CIS 422/522

Project Planning
Documenting Development Decisions

From Process to Plan

• Process definition manifests itself in the project plan
  – Process definition is an abstraction
  – Many possible ways of implementing the same process
• Project plan makes process concrete, it assigns
  – People to roles
  – Artifacts to deliverables and milestones
  – Activities to tasks over time
• Project plan should be one of the first products but expect it to evolve

Project Plan

• Minimal plan contents
  – Risks and mitigation strategies
    • Should evolve with progress and understanding
  – Tasks to be performed
  – Person(s) assigned to roles and tasks
  – Deadline for each task
  – Sequencing among tasks
    • Task dependencies
    • Allocation of labor
• Usually owned by team manager
• Updated as project proceeds

Project Plan Template

• Use the template provided in your Assembla team workspace (under the Wiki tab)
• This should be a living document
  – Changed as the project progresses
  – Ideally, always gives a current view of the progress against the plan*
    • Shows planned activities
    • Gives snapshot of the current project state
    • This is what I should see on your assembla site

*Is this true of your Project Plans now?
Project Planning Tools

Work Breakdown Structure (WBS)
  PERT Chart
  Gantt Chart

Work Breakdown Structure

• This is a technique to analyze the content of work and cost by decomposing it into its component parts. It is produced by:
  – Identifying the key elements
  – Decomposing each element into component parts
  – Continuing to decompose until manageable work packages have been identified. These can then be allocated to the appropriate role/person
• The WBS is used to allocate responsibilities
• For the software, the WBS depends on the software architecture (discuss next)

Pert Chart

• Network analysis or PERT is used to analyze the relationships between the tasks identified by the work breakdown structure and to define the dependencies between tasks
• Helps identify where ordering of tasks may cause problems because of precedence or resource constraints
  – Where one person cannot do two tasks at the same time
  – Where adding a person can allow tasks to be done in parallel, shortening the project
PERT chart

If A -> B then A must finish before B starts

Gantt Charts

- Method for visualizing a project schedule showing
  - The set of tasks
  - Start and completion times
  - Task dependencies
  - Responsibilities
- PERT charts can be reformatted as Gantt charts

Gantt Chart

An incorrect translation of the PERT chart into a Gantt chart

Work Breakdown Structure

SE, Cost planning and control, Hans van Vliet, ©2008
Project Milestone Planning

- Milestone planning is used to show the major steps that are needed to reach the goal on time
- Milestones typically mark completion of key deliverables or establishment of baselines
  - Baseline: when a work product is put under configuration management and all changes are controlled
- Often associated with management review points
  - E.g., Requirements baseline, project plan complete, code ready to test
- Can use Gantt or PERT charts to show milestones

Example Gantt Chart

A Simple Alternative

<table>
<thead>
<tr>
<th>View</th>
<th>Edit</th>
<th>Page History</th>
<th>Community</th>
<th>Version 5.1, last updated by Dalhia Jaffer on Dec 07, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Schedule and Milestones</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

Project Plan for Phase 2 of Project (Finished)

- Red means that it was completed
- Green means that it was completed in the previous iteration and will not be completed in the current iteration

**Week 1 (11/5-11/11)**
- Create search string to display a selection of game rules to choose from (tags and Javicia)
- implemented functionality of showing and hiding pages different game rules
- Create another xml file for a new game manual (tags) as we're creating a writer, we'll wait for the writer to be functional to complete one and file "Tags"
- Test and fix bugs of multi-game rule functionality (tags)
- Update Software Documentation, Software Requirements List, Case, and Config to include information on multi-game functionality (Charts)

**Week 2 (11/13-11/18)**
- Create Uml prototype for writer, nothing has to be functional (tags and Javicia)
- implemented image asterix (tags)
- In the end, print, add interface for writer in parser (Charts)
- Test the prototype (Charts)
- Update CabXrefs to show which feature is implemented (Charts)
- Include another Sublist in Software Requirement (Charts)
- Update Config to include information on multi-game functionality (Charts)
How much planning?

