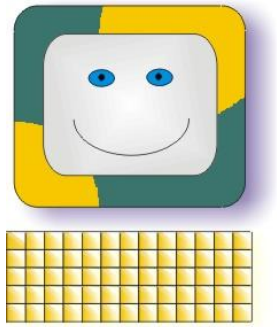
Identifying needs and establishing requirements

8 lecture

Adapted from chapter 10

Kristina Lapin

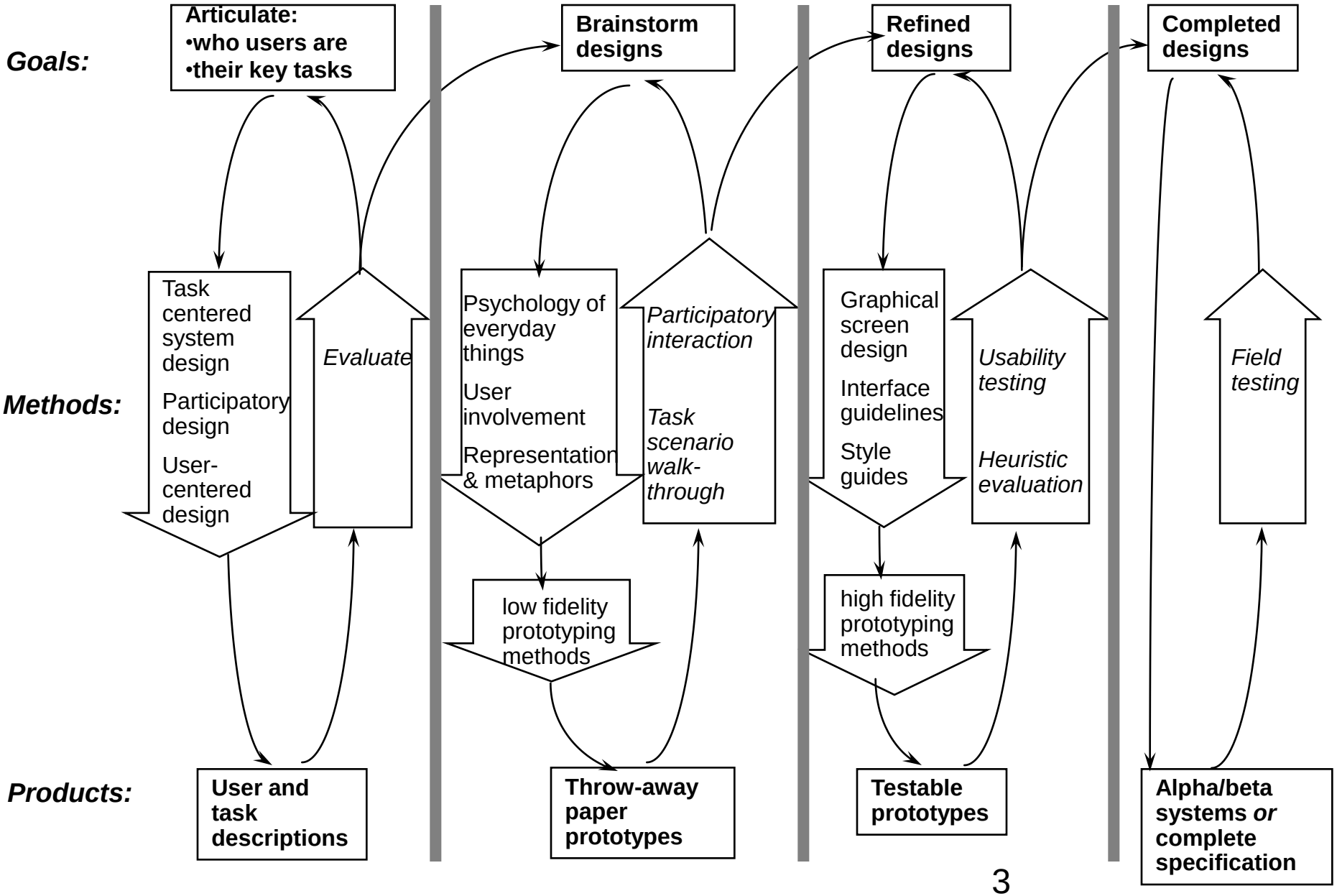


Overview

- The importance of requirements
- Different types of requirements
- Data gathering for requirements
- Task descriptions: Scenarios

  Use Cases

Interfeiso projektavimas ir panaudojamumo inžinerija (Soul Greenberg)



What, how and why?

- What

  Two aims:

  1. Understand as much as possible about users, task, context
  2. Produce a stable set of requirements

- How:

