Design of Interactive Systems (DIS)

Lecture 6: Techniques for designing interactive systems – understanding, environment, design

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Part II Techniques for designing interactive systems

- **Chapter 7: Understanding**
- **Chapter 8: Envisionment**
- **Chapter 9: Design**
- **Chapter 10**: Evaluation
- **Chapter 11**: Task Analysis
- **Chapter 12**: Visual Interface Design
- **Chapter 12**: Multimodal Interface Design

Understanding

- Before creative design can start, the designer must develop a clear **understanding** of **PACT** (***people*** who will be involved with the product or system, the ***activities*** that are the focus of the design, the ***contexts*** in which those activities take place and the implications for the design of ***technologies***).
- From this **understanding** designers generate the **requirements** for the system that is to be designed.

Understanding requirements

- A requirement is ‘something the product must do or a quality that the product must have
- Designers will study **current activities** and gather **stories of use** and soon will have generated a great deal of information about the current situation and about **people’s goals** and aspirations

Prioritizing requirements

- Requirements should be reviewed with customers and clients and modified as necessary. One way of doing this is by using the '**MoSCoW rules**'.
  - **Must have** - fundamental requirements without which the system will be unworkable and useless, effectively the minimum usable subset
  - **Should have** - would be essential if more time were available, but the system will be useful and usable without them
  - **Could have** - of lesser importance, therefore can more easily be left out of the current development
  - **Want to have** but Won't have this time round - can wait till a later development.

Participative design

- Designers need to understand the requirements of other people.
- This is not easy, but talking to people using **interviews**,
- **observing people** and **recording their activities** on video,
- organizing **focus groups**, workshops, etc. will all help the designer to understand both the requirements for the new design and the problems people are having with existing ways of doing things.

Interviews

- One of the most effective ways of finding out what **people want** and what **problems they have** at the moment is to **talk to them**
- Interviews with all the various stakeholders in the domain are a vital way of gathering stories.
  - **Structured interview**
  - **Semi-structured interview**
  - **Unstructured interview**

Questionnaires

- Questionnaires are one way of streamlining the understanding process if a **large number of people** are to be surveyed and **resources are not available** to interview them individually.
- Questionnaires need to be **designed, prototyped** and **evaluated** in the same way as any other form of interaction design.
- A good questionnaire is **time-consuming** to construct so that all the items:
  - are understandable
  - are unambiguous
  - collect data which actually answers evaluation questions
  - can be analysed easily

Working with groups

- An alternative to asking individuals or stimulating individuals to provide information is to **work with groups** of people.
- The most common example of this is the **focus group**.
- Here a group of people are posed questions by facilitators and encouraged to react to each other’s comments.

Fieldwork: observing activities *in situ*

- Observing people's activities as they happen is another excellent, though time-consuming, method of understanding and requirements generation.
- In other cases, an interviewee may describe the 'official' procedure rather than how something is actually done in practice. They might be embarrassed to admit to some difficulty they are having, or may just tell the designer something to get rid of them.

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Envisionment

- Envisionment is concerned with making **ideas visible**; with **externalizing thoughts**.
- Externalization can take all manner of forms: **stories and scenarios**, **presentations**, **sketches**, **formal models**, **software prototypes**, **cardboard models** and so on.

Finding suitable representations

Example: Designer of a **new luxury sports car**. He or she doodles a **few designs** on paper and shows them to other designers on the team.

The designer is using four different representations in at least four different ways:

- The original representations focus on clearing the mind. In this case they are **doodles and sketches** that are used to generate new ideas, examine possibilities and prompt for questions.
- **The blueprints** given to the model maker and **the scale model** given to the Marketing and Sales departments are suitable for accurately expressing ideas to others.
- The **wind tunnel experiments** show representations being used to test ideas.
- The **computer model** is used to make predictions.

An outline envisionment process

Here is a suggested series of steps for the envisionment process

- Review requirements and conceptual scenarios.
- Develop representations of your design ideas. At a minimum these should include **concrete scenarios**, **storyboards** developing the main interaction sequences, and **snapshot sketches** of key screens or other aspects of the product.
- If your product is a new one, **experiment with different metaphors** and **design concepts** through your representations.
- Explore design ideas with the people who will be using the system wherever possible.
- Develop **wireframes** to provide more detail on the proposed structure and navigation.
- Iterate and gradually formalize the design (making it more concrete) through **prototypes** and **further evaluations**.