- How much planning is enough?
- Enough that:
  - Everyone knows what they should be doing
  - Everyone knows what other people are supposed to be doing
  - Everyone knows when specific tasks should be finished
    - Specifically, they can track dependencies between their tasks and other peoples
  - It is easy to determine the current status of the project against plan

Documenting Development Decisions

Why document?

Project Documentation

- Many kinds identified
  - Project plan, schedule, meeting notes
  - Software Requirements
  - Software Architecture
  - Software documentation
- Why document (when agile methods don’t)?

10,000 ft. View

What should the development process accomplish?
Role of Documentation

• To understand what kind of documentation is useful, helps to understand the “why”
• Consider
  1. Goal is to turn an idea into a product
  2. Software engineering is a decision making process
  3. We decompose a complex development process into distinct concerns (requirements, design, code, test, deployment, maintenance, etc.)
• Why document?
  – What purpose does it play?
  – What kinds of things should be documented?

Document Types and Purposes

• Management documents
  – Basis for project management (managerial control of resources)
    • Calendar time, skilled man-hours budget
    • Other organizational resources
  – Project plan, WBS, Development schedule
  – Use: allows managers to track actual against expected consumption of resources
• Development documents
  – Basis for product management (intellectual control)
  – ConOps, Requirements (SRS), Architecture, Detail design, etc.
  – Uses:
    • Making and recording development decisions
    • Allows developers to track decisions from stakeholder needs to implementation

Meeting Developmental Goals Means...

• We have a clear understanding of customer needs and product goals
• External view: We develop products the customer’s wants, on time and within budget
• Internal view: We create process and product infrastructures supporting our business goals
• For most developments, these are “document” driven
Walkthrough

- Consider: What kinds of questions should your documents answer?
  - Assume a manager unfamiliar with the project is reviewing your status
  - Would your documents answer key questions about the project goals and current status?
- Team page: Who is on the team?
- Project plan
  - Who is responsible for which tasks?
  - What are the anticipated risks and what are you doing about them?
  - What is your development process and how does it help address the risks?
  - What is the project schedule of tasks and deliverables?
  - What is the current status relative to schedule?
- ConOps: What capabilities will the software provide the user or customer?
- SRS: What are the detailed technical requirements?

Questions?

Choosing a Process (Review)

- Goal: proceed as rationally and systematically as possible from a statement of goals to a design that meets those goals with development constraints
- Choose a process to provide an appropriate level of control for the given product and context
  - Sufficient control to achieve results
  - No more than necessary to contain cost and effort
- Development goals: want to choose a process that supports project development and addresses risks
  - Schedule
    - Failure to deliver working software
- Instructional goals: process must also support learning software engineering
  - Provide experience with a range of artifacts for all team members
  - Support teacher evaluation

Which process for projects?

- Process viewed as a sequence of iterations, each iteration produces an increment of the working software
  - Build minimal useful subset, test, validate
  - After first iteration, always have working software
  - Document requirements, design, etc.
- Process viewed as nested sequence of builds (sprints)
  - Each build adds small feature set
  - Customer in loop, code centered (little or no documentation)
  - Problem detection and correction though daily team meetings (scrum)
Course Approach

• Will learn a document-driven approach
• Provides broader experience with development roles, activities, and artifacts
• Supports external tracking and review
• Appropriate for a broader range of development situations
• Nothing additional is needed to switch to agile

Focus on Disciplined Process

• Focus on a disciplined development process
  - "Disciplined" means as systematic and rigorous as is practical
  - Basis for maintaining intellectual and managerial control
• Process: we define a process in terms of a set of artifacts, activities, roles and the relationships between them
  - Artifact: any product of the development
  - Activity: the set of tasks performed
  - Roles: set of responsibilities associated with a set of skills
  - Relationships: roles produce artifacts by performing activities
    • A designer produces a design document as part of creating the design
• Example:
  http://en.wikipedia.org/wiki/Scrum_%28development%29

Project Planning