CSC 7003 : Basics of Software Engineering

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http://www-public.telecom-sudparis.eu/~gibson/Teaching/CSC7003/

History of Software Engineering

/~gibson/Teaching/CSC7003/L12-History.pdf
How to View/Structure the History

• People
• Publications
• Companies and Products
• Dates and Interdependencies
• …
The Important People Can Be Used to Structure the History

A good place to start is with « prizes » for individuals:

• Association for Computing Machinery
  • ACM Turing Prize Winners: like the Nobel prize for Computing
  • ACM SIGSOFT (Special Interest Group Software Engineering) Outstanding Research Award
  • ACM Software System Award Recipients

• Institute of Electrical and Electronics Engineers
  • IEEE Technical Council on Software Engineering (Harlan D Mills Award)
  • IEEE Fellows

• American Academy of Arts and Sciences Fellows
ACM Turing Prize Winners: like the Nobel prize for Computing

« an individual selected for contributions of a technical nature made to the computing community. The contributions should be of lasting and major technical importance to the computer field ».

QUESTIONS:

• Which winners can you name?
• Which have most contributed to the discipline of Software Engineering?
ACM Turing Prize Winners: like the Nobel prize for Computing

Of note (for software engineering aspects):

1966 A.J. Perlis
1974 Donald E. Knuth
1978 Robert W. Floyd
1980 C. Antony R. Hoare
1986 John Hopcroft
1995 Manuel Blum
1999 Frederick P. Brooks
2003 Alan Kay
2006 Frances E Allen
2008 Barbara H Liskov
2010 Leslie Valiant
2013 Leslie Lamport

1972 E.W. Dijkstra
1977 John Backus
1979 Kenneth E. Iverson
1984 Niklaus Wirth
1991 Robin Milner
1996 Amir Pnueli
2001 Ole-Johan Dahl  Kristen Nygaard
2005  Peter Naur
2007 Edmund M Clarke  E Allen Emerson
2009 Charles Thacker
2011 Judea Pearl
ACM Software System Award Recipients
(Related to Software Engineering & Program Language)

Some notable examples:

1987 Adele Goldberg  Daniel H.H. Ingalls  Alan C. Kay *Smalltalk*
1992 Daniel G. Bobrow  Richard R. Burton  L. Peter Deutsch  Ronald M. Kaplan  Larry Masinter  Warren Teitelman *Interlisp*
1994 Andrew Birrell, Bruce Nelson, *Remote Procedure Call*
1999 Brian Behlendorf, Roy Fielding, Rob Hartill, David Robinson, Cliff Skolnick, Randy Terbush, Robert S. Thau, Andrew Wilson, *The Apache Group:*
2001 Gerard Holzmann  *SPIN*
2002 James A. Gosling  *Java*
2003 Stuart Feldman  *MAKE*
2006 Bertrand Meyer  *Eiffel*
2007 David Harel  Hagi Lachover  Amnon Naamad  Amir Pnueli  Michal Politi  Rivi Sherman  Mark Trakhtenbrot  Aron Trauring, *Statemate*
2011 John Wiegand, Dave Thomson, Gregory Adams, Philippe Mulet, Julian Jones, John Duimovich, Kevin Haaland, Stephen Northover, and Erich Gamma, *Eclipse*
ACM SIGSOFT Outstanding Research Award

2012 Lori Clarke
2011 David Garlan and Mary Shaw
2010 Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides (posthumously)
2009 Richard N. Taylor
2008 Axel van Lamsweerde
2007 Elaine J. Weyuker
2006 David Harel
2005 Jeff Kramer and Jeff Magee
2004 Nancy Leveson
2003 Leon J. Osterweil
2002 Gerard Holzmann
2001 Michael Jackson
2000 Victor Basili
1999 Harlan Mills (one-time posthumous)
1999 Niklaus Wirth
1998 David Parnas
1997 Barry Boehm

This award is presented to an individual who has made significant and lasting research contributions to the theory or practice of software engineering.
IEEE Technical Council on Software Engineering
(Harlan D Mills Award)

1999 David Parnas
2000 Barry Boehm
2001 Manny Lehman
2002 Jesse Poore
2003 Victor Basili
2004 Elaine Weyuker
2009 Bertrand Meyer
2011 John Rusby
2012 Lionel Claude Braind

**Question:** do you know why the award is named for Harlan D. Mills (May 14, 1919 — January 8, 1996)?
IEEE Fellows: related to Software Engineering or Program Languages/Compilers:

“A member who has made a significant contribution to any of the IEEE fields of interest may be elevated to the grade IEEE Fellow, a distinctive honor”

