Introduction to Software Engineering

Introduction (2)

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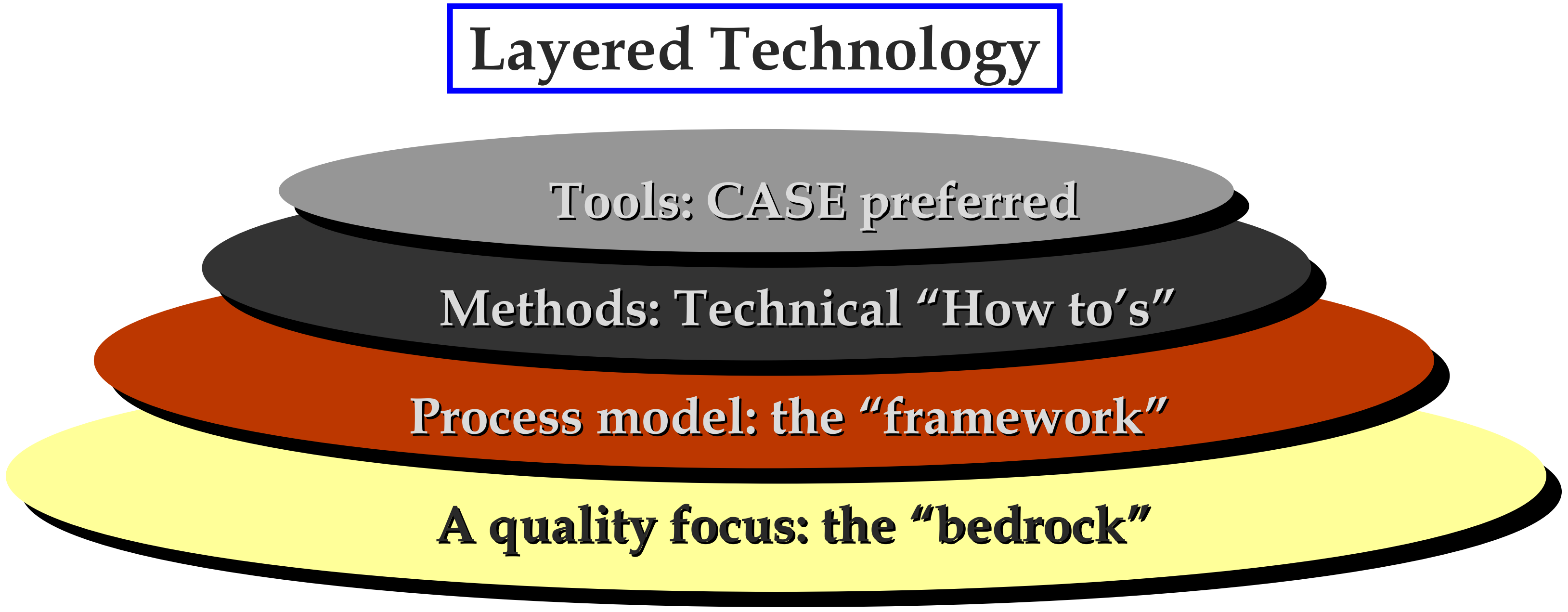
Chapter - Topic Covered

- Layered Technology
- Software Process Framework
- Generic Process Framework Activities
- Umbrella Activities

Software Engineering – Layered Technology


Layered Technology
Tools: CASE preferred
Methods: Technical "How to's"
Process model: the "framework"
A quality focus: the "bedrock"

Layered Technology

A Quality Focus

- Every organization rest on its commitment to quality.
- Total quality management, Six Sigma, or similar continuous improvement culture and it is this culture ultimately leads to development of increasingly more effective approaches to software engineering.
- The bedrock that supports software engineering is a quality focus.

Process:

- It’s a foundation layer for software engineering.
- It’s define **framework** for a set of *key process areas* (KRA) for effectively manage and deliver quality software in a cost effective manner
- The processes define the tasks to be performed and the order in which they are to be performed

Process Framework

Why process :

"A process defines who is doing what, when and how to reach a certain goal"

- To build complete software process.
- Identified a small number of **framework activities** that are applicable to all software projects, regardless of their size or complexity.
- It **encompasses** a set of **umbrella activities** that are applicable across the entire software process.