Basic techniques

- Sketches and snapshots
- Storyboards
- Moodboards
- Navigation maps
- Wireframes

Sketches and snapshots

In the sketches we can see that the designer has been exploring **different ideas** for displaying and searching through **results of a search**.

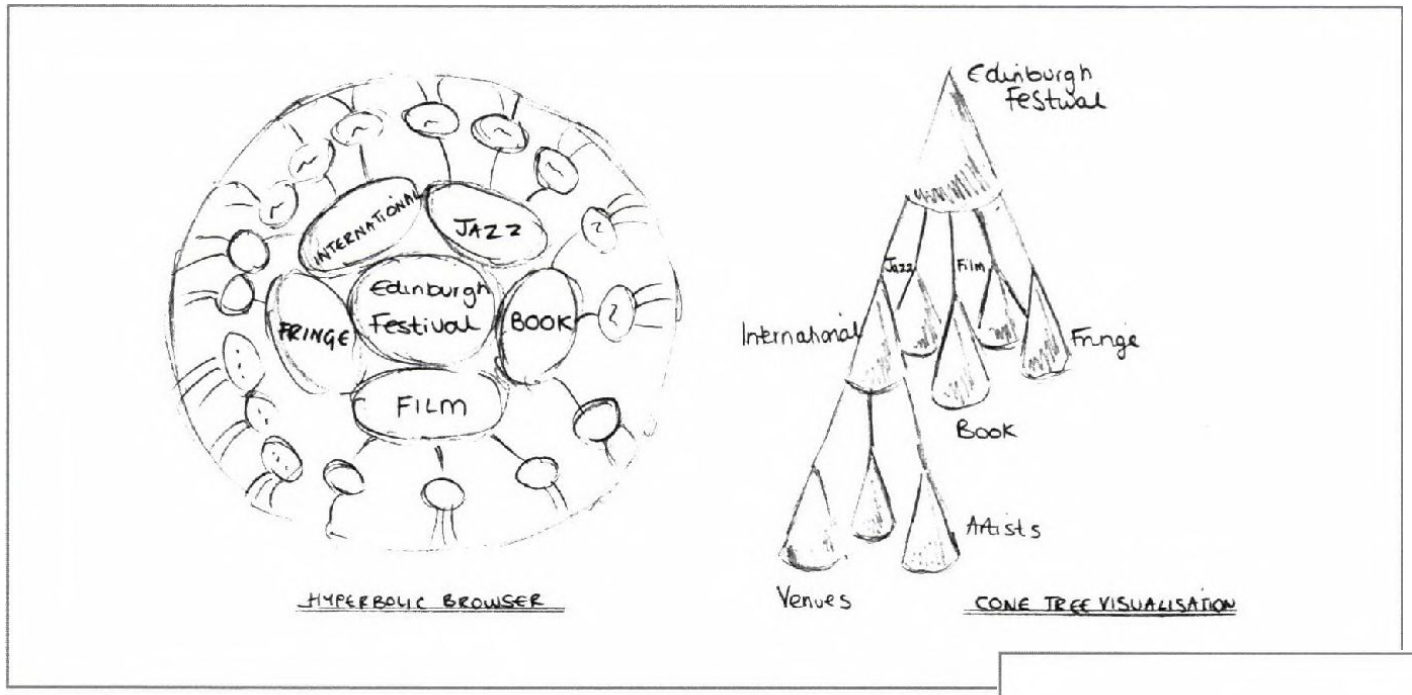
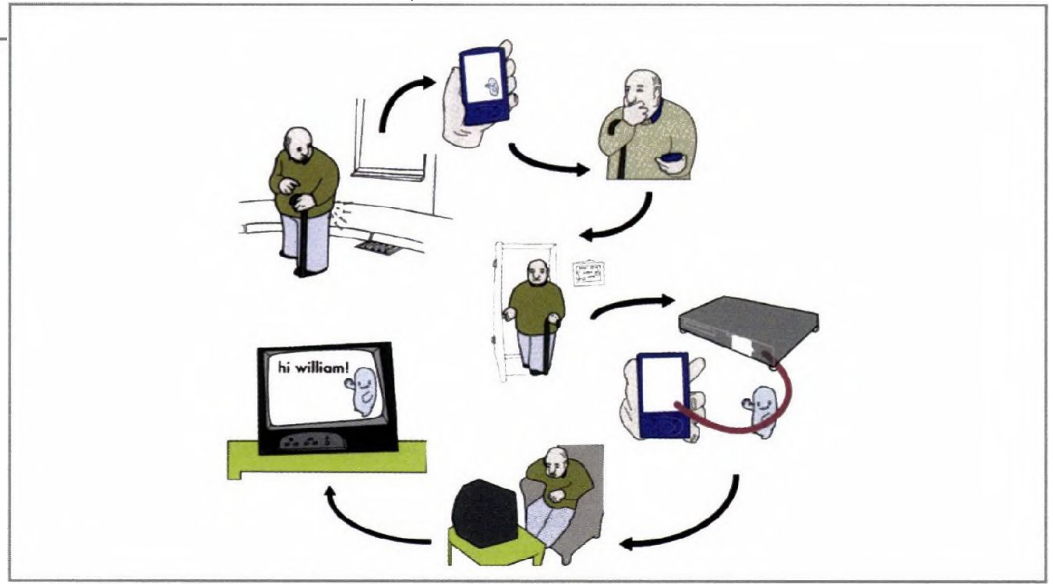


