

TOPICS

**The Nature and History of Software
Development**

Problems with Software Development

**Software Engineering Paradigms and
Technology**

THE NATURE OF SOFTWARE

Characteristics of Software

Failure Curves for Hardware and Software

Software Components

Software Configuration

Software Application Areas

Characteristics of Software

Software is *programs, documents, and data.*

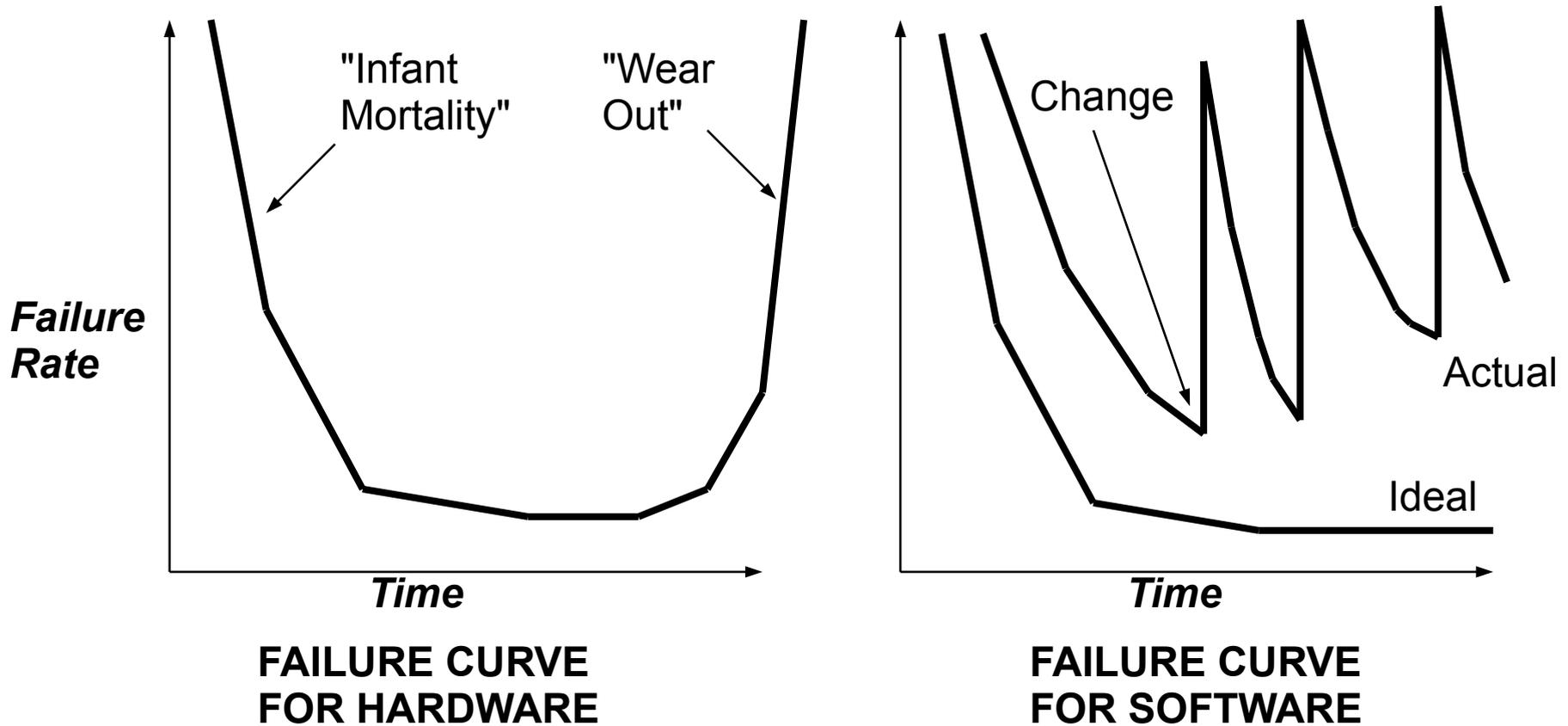
Software is developed or engineered; it is not manufactured like hardware.

Software does not wear out, but it does *deteriorate.*

Most software is custom-built, rather than being assembled from existing components.

Software is a *business opportunity.*

Failure Curves for Hardware and Software



Software Components

Software programs, or software systems, consist of *components*.

A set of components which comprise a logical unit of software is called a *software configuration item*.

Reuse and development of reliable, trusted software components improves software *quality* and *productivity*.

Computer language forms:

Machine level (microcode, digital signal generators)

Assembly language (PC assembler, controllers)

High-order languages (FORTRAN, Pascal, C, Ada, ...)

Specialized languages (LISP, OPS5, Prolog, ...)

