In 2000, total sales of software reached approximately $180 billion, supported by a large workforce encompassing 697,000 software engineers and 585,000 computer programmers.

The Software Problem

- Scale
- Users as bugs
- Users as evolution
- Evolution yields complexity and bugs
- Software engineering matters
Scale

“Studies have found that reworking defective requirements, design, and code typically consumes 40 to 50 percent of the total cost of software development (Jones 1986). As a rule of thumb, every hour you spend on defect prevention will reduce your repair time from three to ten hours. In the worst case, reworking a software requirements problem once the software is in operation typically costs 50 to 200 times what it would take to rework the problem in the requirements stage (Boehm and Papaccio 1988). It’s easy to understand why. A 1-sentence requirement can expand into 5 pages of design diagrams, then into 500 lines of code, 15 pages of user documentation, and a few dozen test cases. It’s cheaper to correct an error in that 1-sentence requirement at requirements time than it is after design, code, user documentation, and test cases have been written to it.”

Steve McConnell, Software Quality at Top Speed, Software Development, August 1996
Users as Evolution

Boehm, SE as it is, ICSE'79
Evolution yields Complexity/Bugs

Figure 4 Serial and average growth trends of a particular attribute

Figure 7 Complexity growth during the interval prior to each release

RAYTHEON HAS SAVED $17.2 million in software costs since 1988, when its equipment division began using rigorous development processes that doubled its programmers’ productivity and helped them to avoid making expensive mistakes.
The Professors

Bill Griswold  Joseph Goguen  Ranjit Jhala

Ingolf Krueger  Jim Hollan
Thursday’s Readings


ACM papers always available for download from UCSD or through UCSD web proxy; easy to search web or ACM Digital Library.

Be prepared to discuss, not just listen.

Also:
- Web site for class to follow, next week.
- I’ll use registration list to form mailing list.