The requirements specification document

- Must be communicated to key stakeholders
- Should contain:
  - Functions and services the system should provide
  - Non-functional requirements
  - Constraints affecting the system’s development and operations
  - Information about other systems the system must interface with
- System models are used to help understand the existing system and describe the proposed system

Example system

- Easy Go Hotel
Modelling

- Why do we do it?
  - Our own understanding
  - Communication with others
- How do we do it?
  - Informal techniques
  - Formal techniques
- How effective is it?
  - Different techniques for different purposes
    - e.g., a road map, an organisation chart, a data flow diagram

Simplification in modelling

- All models are simplifications of the real world: they omit some features and emphasise others
- This is called “abstraction”
- The choice of model and modelling method requires decisions about:
  - What things should be included
  - What things can be omitted

Representation in modelling

- A model is a kind of simulation: it is composed from something which represents reality

Suitability
- The choice of model and modelling method requires decisions about the form of representation that can best represent the real-life object being modelled
Audience

- the suitability of different forms and languages for modelling will vary for different audiences
- all models assume some level of familiarity and understanding on the part of the audience
- the choice of model and modelling method requires decisions about which modelling form and language the target audience will best understand

Purpose of models

- all models are built to serve some purpose
- there is no ‘best’ model independent of any purpose
- the quality of a model is dependent on the purpose for which it was built
- the choice of model and modelling method requires an understanding of the model’s purpose and decisions about the best method for achieving that purpose

Models in analysis and design

- in order to model a system, the systems analyst must choose an appropriate modelling form in terms of its:
  - audience
  - purpose
  - degree of abstraction (simplification)
  - form of representation
  - level of partitioning
  - level of detail
Modelling: for whom?

- System users and sponsors
  - Saltwater Head Librarian; Shire Council; residents of Saltwater
- Other systems analysts
  - Analysts who will help build the system
- Designers
  - Designers of the finished system
- Other technical staff - programmers, database builders, systems administrators, etc
  - Code writers, database designers, help desk, technical support

What can we use to build a model?

- words - written descriptions
- pictures - photographs, drawings, diagrams, graphs,
- mixed (words+pictures) - charts, annotated drawings, maps,
- physical models - real life equivalents, scaled models, simulations

Model paraphernalia

- standardisation of symbols
- special modelling terminology/ rules

provides a “shorthand” way of conveying the model’s message
### What aspects can we model?

- To illustrate the relevant aspects of a system, we must use models of appropriate system components.
- For example, for a house we can model:
  - Its appearance (to show the look and feel)
  - The physical layout of rooms (to show functions)
  - The layout and connections between its structural components (to show the builders how to construct it)

- What are the components of an information system which we can use in a model to illustrate specific features of that system?

### Modelling information systems

- Three aspects of information systems are typically modelled:
  - Data: what information is used in the system:
    - Entity relationship diagrams, data structure diagrams
  - Process: what jobs use or manipulate data in the system:
    - Function decomposition, structure charts, data flow diagrams
  - Behaviour: what changes are wrought on information in the system:
    - Entity life history diagrams, state transition diagrams

### Problems in modelling

- Will other people interpret our models of the world as we do?
- What happens to things which we cannot model (exceptions; non-standard processes; errors)?
- Can we communicate all aspects of a system satisfactorily using our standard modelling techniques?
- Which models work best with which information and which audience?
- Standardisation
- Generalisation
- Abstraction
Process modelling

- processes are the “action” part of businesses
- process modelling graphically represents the processes which act on data to
  - capture
  - manipulate
  - store
  - distribute

Process modelling

- principal techniques
  - function decomposition
  - data flow diagrams
- associated techniques for modelling the details of low-level processes
  - structured English
  - decision tables and decision trees

Data Flow Diagrams

- model the flow of data into, through, and out of an information system
- represent an information system as a network of communicating processes
  - show the processes that change or transform data
  - show the movement of data between processes
Example: As u go Hotel

- Make a reservation
- Check in
- Use safe deposit
- Check out

Easy Go Hotel

Data Flow Diagrams (DFDs)

- a well-known technique
- easily understood
- a good communication tool
- used to model both manual and automated processes
- described in Chapter 8 of the text book: Whitten et al (2001)
Components of a DFD

- process
- data flow
- data store
- external agent

Alternative sets of symbols

- process
- data flow
- data store
- external agent

Process

- represents the work performed which changes data
- transforms incoming data flows into outgoing data flows
- has a unique number and name
Naming processes

- name each process using a verb and a noun phrase:
  - "calculate price"
  - "validate customer details"
  - "accept supplier delivery"
- the name of a process should describe what the process does
- avoid vague names such as "process data"
- the number of a process is an identifier, it does not indicate the sequence of processing

Data Flow

- represents data in motion
- describes a "packet" of data or data that move together
- may consist of many individual, related elements that move together to the same destination

Naming data flows

- name each data flow using a noun or noun phrase
- the name should describe the contents and should include as much information as possible about the data flow
**Data Store**

- represents a collection of data flows at rest
- has a unique name which should describe the contents of the data store
- may represent many different types of physical locations of data
- may be a temporary or a permanent repository of data

**Sales Orders**

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**Data stores**

- data flows to and from a data store can remain unlabelled if all attributes in the store are moving, i.e., if an entire data packet (or packets) is going into or out of the data store

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**External Agent (source/sink)**

- represents an entity in the environment with which the system communicates
- a source if it is an origin of data coming into the system
- a sink if it is a destination for data leaving the system

**Suppliers**
External Agent (source/ sink)

- data flows connecting the external agents to the processes within the system represent the interface between the system and its environment
- external agents are outside the system and define its boundaries
- an external agent may be both a source and a sink
- what a sink does with data it receives from the system and how a source produces data which it inputs to the system are outside the boundary of the system and are not shown on the data flow diagram

Example Data Flow Diagram

References

Next Week

- Ilona Jagielska will be taking over...
- See you all later, and good luck with the unit!