

ECS505U

SOFTWARE ENGINEERING

MUSTAFA BOZKURT
LECTURER IN SOFTWARE ENGINEERING

Week 1

Introduction and Overview

Dr. Mustafa Bozkurt



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NEVER EMAIL me, use the **NEWS FORUM** in QM+ **PLEASE!!**
- Room: CS414
Surgery hours: Thurs 3-5pm.

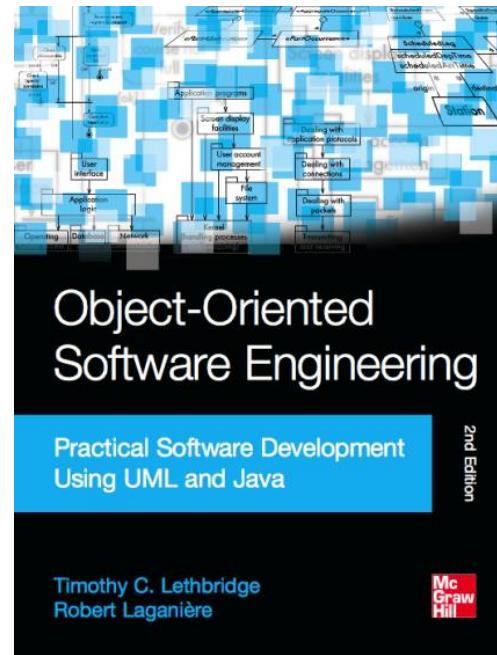
COURSE TEXT BOOK

Lethbridge TC, Laganiere, '*Object-Oriented Software Engineering: Practical Software Development using UML and Java*', 2nd Edition, McGraw Hill, 2005

ISBN: 0-07-70109082

£40 Amazon

£20 used



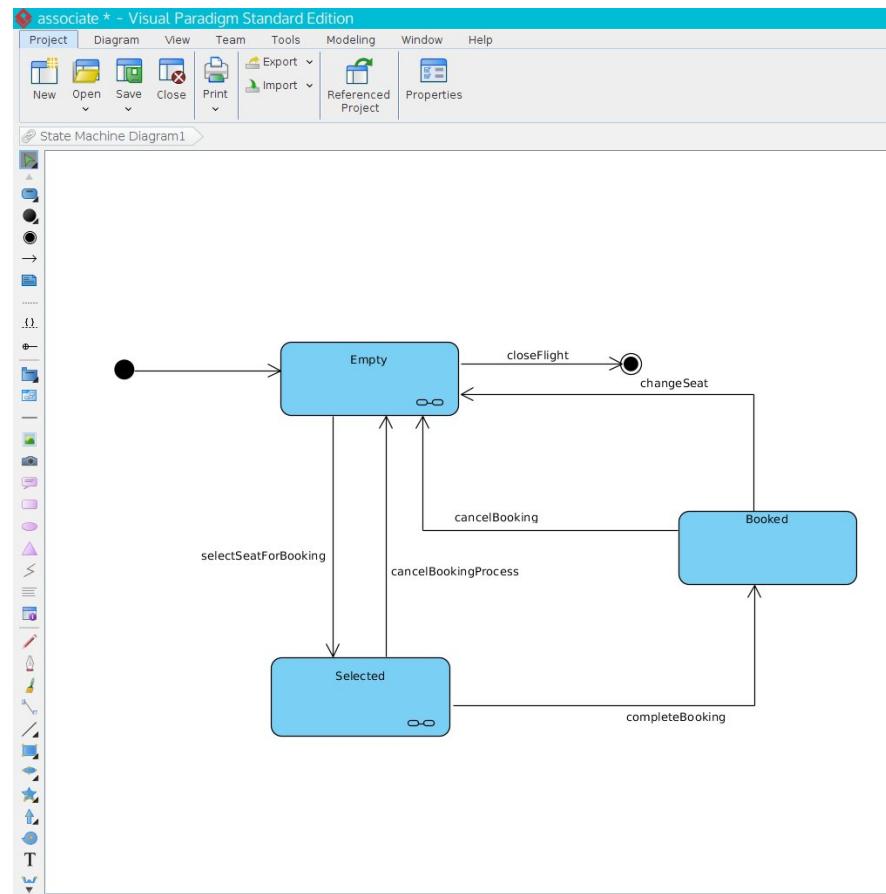
COURSE ASSESSMENTS

1. Coursework 20%

- a. 4 lab exercises (2.5% each)
- b. Coursework (10%)

2. Final exam 80%

Visual Paradigm UML v13.2



Visual Paradigm UML v13.2



ECS505U - Software Engineering - 2015/16

(No news has been posted yet)

Lectures Tuesday 2-4pm in Arts II Lecture Theatre

This is a one-unit module (Semester A only) assessed by exam (80%) and coursework (20%)



