Professional, Legal, Ethical and Social Issues

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Objectives

1. To instill a professional attitude toward the application of computer technology
2. To provide an appreciation of the law as it relates to computing
3. To introduce methods for the rational resolution of ethical problems
4. To ensure awareness and encourage deliberation of the relationship between computer technology and society

Contents

- Professionalism
  - British Computer Society
  - Institution of Engineering and Technology
- Rights & Wrongs
  - Codes & Standards
  - Computer Law
  - Ethical Decision Making
- Risks & Threats
  - Crime, Privacy & Security
  - Safety Critical Systems

Professionalism

- What is a professional?
- Competence-Responsibility-Trust
- When do you become one?
- What is a profession?
- Guarantor of C-R-T

Professional Bodies

- UK
  - British Computer Society (BCS)
    - www.bcs.org
  - Institution of Engineering and Technology (IET)
    - www.theiet.org
- USA
  - Association for Computing Machinery (ACM)
    - www.acm.org
  - Institute of Electrical & Electronics Engineers (IEEE)
    - www.ieee.org
- Business related
  - Chartered Institute of Marketing (CIM)
    - www.cim.co.uk
  - Chartered Institute of Management Accountants (CIMA)
    - www.cimaglobal.com

Professional Recognition

- Your degree course might be accredited by one or more of the following –
  - British Computer Society
    - For exemption from membership examinations (MBCS) and listing on the register of Chartered Information Technology Professionals (CITP)
  - Institution of Engineering and Technology
    - For exemption from membership examinations (MIET)
  - Engineering Council
    - For listing on the register of Chartered Engineers (CEng)

British Computer Society

The Chartered Institute for IT

The British Computer Society
1st Floor, Block D
North Star House
North Star Avenue
Swindon SN2 1FA

http://www.bcs.org
bcshq@hq.bcs.org.uk

Royal Charter 1984 –

To promote the study and practice of Computing and to advance knowledge therein for the benefit of the public

Institution of Engineering and Technology

Represents the professions of Electrical, Electronic, Manufacturing and Systems Engineering

Institution of Engineering and Technology (IET)
Savoy Place
London
WC2R 0BL

http://www.theiet.org
postmaster@theiet.org

The IET was formed from the Institution of Electrical Engineers (IEE) and the Institution of Incorporated Engineers (IIE) in the spring of 2006

Engineering Council UK

ECUK regulates the engineering profession in the UK by licensing engineering institutions to put suitably qualified members on the ECUK's Register of Engineers

Engineering Council UK
10 Maltravers Street
London
WC2R 3ER

http://www.engc.org

ECUK's mission is to set and maintain realistic and internationally recognised standards of professional competence and ethics for engineers, technologists and technicians, and to license competent institutions to promote and uphold the standards

Code of Conduct

http://www.bcs.org/server.php?show=nav.6030

"Professional Behaviour"

- Professional Conduct
- Professional Integrity
- Public Interest
- Fidelity
- Technical Competence
- Impartiality

Code of Good Practice

http://www.bcs.org/server.php?show=conWebDoc.1589

"Professional Competence"

- Personal Requirements
- Organisation and Management
- Contracting
- Privacy, Security and Integrity
- Development
- Implementation
- Live Systems

Standards

"Professional Guidelines"

- There are many international standards providing guidance on computer-related matters
  - Quality
    - Quality Management and Quality Assurance (ISO9000/TickIT)
  - Safety
    - Functional Safety of Electronic Systems (IEC 61508)
  - Security
    - Information Security Management Systems (BS 7799)

Case Study I
"Blind Leading the Blind"

- As a part of your project you need to capture some retinal images – images of the backs of people's eyes (very useful diagnostically)
- You ask your fellow students to volunteer telling them that you will use eye drops to dilate their pupils and the process may affect their vision for a little while after the exercise

Case Study I
"Blind Leading the Blind"

- This is what an excessively dilated pupil looks like – you can barely see the iris
- This condition is called *mydriasis*
- The opposite condition – pupil contraction – is called *miosis*

Case Study I
"Blind Leading the Blind"

- Your plan is to
  - Use mydriatic drops to dilate the pupils
  - Capture the images you need
  - Use miotic drops to return pupils to normal again
- You have informed the subjects of this
  - You have obtained their consent
  - It is a common ophthalmic procedure
  - What can go wrong?