  Data gathering activities

  Data analysis activities

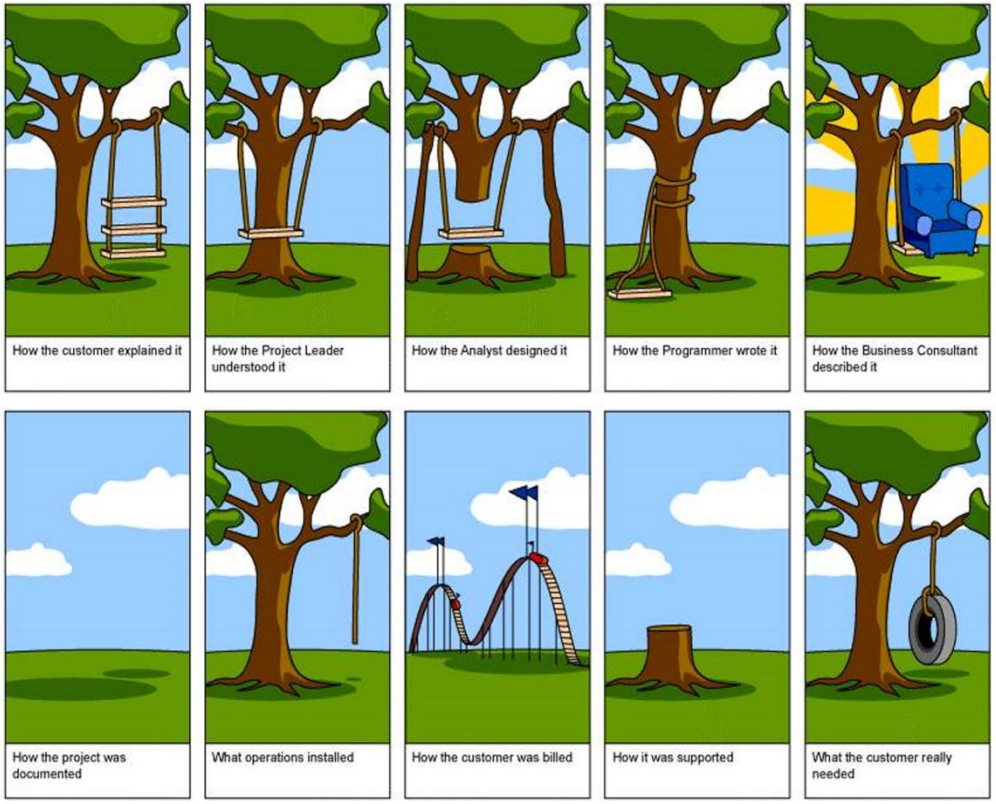
  Expression as ‘requirements’

  All of this is iterative

What, how and why?

- Why:

  Requirements definition: the stage where failure occurs most commonly



Getting requirements right is <u>crucial</u>

Why?

- Stable requirements - a sound basis to project success
  - Software Development Top 30 Mistakes (blog: Carrasco 2006)
    - Error #1: Not understanding the user's needs. Lack of user input, or not even asking.
  - Software defect reduction top 10 list (Boehm, Basili 2001): :
    - *#1: Finding and fixing a software problem after delivery is often 100 times more expensive than finding and fixing it during the requirements and design phase.*

Why?

- Stable requirements - a sound basis to project success
  - Taylor (2000) IT project: sink and swim

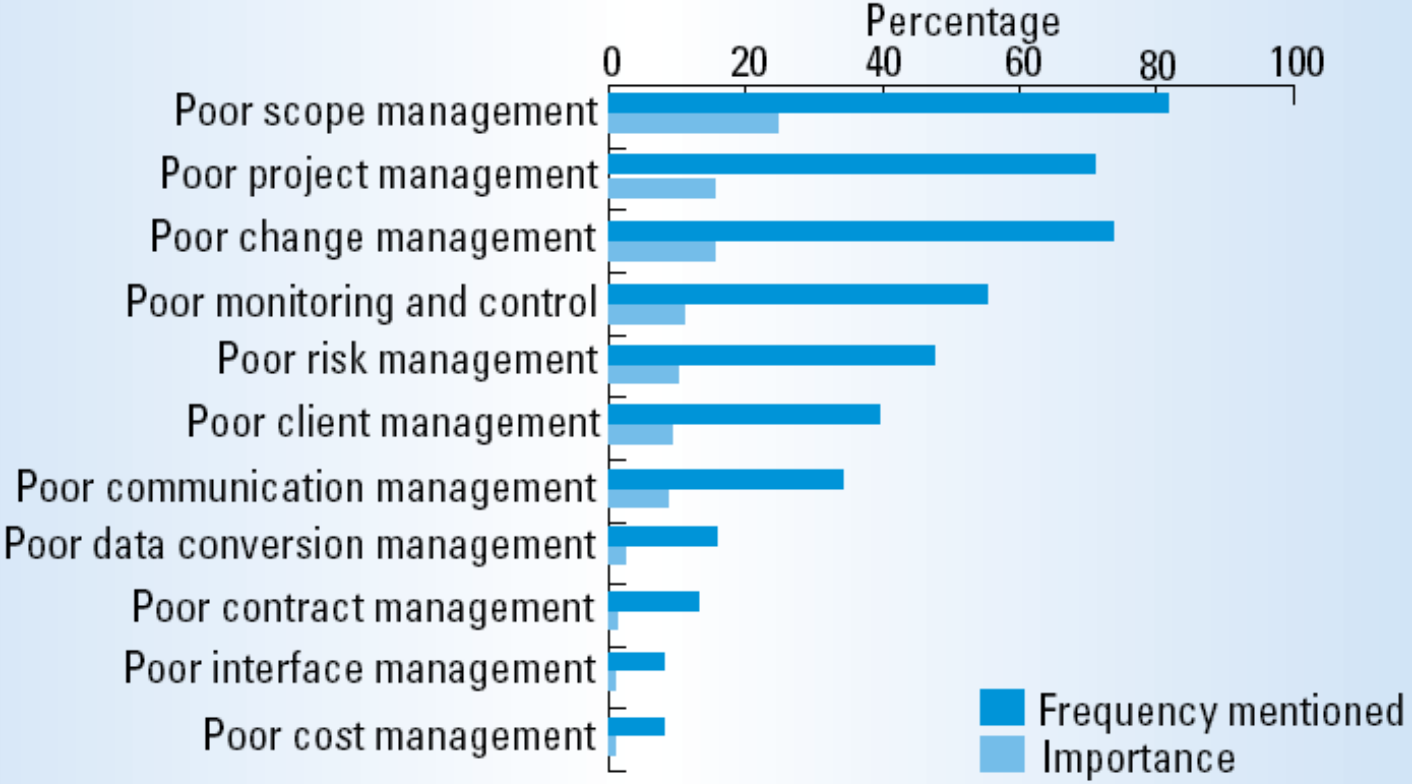


Figure 1: Management activities contributing to failure.

