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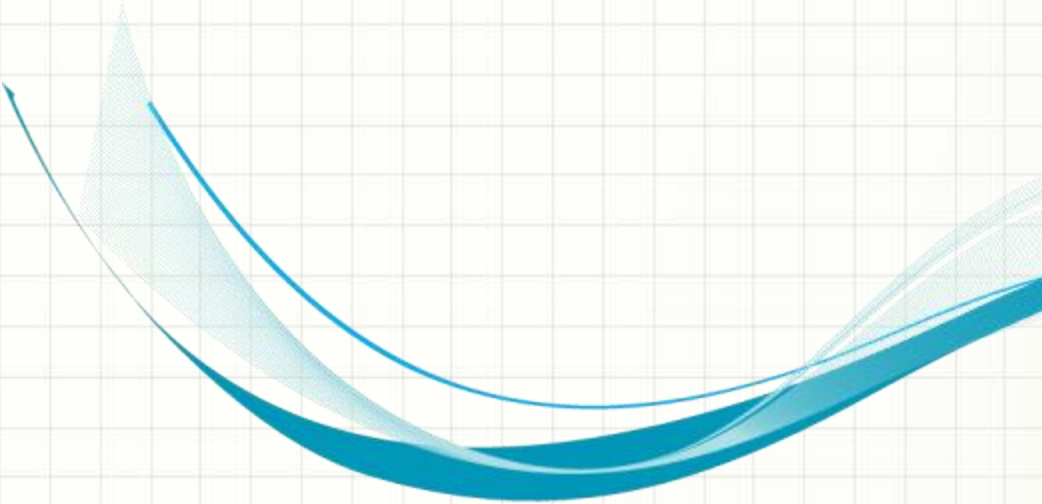
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SOFTWARE ENGINEERING

CS 487

Prof. Dennis Hood
Computer Science



Lecture 11

Software Project Management

Lesson Overview

- Software Project Management
- Reading:
 - Ch. 22 – Project Management
 - Ch. 23 – Project Planning
- Objectives
 - Incorporate the project management perspective into the software engineering life-cycle
 - Examine the role of project planning and management in facilitating effective software engineering

Participation Summary

- Please respond to each of the following:
 1. How many cities did your instructor broadcast from during this course? Using the concepts of reuse, automation, system components, and protocols, explain why you never needed to concern yourself with his broadcast location.
 2. Assess the risk exposure of each of the following:
 1. A world in which cars are only driven by humans
 2. A world in which cars are only driven by computers
 3. A world of both human- and computer-driven cars
 3. Explain the extent to which the results in #2 match your feelings regarding safety
- Submit to Blackboard (.doc or .pdf) by June 23rd

People Management 101

- Your people are your greatest assets
 - And your greatest area of concern
- Soft skills for effective leadership
 - Be consistent in your approach
 - Be respectful
 - Each person brings unique skills and perspective
 - Each person has a life outside of work
 - Get everyone involved (equally)
 - Act with honesty and integrity
 - Be proactive
 - Anticipate (and avoid) trouble

Building Effective Teams

- Match skills to the job
- Experience matters
- Drafting the best available vs. filling the immediate need
- Get the most out of your interview questions
- Use recommendations to validate history
 - Consider hiring from within
- Hire future leaders

Leading Effective Teams

- Understand people's needs and priorities
- Reward is more effective than punishment
- Provide opportunities to innovate
- Provide opportunities to lead
- Reward teams for team successes
- Encourage productive competition
- Manage conflict

The People CMM

- A framework for improvement
 - Informal or ad hoc
 - Repeatable – policies, standards and training
 - Defined – organization-wide best practices
 - Managed – quantitative goals
 - Optimizing – continuous improvement
- Benefits
 - Focus on improvement leads to improvement
 - It's OK to be level 1, for now
 - If you know where you are and where you want to be, you can make a plan to get there

Project Management Described

- Added value
 - Planning and monitoring help to minimize the impact of risks
 - PM anticipates and manages inevitable change
 - PM formalizes the process, a critical component for improving it over time
 - The result is an increased likelihood that the current project will be successful and future projects even more so
- Cost
 - Management is overhead and therefore must strive to be lean and effective

Project Management for IT Managers

- Involves many diverse departments
- Information Technology is a relatively immature discipline
- The domains and technologies are extremely dynamic
- They are also fairly expensive and somewhat resistant to change
- Software development contains little standardization and almost no regulation
- When a project is successful, the “how” is rarely documented for public consumption

What is a Project?

