Benchmarking & User requirements

Unit 5

Eleonora Mencarini, PhD
eleonora.mencarini@unitn.it
Prof. Antonella De Angeli, PhD
antonella.deangeli@unitn.it

Internships and thesis

- Internships
  - there might not be place for all, but we are evaluating your requests – news in a couple of weeks
- Thesis
  - you need to find a professor from your Corso di Laurea as the thesis advisor.

Group Project for the Exam

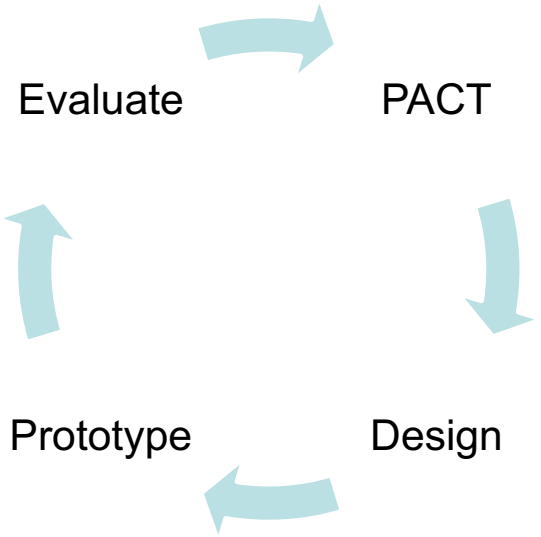
Project Topic

Sustainable Mobility

Project work phases

1. Analysis of existing products
2. Ideation (i.e. Identification of the design space)
3. PACT analysis
4. Design
5. Prototyping
6. Evaluation

2 Iterations



Project outcome

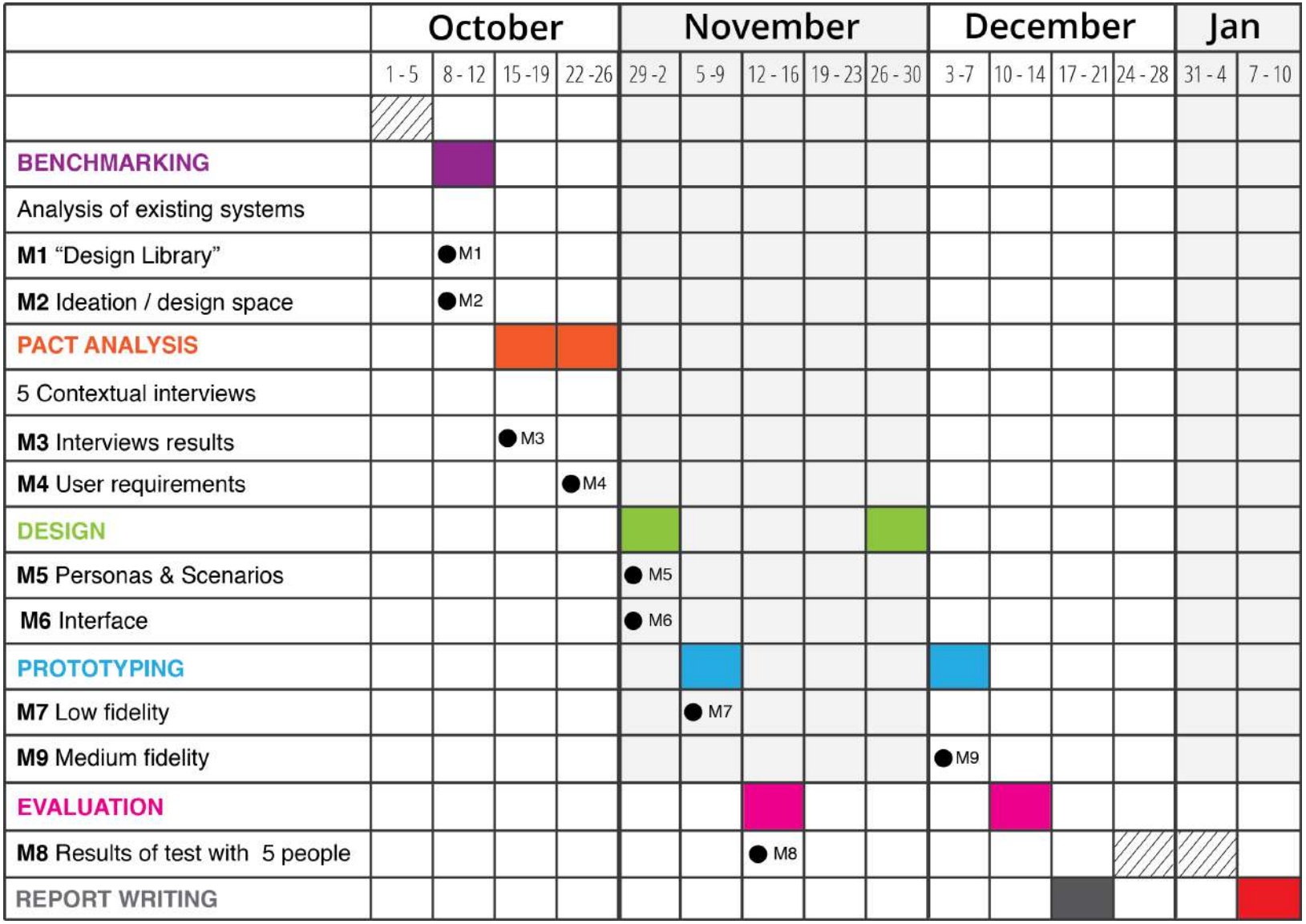
A **medium-fidelity** prototype aimed to **encourage** people to **increase** their use of sustainable mobility options.