Why?

- Stable requirements - a sound basis to start designing
  - Taylor (2000) IT project: sink and swim

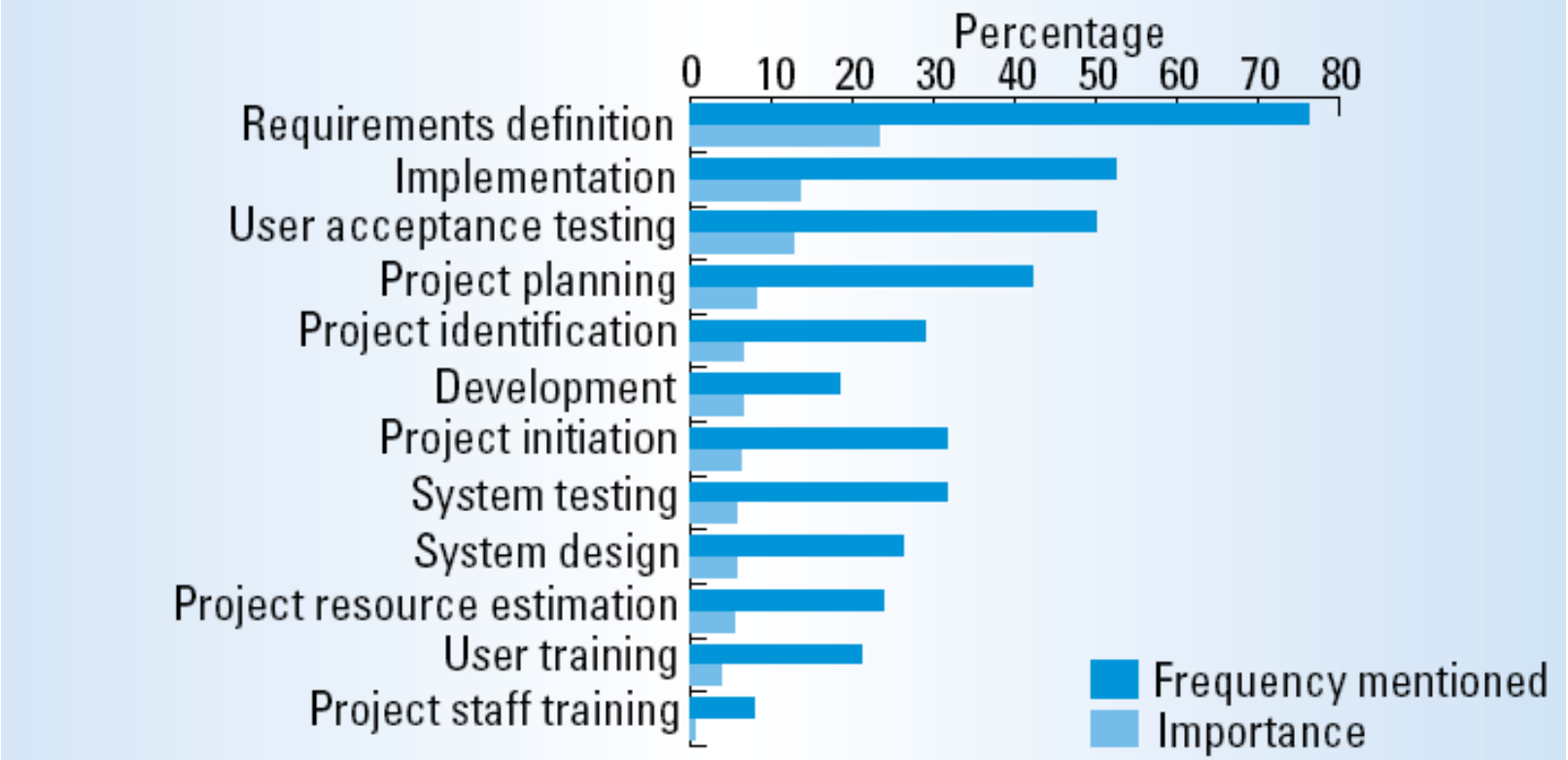


Figure 2: Failure stages.

Why?

- Stable requirements - a sound basis to start designing
  - Taylor (2000) IT project: sink and swim

