Chapter 1

- **Software & Software Engineering**

Slide Set to accompany

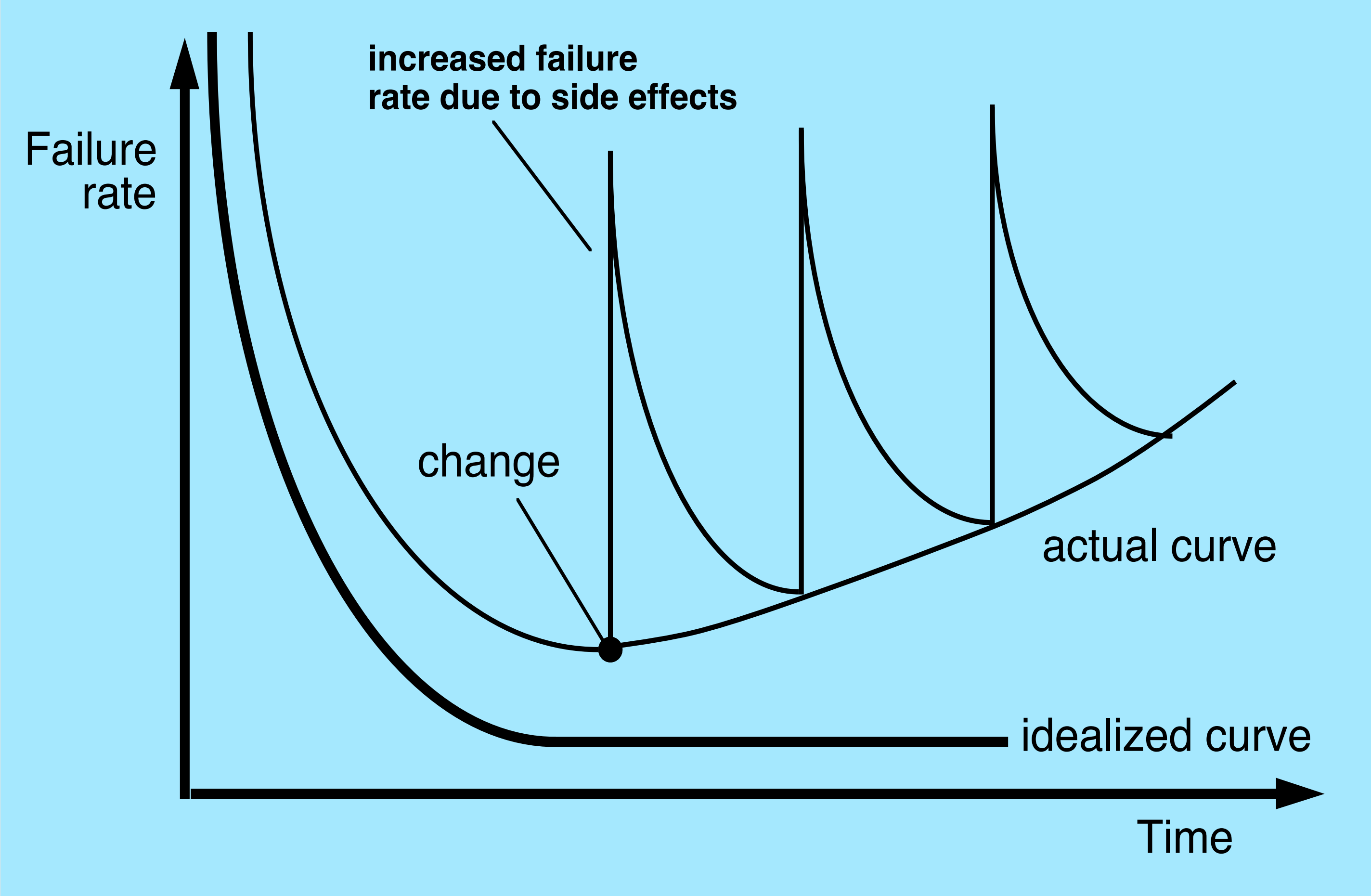
Software Engineering: A Practitioner's Approach, 7/e

by Roger S. Pressman

What is Software?

Software is: (1) instructions (computer programs) that when executed provide desired features, function, and performance; (2) data structures that enable the programs to adequately manipulate information and (3) documentation that describes the operation and use of the programs.

Wear vs. Deterioration



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Why Software must Change

- software must be adapted to meet the needs of new computing environments or technology.
- software must be enhanced to implement new business requirements.
- software must be extended to make it interoperable with other more modern systems or databases.
- software must be re-architected to make it viable within a network environment.