Possible strategies:

- Awareness
- Gamification
- Persuasive technology approach
- Serious games

A **Report**

Gantt for the Project



Sustainable Mobility

Sustainable

- Non-polluting (walking, cycling)
- Low carbon emissions (electric cars, hydrogen cars)
- Shared means of transportation (reduced costs & impact)

Mobility

- Holidays trip
- Short daily trips
- Commuting
- Long trips (e.g. visiting family)
- Etc.

Sustainable Mobility

Transportation systems able to reduce the environmental, social, and economic impact of private cars.

They can be aimed to reduce:

- Air pollution
- Noise pollution
- Traffic jams
- Accidents
- Occupation of space
- Costs

Examples

CARSHARING TRENTINO

BlaBlaCar

mobike
摩拜单车

A PIEDI SICURI
COMUNE DI TRENTO

mi muovo

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Learning outcomes

- Benchmarking (what it is and how to do it)
- Identification of the design space (Ideation)
- The importance and the different types of requirements
- Hints of data-gathering methods

Benchmarking

Benchmarking

Method created and mostly used in the business sector

Aimed to identify the best products / practices in a certain industry (or in similar ones)

By comparing the products/practices identified, it is possible to understand

- what market needs they cover
- how these products differentiate one from the other
- how well they perform

Benchmarking Goal

- To have a **general overview** of the current systems that foster sustainable mobility (may help to identify a gap to work on with your project)

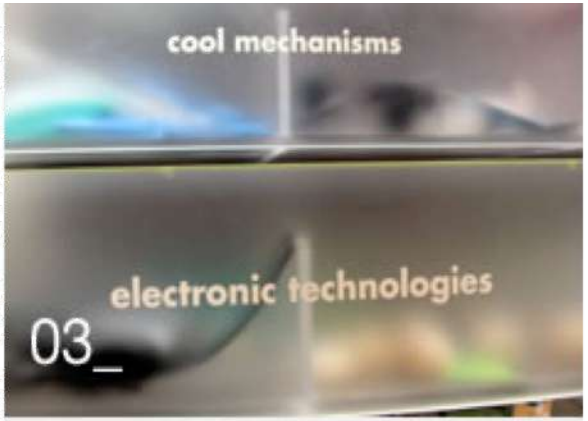
- **Inspirational for the design.** It works as a **design library**, i.e. an organized collection of best practices and examples to take inspiration from.