Case Study I
"Blind Leading the Blind"

- What can go wrong?
  - You have made one of your subjects permanently blind!
  - 3 in 10,000 people will develop acute open angle glaucoma (a sight threatening condition) as a result of routine dilation of the pupils
  - Immediate remedial action could have saved the subject's sight but you weren't in a position to provide this

Case Study I
"Blind Leading the Blind"

- What you should do now
  - Hire a good lawyer
    - You are in big trouble because you were not licensed to use the mydriasis inducing medication and, even if you were, you did not seek approval from the University's Ethics or Safety committees
  - Don't expect any support from the University
    - In fact, expect the opposite - you are in violation of the University's Ethics and Safety policies and you can expect to be disciplined by the University for your actions

Case Study I
"Blind Leading the Blind"

- What you should have done
  - Consulted your supervisor
    - NEVER take a decision to conduct experiments on human subjects ON YOUR OWN – always consult your supervisor before even thinking about it
  - Completed all the Ethics and Risk Assessment forms required by the University
    - Complied with the procedures laid down for this type of experimental work

Computer Law

- In most countries there is a considerable body of law that can apply to computer professionals
  - Contract Law
  - Intellectual Property Law
  - Data Protection Law
  - Computer Misuse Law
  - Computer Evidence

Contract Law

- Contractors versus employees
  - Intellectual property
  - Package licensing versus bespoke software
- Contractual duties
  - Fidelity
  - Confidence
  - Culpability
  - You CANNOT contract out of "reasonable" liabilities

Intellectual Property Law

- Moral rights
  - Right of paternity, right of integrity
- Copyright
  - Protects original works, sound recordings, typographical layouts
- Patents
  - Protect ideas which are novel and not obvious
- Design rights
  - Protect designs such as circuit board layout

Data Protection Law

- The subject of personal data has the right to view and correct that data
- Personal data should be accurate, adequate, relevant and kept up to date
- Personal data should not be kept for longer than is necessary
- Appropriate technical and organisational measures should be taken against unauthorised or unlawful processing of personal data and against accidental loss or destruction of personal data

Computer Misuse Law

- Unauthorised access
  - Systems
  - Programs
  - Data
- Unauthorised modification
  - Editing
  - Deleting
- Jurisdictions

Computer Evidence

- Rules govern what evidence is permissible in courts of law
- Viewing log files with an editor after an intrusion will invalidate the logs as evidence
  - They might have been altered after the event
- Following audit trails back to the place of origin of an attack is a task for specialists
  - Amateurs could invalidate evidence or unwittingly tip off perpetrators

Ethical Decision Making

- Not just about right and wrong
- Moral systems and principles
- Stakeholder analysis
- Six useful tests

Not just right and wrong

- Scientists and engineers are generally not very good at explaining their work or justifying their actions in non-technical terms
- When things go wrong the public will seek assurance that the technical decisions which were taken paid due heed to their interests
- It is crucial that technologists can provide clear and understandable justifications for their motives, decisions and actions

Moral systems & principles

- Citing moral systems and principles can help to provide assurance that one's motives, etc. were of good intent
  - Theology
    - Religious doctrine
  - Moral philosophy
    - Categorical imperative, utilitarianism, etc.
- Not everybody will be re-assured by such references though

Stakeholder analysis

- A stakeholder analysis can help you arrive at sound decisions and provide justifications
  - Any person, group or organisation that could be affected by the decision is a stakeholder
  - Stakeholders are not always easy to identify - some are only affected very indirectly
  - Stakeholder analysis tabulates the alternative decisions and the stakeholders, noting the effect of each alternative on each stakeholder

    e.g. very good, good, neutral, bad, very bad

Six useful tests

- The Golden Rule
  (Other Person's Shoes Test)
- Legality Test
- Smell Test
- Parent Test
- Media Test
- Market Test