Layered Technology

Process

- It provide the technical **how-to's** for building software.
- **Process** encompass a broad **array of activities** that include **requirements analysis**, **design**, **program construction**, **testing**, and **support**.
- There could be more than one technique to perform a task and different techniques could be used in different situations.

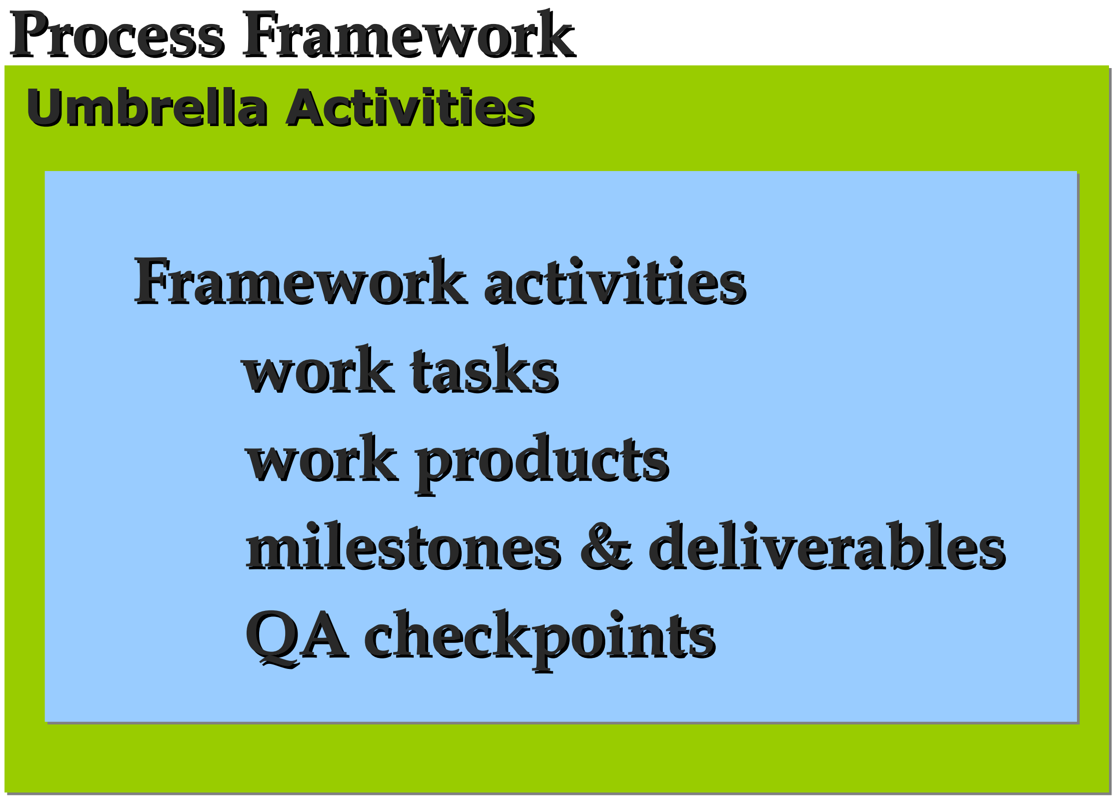
Tools:

- Provide automated or semi-automated support for the process, methods and quality control.
- When tools are integrated so that information created by one tool can be used by another, a system for the support of software development, called ***computer-aided software engineering (CASE)***