Example: IDEO TechBox

- Library, database, website - all-in-one
- Contains physical gizmos for inspiration

The Tech Box is centrally located

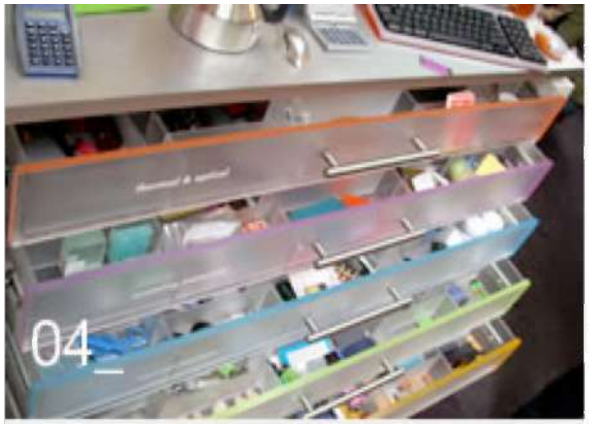
An item on the intranet website



The drawers are sorted by categories

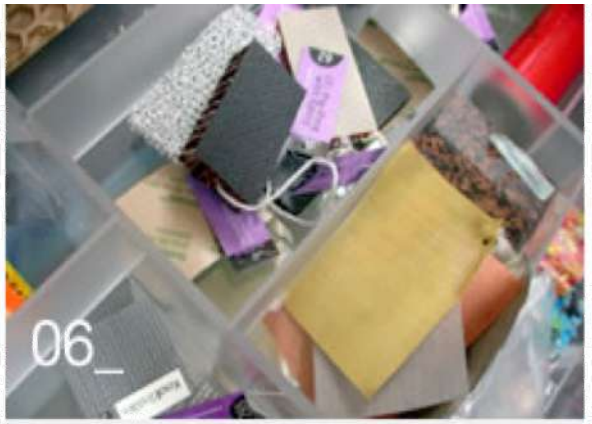
From: www.ideo.com

Example: The TechBox



Each drawer resembles a bento box

The curator keeps order



All the entries are tagged

It really is used daily

Two demonstrations units on top

How to make a benchmarking

1. Collect examples from the web of systems for fostering sustainable mobility

Suggestions:

- Focus on a domain
- Use several keywords
- Local, national, international examples
- Don’t look only at apps (public displays, peripheral displays, tangible interfaces, kiosks, wearable devices, etc.)

How to make a benchmarking

- A possible way collect and organize the examples could be to create a presentation and take note of:
  - Name of the system
  - An representative image
  - A short description of how the system works
  - URL
  - Keywords that summarize why that example is interesting

How to make a benchmarking

2. Classify the examples found for affinity (e.g. thematic, of target users, PACT, of design strategy adopted, etc.).

Tools for visual organization:

- Orthogonal axes
- Conceptual map (hand drawn, or through Xmind)

Definition of the design space (Ideation)

Criteria for the choice:

1. Identification of a (market) gap / people's need
2. Personal interest
3. Easiness access to the field (btw, be ethical, follow the protocols)
4. Realistic evaluation of timing

User Requirements

User Requirements

- User requirements are the translation of user needs in features of the system
- A statement about an intended product that specifies what it should do or how it should perform. Requirements should be as specific, unambiguous, and clear as possible.

User Requirements

- Not a set of rigid prescriptions, but must not change radically during the design and evaluation phase. They can be revised after the evaluation

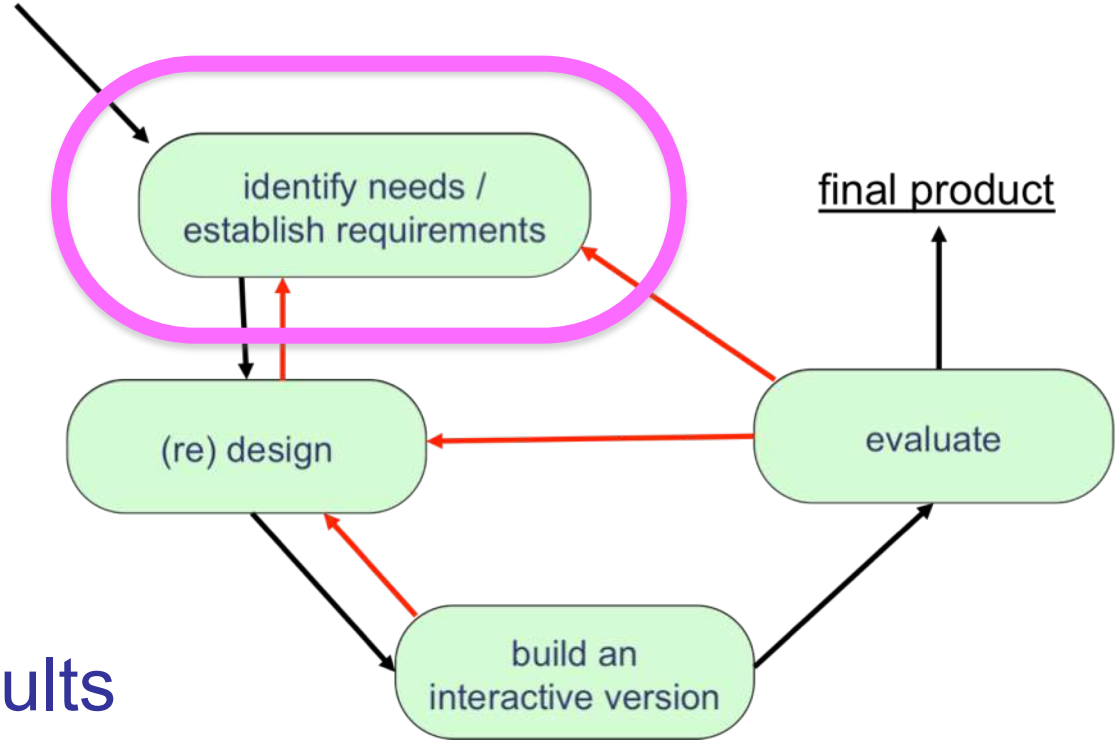
Where do they come from?

