HUMAN-MACHINE INTERACTION

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CAPÍTULO 4: TÉCNICAS DE DISEÑO DE SISTEMAS INTERACTIVOS

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UNIDAD 3: CAPÍTULO 3: TÉCNICAS DE DISEÑO DE SISTEMAS INTERACTIVOS

- DETERMINACIÓN DE REQUISITOS DE USUARIO FINAL
- SELECCIÓN DE UNA REPRESENTACIÓN ADECUADA
- DISEÑO: CONCEPTOS Y TIPOS
- EVALUACIÓN DEL PRODUCTO
- ANÁLISIS DE TAREAS
- DISEÑO VISUAL
- DISEÑO DEL INTERFAZ MULTIMODAL

INTRODUCTION

- Before creative design can start it is essential that the designer develops a clear and thorough understanding of the 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: 'PACT'.

UNDERSTANDING REQUIREMENTS

- A requirement is ‘something the product must do or a quality that the product must have’ (Robertson and Robertson, 1999).
- 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.

UNDERSTANDING REQUIREMENTS

- Many interaction design projects start from a ‘design brief’ which may be quite a vague description of something they want. Often clients will require a requirements specification - a formal written document that contains the requirements.
- Developers also need a clear requirements specification at some point in the development process so that they can cost the project and manage it successfully.

UNDERSTANDING REQUIREMENTS

Requirements templates

The use of a standard format, or template, for specifying requirements is useful, particularly in larger projects. The exact presentation of the information is not important, but at a minimum it should include for each requirement:

- A unique reference number, ideally also coding whether the requirement is functional or non-functional
- A one-sentence summary
- The source(s) of the requirement
- The rationale for it.

As Robertson and Robertson (1999) suggest, there are additional elements which will greatly add to the value of the requirements specification. The most significant of these are:

- The criteria for measuring whether the requirement has been satisfied
- A grade for the importance of the requirement, e.g. on a scale of 1–5
- Dependencies and conflicts with other requirements
- Change history.

UNDERSTANDING REQUIREMENTS

- Conventionally, requirements are divided into two types:
  - **Functional requirements** are what the system must do. Non-functional requirements are a quality that the system must have. These qualities may be crucial factors in the acceptability, sales or usage of a product.
  - **Non-functional requirements** cover a number of aspects of design, including image and aesthetics, usability, performance, maintainability, security, cultural acceptability and legal restrictions. Also important are the data, or media requirements of any system - the type of content that it has to deal with and the various media that will be used.

PARTICIPATIVE DESIGN

- Research work involves using a variety of techniques to understand and analyse someone else's needs, goals and aspirations. The key thing for designers to remember is that they are not the people who will be using the final system. 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.
- Designers employ a range of different styles of interview.
- The structured interview uses questions that are developed beforehand. The interview follows the wording exactly.

Interviews

- Designers very frequently use semi-structured interviews. Sometimes, the interviewer is armed with pre-prepared questions, but can reword these as appropriate and explore new topics as they arise.
- Often, the interviewer simply prepares a checklist, sometimes with suitable prompts such as ‘Tell me about the first things you do when you get into the office in the morning’. Clearly, this free-form approach is more demanding for the interviewer, but the data obtained does generally repay the effort.

Interviews

- Completely unstructured interviews are sometimes used where it is particularly important to minimize designers' preconceptions, or where very little background information is available beforehand.
- As the term suggests, there are no preset questions or topics beyond the general subject of the project in question

Questionnaires

- Most of the methods we discuss in this chapter involve working with people face-toface. However, there are ways of obtaining requirements information at a distance. The most common of these is the questionnaire, but there are more ingenious, novel techniques as well.
- 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

- However, constructing a workable questionnaire is surprisingly difficult and time-consuming. It is a skilled task to devise the wording of questions when there are no opportunities to detect and clear up misunderstandings as they happen. Questionnaires need to be designed, prototyped and evaluated in the same way as any other form of interaction design.
- For small numbers of people - up to 10 or so - an interview will obtain the same information, and more, in a manageable way. This will consume little or no extra resource if the time required to construct a questionnaire is taken into account.

Questionnaires

- Questionnaires are ideally suited to gathering a large amount of quantifiable data, or to capture responses from people who cannot be involved more directly. With the proliferation of on-line questionnaire services such as Survey Monkey, quite complex questionnaires can be constructed and made available on the Web.
- 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.