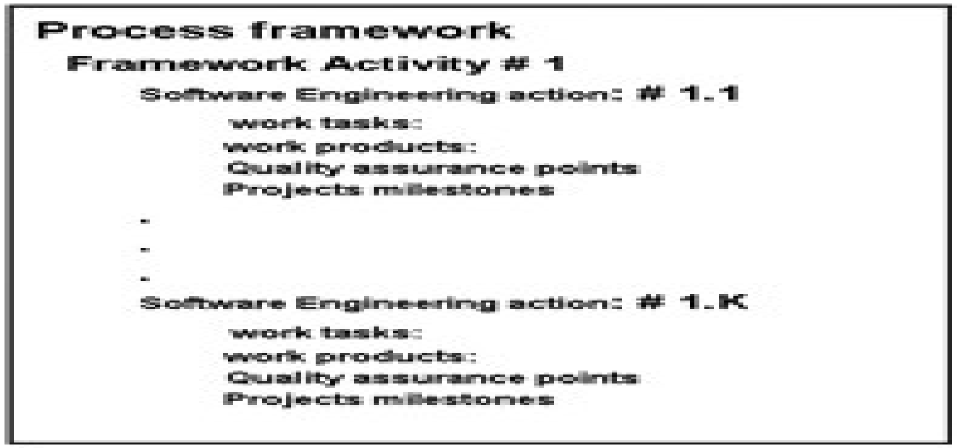
A Process Framework

- A Process Framework/Model can be **Linear Sequential Model, Spiral Model**
- A Framework has ***Process Activities*** i.e. **Software Analysis, Software Design, Software Implementation, Software Testing, Software Deployment**
- Each activity has collection of ***Action/Tasks***. For example Software Analysis has Actions/ Tasks **i.e. Requirement Elicitation, Requirement Prioritization, Requirement Specification etc**
- To achieve a Task we have ***Methods*** i.e. For **Requirement Elicitation** we tasks like **Interviews**, **Observation** etc

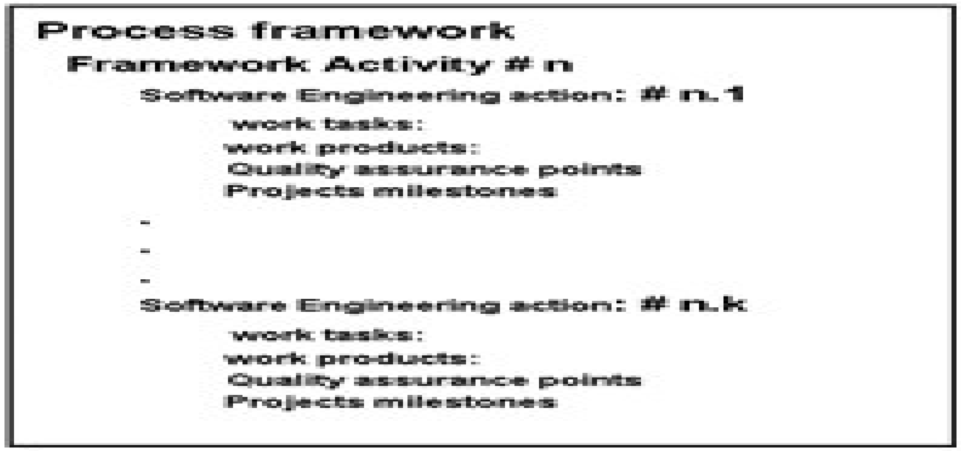
Process Framework



Process Framework



Process framework
Framework Activity # 1
Software Engineering action: # 1.1
work tasks:
work products:
Quality assurance points
Projects milestones
-
-
-
Software Engineering action: # 1.K
work tasks:
work products:
Quality assurance points
Projects milestones



Process framework
Framework Activity # n
Software Engineering action: # n.1
work tasks:
work products:
Quality assurance points
Projects milestones
-
-
-
Software Engineering action: # n.k
work tasks:
work products:
Quality assurance points
Projects milestones

- Each framework activity is populated by a set for *software engineering actions* or collection of related tasks.

