Hard versus Soft Systems Methodology

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Systems approaches

- So we know what the systems approach is now.
- But, there's different ways of viewing a system:
  - Soft systems approach
  - Hard systems approach
- Two ends of a scale, a bit grey in the middle

Soft Systems Approach

- Engineering approach can be inappropriate for 'soft problems' (with fuzzy requirements).

- Soft systems approaches (Soft Systems Methodology, Soft OR) assume:
  - organisational problems are 'messy' or poorly defined
  - stakeholders interpret problems differently (no objective reality)
  - human factors important
  - creative, intuitive approach to problem-solving
  - outcomes are learning, better understanding, rather than a 'solution'

Hard Systems Approach

- Hard systems approaches (systems analysis (structured methods), systems engineering, operations research) assume:
  - Objective reality of systems in the world
  - Well-defined problem to be solved
  - Technical factors foremost
  - Scientific approach to problem-solving
  - An ideal solution

- More traditional way of viewing systems in Computing Science

What's the difference in hard and soft systems methodologies?

- HARD systems - rigid techniques and procedures to provide unambiguous solutions to well-defined data and processing problems problems, focused on computer implementations

- SOFT systems - a loose framework of tools to be used at the discretion of the analyst, focused on improvements to organisational problems

Hard Systems Approach - Example

- "Design a virtual resource management system where resources are held in staff offices but are made available via a web based interface. Resources will be booked out via the on-line management system which will also send reminders when items are due for return."

- Identify any obvious requirements via nouns & verbs
  - Web Based
  - Booking System
  - Users
  - Resources

Example

Expand Requirements

- Web Based
  - Web Server - Platform?
  - Web Client - Browser / Applet
- Booking System
  - Flow control
  - Event manager
  - Data Base
- Users
  - Staff
  - Students
  - Administrators
- Resources
  - Books
  - Journals
  - Rooms?
  - CDs?

Analysis

- Once we have a proper set of requirements, the next step is the analysis of the problem.
  - This involves understanding the scope of the problem
  - Identifying the parts in the requirements that will be part of the eventual solution
    For example, is the web server component part of our solution?
  - Connect them together in an appropriate manner

Design

- Analysis of the problem indicates what the major components in the system are, it will not tell us how these components work.

- Design involves
  - Identification of major component boundaries
  - Decomposition of the major components into smaller semi-independent sub-systems
  - Design of the interfaces between these major components & sub-systems

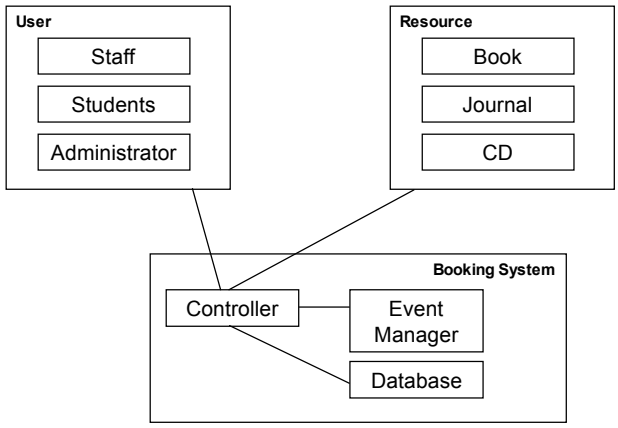
Design

- Design involves (continued)
  - Identification of new components necessary to bridge the gap between objects in the problem domain and the solution domain.
  - Flow of control within the system
  - Flow of data within the system

Implementation & Testing

- Implementation - The translation of the Design into Source Code
  - For each identified component and interface in the design phase, create the source code that will implement it
  - Integration of code components such that they perform as one system
- Testing
  - Check that each element / sub-system / component does what it is required to do by the design
  - Check system meets the requirements specification
  - Check system meets the clients expectations
  - Check system meets the users expectations

Design - Example



Hard vs. Soft Systems : Review

Hard Systems	Soft Systems
Problem has a definite solution	There are many ‘problems’ to be solved
Problem has a number of achievable goals	Goals cannot be measured
They answer the ‘how’ questions	Emphasis is placed on ‘what’ as well as ‘how’
Has a deterministic complexity	Has a unpredictable, non-deterministic, non-definable complexity
Likely to have defined parameters for failure	Less easily dealt with