Previous Exams



Module Summary and Syllabus



News forum



NetBeans



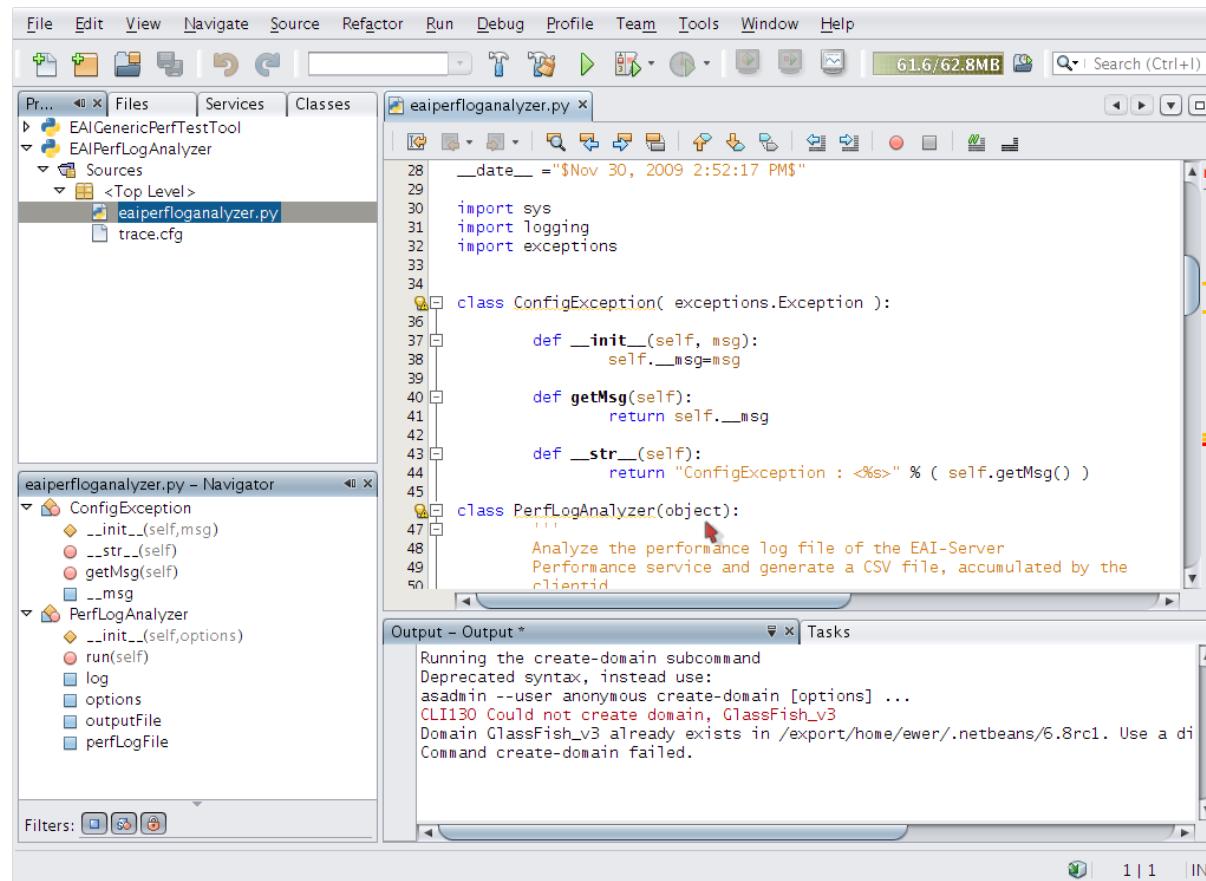
Visual Paradigm UML tool



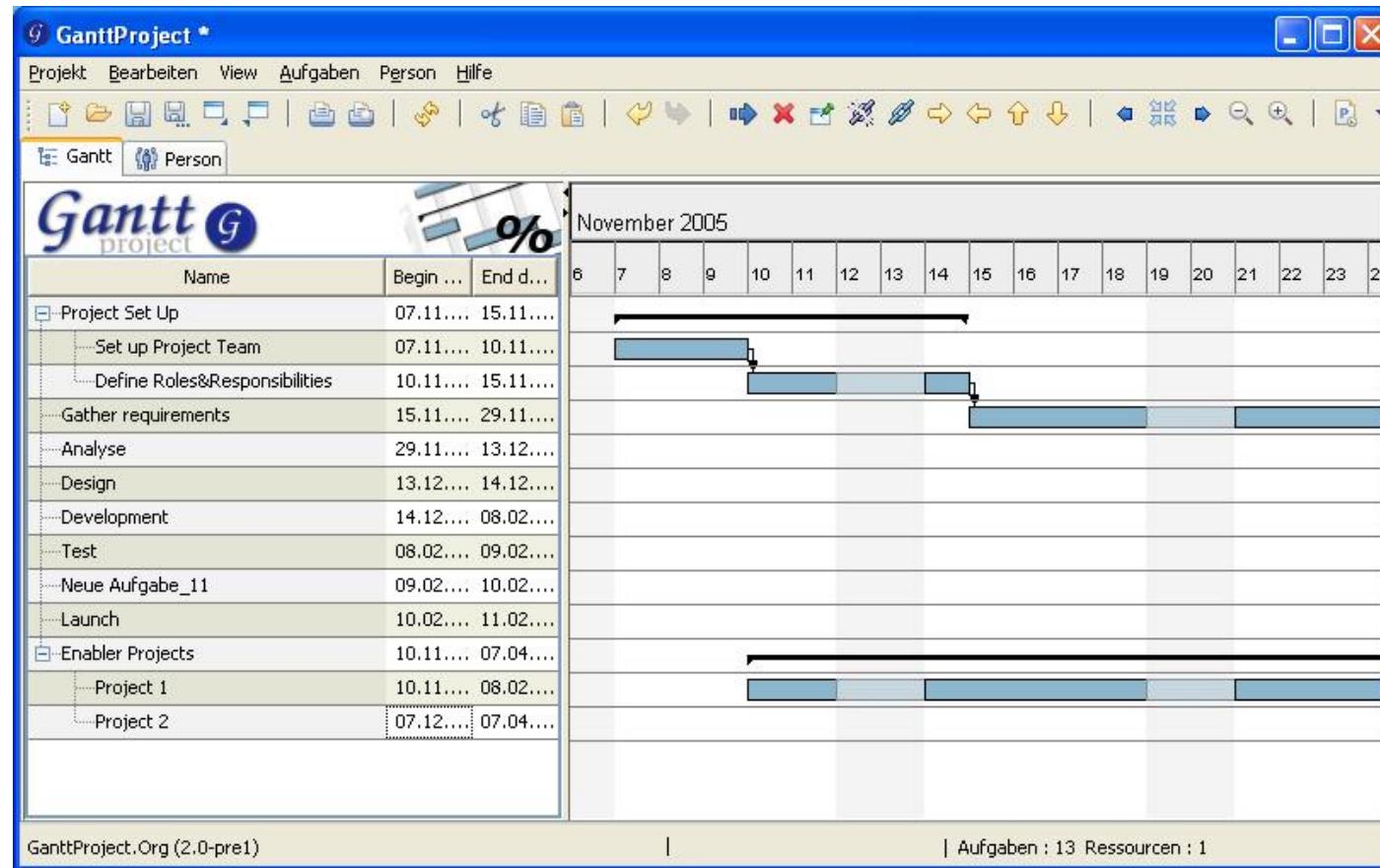
Paradigm

Through Visual Paradigm Academic Partner Program, Queen Mary University of London is granted license for modeling software - VP for educational use.

Netbeans v8.x



Gantt Project



E&T

Engineering and Technology Magazine

HOME MAGAZINE NEWS BLOGS VIDEO

Nasdaq's three-hour outage caused by software bug

30 August 2013 By Tereza Pultarova

[+ Share](#) |    



August 2013

Apple Maps service loses train stations, shrinks tower and creates new airport

Significant glitches reported in service that replaces Google Maps on Apple's iOS6 for iPhones and iPads

Juliette Garside, telecoms correspondent

The Guardian, Thursday 20 September 2012 13.00 BST

[Jump to comments \(560\)](#)



September 2012

ComputerWeekly.com

Apple admits iPhone 5 Maps app needs fixing

Warwick Ashford 

Friday 21 September 2012 08:41



Apple rarely admits anything is amiss, but in an email to an Australian iPhone 5 user, the company has apparently conceded that the iOS Maps app needs improvement.

The Apple Maps application replaces Google Maps on the iPhone, but it is full of errors, particularly for users outside US.

4 September 2012 Last updated at 00:02

135 Share 

RBS computer failure needs clear redress, says MP

Customers affected by the computer failure at RBS in June must be given "clear and straightforward" information on compensation, an MP has said.