Figure 8.1 Sketches of possible visualization

Individual snapshots of a design can be provided to show **key moments** in an interaction



Storyboard

Storyboarding is a technique taken from filmmaking - using a simple cartoon-like structure, **key moments from the interactive experience** are represented

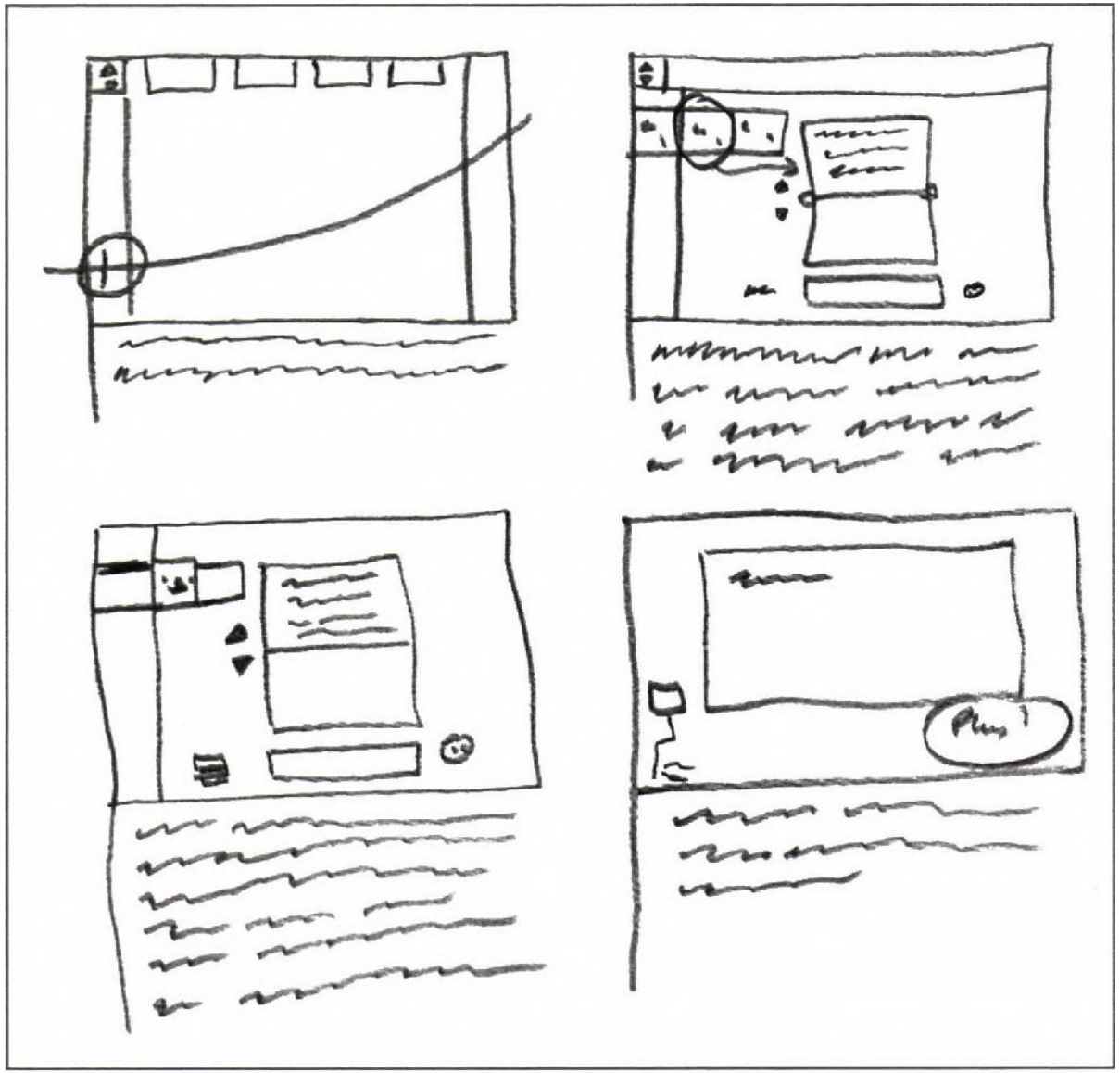
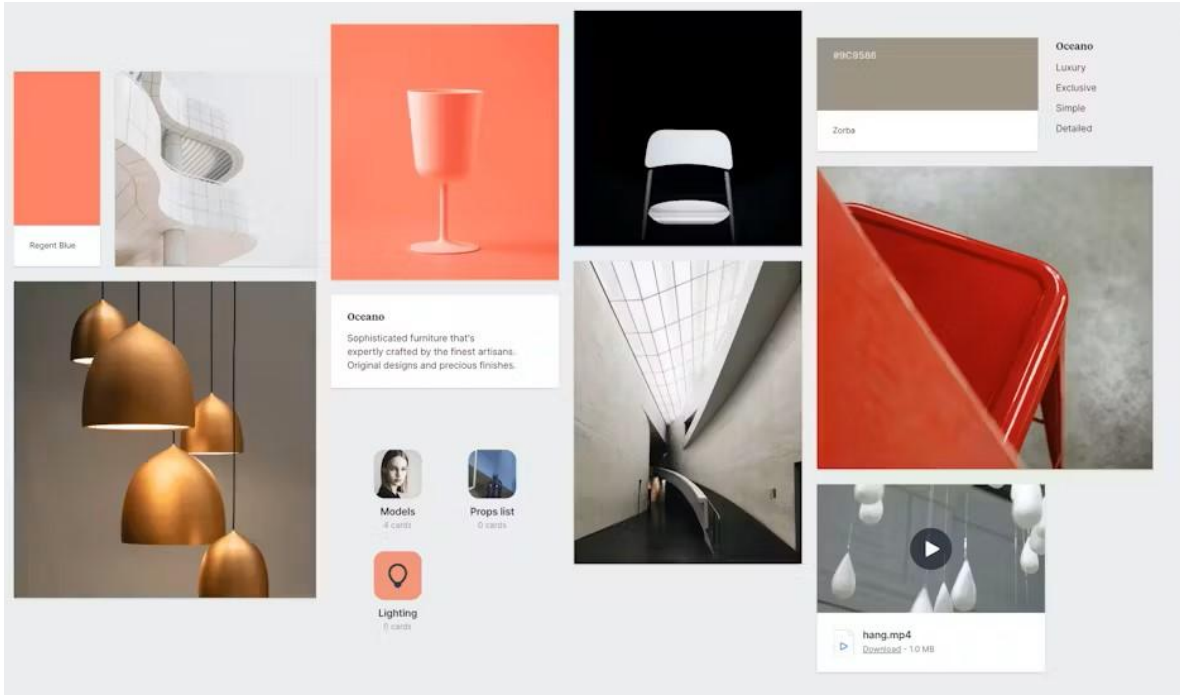


Figure 8.3 Sketched storyboard for the HIC

Mood board

Mood boards are widely used in advertising and interior design.

