

Software Engineering

What is software?

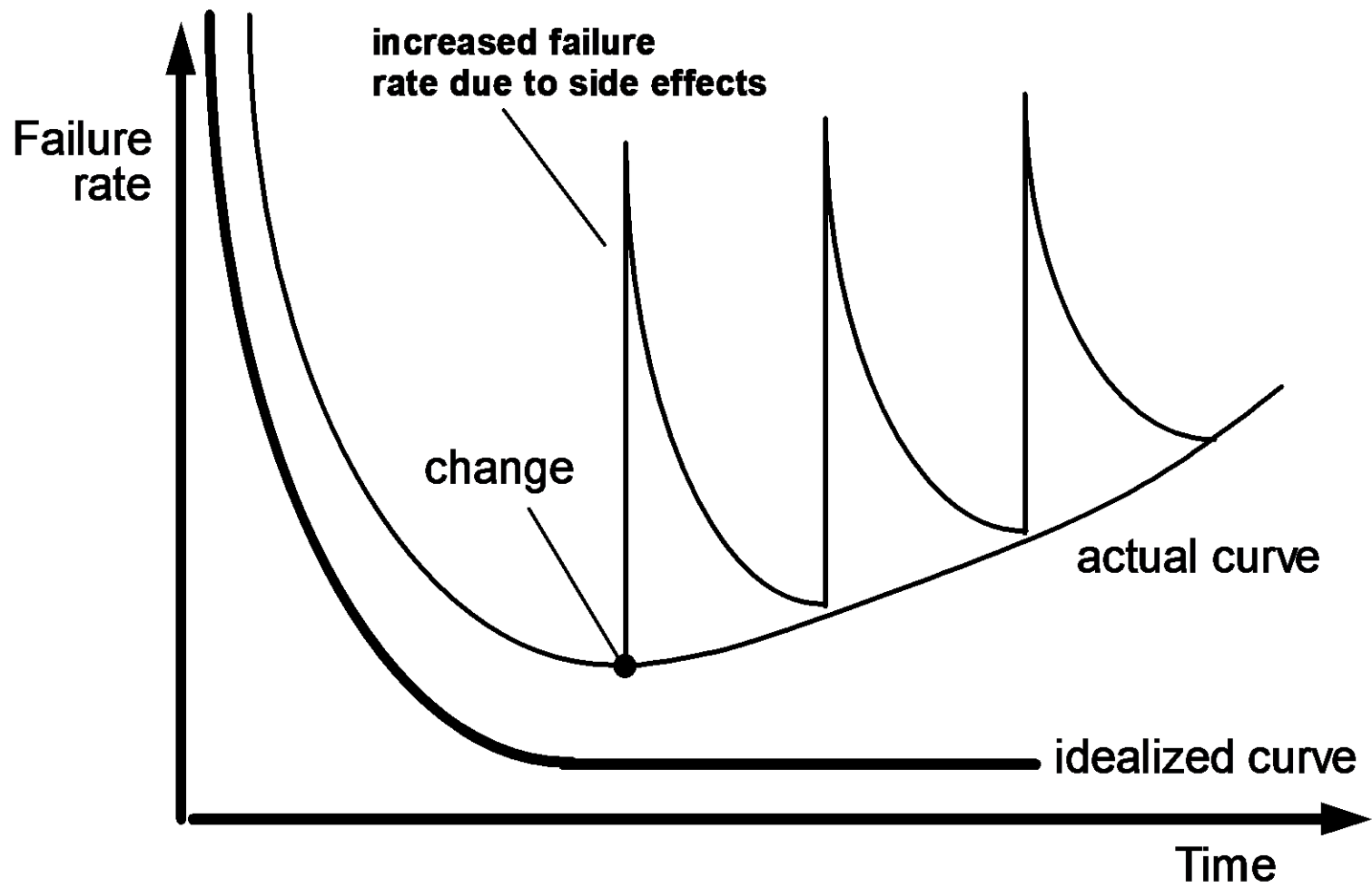
- Computer Programs
- Data
- Documentation

What is software?(contd.)

- We can define it as:
 - *Instructions (Computer Programs) that when executed provide desired features, functions and performance.*
 - *Data Structures that enable the programs to adequately manipulate the information.*
 - *Documents that describe the use of the Programs.*

Characteristics

- Software is developed *not* manufactured.
- Software doesn't wears out but deteriorates!
 - It is not susceptible to environmental maladies.
 - Idealized curve?
 - Software undergoes change, errors are introduced causing high failure rates.
- Software is custom built (mostly).



Categories of Computer Software

- System Software
- Application Software
- Engineering/scientific software
- Embedded software
- Product-line software
- Web Applications
- AI software
- Open Source

Software Crisis

- Term first used in late 1960s
- More powerful and cheaper hardware resulted in
 - More complex application
 - Existing methods of software development were not good enough
 - Software development techniques could not be scaled-up

Software Crisis (contd)

- Resulted in software projects which were:
 - Late – sometimes by many years
 - Over budget
 - Unreliable
 - Difficult to maintain
 - Poor in performance
- Required new techniques and methods to control the complexity inherent in “LARGE” software systems.

Engineering

The science concerned with putting scientific knowledge to practical use.

Webster's Dictionary

Software Engineering

- **The science concerned with putting computer science knowledge to practical use.**

Software Engineering - IEEE

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.

Software Engineering

'all aspects of software production' Software engineering is not just concerned with the technical processes of software development but also with activities such as software project management and with the development of tools, methods and theories to support software production.

-Sommerville-

Software Engineering

**The set of processes and
tools to develop
software.**

**Software Engineering is
nothing but a disciplined
and systematic approach
to software development!**

Software Engineering

- Software Engineering is not just about producing software, but about producing software in a cost-effective way.
- Challenge for software engineers is to produce high-quality software with finite amount of resources and to a predicted schedule and budget.

Well-Engineered Software

- Provides the required functionality
- Maintainable
- Reliable
- Efficient
- User-friendly
- Cost-effective

Well-Engineered Software - contd.

- These requirements may be conflicting:
 - Cost vs. Efficiency
 - Cost vs. Reliability
 - Efficiency vs. User-interface
- Law of diminishing returns.
- Challenge is to balance these requirements.

