

CS4704 Software Engineering

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Why Software Engineering?

Government Spending on Software

- 47% Software Not Delievered
- 29% Delivered but never used
- 19% Abandoned
- 3% Changed and then used
- 2% Used as Delivered

The Mythical Man-Month by Fred Brooks

- Manager of OS 360 (IBM) 1964 -- ??
- Results
 - Product Late
 - Used too much Memory
 - Cost many times more than estimated

Mythical Man-Month

Why?

Program – “does what it is suppose to”

Product –

- Generalized input
- Completely tested
- Complete documentation
- Can be maintained

Product requires 3 times as much time

Why does Software Fail?

- How to estimate time
- Assume that “All will go well”
- Confuse “effort” with “Progress”
- Do not monitor schedule effectively
- When schedule slippage occurs – add more people

Why does Software Fail?

- Programmers are optimistic:
 - “This is the last bug”
 - “It’s going to work this time”

Why does Software Fail?

- Is one man working six months equal to six men working one month?
- **NO**
- Men and months are NOT interchangeable
- Some tasks are not sequential.

What is an acceptable BUG rate?

Why is programming fun?

- People enjoy making things
- Solving Puzzles
- Always learning
- Use your imagination

Effort of more than one person

$$\frac{N(N-1)}{2} \quad N - \text{number of people}$$

By adding more people – could lengthen, not shorten the schedule

What happens when a schedule date is missed?

Brook's Law" "adding more manpower to a late project makes it later

Is there such a thing as a Super Programmer?

- YES
- Productivity is 10 times greater

OS 360

- 1000 people
- 5000 man years

Humbling experience

- It is a very humbling experience to make a multi-million dollar mistake”
- 2 groups of employees:
 - Group 1 – 10 months
 - Group 2 – 7 months
- Problem: can't let 150 people idle for 10 months
- Like construction – don't hire builders until the blue-prints are ready

Designers

- 1st time – want to do it on time
- 2nd time – try everything
- 3rd time – more experience – OK
- OS 360 – most designers were 2nd time
- EX: 26 bytes of permanently resident memory to handle December 31 on leap year when it became day 366. Y2K??

Maintenance

- 50% of IBM OS 360 was maintenance