- These are visual collage of images, text, illustrations and other design elements that help define the direction of project.



For interior designing

For interaction designing

Navigation maps

Navigation is a key feature for many systems. Navigation maps focus on how people move through the site or application. The aim is to focus on how people will experience the site

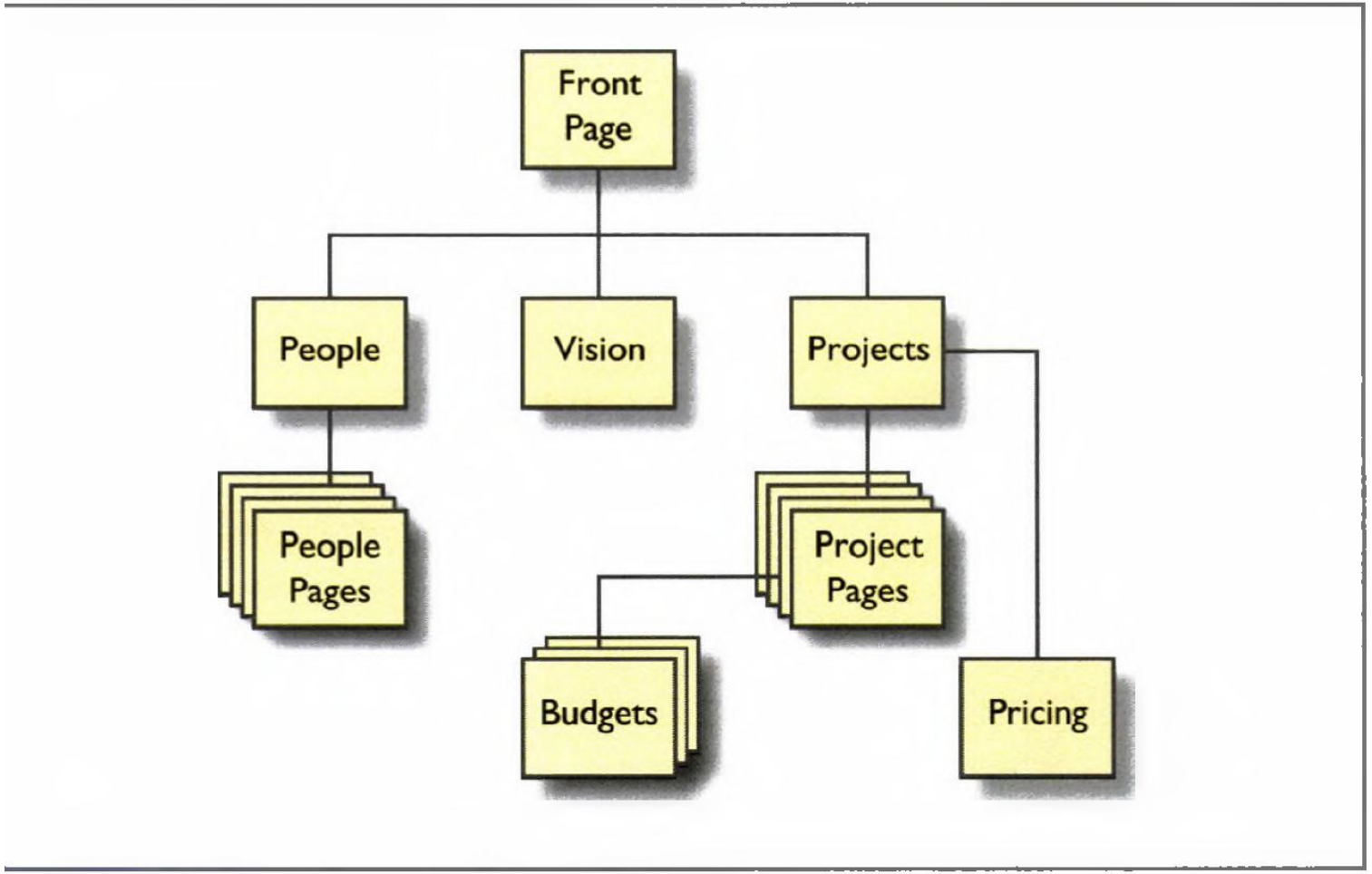
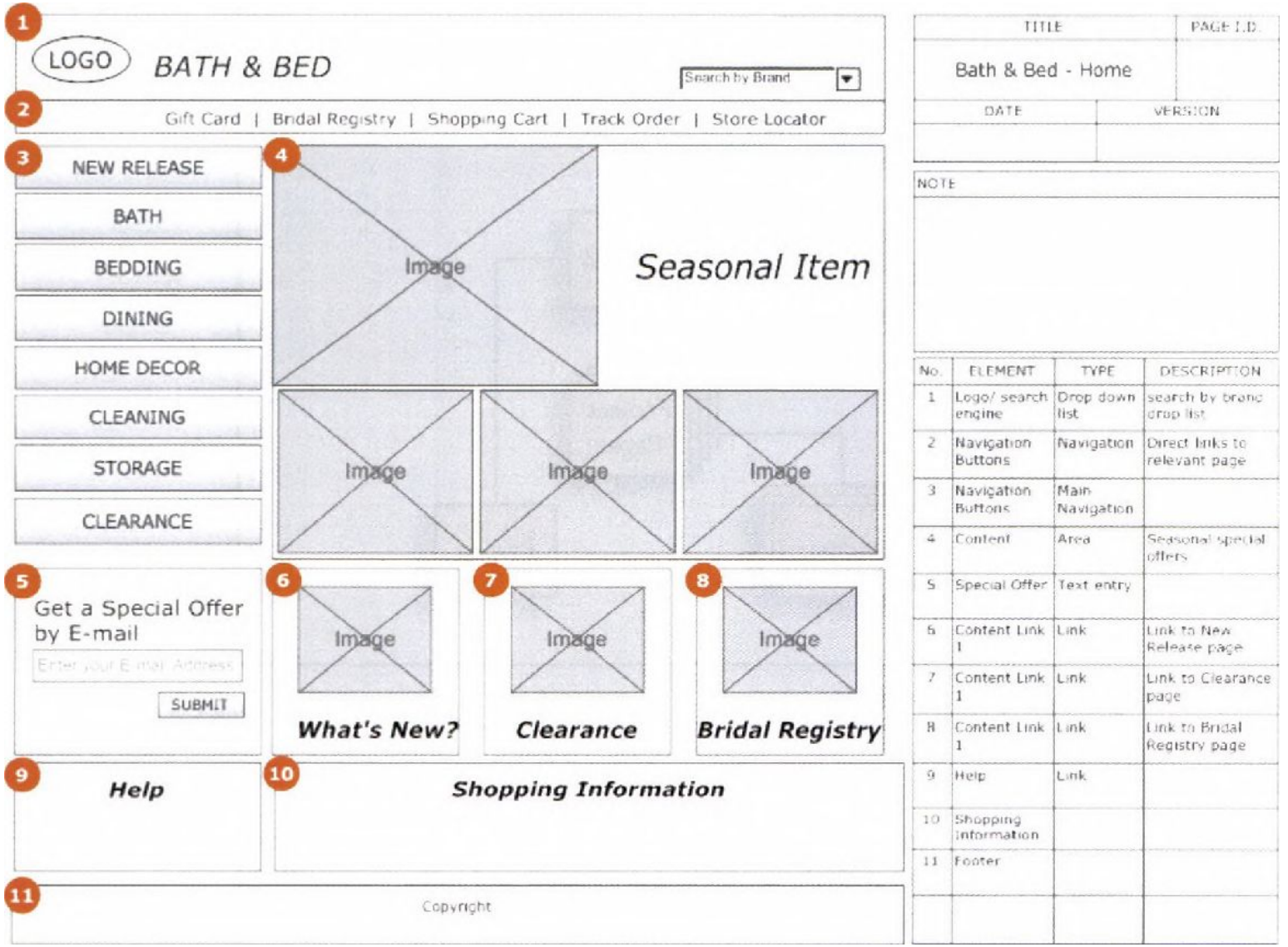


Figure 8.7 Navigation map for a website

Wireframes

- Wireframes are **outlines of the structure** of a software system. They used to be concerned principally with website design.
- It has become a mainstream technique for handheld devices.