Andrew Tyrie, chairman of the Commons Treasury Committee, also said that other banks should be checking their IT systems.

A software upgrade failure led to a huge backlog in updating customers' balances at the banking group.

RBS has already said it has set aside £125m for customer redress.

'Confusion'

Account holders at RBS and NatWest faced disruption for about two weeks owing to the problems.

However, customers of the Ulster Bank subsidiary witnessed the fallout affecting their accounts for even longer.



The IT meltdown has cost the bank millions of pounds

September 2012

Related Stories

[Bank outlines compensation plan](#)

[RBS to pay £125m for IT glitch](#)

[RBS boss Hester not taking bonus](#)

Computer failure delays United Airlines flights

THE ASSOCIATED PRESS

Tuesday, August 28, 2012

United Airlines passengers faced delays and long lines after some of its major computer systems and its website failed Tuesday afternoon.

The glitch was another in a long string of technology problems that began when it merged computer systems with Continental's in March.

United acknowledged at least 200 delayed flights. Its passenger reservation system and website stopped working for about two-and-a-half hours on Tuesday afternoon, although the precise cause wasn't known.

The outage didn't affect planes in flight.

Passengers in several United hubs reported very long lines at ticket counters. During the outage it stopped sending planes to its hubs in Newark, N.J., and San Francisco.



United Continental faces computer issues...

August 2012



Our Paper

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Back Pages,
E-Edition and
Back Issues...

