CS3300: Introduction to Software Engineering

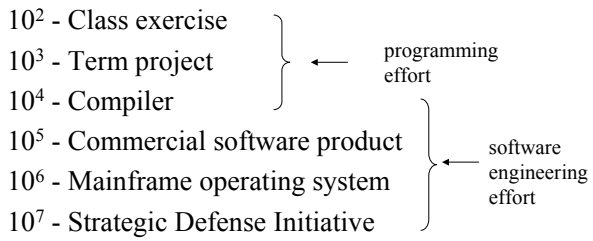
www.cc.gatech.edu/classes/AY2006/cs3300_fall

- Ada Gavrilovska (ada@cc)
  - CCB 222, MW – 1-2pm (may change)
- Daniel Popescu (popescu@cc)
  - TBA
- text: Software Engineering, Sommerville, 7th ed.
- newsgroup, swiki

- reading assignments
- midterm and final (20% + 20%)
- class participation
- project (55%)
  - you choose project
  - groups, 3-5 members, different roles
  - online templates
  - two entire iterations

Software *Engineering*

- Build software
  - address requirements
  - adhere to specification
  - meet constraints
- beyond programming…
  - includes documentation
  - testing & validation
  - maintenance
- development of large-scale software systems through an explicit methodology, notation, guidelines…
  - not an art form or a craft



Software engineering is

"(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," and "(2) the study of approaches as in (1)."

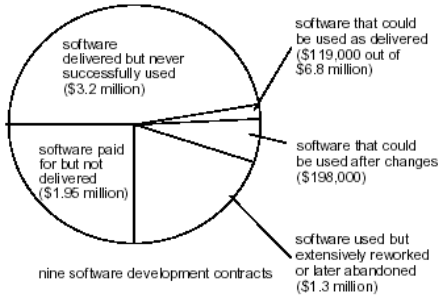
-- IEEE Standard 610.12

- SE certification, licensing
- ethics code (confidentiality, competence, IP rights, resource misuse…)

Why Software Engineering?

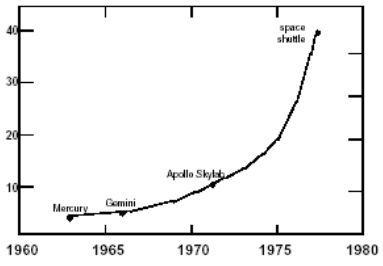
- historically – Software Crisis in late 60s
  - first large-scale software development undertakings, could not deliver functionality, meet requirements, far exceeded costs and time expectations (cowboy methodology)
  - popularized after 1968 NATO Software Engineering Conference
- today
  - in PC market, software costs >> hardware costs
  - growth in developed economies is highly software driven/dependent
  - increase in complexity and demand
  - heterogeneity, delivery and trust
  - mission/business-critical
  - constantly evolving requirements, needs, operating conditions
  - systems with long lifetimes…

How are we doing:



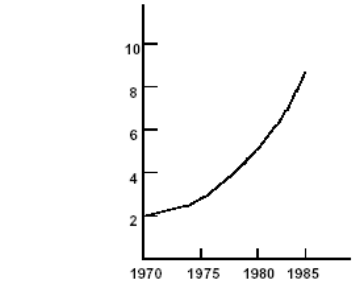
[Source: Software Requirements/ Analysis & Specifications - Davis]

Growth in NASA Software Demand



(Source : Software Engineering Economics - Boehm

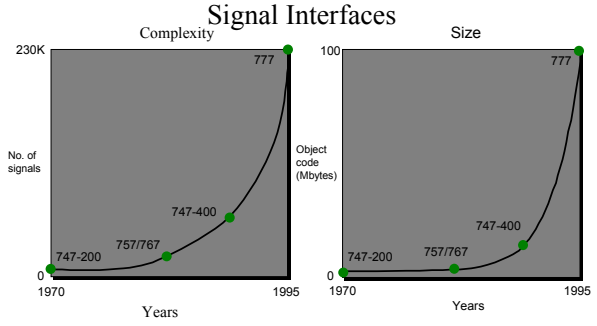
Data Processing in the U.S. as a Percent of G.N.P.