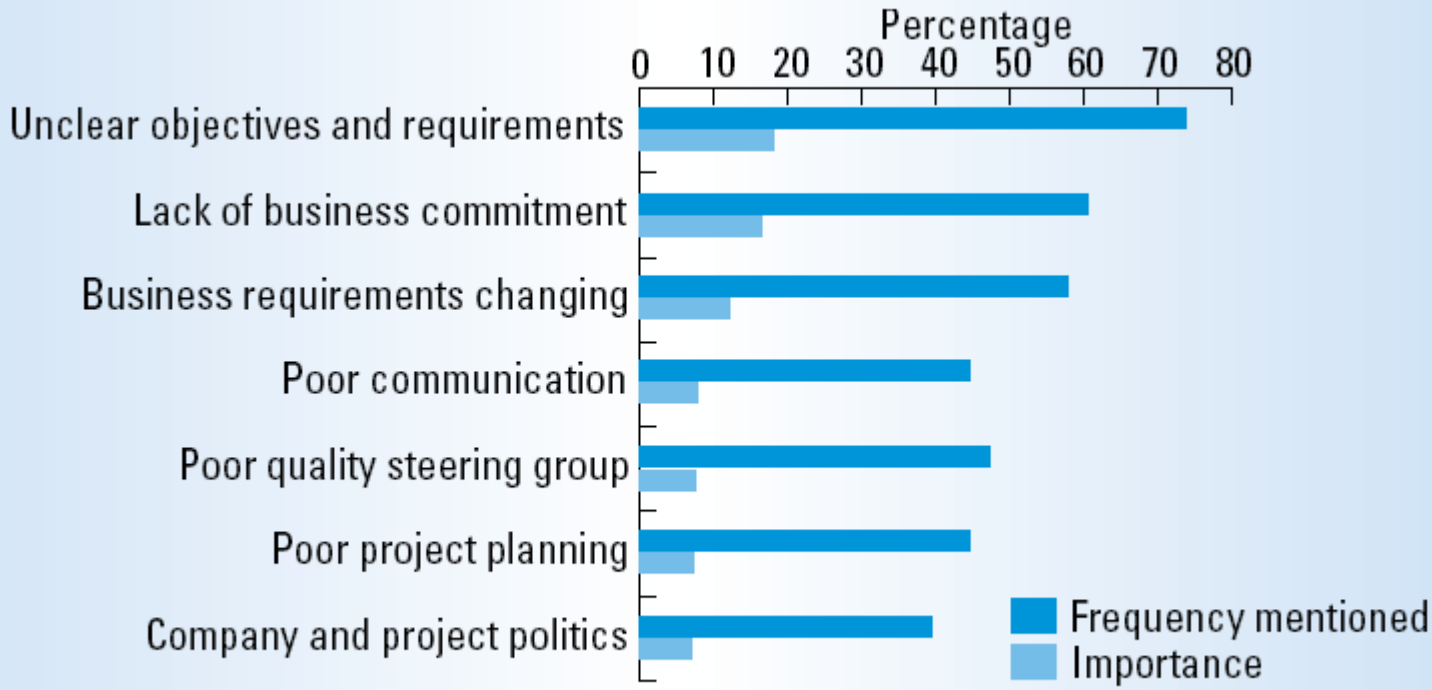


Figure 3: Causes of failure.

Why?

- Stable requirements - a sound basis to start designing

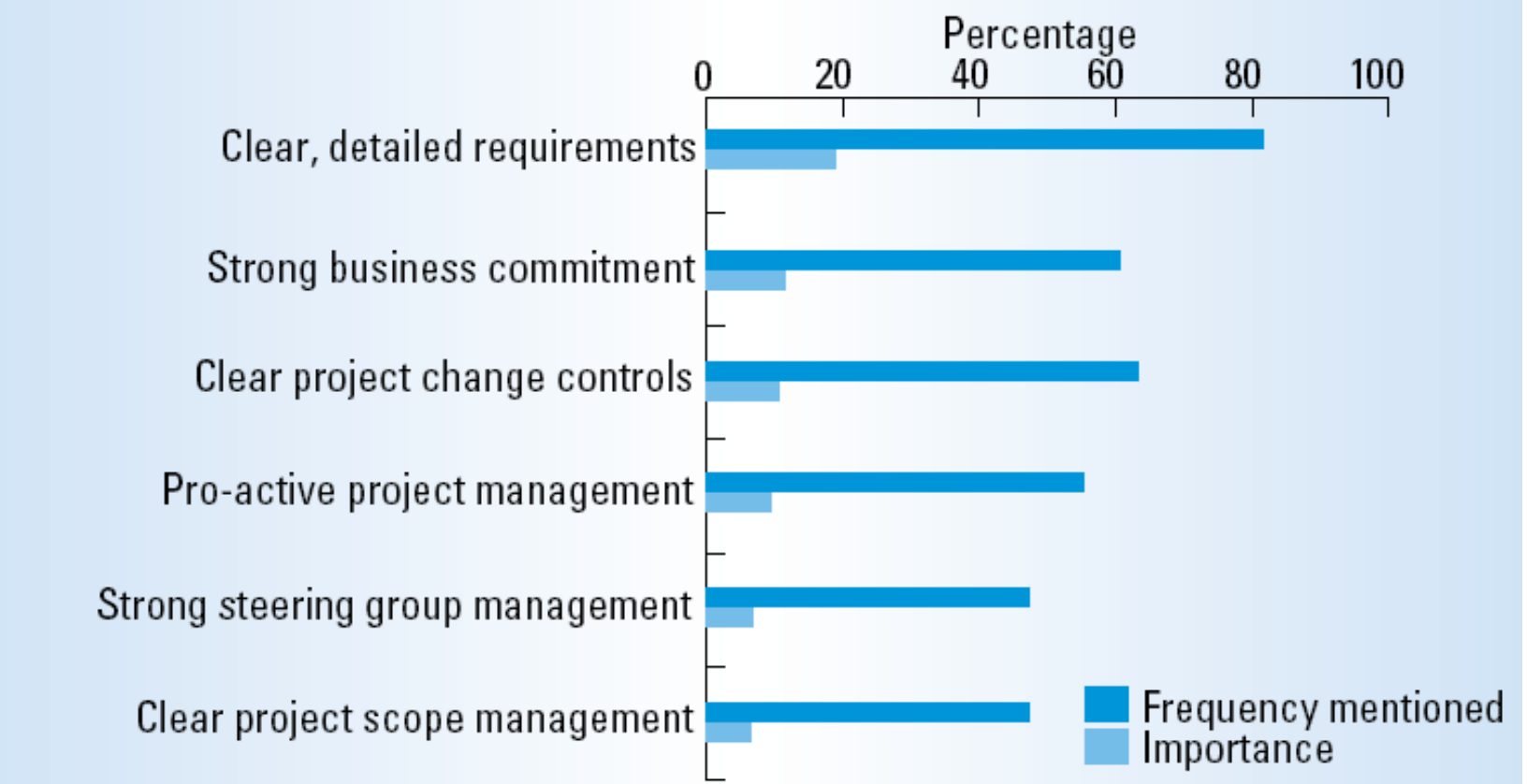


Figure 4: Critical success factors.