Identifying needs

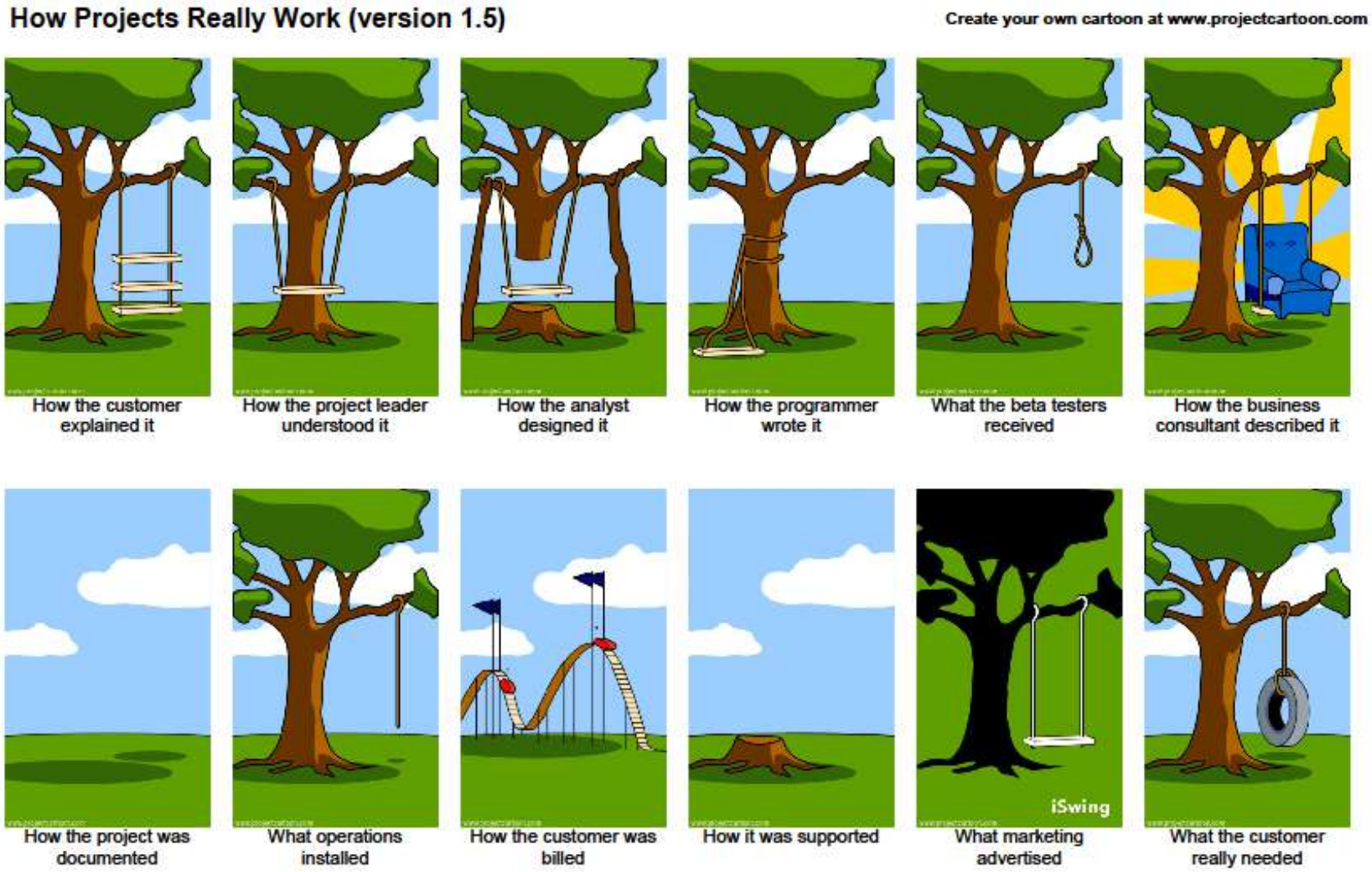
- Understand as much as possible about the user, their activities, and the context of use (see PACT)
- Establish a set of “stable” requirements
- Requirements MUST be justified and related to data