Today 27th September 2011

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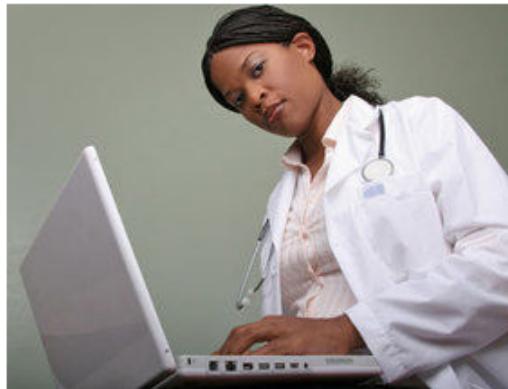
etitions

ess Games

HOME > NEWS / SHOWBIZ > UK NEWS > Ministers axe £12bn NHS computer system

UK NEWS

MINISTERS AXE £12BN NHS COMPUTER SYSTEM



Thursday September 22, 2011

By Daily Express reporter

Have your say(6)

THE disastrous NHS computer system commissioned by Labour at a cost of £12billion is to be scrapped.

Ministers are expected to announce today they are pulling the plug on the world's largest single civilian computer system.

The 10-year "white elephant" has been beset with delays as a series of

£12 billion computer system has been axed



10 recommendations. [Sign Up](#) to see what your friends recommend.

contractors failed to deliver and has been heavily criticised by spending watchdogs.

It was promised that it would create a national database of electronic patient records which would allow surgeries and hospitals to share medical information. It was also intended that X-rays and prescriptions could be sent by email. In May, the National Audit Office said the project represented poor value for money and the Commons Public Accounts Committee said a huge amount of money had been wasted.

September 2011

MP exposes another massive government IT overspend

by Parliamentary reporter

26 Sep 2011

More from this author

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[Computer systems](#) designed to support passport delivery have cost over four times their original £80m estimate, landing taxpayers with a bill of about £365m.

The massive overspend was revealed by Home Office minister Damian Green in an answer to a parliamentary question from Banff and Buchan Scottish National Party MP Eilidh Whiteford, who called an "absolute scandal".

Newsletters

Have similar articles delivered to your inbox

- Weekly Update
 Public Sector

September 2011

Latest stories from Government



Police IT is becoming increasingly fragmented and expensive, says report

► Lib Dems urge government to tackle cloud security issues

What is common among all the failed projects?

Bad software engineering practices!

THE SOFTWARE ENGINEERING CHALLENGE



Mustafa Bozkurt
Software Engineering

Tree house

Not much planning



No foundations to dig

Start construction straight away

No internal structure

Simple instructions to follow

No design decisions to make

Make adjustments on the fly

Done by one person with basic skills

Few tools needed

Small number of users with simple requirements



Skyscraper

Major planning and project management

Major work on foundations

No construction until excavation/foundations laid

Major internal structure and framework

Complex requirements

Major design tasks/decisions

All adjustments must be planned

Multiple people teams with multiple skills

Many tools needed

Multiple users with complex requirements



LESSON OBJECTIVES

- Understand what software engineering.
- Understand why software engineering is necessary
- Motivate you to apply it **NOW**

COURSE OBJECTIVES

To acquire

- Theoretical knowledge
- Technical knowledge
- Managerial knowledge
- Highly marketable skills

PROGRAMMING IN THE SMALL

- Requirements simple, precise, do not change
- Often used by few people
- Often used a few times

