CSE1204 - Information Systems 1

Ethics and Professional Conduct; Quality Assurance in Information Systems Development

“Making the User Boss”

- Design principle
- Boss
  - what order you do your work in
  - what jobs you do
  - wow you schedule tasks

“Making the User Boss”

1. Access to all functions
2. Don’t stipulate order/sequence
3. Self education (online help/user manual)
4. Increase skills

Why Ethics

- The exercise of power always raises ethical issues
  - strong vs. weak
  - knowledgeable vs. ignorant
  - doctor vs. patient
  - teacher vs. student
  - just like: analyst vs. client
- Ethical issues arise for IS professionals because of their specialized knowledge/role in the production and distribution of information

Ethics

Ethics – values and beliefs that direct how we behave in our (working?) lives

- cf. morality (imposed by culture/social peers)
- cf. laws (proscriptive/penalised)

- Ethics is a personal character trait in which an individual understands the difference between “right” and “wrong” and acts accordingly
  - Whitten et al (2001) p. 27

Ethical theories (1)

Utilitarianism:

- look to the expected consequences of an act to determine whether or not that act is ethically permissible
  - eg. “slaves” in a developing country are used to produce something of benefit/value to many other people in the world
  - Bentham, Mill

Deontology:

- duty/obligation (to self or God) serves as the foundation for ethical behaviour
  - eg. “the Bible expressly forbids this”
  - Descartes, Kant

Monash University, SIMS, Semester One, 2005
Ethical theories (2)

Social-contract:
- While free to act individually people must surrender some freedoms to serve the common good and protect the weak from harm
- Eg. Conservation of the environment
- Hobbes

Virtue (Character-based Ethics):
- Living well – moral development as an integral part of living the best life you can
- Eg. Socrates and the hemlock
- Plato

Moral principles

Grounds for justifying moral principles:
- Religion – obedience to divine authority
- Law – obedience to a legal system

Evaluating issues of moral principle:
- Social utility – eg. “Conserve scarce energy resources”
- Duty – eg. “Protect privacy”
- Obligation – eg. “Tell my client the truth”

Basic moral principles:
- “Golden” rule
- Respect elderly/ infirm
- Protect the weak/ young

Ethics as Standards

The continuum of standards:
- Etiquette
- Laws
- Professional Codes
- Ethics

Ethical standards

- Behaviour can have serious consequences for human welfare, either to profoundly injure or benefit people
- Critical system failure
- Covers areas were no rules currently apply
  - Digital cameras at the beach

Professional issues in SDLC

- Work ownership
  - Whose property are the system designs: intellectual property rights
- Selling on a previous solution
  - Should you sell it to others?

Professional issues in SDLC (2)

- Issues in system design:
  - Privacy: security and confidentiality
    - For the client AND the customer
  - Accuracy: preserve and protect
    - For the client AND the customer
  - Property: data ownership respected
    - For the client AND the customer
  - Accessibility: available to proprietors ONLY
    - Any restrictions policed
Other considerations
- your personal/business reputation
- your client’s interests
- confidentiality
  - your client’s confidentiality
  - any associated party’s confidentiality (e.g., customers)
- impartiality
- honesty (your professionalism)
- integrity (ethical-ness)

The ethical dilemma
- New fields (e.g., e-commerce, data privacy)
- Professional duties and responsibilities (sometimes) conflict with organisational goals and outcomes.
- Ethical behaviour can conflict with legal statutes and/or contractual obligations
- The professional needs knowledge and skills to resolve these conflicts by themselves as the situations arise in particular contexts.