- A project is the application of resources to produce a product / deliver a service
- Projects are temporary and unique
 - Temporary implies a definite beginning and ending
 - Unique implies that it has never been done before
 - Projects have objectives / requirements
- A project begins when the involved parties agree to the objectives
- A project ends when the objectives (or an agreed upon revised set) are met or are determined unattainable

Definition of a Project

- Ex.: Your car won't start. You ask the mechanic to find out what's wrong and fix it.
 - Is this a project? Is it more than one project?
- Ex: Your group is responsible for maintaining the XYZ system
 - Is this a project?

Objectives and Constraints

- Objectives are desired results and form the basis of project planning
 - The project plan is designed to achieve the project's objectives
 - The project is done when the objectives have been met (generally speaking)
- Constraints
 - Restrictions on the structure of the project primarily associated with the parameters of the scope triangle

Stakeholders

- A stakeholder is anyone impacted by the project and/or its outcome
 - Customer
 - Sponsor
 - Management
 - Project team
 - Partners, etc.
- Proactive communication is critical to the stakeholders' satisfaction

The Need for Project Definition

- By “definition” we mean establishing the purpose and parameters of the project
 - What will this project achieve?
 - When will it complete?
 - How many people?, having which skills?
 - How much will it cost?
- Consensus among stakeholders is critical to success
- Definition must precede planning

Scope of Work to be Performed

- Scope defines the objectives and the work to be produced
 - Begins as a client request and is negotiated into a contract of deliverables
 - Must also define what won't be done
 - Establishes key milestones and environmental requirements
 - Also agree to conditions of satisfaction
 - Project scope vs. product scope

Inter-related Project Parameters

- What we can accomplish (*scope*) and how well we do it (*quality*) are factors of:
 - How much we invest (*cost*)
 - How long we take (calendar *time*)
 - And how hard we work (resource *effort*)
- A change to any of these 5 factors forces a change to at least 1 of the other 4

Managing Project Priorities

- Priorities determine which factors are:
 - Constrained / Fixed – cannot be altered
 - Enhance – should be optimized
 - Accept / Tolerate – can be slackened
- Factors must be negotiated to meet the objectives of the project while still maintaining the equilibrium of the scope triangle

Requirements

- Requirements must be captured through interactions with the customer and users
 - Interviews, observation, focus groups, etc.
 - Brainstorm sessions, mind mapping, etc.
- Document and “test” requirements
 - Clarify and remove ambiguity
 - Verify completeness
- Establish traceability
 - Each requirement needs a supporting test(s)