Establishing requirements

- Cross-cultural design concerns (Chavan et al, 2009)
  - Market is global, but consumers are always local
  - Product may need to be redesigned
    - Kellogg's Corn Flakes turn into wet paper after pouring warm milk on them. Kellogg's had to reengineer them to stand up to warm milk.
    - Whirlpool "World Washer" had slight feature design and styling modifications to reflect local tastes. Sales were well everywhere but India.
  - Multinational companies
    - One global website or many local websites?
      - Coca-cola vs Pepsi

Requirements

- A statement about intended product that specifies what it should do or how it should perform.
  - Specific, unambiguous, clear
  - Specific
    - The time to download any complete page is less than 5 sec.
  - Abstract
    - Teenager girls should find the site appealing
      - In this vase further investigation is required

Volere shell

Requirement #: **75** Requirement Type: **9** Event/use case #: **6**

Description: **The product shall issue an alert if a weather station fails to transmit readings.**

Rationale: **Failure to transmit readings might indicate that the weather station is faulty and needs maintenance, and that the data used to predict freezing roads may be incomplete.**

Source: **Road Engineers**
Fit Criterion: **For each weather station the product shall communicate to the user when the recorded number of each type of reading per hour is not within the manufacturer's specified range of the expected number of readings per hour.**

Customer Satisfaction: **3** Customer Dissatisfaction: **5**

Dependencies: **None** Conflicts: **None**

Supporting Materials: **Specification of Rosa Weather Station**

History: **Raised by GBS, 28 July 99**

Volere

Establishing requirements

- What do users want? What do users 'need'?

  Requirements need clarification, refinement, completion, re-scoping

  Input: requirements document (maybe)

  Output: stable requirements

- Why 'establish'?

  Requirements arise from understanding users' needs

  Requirements can be justified & related to data

Volere requirements template

PROJECT DRIVERS

1. The Purpose of the Product
2. The Stakeholders

PROJECT CONSTRAINTS

3. Mandated Constraints
4. Naming Conventions and Definitions
5. Relevant Facts and Assumptions

FUNCTIONAL REQUIREMENTS

6. The Scope of the Work
7. Business Data Model and Data Dictionary
8. The Scope of the Product
9. Functional and Data Requirements

NON-FUNCTIONAL REQUIREMENTS

10. Look and Feel Requirements
11. Usability and Humanity Requirements
12. Performance Requirements
13. Operational and Environmental Requirements
14. Maintainability and Support Requirements
15. Security Requirements
16. Cultural and Political Requirements
17. Legal Requirements

PROJECT ISSUES

18. Open Issues
19. Off-the-Shelf Solutions
20. New Problems
21. Tasks
22. Migration to the New Product
23. Risks
24. Costs
25. User Documentation and Training
26. Waiting Room
27. Ideas for Solutions

Types of requirements

- Functional:
  - —What the system should do
  - —Historically the main focus of requirements activities
- Non-functional:
  - —memory size, response time...
- Data:
  - —What kinds of data need to be stored?
  - —How will they be stored (e.g. database)?

Different kinds of requirements

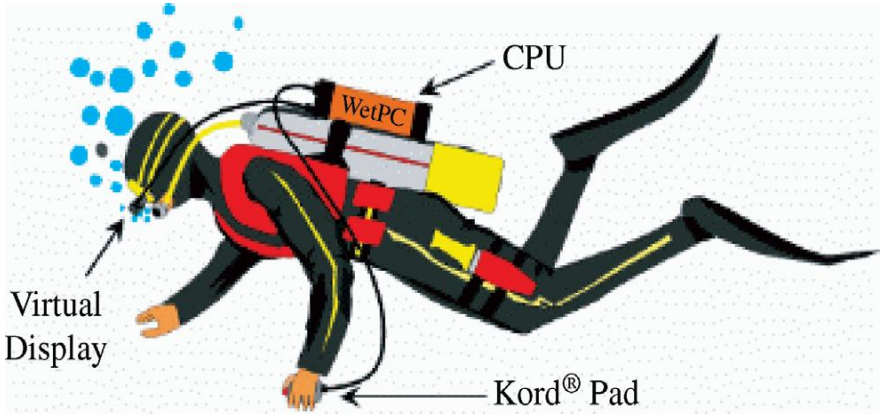
Environment or context of use:

— physical: dusty? noisy? vibration? light? heat? humidity? …. (e.g. OMS insects, ATM)