ENVISIONMENT

Introduction

- 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, card board models and soon.
- Different forms of representation will be more or less useful at different stages in the design process and more or less effective for doing different things. A formal presentation of a design concept for a potential client will look quite different from a sketch of a screen layout intended to explore what something will look like.
- Envisionment is needed to represent design work to ourselves and to others. It occurs throughout development as the designer generates multiple design solutions and whittles them down to a final product.

Finding suitable representations

- Envisionment is fundamental to effective human-centred design, to enable designers to see things from other people's perspectives and to explore design concepts and ideas with others.
- Different representations of design ideas are useful at different stages for different people. They help with generation, communication and evaluation of ideas.
- A sketch 'on the back of an envelope' might be useful for generating an idea and expressing it to a colleague - but it is not so good for giving to a client.

Finding suitable representations

- There are many techniques that can be used to help develop an understanding of the design problem and to envision possible solutions.
- None of these techniques in themselves will lead to the perfect design, but they will all generate some kind of document or representation that can be used in the process of communicating with clients, customers and colleagues. It is through communication that design solutions will arise, be evaluated, and (eventually) be transformed into a final product.

Finding suitable representations

- Choosing suitable representations for the task at hand is one of the skills of a designer; another is making good use of that representation. Representations work by suppressing unnecessary detail, thus ensuring that the significant features of some artefact or activity stand out. A good representation is accurate enough to reflect the features of the system being modelled, but simple enough to avoid confusion. It adopts a style of presentation that is suitable for its purpose.

Finding suitable representations

- 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

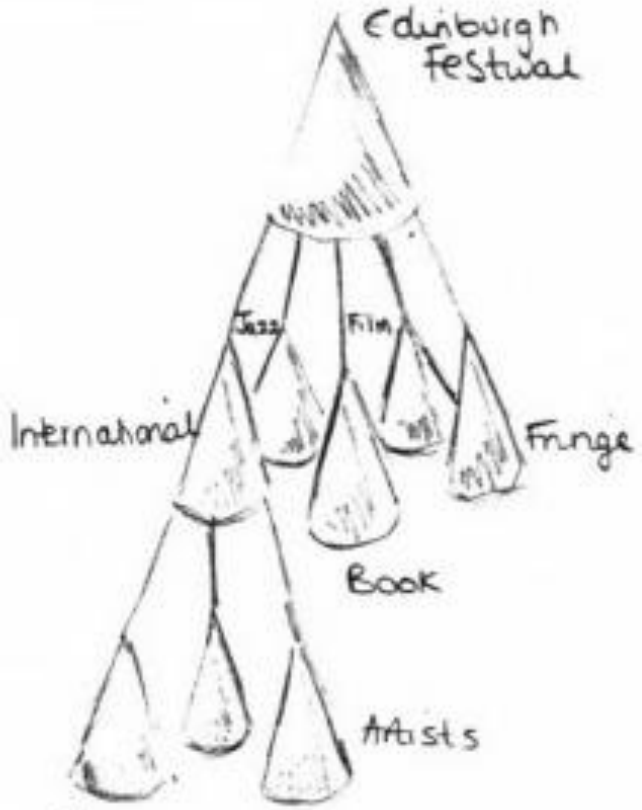
- Here is a suggested series of steps for the envisionment process:
  - Review requirements and conceptual scenarios.
  - Develop representations of your design ideas. At a minimum these should include concrete scenarios, storyboards developing the main interaction sequences, and snapshot sketches of 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

- Envisionment is about bringing abstract ideas to life. It is easy to have great ideas in your head, but it is only by envisioning them that the flaws and difficulties will be exposed. There are a number of basic techniques that can help.
- Some techniques:
  - Sketches and snapshots
  - Storyboards
  - Mood boards
  - Navigation maps
  - Wireframes