HOW

- Data gathering
- Data analysis
- Results
- Expression of results as *requirements*



Why are requirements important?



WHY

- Whenever there is a team working on a project, it is important for everybody to have **a shared understanding** of what are we working on
- A list of user requirements is useful to have a **common ground and documentation**
- To **avoid the high cost of fixing errors** late in the process, i.e. at the moment of software development.

Mistakes

The underestimation of complexity

Poor specifications and failure to see the complexities lead to the underestimation of schedule, budget, …

http://www.cheatsheet.com/entertainment/5-of-the-biggest-video-game-kickstarter-failures-of-all-time.html/?a=viewall

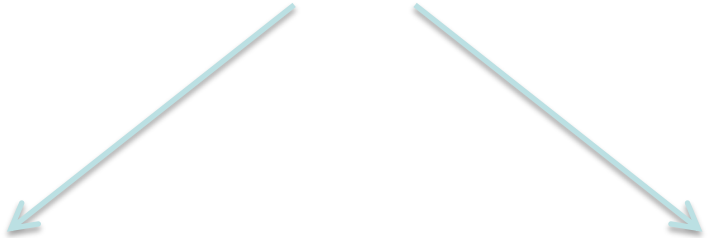
Mistakes

Failure to engage with stakeholders

- Insufficient users' communication: stakeholders need to provide key input to the critical decisions made in the project – so they need to be involved and to be asked the right questions

- Insufficient analysis

Requirements types



Functional

Non-functional

Functional Requirements

- Fundamental or essential characteristics of the product
- Describe what the product has to do or what processing actions it is to take in order to work
- Historically the main focus of requirements activities

Example

- For a smartphone:
  - The Call function has priority on every other app

- For a wearable GPS:
  - The system should provide an alternative navigation modality to the visualization on the display

Non-functional Requirements

- Describe the constraints that there are on the system and its development
- Cover a number of aspects of design: image, usability, performance, maintainability, security, cultural acceptability, etc.
- As important as functional requirements for the product's success.

Example

- For an ultrabook: **Look and feel**
  - Present an up-market, business-like image

- For a nuclear power control system: **Usability**
  - Warnings signals MUST be clear and unambiguous
  - Emergency shut down button MUST be immediately identifiable

Other kinds of requirements

- Data Requirements (often functional)
  - Type, size/amount, accuracy, how to share them
- Environmental or contextual requirements (non-functional)
  - **Physical**: dusty? noisy? vibration? light? heat? humidity? …. (e.g. 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

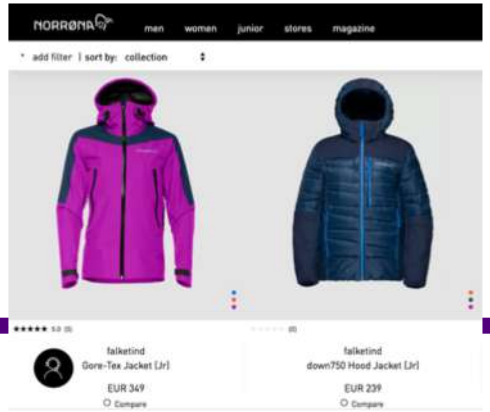
User requirements

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

Exercise

Suggest one key functional, data, environmental, usability, and look and feel requirements for