1968: Marvin Minsky (MIT)  
1970: Heinz Zemanek (IBM)  
1972: Watts S. Humphrey (CMU SEI)  
1978: CV Ramamoorthy (UC Berkeley)  
1983: Manuel Blum (UC Berkeley)  
1985: Per Brinch Hansen (Syracuse U.) David J. Kuck (Intel)  
1986: Manny Lehman (Middlesex U.)  
1987: John D. Musa (Independent Consultant)  
1989: Amrit Goel (Syracuse U.) William Wulf (U. Virginia)
IEEE Fellows: related to Software Engineering or Program Languages/Compilers:

1990: Victor Basili (U. Maryland)
1993: Michael A. Harrison (UC Berkeley) Norman Schneidewind (Naval Postgraduate School)
1994: Wen-Tsuen Chen Alan Davis (U. Corolado)
1995: Arvind (MIT) Brent Hailpern (IBM Research) Ken Kennedy (Rice U.)
1996: Peter Freeman (Georgia Tech) Harold Lawson, Jr. Jeffrey Tsai(U. Illinois at Chicago) Tony Wasserman (Software Methods&Tools)
1999: Jean-Luc Gaudiot (UC Irvine) Luqi (Naval Postgraduate School) Rudrapatna Shyamasundar (Tata Institute of Fundamental Research)
IEEE Fellows: related to Software Engineering or Program Languages/Compilers:

2000: Tom DeMarco (Atlantic Systems Guild) David Padua (UIUC) Koji Torii (Osaka U.)

2001: Karl Chang (Iowa State U.) William E. Howden (UCSD) Sy-Yen Kuo (National Taiwan U.)
Richard H. Thayer (Independent Consultant) Mladen A. Vouk (NCSU)

2002: Gul Agha (UIUC) Vijay Vaishnavi (Georgia State U.)


2007: Bill Curtis (Borland) Mehdi Jazayeri (U. Lugano, Switzerland)

IEEE Fellows: related to Software Engineering or Program Languages/Compilers:

2009: Roger U. Fujii (Northrop Grumman), David Parnas (U. Limerick, Ireland), Fred B. Schneider (Cornell U.), Moshe Y. Vardi (Rice U.)

2010: E. Grady Booch (IBM), Lionel C. Briand (Simula Research Laboratory, Norway), Douglas Burger (Microsoft Research), Eliot Moss (U. Mass), Jeffrey Voas (SAIC)

2011: Lori A. Clarke (U. Mass) Mary Jean Harrold (Georgia Tech) Kathryn S. McKinley (UT Austin) Guy Lewis Steele (Sun) Alexander Wolf (Imperial College London) Liang-Jie Zhang (IBM Research)

2012: Matthew B. Dwyer (UNL) David Garlan (CMU) Brad A. Myers (CMU) Mary Lou Soffa (U. Virginia)
American Academy of Arts and Sciences Fellows (related to Software Engineering or Program Languages/Compilers):

An international learned society (USA oriented) composed of the world's leading scientists, scholars, artists, business people, and public leaders

Dana S. Scott (CMU, 72)  Donald E. Knuth (Stanford U., 73)
John McCarthy (Stanford U., 74)  Frederick P. Brooks (UNC, 76)
John Backus (??, 85)  John Hopcroft (Columbia U., 87)
Albert R. Meyer (MIT, 87)  Bill Gates (Microsoft, 92)
Barbara Liskov (MIT, 92)  Frances E. Allen (IBM Research, 94)
Alan Kay (Viewpoints Research, 94)  Manuel Blum (UC Berkeley, 95)
Susan Graham (UC Berkeley, 95)  William A. Wulf (U. Virginia, 95)
Gerald J. Sussman (MIT, 96)  Steven Jobs (Apple, 00)
Anita K. Jones (U. Virginia, 00)  Guy L. Steele, Jr. (Sun, 02)
Alfred V. Aho (Columbia U., 03)  Richard M. Stallman (Free Software Foundation, 03)
John Guttag (MIT, 05)
Publications: The ICSE "Best Paper from 10 ICSEs Ago" Award

Every ICSE (since the 11th, of course) a paper from the 10th-previous ICSE has been selected for an award. Naturally, this is flawed as a measure of classic papers -- not all outstanding, influential papers appeared in ICSE, and there clearly isn't exactly one outstanding paper per conference.

Publications: The ICSE "Best Paper from 10 ICSEs Ago" Award


2000  no award


Publications: The Dagstuhl on History of Software Engineering Informal Poll

In 1996 a collection of software engineers and historians of computing spent a week discussing the history of software engineering. Albert Endres polled the assembled multitude for their nominations for "classic software engineering papers."