Fourth generation languages (databases, windows apps)

Software Configuration

**Software
Project
Plan**

**Software
Requirements
Specification**

**Software
Design**

**User
Documents**

**Software
Test Plan and
Procedures**

**Data
Structures
and
Dictionary**

Code



Software Development Activities

Planning Activity

Software Project Plan

Requirements Definition Activity

**Software Requirements
Specification**

**Software Test Plan and
Procedures**

Data Structures and Dictionary

User Documents

Design Activity

Software Design Documents

Software Test Plan and Procedures

Data Structures and Dictionary

Coding and Testing Activity

Code

Software Test Plan and Procedures

Delivery and Maintenance Activity

User Documents

Others as needed

Software Application Domains

System

compilers

editors

Operating Systems

- **Real Time**

machine control

auto controls

Business

databases

stock management

- **Personal Computer**

- all non-realtime above**

Embedded

appliance control

FPGA programs

auto controls

Engineering and Scientific

simulation

computer-aided design

"number crunching"

Artificial Intelligence

expert systems

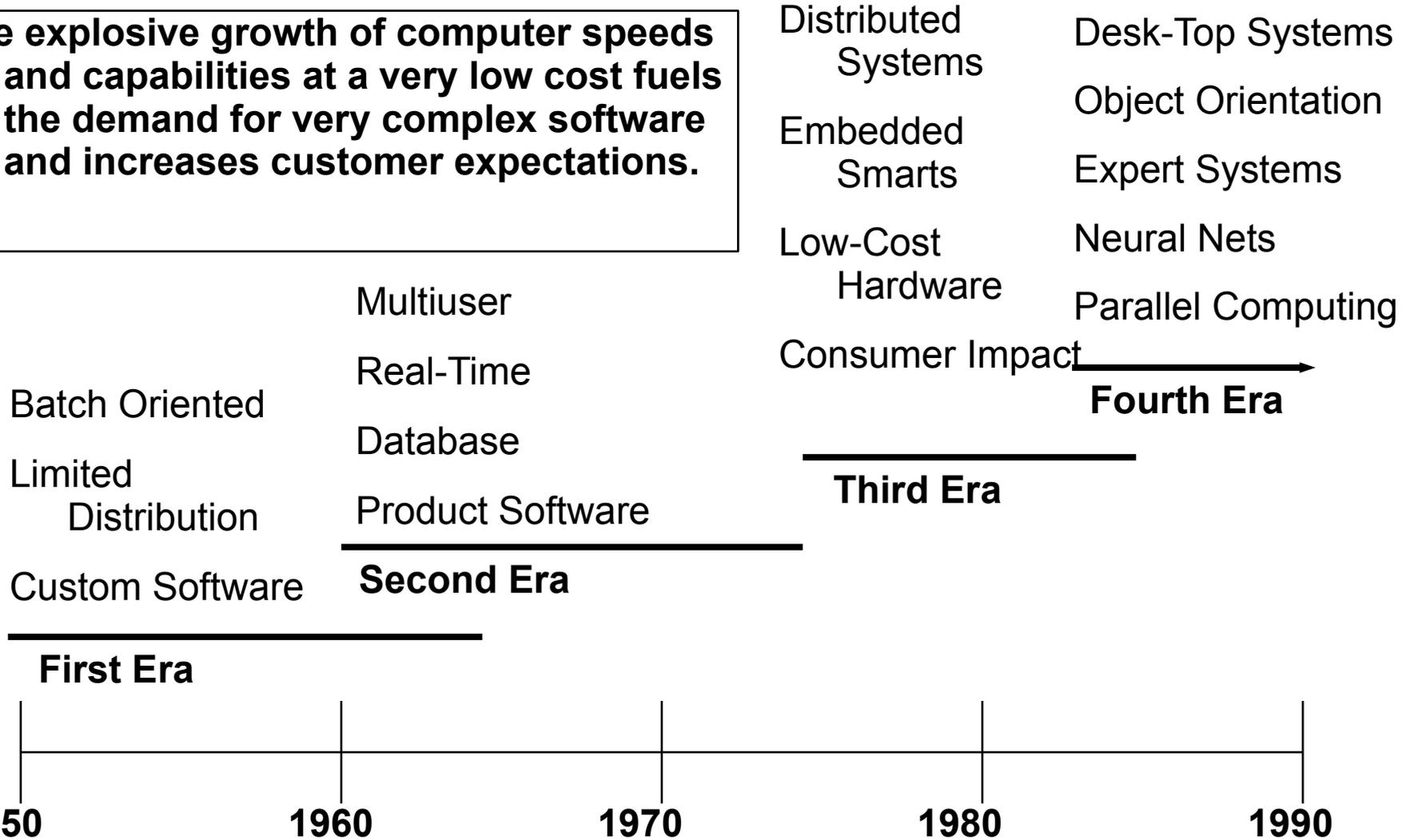
neural networks

HISTORY OF SOFTWARE DEVELOPMENT

**Role of Software
Industrial View**

Role of Software

The explosive growth of computer speeds and capabilities at a very low cost fuels the demand for very complex software and increases customer expectations.



Role of Software, Continued

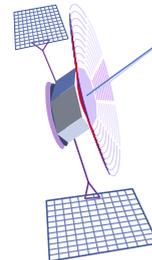
Where Do We Go From Here?

Parallel computing to extend speed of computation



Object-oriented methods of software design

Software frameworks evolve to handle larger and multiprogram systems



Heavy dependence on graphics interfaces

Artificial intelligence and neural computing become useful

National computing motivates huge software systems



Advanced programming languages

Industrial View



Why does it take so long to finish a working software system?

Why are development costs so high?

Why can't we find all software errors before software is delivered?

How can we measure the progress of software development?

How can we survive in the global economy?