Knowledge Areas

Week 36 – Requirements

Week 37 – Planning and Processes

Week 38 – Design and Architecture

Week 39 – Testing and SCM

Week 40 – Software Quality

Project Management

Life-cycle models, Agile methods
A Software Life-cycle Model
Which part will we talk about today?

Project Management, Software Quality Assurance (SQA), Supporting Tools, Education

Validate Requirements, Verify Specification

Acceptance Test (Release testing)

System Testing (Integration testing of modules)

Module Testing (Integration testing of units)

Verify System Design

Verify Module Design

Verify Implementation

Module Design (Program Design, Detailed Design)

System Design (Architecture, High-level Design)

Requirements

Implementation of Units (classes, procedures, functions)

Unit testing

Part I
Introduction to Project Management

Part II
Time- and Resource Planning

Part III
Risk Management

Part IV
Communication and Documentation

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Agenda - What will you learn today?

Part I
Introduction to Project Management

Part II
Time- and Resource Planning

Part III
Risk Management

Part IV
Communication and Documentation

Part I
Introduction to Project Management

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Communication and Documentation
Part I
Introduction to Project Management
What is a project?

- Climb Mount Everest
- Build a house
- Take a course
- Create a software

Part I
Introduction to Project Management

Part II
Time- and Resource Planning

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Risk Management

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Communication and Documentation
A project is a temporary endeavor undertaken to create a unique product or service.

Project Management Institute
Choose a Project to Join!

Clear purpose/goal, but no predefined process to follow to get there.

Unclear purpose/goal, but a strict process that you have to follow.
SMART Goals

**Specific**
Must be straightforward and answer the questions: **What** will you do? **Why** is it important?

**Measurable**
If you cannot measure it, how do you then know if the goal is reached or not?

**Agreed Upon**
Agreed upon with all stakeholders (e.g. customer, user etc.)

**Realistic**
Possible with the current resources, knowledge and time. You must be both willing and able to do it.

**Timely**
A clear time frame for the goal.

Note that there exists other similar versions the definition of SMART goals.
Who are involved in a software project?

A person or organization with a major interest in the project outcome.

- **User** - Uses the system
- **Customer** - Pays for the system
- **Development Organization** - Provides the system
- **Supplier**

**Stakeholders**
Dependent project parameters

- Calendar Time
- Resources
- Features
- Quality

Part I
Introduction to Project Management

Part II
Time- and Resource Planning

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Risk Management

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Communication and Documentation

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Part II

Time- and Resource Planning
A project

Lots of things to do...

Time

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Introduction to Project Management

Part II
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Work breakdown

Part I
Introduction to Project Management

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Part IV
Communication and Documentation
A task or an activity

Examples:
- Implement encryption module
- Interview users
- Design user-interface prototype

Task (or activity)

Time

Duration, e.g. 10 days
Dependencies between tasks

Task1 and Task2 are precursors (predecessors) to Task3
Tool Support

Microsoft Project

OpenProj

IDA's MSDN Academic Alliance
(see "Resources" on course page)

http://openproj.org
Tasks, Duration, and Dependencies

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
<th>Predecessors</th>
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<td>Training in J2EE</td>
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<td>Tue 07-09-04</td>
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<tr>
<td>User interface prototype</td>
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<td>Mon 07-09-03</td>
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<td>Mon 07-09-10</td>
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<td>Wed 07-09-12</td>
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<td>Tue 07-10-09</td>
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<td>Tue 07-10-09</td>
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<tr>
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<td>Tue 07-12-04</td>
<td>23</td>
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<tr>
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<td>Tue 07-11-27</td>
<td>Mon 07-12-03</td>
<td>22</td>
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Milestone and Tollgate

Milestone

Verify internal sub-goal fulfillment
- Properties of a SMART goal

Tollgate

External decision point
- E.g. after a pre-study phase, the customer decides if the project should continue or not.
Critical Path, Slack and Real time

Available time = Slacktime + Real time

Critical Path

Slack (float) time

Real time (estimated)
Who is going to "do" the task and with what?

Resource planning

Time

Task1

START

STOP

Part I
Introduction to Project Management

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A key to a success project

Buffer Time

Time

Internal Deadline

External Deadline

Buffer

To who should you communicate the deadlines?

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Introduction to Project Management

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A good team can produce better results than individuals working alone.
“Coming together is a beginning, keeping together is progress, working together is success”

Henry Ford
A Team is more than just a Group
A group of people with different skills and different tasks, who work together on a common purpose/goal.
Optimal size between 5-12 members

Large teams can divide into sub-teams according to need.
There are problems you encounter as size increases.
Assigning more programmers to a project running behind schedule will make it even later, due to the time required for the new programmers to learn about the project, as well as the increased communication overhead.