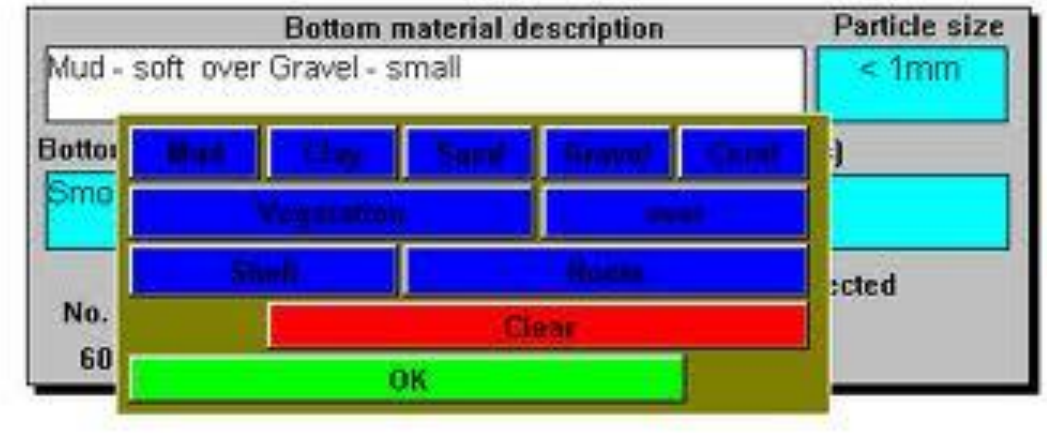
— social: sharing of files, of displays, in paper, across great distances, work individually, privacy for clients

— organisational: hierarchy, IT department's attitude and remit, user support, communications structure and infrastructure, availability of training

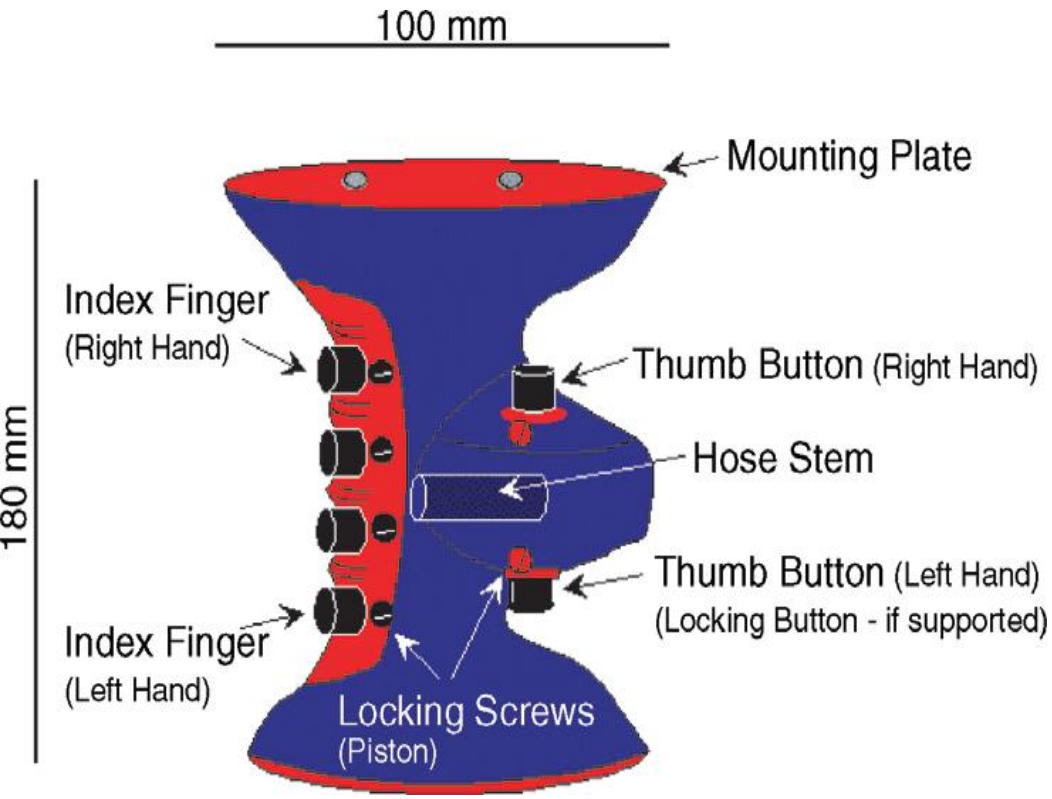
An extreme example: WetPC –underwater wearable PC for



Kord Pad



An extreme example: WetPC with SeaSlate and KordGrip



Types of requirements

- Users: Who are they?
  - — Characteristics: ability, background, attitude to computers
  - — System use: novice, expert, casual, frequent
  - — Novice: step-by-step (prompted), constrained, clear information
  - — Expert: flexibility, access/power
  - — Frequent: short cuts
  - — Casual/infrequent: clear instructions, e.g. menu paths

What are the users' capabilities?

Humans vary in many dimensions:

— size of hands may affect the size and positioning of input buttons

— motor abilities may affect the suitability of certain input and output devices

— height if designing a physical kiosk

— strength - a child's toy requires little strength to operate, but greater strength to change batteries

— disabilities (e.g. sight, hearing, dexterity)

Personas

- Capture user characteristics
- Not real people, but synthesised from real user characteristics
- Should not be idealised
- Bring them to life with a name, characteristics, goals, personal background
- Develop multiple personas

Personas

CAPLIN

Ginnie

BACKGROUND

- 15, Female
- Ongoing Private Education
- Ambitious
- Comfortable using technology to communicate

MOTIVATIONS

- Keeping in touch with her network
- Fashion/street cred
- Keeping up with peers.

FRUSTRATIONS

- Sad people trying to be 'friends' on Facebook
- Having to be in bed @ 11pm
- Being swamped in friends updates
- Missing important status updates

Receives private tutoring in Maths and English as these are not her strong subjects. Enjoys playing for the school's 2nd teams for netball and Lacrosse and is good at art.

She loves recording her favourite shows: ER and Sun Valley High on Sky+ and spends some of her time on her Laptop that Daddy bought her watching videos on YouTube, downloading music, keeping up to date with her friends on Facebook and chatting via MS IM to her cousin who is at University in Leeds.