1. Self-service filling and payment system for a petrol (gas) station

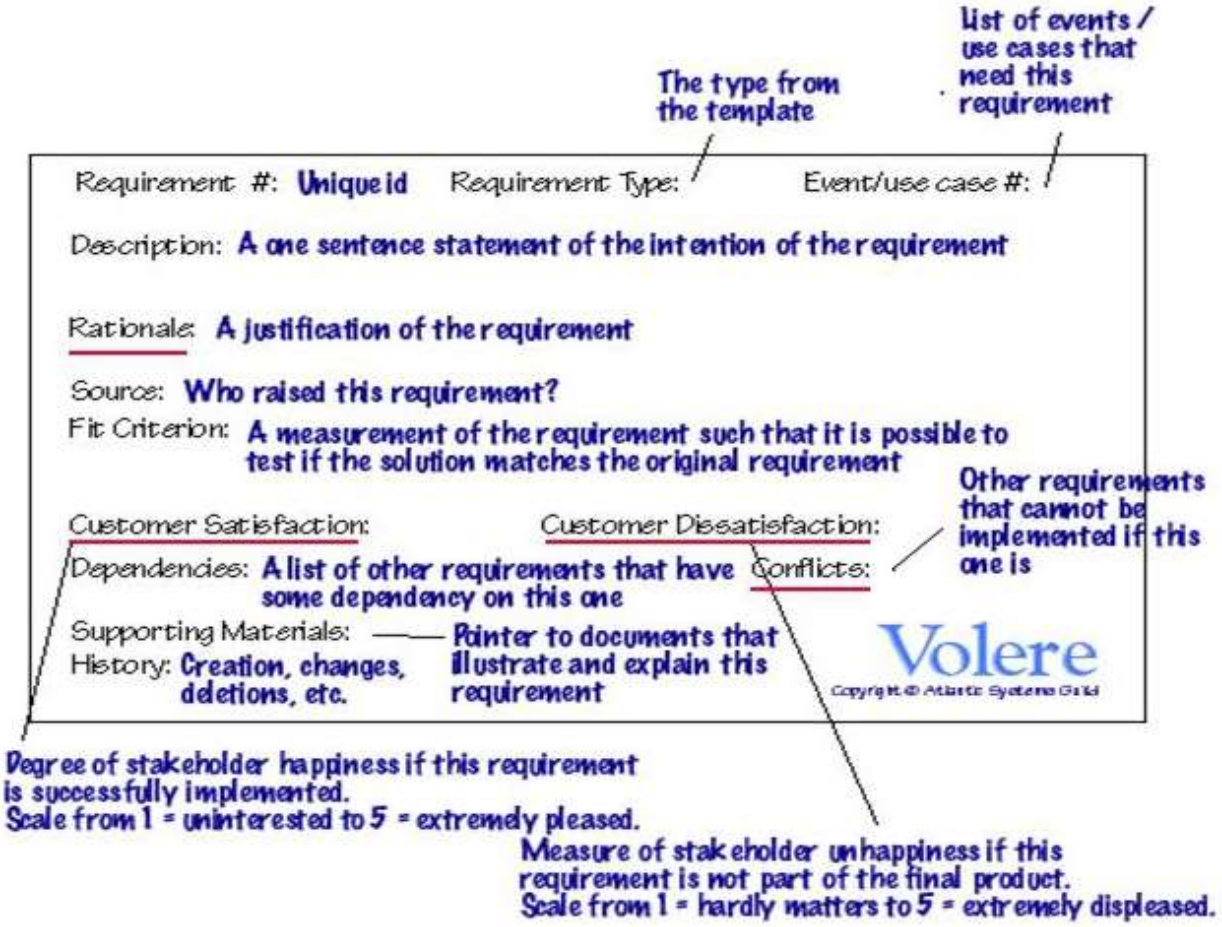


2. Fashion clothes website

Requirements templates

- Standard format, or template, for specifying requirements
  - Unique reference number specifying whether the requirement is functional or not
  - A one sentence summary
  - The source(s) of the requirement
  - The rationale for it

Volere requirement shell



http://www.volere.co.uk/pdf%20files/06%20Atomic%20Requirements.pdf

Data-gathering

Data-gathering methods

- Studying documentations
- Researching similar products
- Observation
- Interviews
- Questionnaires

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
- Good for understanding **legislation**, and getting **background information**
- Not to be used in isolation
- Advantage: No stakeholders time