Case Study II
"Free and Easy Feedback"

- As a part of your project you create a website
- You ask your fellow students to give you feedback on the usability of your website via an online questionnaire
- You store all the feedback, unencrypted, along with the name of the person who supplied it in a file in your personal filespace

Case Study II
"Free and Easy Feedback"

- In a free-text box for general comments at the end of your questionnaire one, very thoughtful, respondent states -

  "The reason I found the font and background colours difficult to distinguish might be due to my dyslexia"

Case Study II
"Free and Easy Feedback"

- Six months after you have left university you receive an angry e-mail from the respondent who had stayed on for further study and is now standing for the sabbatical post of President of the Students' Association
- A fellow candidate is distributing election material alluding to the respondent's dyslexia

F21RP Research Methods
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Case Study II
"Free and Easy Feedback"

- The respondent is adamant that the only way the information could have been obtained was through the response submitted to your website questionnaire
- You did not release the information personally
- What do you do? What should you have done?

Case Study II
"Free and Easy Feedback"

- What you should do now
  - Don't just delete the data
    - Your filespace has been hacked so report it to identify the culprit
  - Don't try to investigate it yourself
    - Your filespace is evidence and if you try investigating it yourself you are likely to invalidate that evidence

Case Study II
"Free and Easy Feedback"

- What you should have considered
  - Data protection law
    - Requires you to take adequate security precautions
    - Requires you to delete data as soon as you no longer need it
  - Stakeholder analysis
  - Six useful tests

Case Study II
"Free and Easy Feedback"

- What you should have done
  - At the time
    - Warned respondents about lack of confidentiality
    - Anonymised the responses
    - Encrypted the data
  - Afterwards
    - Deleted the data once it was no longer needed

Computer Crime

- Theft
  - Stealing plain and simple; taking away another's property
- Piracy
  - Stealing potential revenue; copyright or patent violation
- Espionage
  - Stealing secrets; acquisition of confidential information
- Fraud
  - Deceitfully gaining advantage; financial or other advantage
- Sabotage
  - Reducing effectiveness of a system; deliberate damage

Computers & Privacy

- Personal data
  - Consumer databases
  - Health databases
  - Profiling
  - Identity theft
- Surveillance
  - Satellite and street cameras
  - Website tracking
  - Mobile phone tracking

Computer Security

- Verification of identities
- Authentication of messages
- Encryption of data
- Access controls
- Audit trails
- Risk analyses

Safety Critical Systems
Therac-25

- The Therac-25 was a new version of a radiation therapy machine with more software control
  - Between June 1985 and January 1987 overdoses of radiation were given to six people
  - Three of them died
- Causes
  - Poor safety design - lack of safety interlocks
  - Software errors - insufficient testing and debugging
  - Inadequate reporting and investigation of accidents
  - Overconfidence

Safety Critical Systems
Ariane 5

- In June 1996, 40 seconds after initiation of its flight sequence, at an altitude of about 3700m, the Ariane 5 rocket veered off its flight path, broke up and exploded
- The cause was an internal variable related to the horizontal velocity exceeding the maximum value that a 16-bit integer could hold
- This software was, in fact, unnecessary for Ariane 5 but necessary in its predecessor, Ariane 4
- It had been retained in the inertial reference system of Ariane 5 for reasons of commonality

Summary

- We have looked at what it means to be a computing professional
  - What a professional is and the role of professional bodies
- We have considered the main branches of law that affect the practise of computing
  - Contracts, Intellectual Property, Data Protection, Computer Misuse and Computer Evidence
- We have examined methods for the resolution of ethical problems
  - Moral systems, stakeholder analysis and the six useful tests
- We have studied some examples of the relationship between computer technology and society
  - Crime, privacy, security, risks and threats