Prototypes

- A prototype is a concrete but partial representation or implementation of a system design
- A prototype may be made of something as simple as paper, cardboard or other suitable material, or it maybe developed using a sophisticated software package.
- **Hi-Fi**
- **Lo-Fi**
- **Paper**
- **Video**

Presenting designs

- Presenting design ideas **clearly** and **appropriately** is a key skill of the designer.
- The design process is a long one, with many different stages, there are many different people involved.
- There are many different reasons for giving a presentation.
- People at the **senior management** are generally concerned with **strategic issues** rather than detail, so a presentation to **management** should focus on **impact**, **image** and **concept**.
- If the presentation is aimed at the **client** or **end-users** then one would expect a **bit more detail** and some idea of **how it works**.

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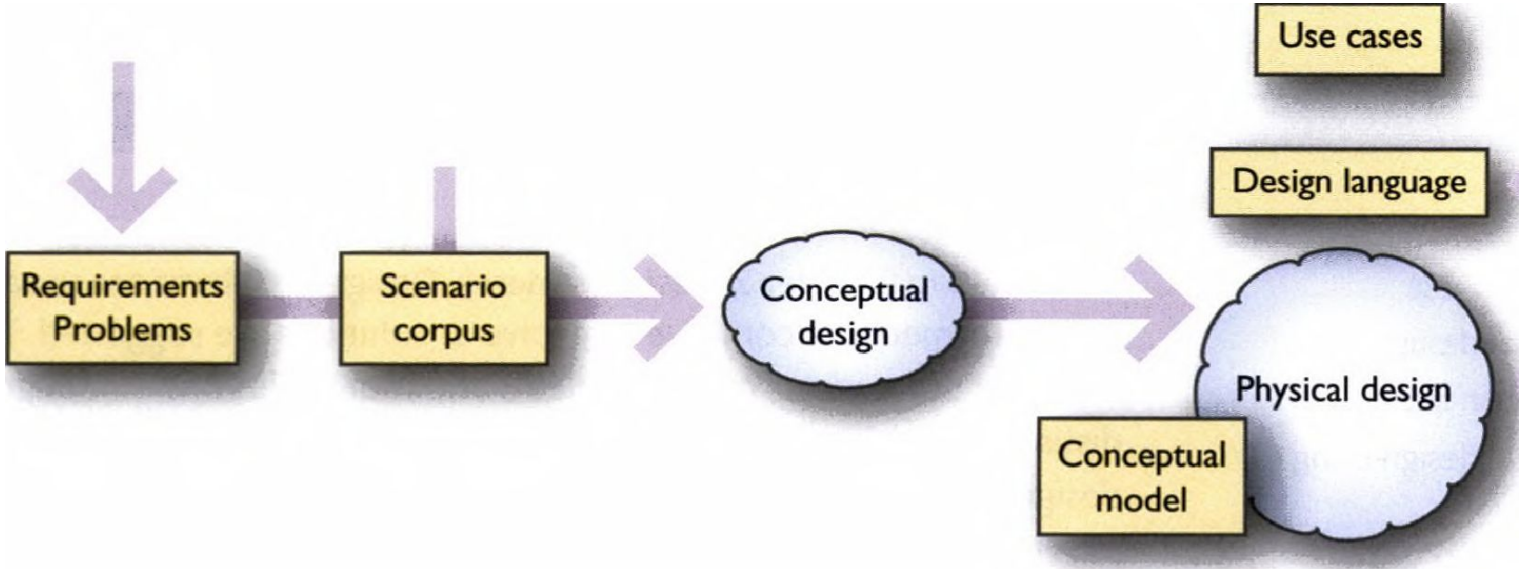
Designs

- In design we distinguish **conceptual design** - design in the abstract - from **physical design** - where ideas are made concrete.
- Conceptual design is concerned with arriving at an **abstract description** of the system - its logic, functions, structure and content - but not with how the structure and functions are to be physically realized.
- Physical design is concerned with **who does what**, how the artefacts will **look** and how they **behave**.



