IF2261 Software Engineering

Project Management

Program Studi Teknik Informatika
STEI ITB

Overview

- Project management involves the planning, monitoring, and control of people, process, and events that occur during software development
- Everyone manages, but the scope of each person's management activities varies according his or her role in the project
- Software needs to be managed because it is a complex, long duration undertaking
- Managers must focus on the fours P's to be successful (people, product, process, and project)
- A project plan is a document that defines the four P's in such a way as to ensure a cost effective, high quality software product
- The only way to be sure that a project plan worked correctly is by observing that a high quality product was delivered on time and under budget

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Management Spectrum

- People
  - recruiting,
  - selection,
  - performance management,
  - training,
  - compensation,
  - career development,
  - organization,
  - work design,
  - team/culture development)
- Product
  - product objectives,
  - scope,
  - alternative solutions,
  - constraint tradeoffs
- Process
  - framework activities populated with tasks,
  - milestones,
  - work products, and
  - QA points
- Project
  - planning,
  - monitoring,
  - controlling

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People

- Players
  - senior managers,
    - defines business issues
  - project managers,
    - plan, motivate, organize, control the practitioners
  - practitioners,
    - deliver technical skills to engineer a product
  - customers,
    - specify the requirements
  - end-users,
    - interact with the software once it is released

  also called "stakeholders"

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People (2)

- Team leadership model
  - motivation,
    - the ability to encourage technical people to produce to their best ability
  - organization,
    - the ability to mold processes that will enable the initial concept to be translated into final product
  - idea or innovation
    - the ability to encourage people to create and feel creative
- Characteristics of effective project managers
  - problem solving,
  - managerial identity,
  - achievement,
  - influence and team building

Factors Affecting Team Organization

- Difficulty of problem to be solved
- Size of resulting program
- Team lifetime
- Degree to which problem can be modularized
- Required quality and reliability of the system to be built
- Rigidity of the delivery date
- Degree of communication required for the project

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Team Organizational Paradigms

- Closed paradigm
  - top level problem solving and internal coordination managed by team leader, good for projects that repeat past efforts
- Random paradigm
  - team loosely structured; success depends on initiative of individual team members, paradigm excels when innovation and technical breakthroughs required
- Open paradigm
  - rotating task coordinators and group consensus, good for solving complex problems - not always efficient as other paradigms
- Synchronous paradigm
  - team organized to work on pieces of the problem and to require little active communication with each other

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Toxic Team Environment Characteristics

- Frenzied work atmosphere where team members waste energy and lose focus on work objectives
- High frustration and group friction caused by personal, business, or technological problems
- Fragmented or poorly coordinated procedures or improperly chosen process model blocks accomplishments
- Unclear role definition that results in lack of accountability or finger pointing
- Repeated exposure to failure that leads to loss of confidence and lower morale

→ Not every group is a team, and not every team is effective (Glenn Parker)

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Agile Teams

- Teams have significant autonomy to make their own project management and technical decisions
- Planning kept to minimum and is constrained only by business requirements and organizational standards
- Team self-organizes as project proceeds to maximize contributions of each individual's talents
- May conduct daily (10 - 20 minute) meeting to synchronized and coordinate each day's work
  - What has been accomplished since the last meeting?
  - What needs to be accomplished by the next meeting?
  - How will each team member contribute to accomplishing what needs to be done?
  - What roadblocks exist that have to be overcome?

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Coordination and Communication

- Formal, impersonal approaches
  - e.g., documents, milestones, memos
- Formal interpersonal approaches
  - e.g., review meetings, inspections
- Informal interpersonal approaches
  - e.g., information meetings, problem solving
- Electronic communication
  - e.g., e-mail, bulletin boards, video conferencing
- Interpersonal networking
  - e.g., informal discussion with people other than project team members

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The Product

- Software scope
  - context,
    - How does the software to be built fit into a larger system, product, or business context
  - information objectives,
    - What customer-visible data objects are produced as output
  - function and performance
    - What functions does the software perform to transform input data into output; are there any special performance characteristics to be addressed
- Problem decomposition
  - partitioning or problem elaboration
    - focus is on functionality to be delivered and the process used to deliver it

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The Process

- Process model chosen must be appropriate for the:
  - customers and developers,
  - characteristics of the product, and
  - project development environment
- Project planning begins with melding the product and the process
  - Each function to be engineered must pass through the set of framework activities defined for a software organization
  - Work tasks may vary but the common process framework (CPF) is invariant (project size does not change the CPF)
- The job of the software engineer is to estimate the resources required to move each function through the framework activities to produce each work product

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Signs of Potential Project Failure

- Developers do not understand customer's needs
- Product scope poorly defined
- Changes poorly managed
- Chosen technology changes
- Business needs change or ill-defined
- Deadlines unrealistic
- Users are resistant
- Sponsorship lost or never obtained
- Project team members lack appropriate skills
- Managers and practitioners avoid best practices and lessons learned

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Avoiding Project Failure

- Start on the right foot
  - Working hard to understand the problem
  - Setting the realistic objectives
  - Building the right team
  - Giving the team the autonomy, authority, and technology to do the job
- Maintain momentum
  - Provide incentives to minimize turnover of personel
- Track progress
  - Progress is tracked as work products are produced
- Make smart decisions
  - Decide to use COTS
  - Decide to use standard interfaces
- Conduct a postmortem analysis
  - Establish a consistent mechanism for extracting lesons learned for each project

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W5HH Principle (Barry Boehm)

to define a key project charactersitics

- Why is the system being developed?
- What will be done?
- When will it be accomplished?
- Who is responsible for a function?
- Where are they organizationally located?
- How will the job be done technically and managerially?
- How much of each resource is needed?

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