Sketches and snapshots

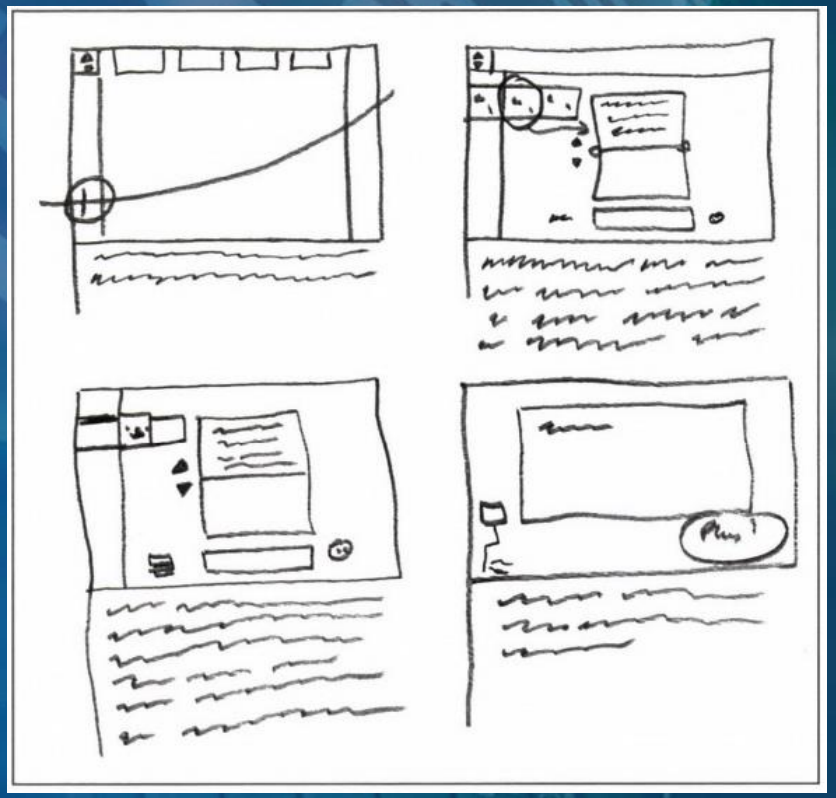
HYPERBOLIC BROWSER



CONE TREE VISUALISATION

Storyboarding

- Storyboarding is a technique taken from filmmaking - using a simple cartoon-like structure, key moments from the interactive experience are represented.
- Three main types of storyboarding are commonly found in interactive media design:
  - Traditional storyboards
  - Scored storyboards
  - Text-only storyboards

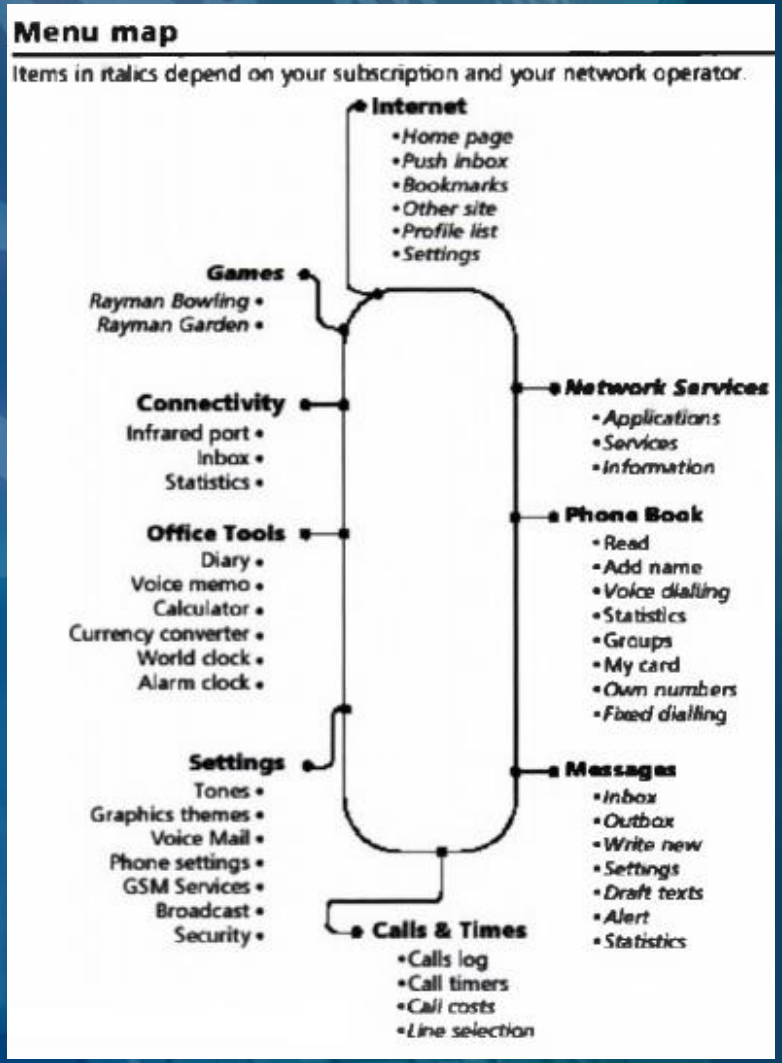


Mood boards

- A **mood board** is a type of collage consisting of images, text, and samples of objects in a composition. It can be based upon a set topic or can be any material chosen at random. A mood board can be used to convey a general idea or feel about a particular topic. They may be physical or digital, and can be effective presentation tools
- Mood boards are widely used in advertising and interior design. Quite simply you gather visual stimuli that capture something of how you feel about the design - photographs and other images, colours, textures, shapes, headlines from newspapers or magazines, quotations from people, pieces of fabric and so on.