THE PROBLEM OF SCALING UP



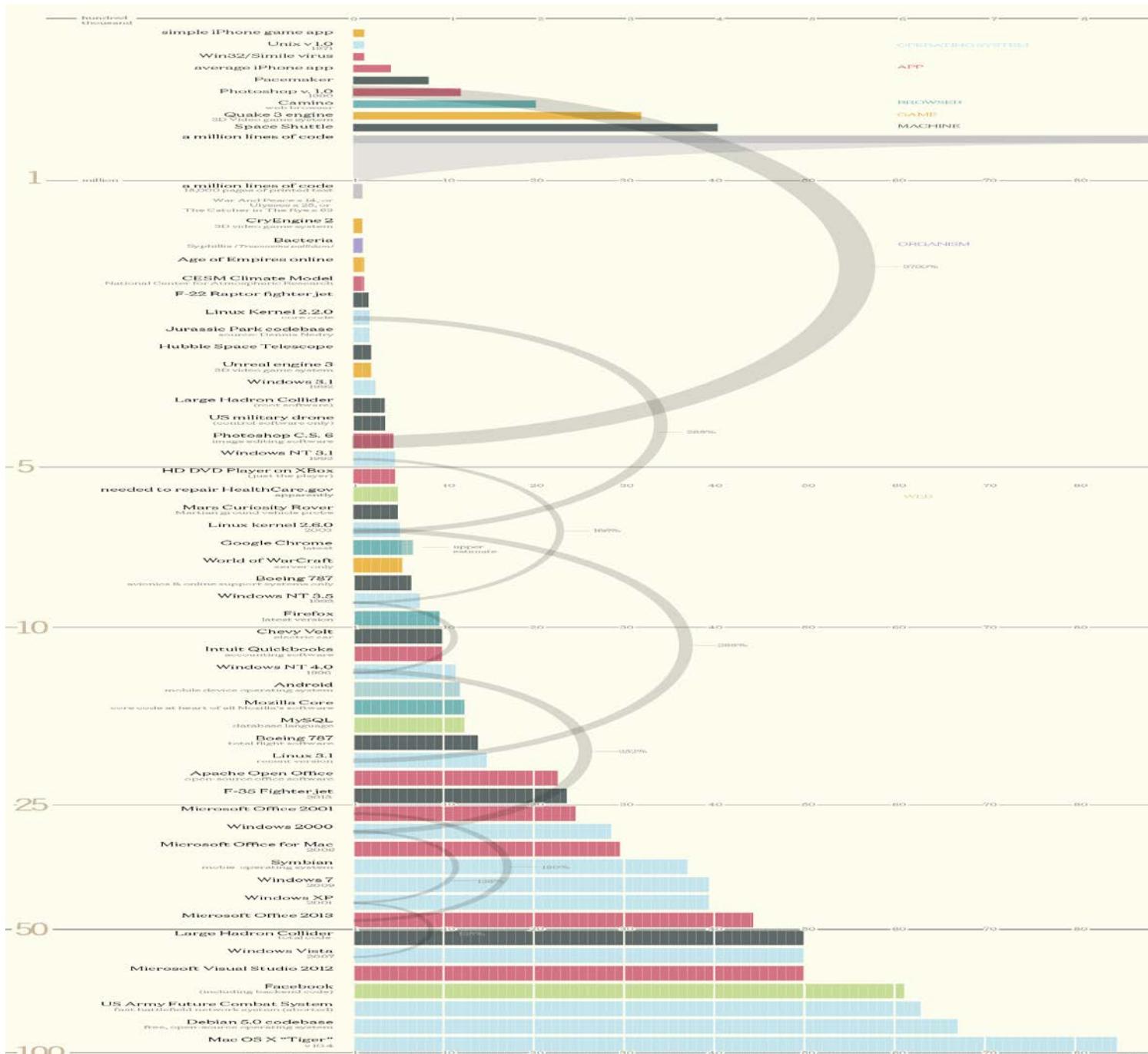
<http://www.digsdigs.com/>



<http://en.wikipedia.org/>

- A program of < 5,000 LOC or 100 function points is small
- Techniques which work for programming in the small do not scale up

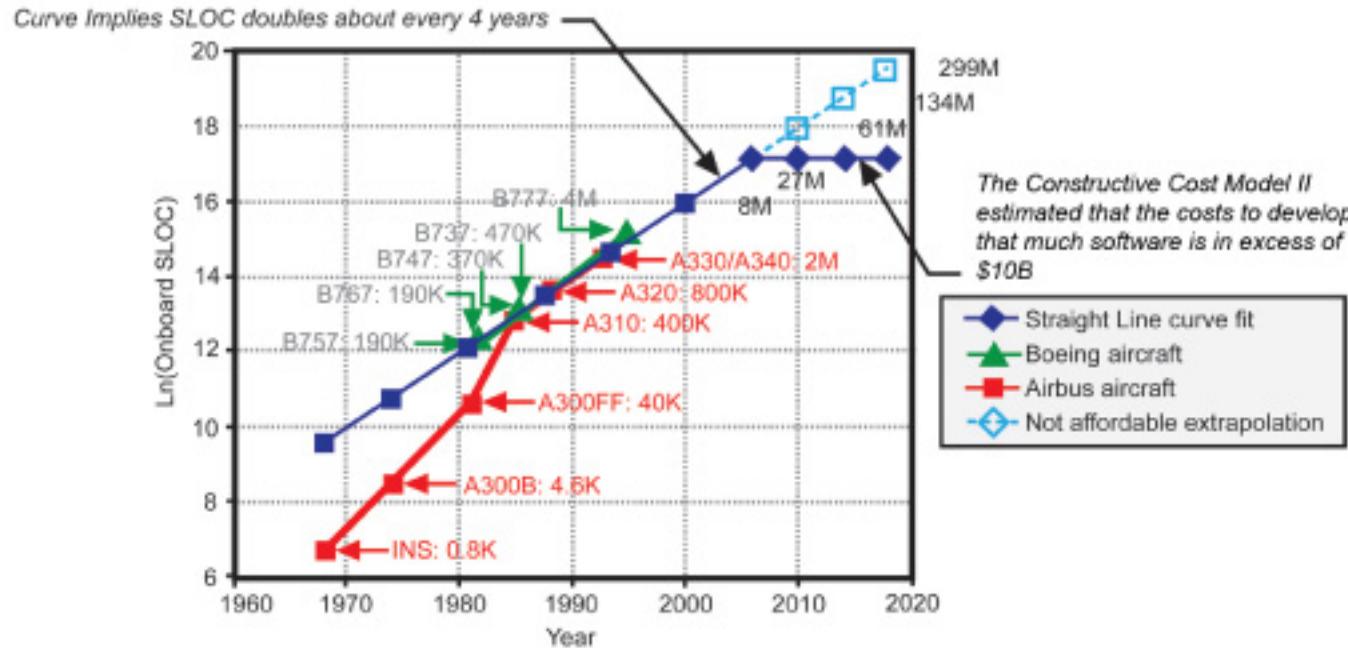
<http://www.informationisbeautiful.net/visualizations/million-lines-of-code/>



SIZE OF SOFTWARE

Software size doubling every four years

Estimated Onboard Software Lines of Code (SLOC) growth



Airbus data source: J.P. Potocki De Montalk, "Computer Software in Civil Aircraft," Sixth Annual Conference on Software Assurance (Compass '91), Gaithersburg, MD, June 24-27, 1991
Boeing data source: J.J. Chilenski, 2009