Work Decomposition

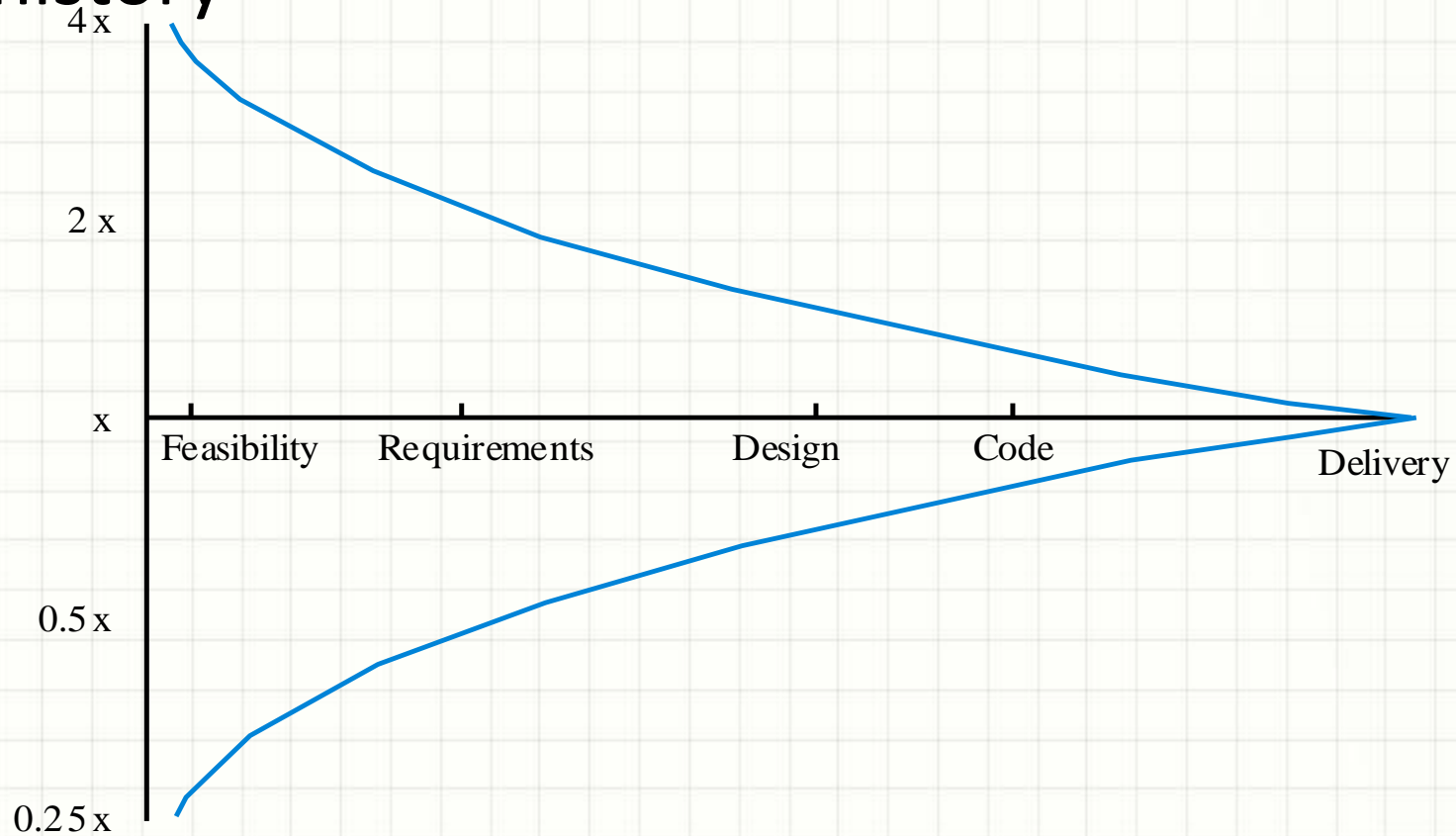
- Breaking the goal into manageable pieces
- Decomposition techniques
 - Top-down vs. bottom-up
 - Activities vs. deliverables
- Stopping Rules
 - Progress and completion can be measured
 - Start and end events are clearly defined
 - Effort can be estimated with confidence
 - Required skills are well understood

Estimating Software

- Things to estimate/predict
 - Time, effort, cost, etc.
 - Defects, user satisfaction, etc.
- What drives these?
 - Requirements, objects, components, subsystems, interfaces, methods, data tables, complexity, others?
- Cost elements
 - Labor
 - Infrastructure
 - Tools
 - Travel, training, etc.

Estimation

- We predict the future by utilizing relevant past history



Productivity

- N units produced / M person-hours
- What should the numerator refer to in software engineering efforts?
 - Many possible adequate solutions, each potentially with many ways to achieve it
 - Size-related such as lines of code
 - Function-related such as function points
- Factors affecting productivity
 - Experience
 - Process maturity
 - Project size
 - Tool support
 - Working environment