Generic Process Framework Activities

- Communication:
  - Heavy communication with **customers**, **stakeholders**, team
  - Encompasses requirements gathering and related activities
- Planning:
  - Describe technical task, **likely risk**, **resources will require**, work products to be produced and a work schedule.
- Modeling:
  - Help developer and customer to understand requirements (Analysis of requirements) & Design of software
- Construction:
  - Code generation: either manual or automated or both
  - Testing – to uncover error in the code.
- Deployment:
  - Delivery to the customer for evaluation
  - Customer provide feedback

The Process Model: Adaptability

- The framework activities will <u>always</u> be applied on <u>every</u> project ... BUT
- The tasks for each activity will vary based on:
  - The type of project
  - Characteristics of the project

Umbrella Activities

- Software Project Tracking and Control
  - Assessing progress against the project plan.
  - Take adequate action to maintain schedule.
- Formal Technical Reviews
  - Assessing software work products in an effort to uncover and remove errors before goes into next action or activity.
- Software Quality Assurance
  - Define and conducts the activities required to ensure software quality.
- Software Configuration Management
  - Manages the effects of change.

Umbrella Activities

- Document Preparation and Production
  - Help to create work products such as models, documents, logs, form and list.
- Reusability Management
  - Define criteria for work product reuse
  - Mechanisms to achieve reusable components.
- Measurement
  - Define and collects process, project, and product measures
  - Assist the team in delivering software that meets customer's needs.
- Risk management
  - Assesses risks that may effect that outcome of project or quality of product (i.e. software)

What are software myths?

- Beliefs about software and the process used to build it. Myths have number of attributes that have made them dangerous.
- Misleading Attitudes - caused serious problem for managers and technical people.

Management Myths

- Managers in most disciplines, are often under pressure to maintain budgets, keep schedules on time, and improve quality.
- **Myth1**: We already have a book that's full of standards and procedures for building

software, won't that provide my people with everything they need to know?

Management Myths

Reality :

- Are software practitioners aware of existence standards?
- Does it reflect modern software engineering practice?
- Is it complete? Is it streamlined to improve time to delivery while still maintaining a focus on quality?

Management Myths

- **Myth2*:*** If we get behind schedule, we can add more programmers and catch up
- **Reality*:*** Software development is not a mechanistic process like manufacturing. Adding people to a late software project makes it later.
- People can be added but only in a planned and well-coordinated manner

Management Myths

- **Myth3***:* If I decide to outsource the software project to a third party, I can just relax and let that firm build it.
- **Reality***:* If an organization does not understand how to manage and control software projects internally, it will invariably struggle when it outsource software projects

What is a Customer?

- Customer may be a person from inside or outside the company that has requested software under contract.