She loves Ugg boots and Abercrombie & Fitch and uses the Internet to shop and find the cheapest prices.

"I want to easily hook up with my friends whilst watching TV"

Kinds of requirements

What factors (environmental, user, usability) would affect the following systems?

1. An interactive product to use in a university's self-service cafeteria that allows users to pay for their food using a credit system
2. An interactive product to control the functioning of a n uclear power plant

Data gathering for requirements

Interviews:

- Props, e.g. sample scenarios of use, prototypes, can be used in interviews
- Good for exploring issues
- But are time consuming and may be infeasible to visit everyone

Focus groups:

- Group interviews
- Good at gaining a consensus view and/or highlighting areas of conflict
- But can be dominated by individuals

Data gathering for requirements

Questionnaires:

- Often used in conjunction with other techniques
- Can give quantitative or qualitative data
- Good for answering specific questions from a large, dispersed group of people

Researching similar products:

- Good for prompting requirements

Data gathering for requirements

Direct observation:

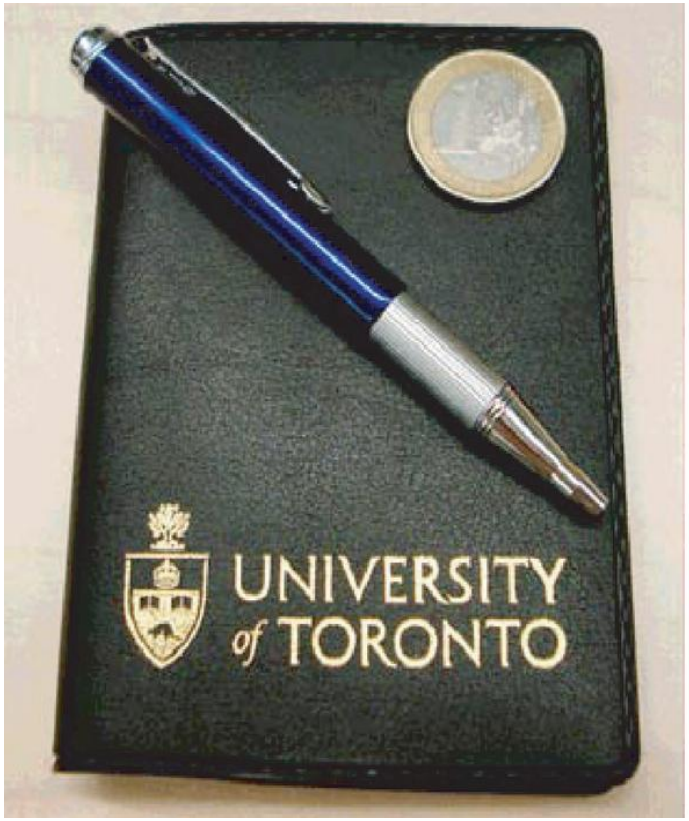
- Gain insights into stakeholders' tasks
- Good for understanding the nature and context of the tasks
- But, it requires time and commitment from a member of the design team, and it can result in a huge amount of data

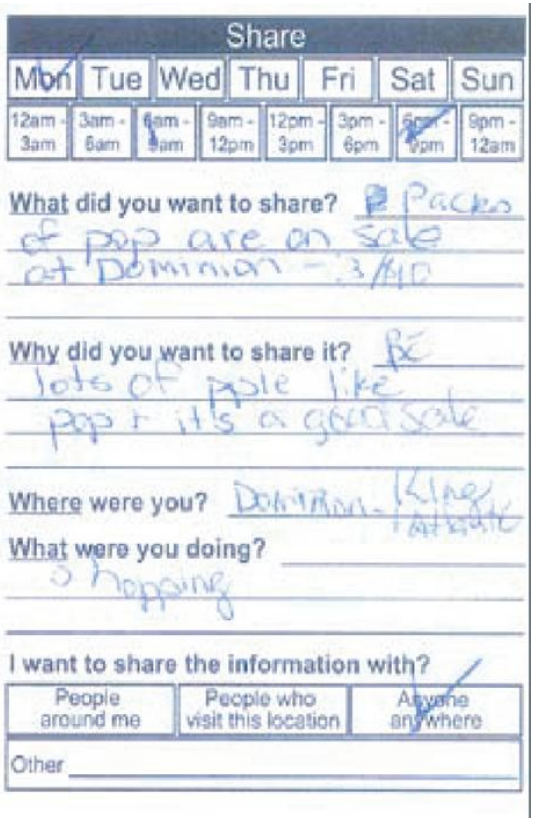
Indirect observation:

- Not often used in requirements activity
- Good for logging current tasks

Combining data gathering in requirement activities

Diary and interview





Dearman et al. 2008)

Combining data gathering in requirement activities

1. Persons	
1.1 Well-being	*"How sick is my student feeling?"*
1.2 Background	*"Is my ex-girlfriend seeing anyone?"*
1.3 State of an asset	*"Did I forget to turn the TV off?"*
1.4 Contact information	*"What is my uncles email address?"*

2. Establishments & Organizations	
2.1 Properties	*"A list of all organization members."*
2.2 Operating procedures	*"Does Toys-R-US allow exchanges without a receipt?"*
2.3 Contact information	*"What is the phone number for EL Trompo."*

Mobile probe:
Mobile worker's everyday problems

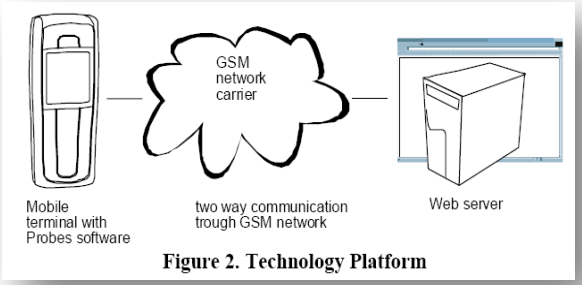


Figure 2. Technology Platform

User J
Wed, 21 Jan 2004 11:39

What kind of information do you need at the moment?