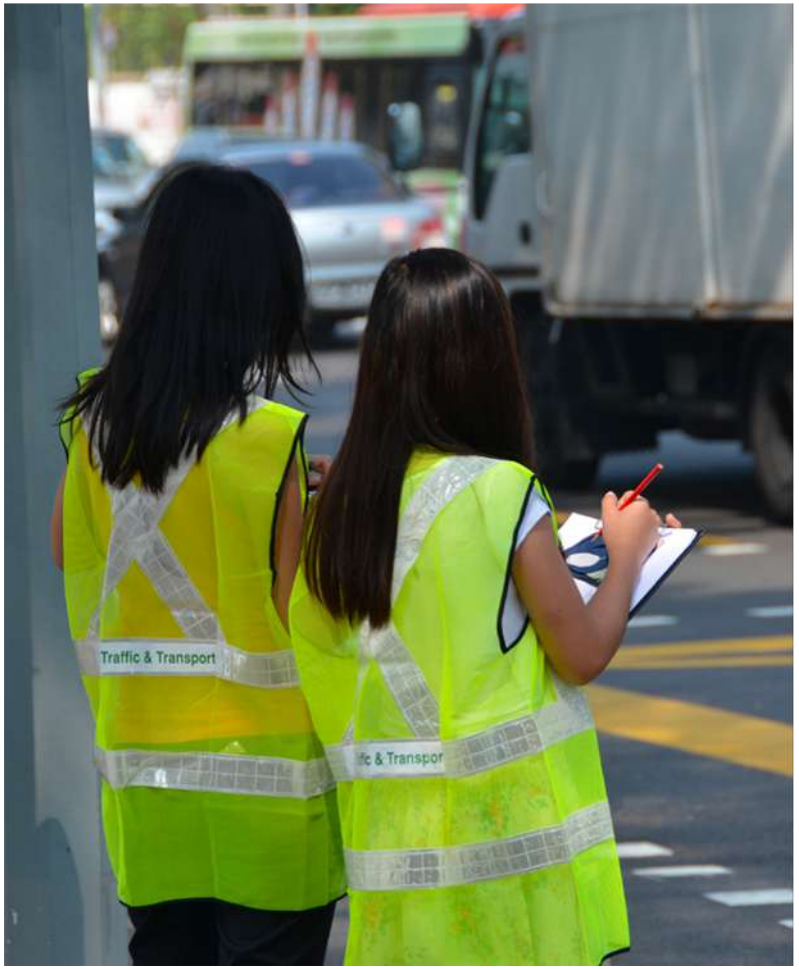
Researching similar products

Benchmarking

(see at the beginning of the presentation)

Observations

- Spend time with users in their daily activities
- Good to gain insights on the nature and context of users' activities
- Participant / Non-participant
- Require time and commitment and can result in a huge amount of data



Questionnaires

- A series of questions designed to elicit specific information

- Questions may require different kinds of answers:
  - simple YES/NO;
  - choice between pre-set answers;
  - comment

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
- Good to know opinions, bad to know motivations

Interviews

- Structured, unstructured or semi-structured
- Good for exploring issues
- Time consuming

Focus Group

- Group interviews
- Good at gaining a group view and/or highlighting areas of conflict
- Probes and props, e.g. sample scenarios of use, prototypes, can be used to stimulate discussion

Which methods to chose?

Depends on:

- Amount of time available
- Level of detail and risk associated with the findings
- Kind of task to be studied:
  - Sequential steps or overlapping series of subtasks
  - High or low, complex or simple information?
  - Task for a layman or a skilled practitioner?
- Analyst's level of knowledge of the topic

Problems with data gathering

- Identifying the right people
  - users, managers, developers, customer reps?, union reps?, shareholders?
- Identifying the right way to involve stakeholders
  - Availability of key people
  - interviews, contextual studies, workshops, participatory design

Guidelines

- Involve all the stakeholder groups
  - Primary, secondary, tertiary users
- Involve more than one representative from each stakeholder group
- Use a combination of data gathering techniques

Guidelines

- When possible, support the process with props such as early prototypes and task descriptions
- **Run a pilot session**
- Consider carefully how to record the data
  - Photos, videos, audio recording, notes..

Summary

- How to make a benchmarking
- Choice criteria for the design space
- There are 2 different kinds of requirement, both are significant for interaction design
- The most commonly-used techniques for data gathering

Recommended reading

Sharp et al. (2015)

- Chapter 10