Software Engineering (20CS440)

The Presentation Slides are Influenced by the Text Book *Software Engineering: A Practitioner's Approach, 8/e* (McGraw-Hill)

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Unit I : Software Process

(Software and Software Engineering)

Chapter 1:The Nature of Software
Chapter 2:Software Engineering
Chapter 3: Software Process Structure
Chapter 4: Process Models

Chapter 1:The Nature of Software

- ## **1.1 The Nature of Software**
  - ### 1.1.1 Defining Software
  - ### 1.1.2 Software Application Domains
  - ### 1.1.3 The Legacy 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.
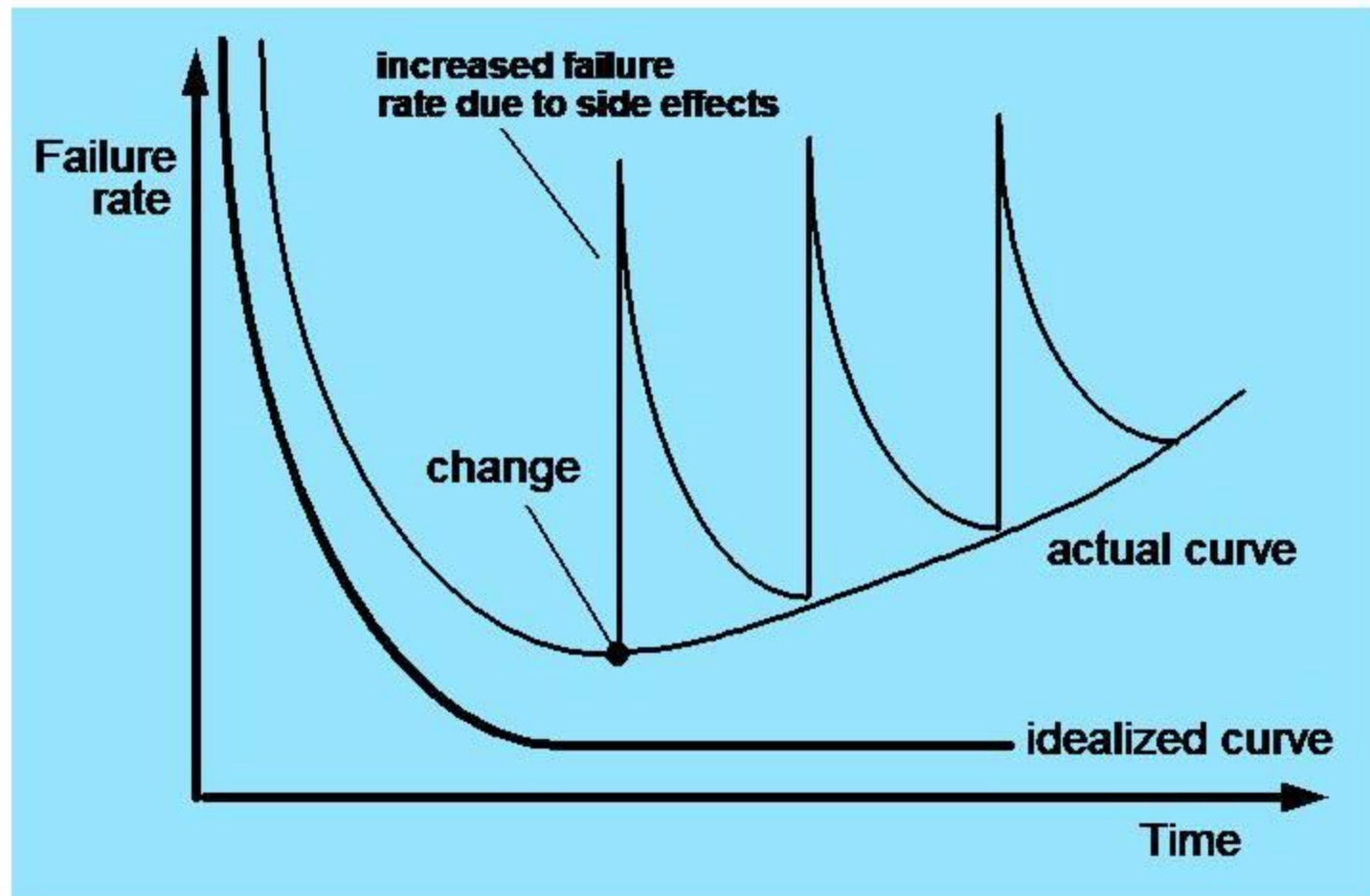
1.1 The Nature of Software

1.1.1 Defining Software and Characteristics

- Software is **developed or engineered, it is not** manufactured in the classical sense.

- Software doesn't **"wear out" but it deteriorates** (due to change). **Hardware has bathtub curve** of failure rate (initial high failure rate, then drop to steady state, then cumulative effects of dust, vibration, abuse occurs).

- Although the industry is moving towards component-based construction (e.g. standard screws and off-the-shelf integrated circuits), most **software continues to be custom-built**. Modern reusable components encapsulate data and processing into software parts to be reused by different programs. Ex: GUI, window, pull-down menus in library etc.

Wear (h/w) vs. Deterioration (s/w)
Failure curve for software

Failure rate

increased failure rate due to side effects

change

actual curve

idealized curve

Time

1.1 The Nature of Software

1.1.2 Software Application Domains

1. **System software**: Collection of programs written to service other programs. Ex compilers, editors, file management utilities

2. **Application software**: stand-alone programs for specific needs.

3. **Engineering/scientific software**: Characterized by "number crunching" algorithms such as automotive stress analysis, molecular biology, orbital dynamics etc

4. **Embedded software** resides within a product or system (key pad control of a microwave oven, digital function of dashboard display in a car)

5. **Product-line software (package)** focus on a limited marketplace to address mass consumer market (word processing, graphics, database management)

6. **Web/Mobile Applications** (Web applications) network centric software. As web 2.0 emerges, more sophisticated computing environments is supported integrated with remote database and business applications.

7. **AI** software uses non-numerical(different datatypes) algorithm to solve complex problem. Robotics, expert system, pattern recognition game playing

1.1 The Nature of Software

1.1.3 Legacy Software

- Older soft wares: modified continuously to meet needs, costly to maintain and risky to evolve. Also it is poor quality.

- They need to be evolved because:

    - 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.