Conceptual designs

- Designers need to ensure that their conception of the system is **easily learnt by people** and **fits with their expectations** and preferences.
- But often we have to spend a **long time looking for some function**, or we do not know about the **existence of some function**, because the designer has put it somewhere unexpected.
- A good conceptual model will come from considering the underlying metaphor.

Exploring design concepts

Bill Verplank (Verplank, 2007) is an interaction designer argues that interaction design is ‘design for human use’ and focuses on three main things,

1. **How do you do?**
2. **How do you feel?**
3. **How do you know?**

How do you do?

- For example, one distinction he highlights is between handles and buttons.
- Handles are better for **continuous control** (e.g. a trombone), but buttons are better for **discrete control**

How do you feel?

- ‘How do you feel?’ concerns how we make sense of the world and the sensory qualities that shape media.

How do you know?

- ‘How do you know?’ concerns the ways that people learn and plan; how designers want people to think about their system.
- Paths are good for beginners as they provide step-by-step instructions on what to do. Maps are good for understanding alternatives.

Exploring design space

- A design space constraints a design in some dimensions whilst allowing exploration of alternatives in others
- Designers always work within constraints, whether these are financial or functional, but they need to take care not to impose too many constraints too early in the process.
- Font size is a key design issue. Features of using large font size are:

1. **It can be seen from further away (positive).**
2. **It takes up valuable screen space (negative).**
3. **It means fewer tracks can be displayed (negative).**

Metaphors in design

- Metaphor is generally seen as taking concepts from one domain (called the source domain) and applying them to another (target domain).

Conceptual design using scenarios

- Stories aid **understanding**, **conceptual scenarios** abstract from stories to provide **generic activities**. Fixing certain design constraints leads to concrete scenarios that may finish up as functional specifications expressed as **use cases**.
- A scenario corpus is developed that should be discussed and evaluated at design team sessions and with the participation of stakeholders.
- There are degrees of concreteness in scenarios. The most concrete forms are used to envision or evaluate specific interactions.

Objects and actions in MP3 example

Table 9.2 Object–action analysis of part of scenario MP3/01

Activity	Consists of sub-activities	Action	Object	Comments
Search for MP3 track by name P3	Go to Search function **P3**	Go to	Search object	'Search object' – may need revision?
	Enter query (track name) **P3**	Enter (*user input*) Confirm	Search object Query	
Play track P4	Select search result (MP3 track) **P4**	Select	Search result (*track*)	= MP3 track. There is no 'browse search result' formula here, as it is specified that search result contains only one object (track)
	Play track **P4**	Play (*start play*)	Track	'Play' does not imply playing complete track – track may be paused, stopped, fast-forwarded, etc. 'Start Play' may be the better term

Physical design

- physical design is concerned with how things are going to work and with detailing the look and feel of the product.
- Physical design is about structuring interactions into logical sequences and about clarifying and presenting the allocation of functions and knowledge between people and devices.

Design languages

A design language consists of the following:

- A set of *design elements* such as the use of colour, styles and types of buttons, sliders and other widgets
- Some *principles of composition* (i.e. the rules for putting them together)
- Collections of *qualifying situations* - contexts and how they affect the rules.

A consistent design language means that people need only learn a limited number of design elements and then they can cope with a large variety of different situations.

Microsoft's design language

Starting with the Windows 7 mobile platform and moving onto the desktop in Windows 8, Microsoft have introduced a new design language for their products. The inspiration for the language is described on their website as being Swiss influenced print and packaging and Microsoft software such as Zune and Office Labs, plus games that focus on motion and content over chrome.

The main features of the design language are:

- **Motion.** A system is created to bring the interface to life by developing a consistent set of motions or animations which provide context for usability.
- **Typography.** Aiming for the right balance of weight and positioning can help lead users to more content.
- **Content not Chrome.** Extra chrome is removed so that in the UI, the main focus becomes the content.
- **Honesty.** Design specifically for a hand-held device, incorporating a high resolution screen and using touch. Interaction is expedited and made simple.

Source: www.microsoft.com/design/toolbox/tutorials/windows-phone-7/metro/

Class activity

The figure represents a 16A socket for heavy-duty plugs. Develop a scenario corpus (story to use-case). Identify the key requirements for the socket's design and propose potential design solutions with a prototype concept.