Characteristics of ethical standards
- Long term viewpoint – not just the present
  - How will your system be used in the future?
- Broad view – not just this instance
  - This is how the system will be used in Australia, but how will it be used in Colombia?
- Takes priority over other standards – etiquette, laws (“higher good”)

Professional Codes
- Rules that govern the conduct of members
- Members assume a moral obligation to conform
- Conformity is a condition of membership
- Violation can result in exclusion
- Are incomplete and inadequate as a guide for individual ethical behaviour

Professional codes of ethics
- Australian Computer Society (ACS)
  - ACS web site: www.acs.org.au
- Association for Computing Machinery (ACM)

Professional ethics: the Computer Ethics Institute
Ten “commandments” of Computer Ethics:
- Do not use computers to cause harm to others
- Do not interfere with others’ computer work
- Do not access others’ files without permission
- Do not use a computer to steal
- Do not use a computer to lie
- Do not use illegal copies of proprietary software
- Do not use others’ computer resources without compensation
- Do not appropriate others’ intellectual output
- Do think about the social consequences of the system or software you are producing
- Always show consideration and respect for others in your use of computers – Whitten et al (2001) p. 28
ACS Code of Professional Conduct and Professional Practice

- The public interest
- Integrity
- Confidentiality
- Objectivity and independence
- Competence
- Keeping up-to-date
- Subordinates
- Responsibility to your client
- Promoting information technology
- The image of the profession and the Society

Definitions of Quality

- Degree of excellence (Oxford)
- Fitness for purpose (AS1057)
  - includes quality of design, the degree of conformance to design, and it may include such factors as economic or perceived values
- Ability to satisfy stated/implied needs (ISO8402)
- Conformance to requirements (Crosby, Horch)

Determining Quality ..

- when having a meal in a restaurant
- when purchasing a car
- when buying a computer

The requirements vary immensely, and some of the success measures are very hard to quantify...

Quality means different things to different people .. and it varies in different situations

Why should it concern us?

- Customers’ expectations and demands are increasing
- Competitors provide it
- Substantial savings demonstrated

Information systems: quality issues

The system:
- does not meet the client’s business or processing needs
- does not support the client’s working methods
- is unstable and unreliable
- does not improve productivity
- is difficult to use or requires excessive training to use
- is expensive to maintain
Information systems: quality issues

The system:
- is incomplete
- is expensive to operate
- has a short life span
- is delivered late
- costs more than budget
- cannot grow with the organisation
- does not produce a return on investment

Error detection in systems

- "Effort spent on software maintenance is greater than that spent on software development."

- "An error is typically 100 times more expensive to correct in the maintenance phase on large projects, than in the requirements phase."


Error Detection

* The cost of detecting and correcting errors rises greatly during the systems development cycle.

In addition to this is the cost to the organisation of having an incorrect system.

Quality Costs

The tip of the Iceberg

Obvious upfront costs to the organisation

User complaints, Downtime, Loss of sales, Re-testing, Re-documenting, Re-training, Overtime, Customer complaints, Financial losses, Employee turnover

Quality in Systems Development (must be embedded in the process)

Quality dimensions

- Correctness - Does it accurately do what is intended?
- Reliability - Does it do it right every time?
- Efficiency - Does it run as well as it could?
- Integrity - Is it precise and unambiguous?
- Usability - Is it easy to use?
Quality dimensions

- Maintainability - Is it easy to fix?
- Testability - Is correctness easy to check and verify?
- Flexibility - Is it easy to adapt and extend?
- Portability - Can it be easily converted?
- Reusability - Does it consist of general purpose modules?
- Interoperability - Will it integrate easily with other systems?

Correctness

- Does it accurately do what is intended?
  - meets the specification
  - fulfils the user’s objectives
- Note that these may be contradictory requirements given variations in:
  - the quality of the analysis process,
  - the speed of environmental change in the system’s domain of operation.
  
  E.g. a good specification can produce the wrong system if development is slow and the environment changes quickly.

Reliability

- Does it do it right every time?
  - The system doesn’t malfunction or fail (in normal use).
  - The system performance is not diminished too much during periods of heavy use.
  - When the system fails (and it will), recovery is both possible and rapid, with no loss of data.

Efficiency and integrity

- Does it run as well as it could?
  - The system makes good use of:
    - machine resources
    - human resources.
  - The amount of resources needed to perform a function.
- Is it precise and unambiguous?
  - Terminology is consistent
  - The design is consistent.
  - Programming practices are consistent.

