

# Identifying needs and establishing requirements



# Overview

- The importance of requirements
- Different types of requirements
- Data gathering
- Task descriptions:
  - Scenarios
  - Use cases
  - Essential use cases
- Task analysis

# What, how and why ?

- Two aims
  - Identify needs
    - Understand users, task, context
  - Produce stable set of requirements
    - Basis to move forward thinking about design
- How
  - Data gathering activities
  - Data analysis activities
  - Always iterative
- Why
  - Requirements gathering = stage where most failures occur

# Establishing requirements

- What do users want ? What do users need ?
- Requirements need clarification, refinement, completion, re-scoping
- Input: requirements document (maybe)
- Output: set of requirements
- Why establish ?
  - Understanding user needs
  - Justified and related back to data collected

# What is a requirement ?

- Statement about intended product that specifies what it should do and how it should perform
- Specific, unambiguous, clear
  - Time to download any page is less than 5 seconds on a DSL line of 20Mbits/second
  - The playback bar should always indicate the position in the audio stream
- Too vague
  - Appealing to teenage girls (too vague)
  - The buttons should be engaging

# Different kinds of requirements

- Functional
  - What the system should do
  - Historically the main focus of requirements activities
  - Examples: word processor must support variety of formatting styles
- Non-functional
  - Run on a variety of platforms
  - Function on 64M of RAM
  - Delivered in 6 months
- Data
  - What kinds of data need to be stored ? Database ?

# Different kinds of requirements

- Environment or context of use
  - Physical
    - Dusty ? Noisy ? Vibrations ? Light ? Heat ? Humidity ?
  - Social
    - Sharing of files, displays, privacy, locking
  - Organizational
    - Hierarchy, IT departments, user support, communications structure, availability of training
  - Users
    - Novice : step-by-step, constrained, clear information
    - Expert : flexibility, access, power
    - Frequent: short cuts
    - Casual/infrequent: clear instructions, menu paths

# Different requirements

- Usability
  - Learnability, flexibility, throughput,
- IMPORTANT
  - User requirements and usability requirements refer to different things
- Kinds of requirements
  - What factors (environmental, user, usability) ?
    - Self-service cafeteria - paying using credit system
    - Nuclear plant control room
    - Distributed car design teams



# An example

- **Self-service cafeteria**
- *Functional*: Calculate total cost of purchases
- *Data*: Access to price of products in cafeteria
- *Environmental*: Noisy and busy environment, users maybe talking while using the system
- *User*: Majority of users under 25, comfortable dealing with technology
- *Usability*: Simple for new users, memorable for frequent users, efficient, deal easily with user errors

# Data gathering techniques (1)

- Questionnaires
  - A series of questions designed to elicit specific information
  - Questions may require different kinds of answers
    - Yes/No, multiple choice, general comments
  - Often used in conjunction with other techniques
  - Can give quantitative and qualitative data
  - Good for answering specific questions from a large, dispersed group of people

# Data gathering (2)

- Interviews
  - Forum for talking to people
  - Structured, unstructured or semi-structured
  - Pros, e.g. Sample scenarios of use, prototypes, can be used in interviews
  - Good for exploring issues
  - Time consuming, infeasible for large user or dispersed user populations

# Data gathering (3)

- Workshop or focus groups
  - Group interviews
  - Good at gaining a consensus view and/or highlighting areas of conflict

# Data gathering (4)

- Naturalistic observation
  - Spend time with stakeholders in their day-to-day tasks, observing work as it happens
  - Gain insights into stakeholder's tasks
  - Good for understanding the context and nature of tasks
  - But, it requires time and commitment from a member of the design team, and it can result in a huge amount of data
  - Ethnography is one form

# Data gathering (5)

- Studying documentation
  - Procedures and rules are often written in manuals
  - Good source of data about the steps involved in an activity, and any regulations governing a task
  - Not to be used in isolation
  - Good for understanding legislation, and getting background information
  - No stakeholder time, which is a limiting factor in the other techniques

# Data gathering (6)

- Data logging
- Instrument software to record user's activity in a log that can be examined later
- RECORD EVERYTHING
- Easy to do
- Requires a prototype or existing software

# Choosing between techniques

- Data gathering techniques differ in two main ways
  - Amount of time, level of detail and risk associated with the findings
    - Naturalistic observation (2 days of effort, 3 months of training)
    - Interview (1 day of effort, 1 month of training)
  - Knowledge the analyst requires
- Sequential steps, overlapping subtasks ?
- Complex or simple information ?
- Layman or skilled practitioner ?



# Problems with data gathering (1)

- Identifying and involving stakeholders, managers, developers, customer reps etc.
- Involving stakeholders: workshops, interviews, workplace studies
- “Real” users not managers
  - Traditionally a problem in software engineering , better now

# Problems with data gathering (2)

- Requirements management: version control, ownership
- Communication between parties
  - Within development team
  - With customer/user
  - Between users ... different parts of an organization use different terminology
- Domain knowledge distributed and implicit:
  - Difficult to dig up and understand
  - Knowledge articulation: how do you walk ?
- Availability of key people

# Problems with data gathering (3)

- Political problems with the organization
- Dominance of certain stakeholders
- Economic and business environment changes
- Balancing functional and usability demands

# Some basic guidelines

- Focus on identifying the stakeholders needs
- Involve all the stakeholder groups
- Involve more than one representative from each stakeholder group
- Use a combination of data gathering techniques
- Support process with props
- Run pilot session
- Carefully record data – always better to have more

# Data interpretation and analysis

- Start soon after data gathering section
- Initial interpretation before deeper analysis
- Different approaches emphasize different elements e.g class diagrams for object-oriented systems, entity-relationship diagrams for data intensive systems

# Task descriptions

- Scenarios
  - An informal narrative story, simple, “natural”, personal, not generalizable
- Use cases
  - Assume interaction with the system
  - Assume detailed understanding of the interaction
- Essential use cases
  - Abstract away from the details
  - Doesn't have the same assumptions as use cases

# Scenario for shared calendar

“The user types in all the names of the meeting participants together with some constraints such as the length of the meeting, roughly when the meeting needs to take place, and possibly where it needs to take place. The system then checks against the individuals’ calendars and the central departmental calendar and presents the user with a series of dates on which everyone is free all at the same time. Then the meeting could be confirmed and written into people’s calendars. Some people, though, will want to be asked before the calendar entry is made. Perhaps the system could email them automatically and ask that it be confirmed before it is written in.”