Software Engineering

- Some realities:
  - *a concerted effort should be made to understand the problem before a software solution is developed*
  - *design becomes a pivotal activity*
  - *software should exhibit high quality*
  - *software should be maintainable*

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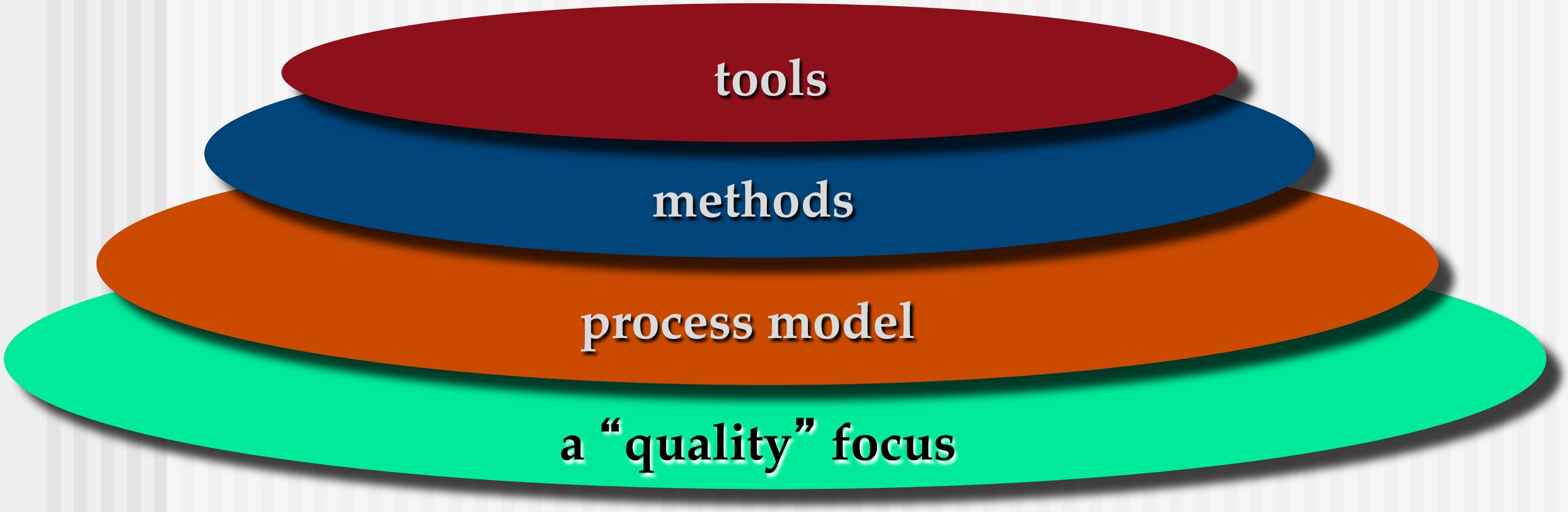
Software Engineering

- The IEEE definition:
    - *Software Engineering: (1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2) The study of approaches as in (1).*

A Layered Technology



Software Engineering

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A Process Framework

- **Process framework**
  - **Framework activities**
    - work tasks
    - work products
    - milestones & deliverables
    - QA checkpoints
  - **Umbrella Activities**

Framework Activities

- Communication
- Planning
- Modeling
  - Analysis of requirements
  - Design
- Construction
  - Code generation
  - Testing
- Deployment

Umbrella Activities

- Software project management
- Formal technical reviews
- Software quality assurance
- Software configuration management
- Work product preparation and production
- Reusability management
- Measurement
- Risk management

Adapting a Process Model Impacts:

- the overall flow of activities, actions, and tasks and the inter-dependencies among them
- the degree to which actions and tasks are defined within each framework activity
- the degree to which work products are identified and required
- the manner in which quality assurance activities are applied
- the manner in which project tracking and control activities are applied

Adapting a Process Model Impacts:

- the overall degree of detail and rigor with which the process is described
- the degree to which the customer and other stakeholders are involved with the project
- the level of autonomy given to the software team
- the degree to which team organization and roles are prescribed

The Essence of Practice

- Polya suggests:
  1. *Understand the problem* (communication and analysis).
  2. *Plan a solution* (modeling and software design).
  3. *Carry out the plan* (code generation).
  4. *Examine the result for accuracy* (testing and quality assurance).

[Polya, 1945, *“How To Solve It”***]**

End!