Fred Brooks
Team intercommunication formula:
Number of channels of communication = \( n(n - 1) / 2 \)
\( n = \) people

Example: 5 developers give \( 5 \times (5 - 1) / 2 = 10 \) channels of communication.
10 developers give \( 10 \times (10 - 1) / 2 = 45 \) channels of communication.
50 developers give \( 50 \times (50 - 1) / 2 = 1225 \) channels of communication.

Source: Fred Brooks, “The Mythical Man Month”
Six Parameters for Success in Project

- Efficiency
- Success

- Irritation
- Bad start, confusion, messy

- Confusion
- Rewards for good behavior

- Vision
- Fear
- Competence

- Motivation
- Resources

- Frustration

Ref. Rune Olsson – IEI - LiU
Part III
Risk Management
What is a risk?

Risk is something that can eliminate full success of the project

Examples:

- **Staff turnover** - Experienced team members will leave the project
- **Requirement change** - Significant requirements will change late in the process.
- **Size underestimated** - The size of the project was larger than expected
Kinds of risks

General

"A team member gets sick"
"There is a risk that the project gets delayed"

Project Specific

"The delivery of the development hardware environment is delayed."
"Anders needs to visit his family, since his father is sick."

Direct

The project has great control
"The Windows platform will not scale"

Indirect

Risk where the project has little control
"The servers will stop running due to an earthquake"
What is risk management?

Risk management is the process of measuring or assessing risk and then developing strategies to manage the risk.

Iterate

Risk identification → Risk analysis → Risk planning → Risk monitoring

List of potential risks → Prioritized list → Risk plan → Risk assessment

"What can go wrong" → "How bad is it" → "What shall we do with it" → "Has the probability changed?"
1. Risk Identification

Brainstorming with the whole team for 10 minutes.
What can go bad?!?

Types of risks

- **Technology risks** - Hardware/software technology used for development, e.g. using Java
- **People risks** - people in the development team
- **Organizational risks**
- **Tools risks** - Risks with the current tool used
- **Requirements risks** - Changes in customer requirements
- **Estimation risks** - Wrong project estimations
2. Risk Analysis

Probability

- low: 1
- moderate: 2
- high: 3
- very high: 4

Impact

- catastrophic: 4
- serious: 3
- tolerable: 2
- insignificant: 1

Probability x Impact = Risk Magnitude Indicator

Sort list after risk magnitude!
3. Risk Planning

1. Risk Avoidance
   Reorganize so that the risk disappears.
   "Communication problem between develop sites in Stockholm and India
   -> localize all development in India?"
   "the web-server fails often low accessibility
   -> outsource the operation?"

2. Risk Transfer
   Reorganize so that someone else takes the risk, insurance, customer, bank.
   "Changes of requirements late in project
   -> a prototype?"
   Lower the probability.

3. Risk Acceptance
   Live with it
   "The key architect starts to work for another company
   -> 2 architects?"
   Lower the impact
   A plan B...

Mitigate the risk
Define Contingency plan
Example

No Risk Description
1. During implementation it is discovered that the new web-platform cannot talk to the legacy database system

<table>
<thead>
<tr>
<th>Probability</th>
<th>Impact</th>
<th>Risk Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate (2)</td>
<td>Serious (3)</td>
<td>6</td>
</tr>
</tbody>
</table>

Plan

Avoid risk: Do not introduce a new web-platform. Use the existing platform.

Transfer risk: Sign a contract with a contractor, who guarantees access to the system.

Accept risk

Mitigate: - Create a prototype early in the process.
- Solve issues before implementation phase

Contingency plan: Transfer the whole old legacy database system to a modern DBMS.
Make the risks useful

- Few (3-10)
- Project Specific
- Regular meetings
Part IV
Communication and Documentation
The Project Plan

Why a project plan?

- Tool for the project manager
- Communication medium between project members and other stakeholders
- **What** should be done, **when** and by **who**

When is the plan finished?

![Flowchart showing the evolution of project plan versions over time.](image)

More information...
The Project Plan - Content

**Project Description**
- Background to the project
- Relevant constraints (budget etc.)
- Project Goal
- Start and expected end date.

**Time and Resource Plan**
- Milestones
- Tollgates
- Deliverables
- Activities
- Resources

**Project Organization**
- Roles
- Knowledge / skill
- Training
- Communication and reports

**Risk Management**
- Risks, Probability, and Impact
- Mitigation and Contingency plan
Content of a status report?

- Summary - current status
- What has happened since last report
- What happens next (both in long and short term)
- Problems and risks

Status Report I
Status Report II
Status Report III

Time

More information...
Agenda - What will you learn today?

Part I
Introduction to Project Management

Part II
Time- and Resource Planning
- Work breakdown
- Activities
- Resources
- Milestones / Tollgates

Part III
Risk Management
- Identify (project specific)
- Analyze (probability, impact)
- Plan (mitigation, contingency plan)

Part IV
Communication and Documentation
- Project description
- Organization
- Time and resource plan
- Risk management
Plan, re-plan, re-plan,...