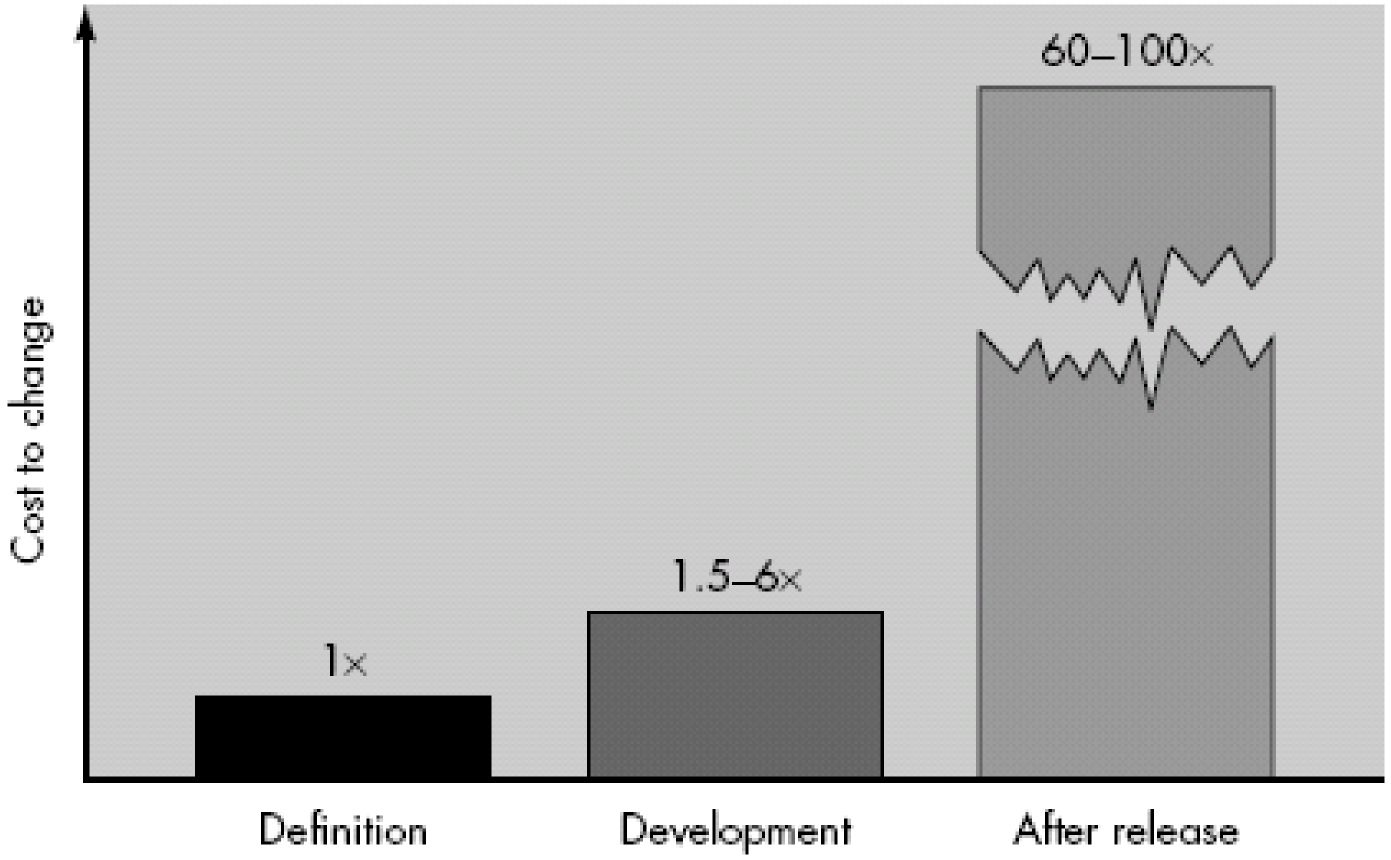
Customer Myths

- **Myth:** A general statement of objectives is sufficient to begin writing programs— we can fill in the details later.
- **Reality:** A poor up-front definition is the major cause of failed software efforts.
- A formal and detailed description of the information domain, function, behavior, performance, interfaces, design constraints, and validation criteria is essential.
- These characteristics can be determined only after thorough communication between customer and developer.

Customer Myths

- **Myth:** Project requirements continually change, but change can be easily accommodated because software is flexible.
- **Reality:** Customer can review requirements and recommend modifications with relatively little impact on cost.
- When changes are requested during software design, the cost impact grows rapidly. Below mentioned *figure* for reference.

Cost of Change in Software Development Life Cycle



Practitioners Myths

- **Myth1:** Once we write the program and get it to work, our job is done.
- **Reality:** Someone once said that "the sooner you begin 'writing code', the longer it'll take you to get done." Industry data indicate that between 60 and 80 percent of all effort expended on software will be expended after it is delivered to the customer for the first time.

Practitioners Myths

Myth2: Until I get the program "running" I have no way of assessing its quality.

Reality: One of the most effective software quality assurance mechanisms can be applied from the inception of a project—the *formal technical review.*

Practitioners Myths

- **Myth3:** The only deliverable work product for a successful project is the working program.
- **Reality**: A working program is only one part of a *software configuration* that includes many elements. Documentation provides a foundation for successful engineering and, more important, guidance for software support.

Practitioners Myths

- **Myth4:** Software engineering will make us create voluminous and unnecessary documentation and will definitely slow us down.
- **Reality:** Software engineering is not about creating documents. It is about creating quality. Better quality leads to reduced rework. And reduced rework results in faster delivery times.

The End

- Thanks for Listening