SOURCE : IEEE Software

Growth in Systems

Signal Interfaces



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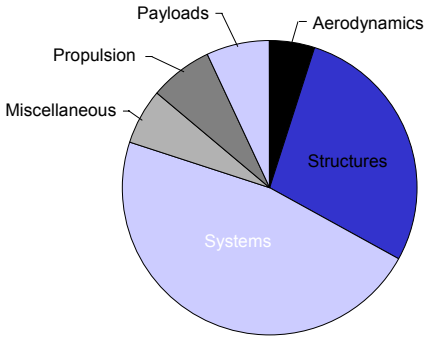
Creation Costs Distribution

Engineering and Laboratories



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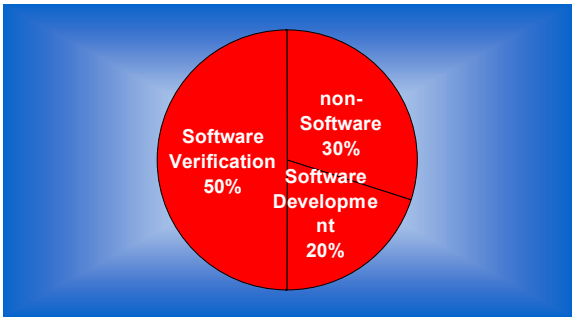
BCA LRU System Resource Distribution



- … in conclusion
  - SE important/critical discipline
  - concerned with cost-effective software development
  - with a systematic approach, using appropriate tools and techniques, and resources, and under specific development constraints
  - where delivered product should meet requirements, specifications, projected time/cost estimates, and deliver functionality

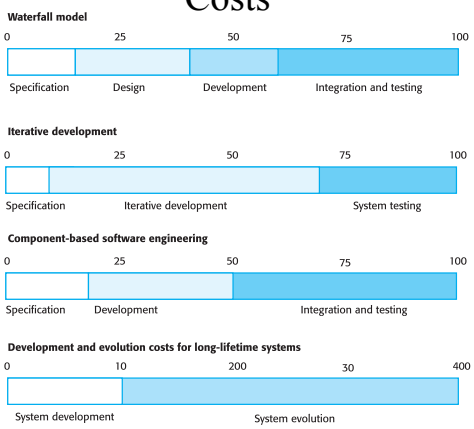
Software Process

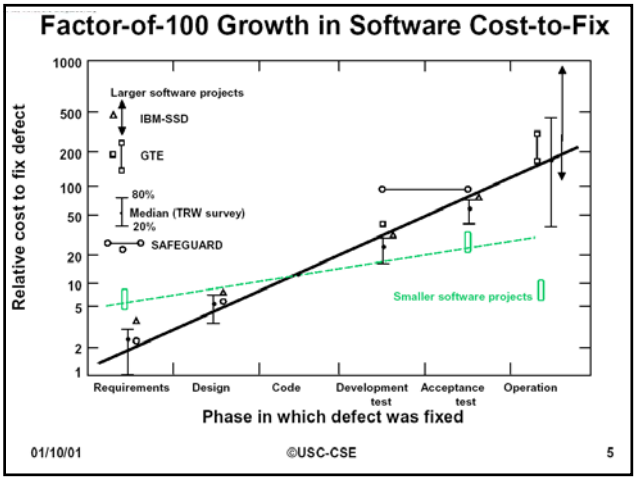
- A set of activities whose goal is the development or evolution of software.
- Generic activities in all software processes are:
  - Specification - what the system should do and its development constraints
  - Development - production of the software system
  - Validation - checking that the software is what the customer wants
  - Evolution - changing the software in response to changing demands.

Software Process Model

- An abstract representation of a software process, presented from a specific perspective.
  - Waterfall model;
  - Iterative development;
  - Component-based software engineering;
  - Agile process models/Extreme Programming (XP);
  - Formal models;
  - Rational Unified Process (RUP)
  - …
- "determine order of phases of development, and transition criteria"

Costs





Software Engineering Method

- Structured approaches to software development which include system models, notations, rules, design advice and process guidance.
- Model descriptions
  - Descriptions of graphical models which should be produced;
- Rules
  - Constraints applied to system models;
- Recommendations
  - Advice on good design practice;
- Process guidance
  - What activities to follow