Software is Different (i)

- The production of software is fundamentally different than the production of other manufactured goods

Textiles, Apparel, Consumer Products, Electronics, etc.

- Software is developed, it is not manufactured in a classical sense
  - The construction phase is very different
  - Most production expenses are associated with engineering activities
Software is Different (ii)

- Software products age in a fundamentally different way than other manufactured goods.

 manufactured goods

Software doesn’t wear out, but it does deteriorate!

Software is Different (iii)

- Software is usually developed using custom-made components.

- Component libraries
- Design patterns
Software Applications

- **System software**
  - Supports other software
  - Operating systems, drivers

- **Real-time software**
  - Provides timing guarantees
  - Flight control software, ABS

- **Business software**
  - Facilitate business operations
  - Payroll, inventory

- **Engineering and Scientific**
  - Number-crunching, simulation
  - Matlab, Mathematica

- **Embedded software**
  - In ROM, controls devices
  - Remote controls, microwaves

- **Personal computer software**
  - Mass-market software
  - Word processors, spreadsheets

- **Web-based software**
  - Client-server, browser-based
  - Google, Hotmail

- **Artificial intelligence software**
  - Heuristic-based systems
  - Expert-systems

Software Myths (Management)

- We have a book filled with standards and development procedures. Won’t that provide my developers with everything they need to know?
- My developers don’t need additional tools; we buy them state-of-the-art development equipment
- If we’re behind schedule, we’ll just add additional developers to get us back on track
- If we outsource the project, we can forget about it for awhile while we’re working on other things
Software Myths (Customer)

- I can give the developers a general idea of what I want developed, and fill in the details later
- Software is flexible; if things change, the developers will be able to accommodate the changes easily

Software Myths (Developer)

- Once we write the program, our job is done – so let’s start coding early
- Until the program is running, we have no way to assess its quality
- The only deliverable for a successful project is a working program
- Software engineering will make us create voluminous and unnecessary documentation that will invariably slow us down
What is “Good Software”?

Zen question!

- **Maintainable**: Change is the only constant!
- **Dependable**: Can’t afford failures
- **Efficient**: Most bang for the buck
- **Usable**: Users are all different

Key Challenges

- **Heterogeneity**: Everyone’s using their own flavor
- **Delivery**: Time-to-market vs. Quality
- **Trust**: Who do I believe?
The Software Crisis?

Crisis

Chronic Affliction

Patience is a Virtue

“Good cooking takes time. If you are made to wait, it is to serve you better, and to please you.”

... As it is with software engineering.
Reading Assignment