**Most often named, in order**

Brooks: *No Silver Bullet*
Dijkstra: THE
**Parnas**: *Information Aspects of Information Hiding* IFIP ’71
**Parnas**: *Decomposing Systems*
Lehmann: *Laws of SW Evolution*
**Boehm**: *Software Engineering*
**Boehm**: *Spiral Model*
DeRemer/Kron: *Programming in the Large*
Henninger: *Specifying Complex Systems*
Brooks: *Mythical Man Month*
Belady/Lehmann: *Charact. of Large Sytems*
**Parnas**: *Role of Specification*
## Companies and Products – do you know their history?

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Companies and **Products** - do you know their history?

**Operating Systems:**
- Windows DOS
- Unix : Linux, Sun OS-Solaris, Mac OS X
- Embedded : Symbian OS, Palm OS, BSD

**Compilers/Languages:**
- OO – C++, Java, …
- YACC, Bison, Lex
- Functional/Logical
- Databases
- Mathematica, Matlab, Minitab

**Other Key Areas:**
- Personal Applications
- Video Games
- Embedded/Firmware
- Middleware
- Web Sites/Services/Protocols
- Multimedia Players/Coding
- Software Development
- Simulation/Modelling
- Enterprise Software

**Open Source:**
- OSS, GNU, FSF, OSI
A selection of interesting happenings

1960s

1960: Algol - first structured, procedural, programming language to be released; and first \textit{compiler compiler}

1962: Spacewar!, the first computer game is written by MIT student Steve Russell.

1965: BASIC programming language (Beginners All Purpose Symbolic Instruction Code) developed at Dartmouth College, USA, by Thomas E. Kurtz and John Kemeny.

1968-69: The NATO Science Committee sponsored two conferences on software engineering in 1968 (Garmisch, Germany — see conference report) and 1969, which gave the field its initial boost. Many believe these conferences marked the official start of the profession of software engineering.
Dates and Interdependencies – A temporal sequence

1970s

1970 Forth programming language developed. A simple, clean, stackbased design, which later inspired PostScript and the Java virtual machine.

1972 Pong released - widely recognised as the first popular arcade video game. It was invented by Allan Alcorn.

1972 Smalltalk Programming Language at Xerox Parc

1972 C programming language developed at The Bell Laboratories in the USA by Dennis Ritchie; and The first international connections to ARPANET are established. ARPANET later became the basis for what we now call the Internet.

1973 Development of the TCP/IP protocol suite by a group headed by Vinton Cerf and Robert E. Kahn. These are the protocols used on the internet; and Ethernet developed.

1975 First microcomputer implementation of BASIC by Bill Gates and Paul Allen, it was written for the MITS Altair - the first personal computer - this led to the formation of Microsoft later in the year.

1977 Apple II computer released
Dates and Interdependencies – A temporal sequence

1980s

1980 Development of MS-DOS/PC-DOS began. Microsoft (known mainly for their programming languages) were commissioned to write the Operating System for the PC

1983 Apple introduced its Lisa. The first personal computer with a graphical user interface. (Inspired by Xerox Star and Smalltalk)

1983 C++ (Stroustrup) – C with classes

1984 Richard Stallman quit his job at MIT in order to start the GNU project, a free and improved replacement for Unix

1985 Windows launched by Microsoft

1986 Fred Brooks published the No Silver Bullet article, arguing that no individual technology or practice would ever make a 10-fold improvement in productivity within 10 years

1987 Perl Programming Language

1989 World Wide Web, invented by Tim Berners-Lee
Dates and Interdependencies – A temporal sequence

1990  Phil Zimmermann releases the public key encryption program PGP along with its source code, which quickly appears on the Internet.

1990  The Linux kernel is born with the following post to the Usenet Newsgroup comp.os.minix by Linus Torvalds, a Finnish college student

1991  Visual Basic (Alan Cooper) sold to Microsoft

1994  Peter Shor devises an algorithm which lets quantum computers determine the factorization of large integers quickly.

1994  Object Modelling Unified  Rumbaugh's OMT, which was better for object-oriented analysis (OOA), and Grady Booch's Booch method, which was better for object-oriented design (OOD)

1995  Sun Microsystems first announces Java at the SunWorld conference.

1997  UML 1 released

1998  Standard C++ (ISO) and beginning of Eclipse (IBM)
Dates and Interdependencies – A temporal sequence

2000s

2000  C# - Anders Hejlsberg at Microsoft (ECMA)

2001  AspectJ - Xerox PARC, and Visual Basic .NET by Microsoft

2001  The Agile Manifesto is drafted as a statement of the principles that underpin agile software development.

2005  IBM introduce service oriented architecture

2005  UML2

QUESTION: What you would add for years 2005-2015?
The Future of software engineering?

Aspects
Agile
Cloud
Experimental
Grid
Models
Multicore
Services
SPLs
Ubiquitous/Autonomous/Intelligent

QUESTION: What are the most important research questions that need to be answered?

QUESTION: What are the most important software engineering tools under development