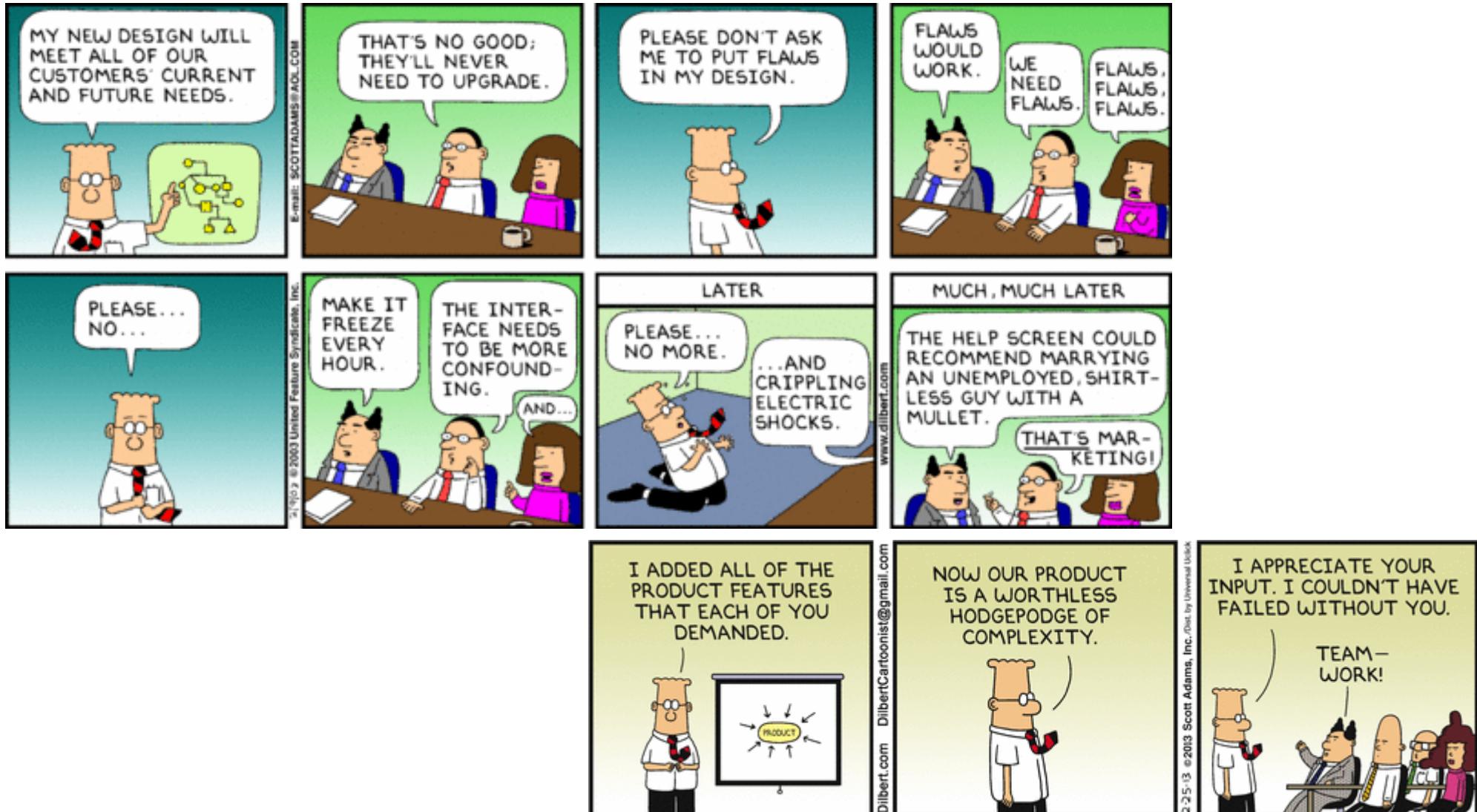
<http://eecatalog.com/military/2013/06/06/do-178c-accommodating-the-evolution-of-software-processes/>

SIZE OF SOFTWARE

		Oil exploration software	Magnetic resonance scanner	Flight management system	Copier	Car navigation System	Workflow engine
CAGR		1.11	1.13	1.15	1.18	1.23	1.29
Year	0	1.00	1.00	1.00	1.00	1.00	1.00
	1	1.11	1.13	1.15	1.18	1.23	1.29
	2	1.23	1.28	1.31	1.39	1.51	1.66
	3	1.37	1.44	1.51	1.64	1.86	2.15
	4	1.52	1.63	1.72	1.94	2.29	2.77
	5	1.69	1.84	1.98	2.29	2.82	3.57

M. van Genuchten and L. Hatton, "Quantifying Software's Impact", Computer , January 2013, IEEE Computer Society

WHY LARGE SOFTWARE PROJECTS FAIL?



WHY LARGE SOFTWARE PROJECTS FAIL?

- Lack of end-user involvement
- Poor communication (internal and external)
- Poor configuration management
- Inadequate testing
- Poor management
- Technical complexity issues

CONSEQUENCES

- Poor Quality
- Late delivery
- Excessive costs

The performance of different types of IT projects varies significantly.

