimates
  - Defects injected
  - Defects found by compiler
  - Defect fix times
- Develop design and code review checklists to find most frequent defects in these stages.

Techniques – Function Point Analysis

- Provides the ability to:
  - Size the system to be developed
  - Size changes to the system
  - Suits systems without high algorithmic content
  - Replaces "Lines-of-Code" as a sizing method
  - Reproducible and auditable
  - Produces a single number
  - Sum of (no of inputs, outputs, inquiries, interfaces and logical files * complexity weightings)
- Can be estimated early in the system lifecycle
  - Eg No of Entities in a 3NF ER model * 30 = ~Function Points
- Industry standards and Benchmarking databases

Techniques – Estimation by Analogy or "Fuzzy Logic"

- Gather size data on previously developed programs
- Subdivide these data into size categories and subcategories
- When estimating a new program, compare the planned program with prior programs and select the most appropriate size category
- Fuzzy logic estimating
  - Is based on relevant historical data
  - Is easy to use
  - Requires no special tools or training
  - Provides reasonably good estimates where new work is like prior experience.

Techniques – Earned Value

- Purpose is track the rate of progress to completion
- Key Concepts:
  - The value of a task is the estimated work effort to complete it
  - The project value is the sum of all the task values
  - When a task completes, it adds value to the project
  - The value that a task adds is its percentage of the project value
  - When the Project Completes, Cumulative Earned Value is 100
- At any point in the project, the Planned Earned Value can be compared to the Actual Earned Value
- If a task takes more effort than estimated but still completes on schedule:
  - The rate of progress is satisfactory
  - But the Project Budget may be in trouble

Resources – CMMI Process Models

- Provides a Best Practice model for:
  - Project Management Processes
  - Software Engineering Processes
  - Support Processes
- Tells the Project Manager
  - How to carry out their own management processes
  - How the other processes will be carried out
    - Essential if Engineering and Support work is to be planned and tracked
- Designed for Process Improvement
  - But a very good starting point for Managers wanting to go from a Chaotic to a "Managed and Repeatable" level of process capability maturity
Resources – Benchmarking Databases

- ISBSG
  - International Software Benchmarking Standards Group
  - An international database
  - ~ 2,500 projects completed within 5 years
  - Variety of languages and platforms
  - Project Size: function points delivered
  - Project Effort: work hours by resource type
  - Some quality data
  - Minimal cost
  - Used for comparison and estimation

Resources – Risk Taxonomy

- A scheme that organises the body of knowledge about risks and defines the relationships among the different organisational units
- It is used for classifying and understanding the possible risks in software development
- Examples:

Tools – MS Project and similar

- Help people visualise the future
  - Gantt charts, networks, precedence lines
  - Milestones
- Help people to create the future
  - Implement activities that will change the future
  - Identify when the probable future is different the desired future
- Help people to predict the future from the past and present
  - Entering actuals
  - Trend lines, %age complete
- Help people to communicate
  - Status reporting

Tools – Line of Balance Charts

http://www.msh.com/ew/kb2html

- Line Of Balance (LOB) is a management control process for collecting, measuring and presenting facts relating to time, cost and accomplishment - all measured against a specific plan.
- It shows the process, status, background, timing and phasing of the project activities, thus providing management with measuring tools that help:
  - Comparing actual progress with a formal objective plan.
  - Examining only the deviations from established plans, and gauging their degree of severity.
  - Receiving timely information concerning trouble area
  - Indicating areas where appropriate corrective action is required
  - Forecasting future performance.
- The "Line of Balance" itself is a graphic device that enables a manager to see at a single glance which of many activities comprising a complex operation are "in balance" and those which are not, and, whether those which should have been completed at the time of the review actually are completed and whether any activities scheduled for future completion are lagging behind schedule.
- Originally developed for managing repetitive tasks but its scope has been enlarged

COMP 3710
Software Project Management
S2 2003 Lecture 8 - END

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