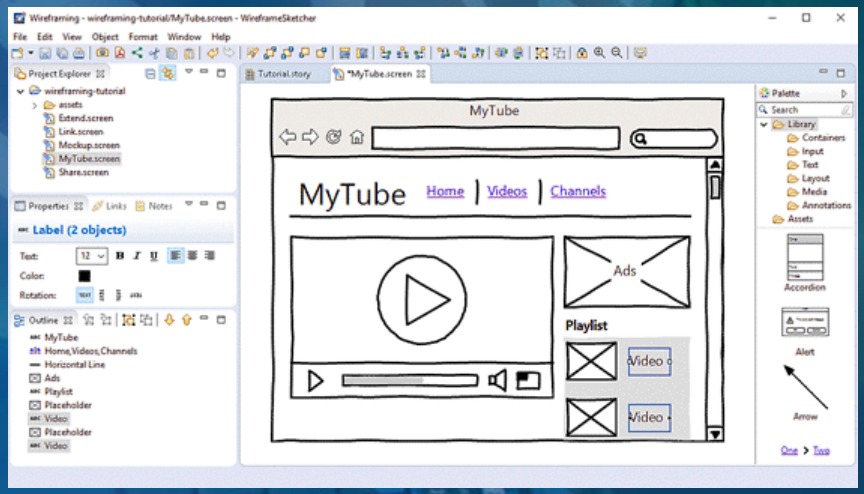
Navigation maps

- 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. Each page in the site, or location in the application, is represented with a box or heading and every page that can be accessed from that page should flow from it.



Wireframes

- Wireframes are outlines of the structure of a software system. They used to be concerned principally with website design, but with the proliferation of small-scale apps for handheld and tablet devices, wireframing has become a mainstream technique.
- Wireframes work because they focus on the general elements of a design without worrying about the final detail. For example in a mobile phone app there are buttons, menu items, selections. Certain events cause certain behaviours such as a button click moves the user to the next page. Wireframing makes use of these generic design features for both apps and websites to create quick designs often for quick evaluation.



Prototypes

- A prototype is a concrete but partial representation or implementation of a system design. Prototypes are used extensively in most design and construction domains.
- Prototypes may be used to demonstrate a concept (e.g. a prototype car) in early design, to test details of that concept at a later stage and sometimes as a specification for the final product. 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.

Prototypes

- For the design team, representations like navigation maps and flow charts might be meaningful, but for clients and ordinary people some form of prototype is crucial for capturing the outcomes of the envisioning techniques we have discussed so far.
- The prototype might seek to highlight just the interface, or some crucial aspect of the functionality. Prototypes are first and foremost a way of involving people and clients in evaluating your design ideas.
- There are two main kinds of prototyping - low-fidelity (lo-fi) and high-fidelity (hi-fi).

Hi-fi prototypes

- Hi-fi prototypes are similar in look and feel, if not necessarily in functionality, to the anticipated final product. They are produced in software, whether in the development environment which will be used for implementation or in packages that will allow interactive effects to be mocked up easily.
- Hi-fi prototyping has the following features:
  - It is useful for detailed evaluation of the main design elements (content, visuals, interactivity, functionality and media) - for example, hi-fi prototypes can be used in usability studies to establish whether people can learn to use the system within a specified amount of time.
  - It often constitutes a crucial stage in client acceptance - as a kind of final design document which the client must agree to before the final implementation.
  - It is generally developed fairly well into the project when ideas are beginning to firm up, unless there is some crucial issue that needs to be resolved before any other work can proceed.