% of IT projects with given issue (for those with budgets >\$15 million in 2010 dollars)

Project type	Average cost overrun	Average schedule overrun	Average benefits shortfall
Software	66	33	17
Nonsoftware	43	3.6	133
Total	45	7	56

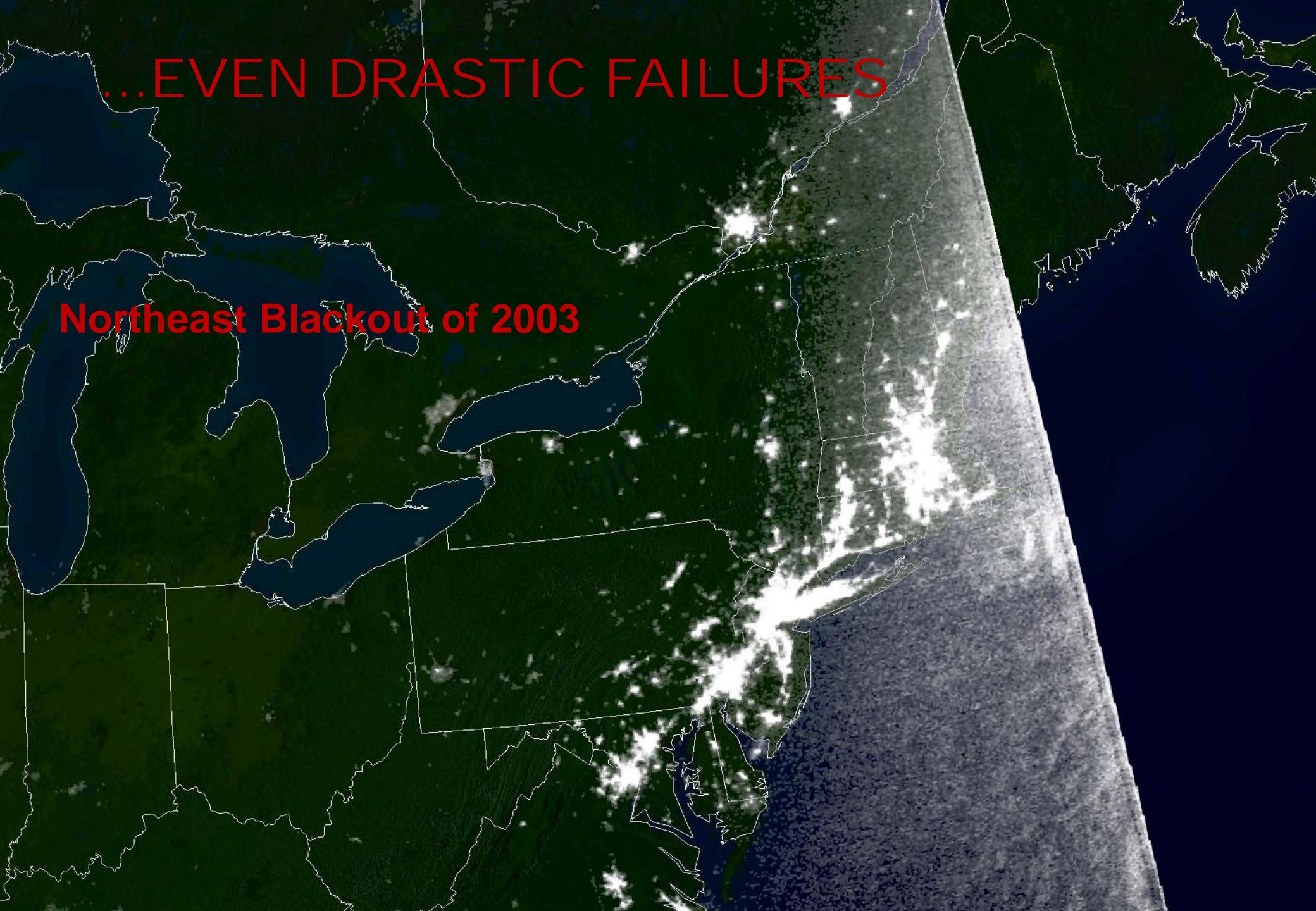
Source: McKinsey–Oxford study on reference-class forecasting for IT projects

Source: McKinsey–Oxford study on reference-class forecasting for IT projects

http://www.mckinsey.com/insights/business_technology/delivering_large-scale_it_projects_on_time_on_budget_and_on_value

...EVEN DRASTIC FAILURES

Northeast Blackout of 2003



Mars Global Surveyor (2006)



...EVEN DRASTIC FAILURES

Ariane 5 rocket
(1996)