Where is my car?

Huilkii et al, 2004

Data gathering for requirements

Studying documentation:

- Procedures and rules are often written down 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 on the other techniques

Data gathering for requirements

- How to involve new ideas?
- Brainstorming for innovation
- How to make a brainstorming session succesful?
  - Include participants for a wide range of disciplines
  - Din’t ban silly stuff
  - Use catalysts for further insipiration
  - Keep records
  - Sharpen the focus
  - Use warm-up exercises

Contextual Inquiry

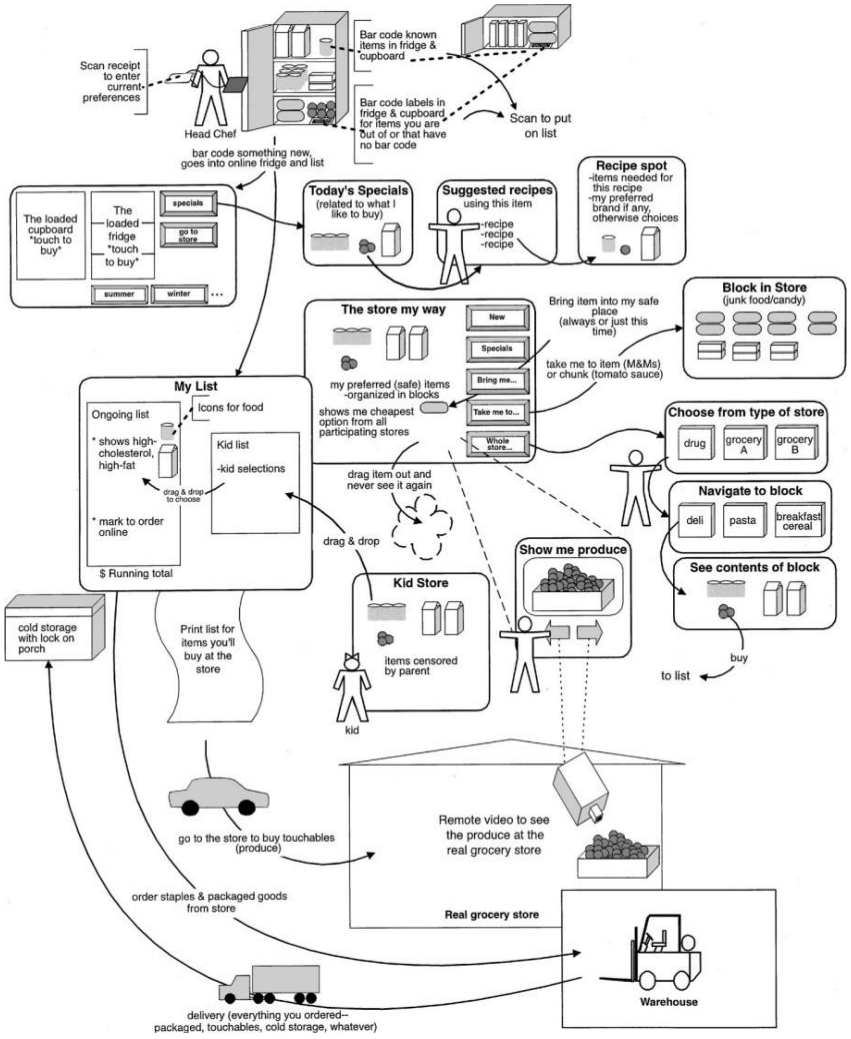
- An approach to ethnographic study where user is expert, designer is apprentice
- A form of interview, but
  - — at users' workplace (workstation)
  - — 2 to 3 hours long
- Four main principles:
  - — Context: see workplace & what happens
  - — Partnership: user and developer collaborate
  - — Interpretation: observations interpreted by user and developer together
  - — Focus: project focus to understand what to look for

Examples

Future Technology Workshops:
New ways of interacting with images

The Living Box: ethnographic interviews, focus groups and questionnaires

The result of contextual inquiry



The room of contextual inquiry

A Contextual Design team is truly immersed in customer data.

Problems with data gathering (1)

- Identifying and involving stakeholders: users, managers, developers, customer reps?, union reps?, shareholders?
- Involving stakeholders: workshops, interviews, workplace studies, co-opt stakeholders onto the development team
- 'Real' users, not managers: traditionally a problem in software engineering, but 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 organisation 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 within the organisation
- 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

Some basic guidelines

- Support the process with props such as prototypes and task descriptions
- Run a pilot session
- You will need to compromise on the data you collect and the analysis to be done, but before you can make sensible compromises, you need to know what you'd *really* like
- Consider carefully how to record the data

Data interpretation and analysis

- Start soon after data gathering session
- 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

Summary

- Getting requirements right is crucial
- There are different kinds of requirement, each is significant for interaction design
- The most commonly-used techniques for data gathering are: questionnaires, interviews, focus groups, direct observation, studying documentation and researching similar products
- Scenarios, use cases and essential use cases can be used to articulate existing and envisioned work practices.
- Task analysis techniques such as HTA help to investigate existing systems and practices

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