Lo-fi prototypes

- Lo-fi prototypes - often termed paper prototypes, since that is what they are usually made from - on the other hand, have the following features:
  - They are more focused on the broad underlying design ideas - such as content, form and structure, the ‘tone’ of the design, key functionality requirements and navigational structure.
  - They are designed to be produced quickly, and thrown away as quickly.
  - They capture very early design thinking and should aid, not hinder, the process of generating and evaluating many possible design solutions

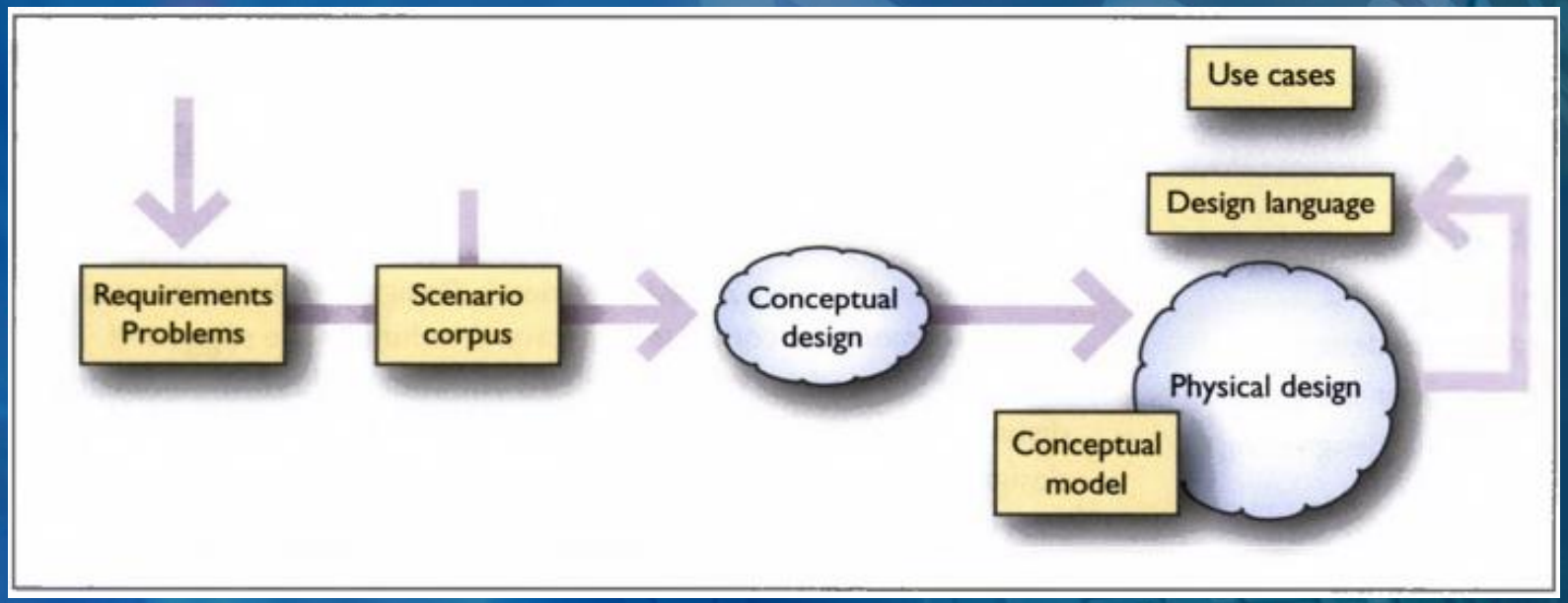
Main practical issues

- The main practical issues with designing paper prototypes are as follows:
  - Robustness. If a paper prototype is to be handled by lots of people it needs to be tough enough to survive.
  - Scope. Focus on broad issues and key elements; if you are trying to tell too detailed a story it can be hard for users to understand.
  - Instructions. There is a trade-off between adding enough detail for someone to be able to use the prototype without the designer helping (in which case the boundary between the design ideas and the supplementary information can be hard to see) and adding so much detail that it needs someone to talk the person through it (which may affect their responses).
  - Flexibility. Have parts of the paper prototype adjustable so that people viewing it can 'redesign it' on the fly, e.g. by using sticky notes to represent parts of the screen where the user can move elements around or add new items.


DESIGN

Introduction

- In design we distinguish conceptual design - design in the abstract - from physical design - where ideas are made concrete.



Design: types

- 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 (with the allocation of functions between people and artefacts), how the artefacts will look and how they behave.

Conceptual design

- Clear conceptual design is central to developing systems that are understandable.
- Designers need to ensure that their conception of the system is easily learnt by people and fits with their expectations and preferences. This is so that people can develop a clear ‘mental model’ of the system.