



Professionalism in Computing

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What is Computing?

- Originally used to identify people who calculated (computed) values
 - Large numbers of people used to, say, calculate the trajectory of projectiles for weapons
- Pioneers, such as Charles Babbage and Alan Turing, designed machines that could replace these people: the modern definition of computers
- 'Computing' is now the study and application of computers in:
 - An academic (science) context
 - An industrial (engineering) context
 - An organisational (sociology) context

Science

- Computer science is:
 - “the study of the theoretical foundations of information and computation and their implementation”
Wikipedia (2006). Computer Science. http://en.wikipedia.org/wiki/Computer_science. [Accessed 26-09-06].
 - Hardware, programming languages, protocols...
 - Artificial intelligence, security...
- Scientific prototypes have become tools:
 - Internet and WWW
- Unlike other sciences that describe phenomena
 - Computing is about inventing
 - Following professional scientific approaches

Schneider, F.B. & Rodd, M. (Eds) (2001). *International Review of UK Research in Computer Science*. EPSRC, BCS and IEE. Available at http://www.theiet.org/publicaffairs/ir/careport/cs_report.pdf. [Accessed 26-09-06].

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Engineering

- Computer/systems engineering is about applying appropriate methods:
 - Manufacturing software and hardware products and systems
 - Project management
- To develop engineered solutions to problems:
 - Following defined methods (systems analysis and design)
- Yet slightly different to traditional engineering
 - It is common to build, say, a C++ compiler in C++, using an earlier version of the compiler to compile the new version
 - Would you do this with a building or a bridge?
- Not inventing but construction:
 - Quality products
 - Following professional construction (development) methods and standards

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Sociology

- Understanding how technology can help society and organisations:
 - Understanding organisations and businesses
 - Socio-technological changes
- Realising that using technology is not just for technology's sake
 - Finding solutions to organisational problems
 - Procedures, processes and change
- Not construction, but finding solutions:
 - Producing appropriate business solutions
 - Following professional approaches to organisational change

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What is a Professional?

- “Reaching a standard [...] of a professional person or his work; competent in the manner of a professional”
- “One who makes a profession or business of any occupation, art, or sport, otherwise usually or often engaged in by amateurs”
- “Trained and skilled in the theoretic or scientific parts of a trade or occupation [...]; that raises his trade to the dignity of a learned profession”

Simpson, J.A. & Weiner, E.S.C. (Ed) (1989). Oxford English Dictionary, 2nd. Oxford, UK: Clarendon Press.

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The Cost of Not Being Professional

- IT projects are hard to get right:
 - 2001: 51% of ERP projects unsuccessful
 - 2001: 40% of ERP projects failed to achieve return
 - 1997: 61% failed projects
 - 1995: 53% of projects 189% over budget
 - 1995: 70% of projects fail
- Mars Climate Orbiter Spacecraft:
 - Lost because one NASA team used imperial units while another used metric units
 - \$125 million

IT Cortex (2001). Statistics over IT Failure Rate. http://www.it-cortex.com/Stat_Failure_Rate.htm. [Accessed 26-09-06].

BBC (1999). Confusion leads to Mars failure. <http://news.bbc.co.uk/1/hi/sci/tech/462264.stm>. [Accessed 26-09-06].

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The Cost of Not Being Professional

- London Ambulance Computer Aided Despatch:
 - “system [or] users [...] not ready for full implementation”
 - “software was not complete, not properly tuned, and not fully tested”
 - “staff [...] had no confidence in the system and were not all fully trained”
- Delays to answering calls and ambulance despatch
- Patriot Missile Defence System:
 - In the first Gulf War, the Patriot system failed to stop a Scud missile because of a software problem: cumulative problem in accuracy over time (100 hours)
 - 28 soldiers died

Finkelstein, A. (1993). Report of the Inquiry Into The London Ambulance Service. International Workshop on Software Specification and Design Case Study. The Communications Directorate, South West Thames Regional Health Authority. Available at <http://www.cs.ucl.ac.uk/staff/A.Finkelstein/papers/ica93.pdf>. [Accessed 26-09-06].

General Accounting Office (1992). GAO/IMTEC-92-26 Patriot Missile Software Problem. Information Management and Technology Division, GAO. Available at <http://www.fas.org/ssp/starwars/gaoim92026.htm>. [Accessed 26/09/96].

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What is a Professional?

- Group challenge:
 - Each of you will be given a number
 - Arrange your group in a line in numerical order
 - You must not tell or show anybody else what your number is
 - You are not allowed to communicate with each other by speaking or holding up fingers, pens, etc.

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What is a Professional?

- This exercise was designed to get you thinking about:
 - Your approach to the problem:
 - Did you understand what was required?
 - Was your solution flexible?
 - Your execution of the solution:
 - Did your solution work?
 - Was it well executed?
 - The skills you need to become a professional:
 - Problem solving
 - Teamwork and leadership
 - Planning
 - Delivery

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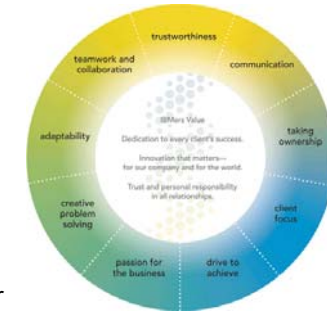
A Practical Definition

- A computing professional has professional skills...
 - Can work with people (customers/team)
 - Can present ideas (presentations/sales)
 - Can find solutions (research)
 - Can document work (reports/design/test/manuals)
 - For example IBM's 'core competencies'
- ...and understands computing principles:
 - Hardware/software (technologies)
 - Software development lifecycle (design/code/test)
 - Programming languages, mathematics, data, security, etc.

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IBM

- “There is a myth that we only look for graduates with computer science degrees – **we don't.**”
- “What is really important is that you can demonstrate that you have the **attributes and skills** that will ensure you have a successful career with us. We call these our ‘**core competencies**’.”



IBM (2006). IBM Employment – UK. <http://www-05.ibm.com/employment/uk/graduates/look/index.html#>
[Accessed 11-09-06].

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Skills

- IT is not just about technology
- We aim to teach you the skills to:
 - Present your work (written / oral)
 - Carry out your work (research / analysis)
 - Work in teams
 - Complete your studies and (hopefully) get a good job
- We also aim to give you an appreciation of:
 - Environment in which IT is used (business)
 - Constraints in which IT is applied (ethical / legal)

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Reminder

- Next CS174 session:
 - For this week only
 - Friday 29AP02 10:00-13:00
 - Groups A, B then C
- Notes:

<http://www.cs.surrey.ac.uk/teaching/cs174/>

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