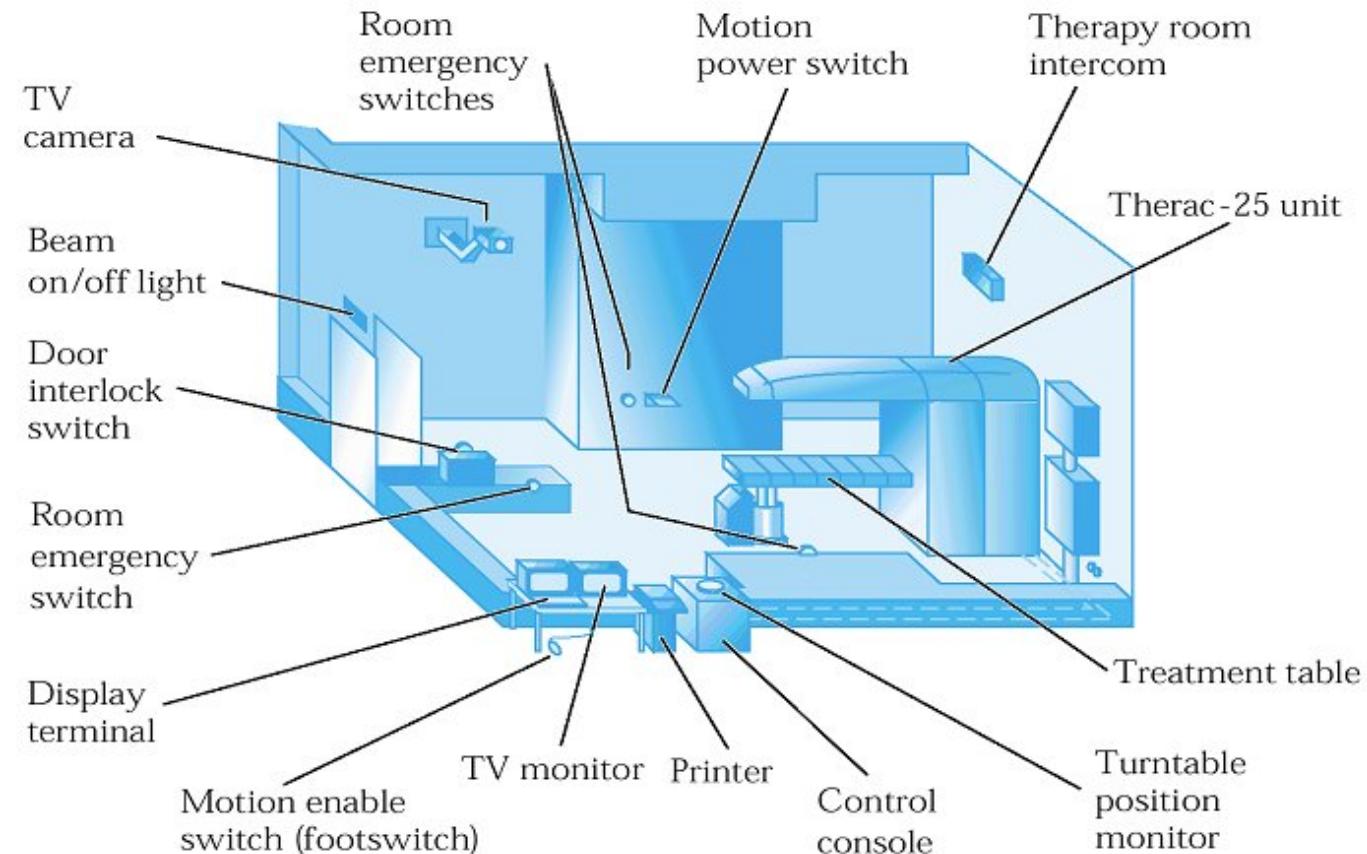
...EVEN DRASTIC FAILURES

London ambulance
despatch system
(1992)



...EVEN DRASTIC FAILURES

Therac-25 radiation machine



WHAT IS ENGINEERING?

The application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

WHAT IS SOFTWARE ENGINEERING?

The systematic application of scientific and technological knowledge, through the medium of sound engineering principles, **to the production of computer programs, and to the requirements definition, functional specification, design description, program implementation, and test methods that lead up to this code.**

WHAT'S SPECIAL ABOUT SOFTWARE?

- Major cost/effort is in design not manufacture
- Inevitable novelty
- Discontinuous behaviour
- Changes have side-effects

Myth 1: ‘The sooner we start coding, the sooner the project will be complete’.

Myth 2: ‘Once the program has compiled successfully, our job is done’.

Myth 3: ‘Until we get a program running we can’t assess the quality of the project’.

Myth 4: ‘The only deliverable for a software project is the working program’.

Myth 5: ‘The project is 90% complete’.

Myth 6: ‘Software is easy and cheap to change’.

SOFTWARE ENGINEERING 'SOLUTION' FOR LARGE PROJECTS

Apply general engineering activities:

- Managing
- Modelling
- Testing
- Maintaining

COURSE CONTENT

- Systems concepts
- Object oriented design
- Software life-cycles
- Project management and planning
- UML for software design
- Software Testing strategies
- Software Quality Assurance
- Software metrics and risk
- Design patterns

COMMUNICATIONS

- Use the course web page – it is the main source of information
- Post all (non-personal) queries to QM+ forum
- Use email only if your question is personal or is really not answered on web site or forum.

SUMMARY

- ‘Programming in the small’ techniques insufficient
- Poorly managed and poorly engineered software systems fail
- To build a real software system you need to apply software engineering techniques

BUT NOTE....

You can only **LEARN** software engineering by
DOING software engineering

DON'T RUN TO THE EXIT