Usability and Maintainability

- Is it easy to use? ....
  - learn
  - operate
  - prepare input for
  - interpret output from
- Is it easy to fix?
  - can areas requiring change be located easily?
  - can changes to be made easily?
  - can documentation be updated easily?
  
The system must be structured so changes are limited in scope (have minimal impact beyond the area being changed).

Testability and flexibility

- Is correctness easy to check and verify?
  - Test strategy part of design process.
  - System-specific test data generator available to developers and maintainers.
  - System structured to support module testing and integration testing
- Is it easy to adapt and extend?
  - The system is designed to be changed as the environment changes
  - Performance is sacrificed for flexibility, e.g., small parameter tables are used rather than hardwired code.
Portability and reusability

- Can it be easily converted?
- Limited (and explicitly detailed) use of hardware-specific features.
- Limited (and explicitly detailed) use of proprietary software features.
- Hardware and software performance tuning makes minimal use of such features.
- Does it consist of general purpose modules?
  - Highly modular black box design.
  - Mechanisms in place to reward developers for writing for reuse and reusing existing modules.
  - Tools, techniques and standards necessary to describe, catalogue and retrieve modules from an organisation wide library.
  - Not just reuse of code

Interoperability

- Will it integrate easily with other systems?
  - Accept from the beginning that the system will have to integrate with other systems (data, presentation, control, and platform integration)
  - Standard formats and protocols for integration built into system
  - For example, facilities for data exchange part of initial design. Such facilities must be included in the specification, even when not asked for in the initial user specification.

The Quality Process

- The quality process involves the functions of:
  - Quality control - monitoring a process and eliminating causes of unsatisfactory performance
  - Quality assurance - planning and controlling functions required to ensure a quality product or process

Implementing a Quality System

- Quality must start at the top - Executive sponsorship is vital.
- Everyone must be involved and motivated to realise that they have a responsibility towards the final product, its use, and its quality.
- Improve job processes by using standards, and preparing better documentation (using project control methodologies).
- Use a QA group.
- Use reviews.

Standards

- Levels of standards
  - Industry / National / International
  - Organisational
  - Industry
  - Capability Maturity Model (Humphrey 1989)
  - See Whitten et al (2001) pp 76-77
  - National / International
  - Standards Australia (AS 3563)
  - International Standards Organisation (ISO 9000)
  - Organisational
  - The organisation may adopt or tailor industry, national or international standards.

Standards - Examples

- Document template (form eg template for these slides)
- Acceptance test sign off form (form)
- Screen standards (standard - mandatory practice)
- Unit test process (standard - mandatory practice)
- COBOL II standards (standard - mandatory practice)
- Post implementation review procedure (advisory practice)
  - Note: different organisations and projects will have different views about whether a standard is mandatory or advisable.
Quality reviews

- Reviews are used in the quality control and quality assurance functions. There are two main forms of review:
  - Quality Assurance:
    - management reviews
  - Quality Control
    - technical reviews

Management or Project Review

- Management must check the baseline for a deliverable to see that it meets the quality assurance requirements.
- This may involve simply noting that a technical review has passed a particular deliverable. The manager can then be assured of quality (given that the manager has actively taken part in the development of the quality system).
- The manager can then alter the project plan if necessary to allow for delays or early completion.

Technical Reviews

- A technical review (from here on abbreviated to review) is a structured meeting where a piece of work, which has previously been distributed to participants, is checked for errors, omissions, and conformance to standards.
- All deliverables need review, otherwise how do you control quality?
- The review is part of quality control and must produce a report so that the quality assurance function can be satisfied.
- The report may be a checklist which indicates that the deliverable passes/fails the quality requirements for that type of deliverable.
- The report is part of the baseline for the deliverable.

Technical Reviews

- A technical review:
  - is a formal meeting of a team which is guided by an agenda and standards
  - allows input from many people
  - produces a report which is made public
  - requires committed participants to be responsible and accountable for their work
  - is educational as it clarifies standards, and highlights strengths and weaknesses of the team's skills and knowledge
  - expects all participants to be responsible for the resulting quality of the artefact

References