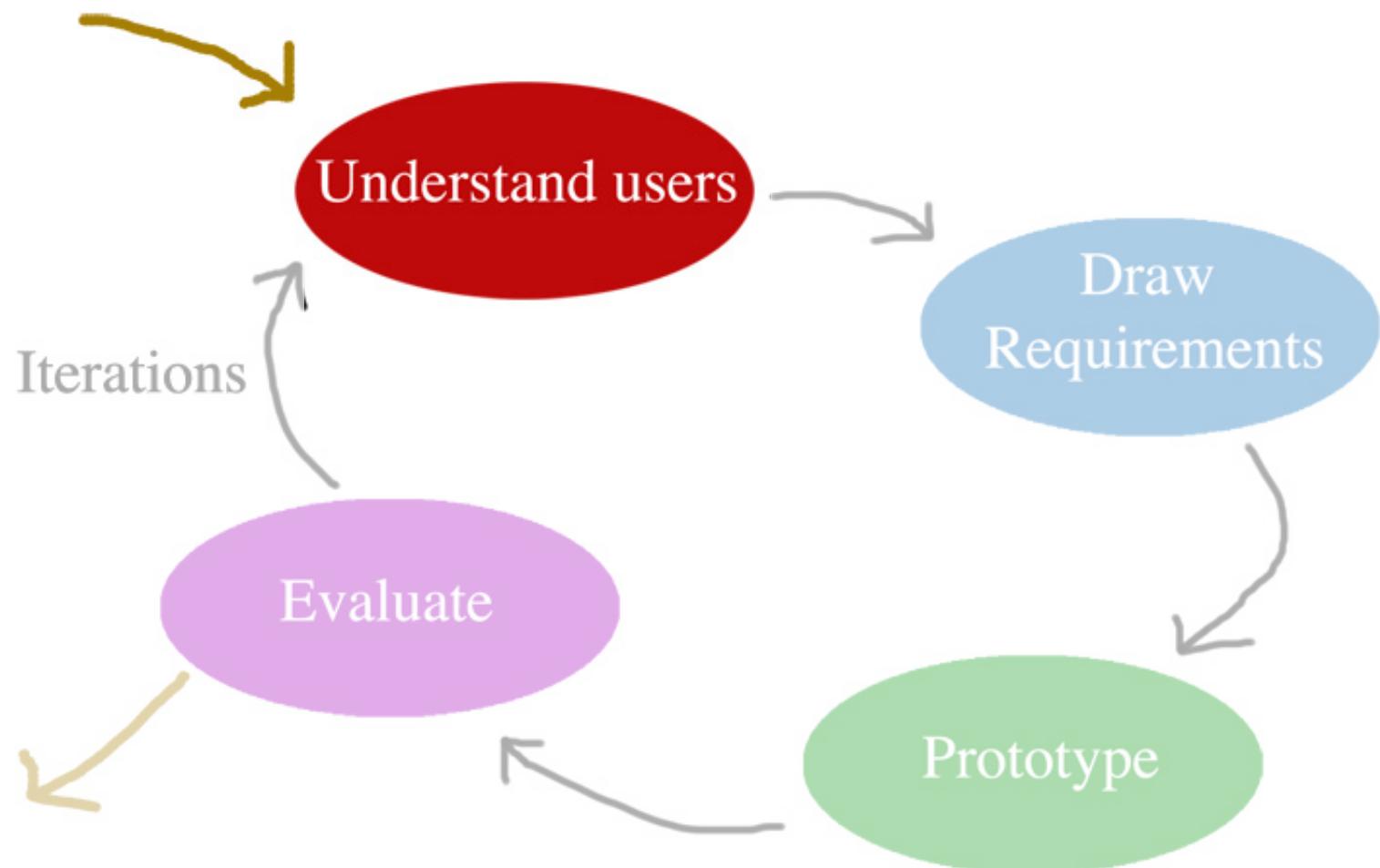


CS4826 HCI

Week 6

The User-Centred Design Process



Functional approach to HCI:

main goal is to improve the execution of tasks and activities, reduce error and frustration.

Domains studied extensively by HCI specialists:

- air traffic control and other critical control domains
- home appliances
- GUIs, Graphical User Interfaces. Software support systems.

Usability (development of usability engineering)

Formal Methods: creating a model of the user's skills and abilities as a point of reference for design

Methodologies and approaches...

- Structured interviews
- Task Analysis

Identify critical stages of action and define requirements for better design

Find measurable indicators of performance

This approach based on the formal and detailed representation of human activity by means of models.

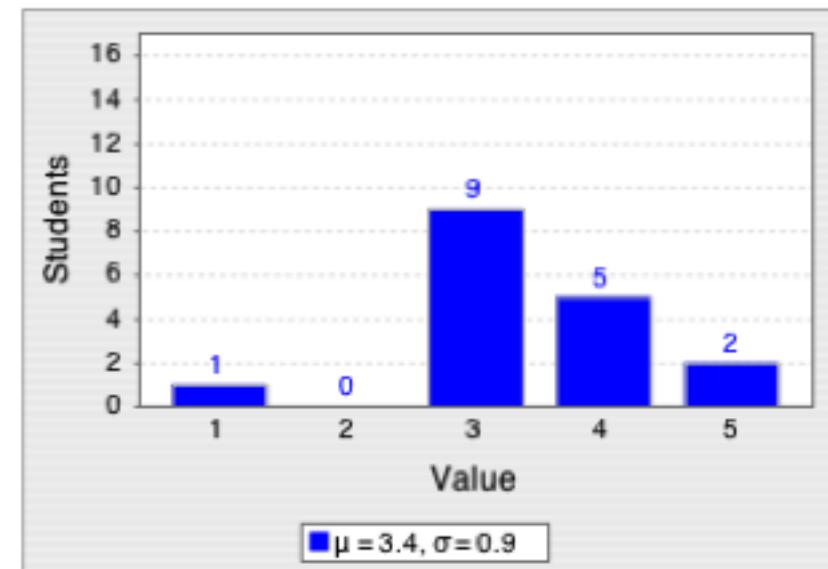
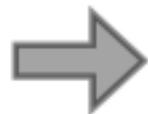
Important for example when studying fixed **procedures**

-Structured interviews and questionnaires (scale)

- Looking for **quantitative** indicators
- Use of a quantitative scale (for example a Likert scale below)
- Statistical analysis (origin in psychometrics)
- Only a certain type of information can be gathered

I think the pace of the lecture is

1 – much too slow
2 – too slow
3 – just OK
4 – too fast
5 – much too fast



- Task Analysis: create a representation of tasks

Create a model of how activities are executed

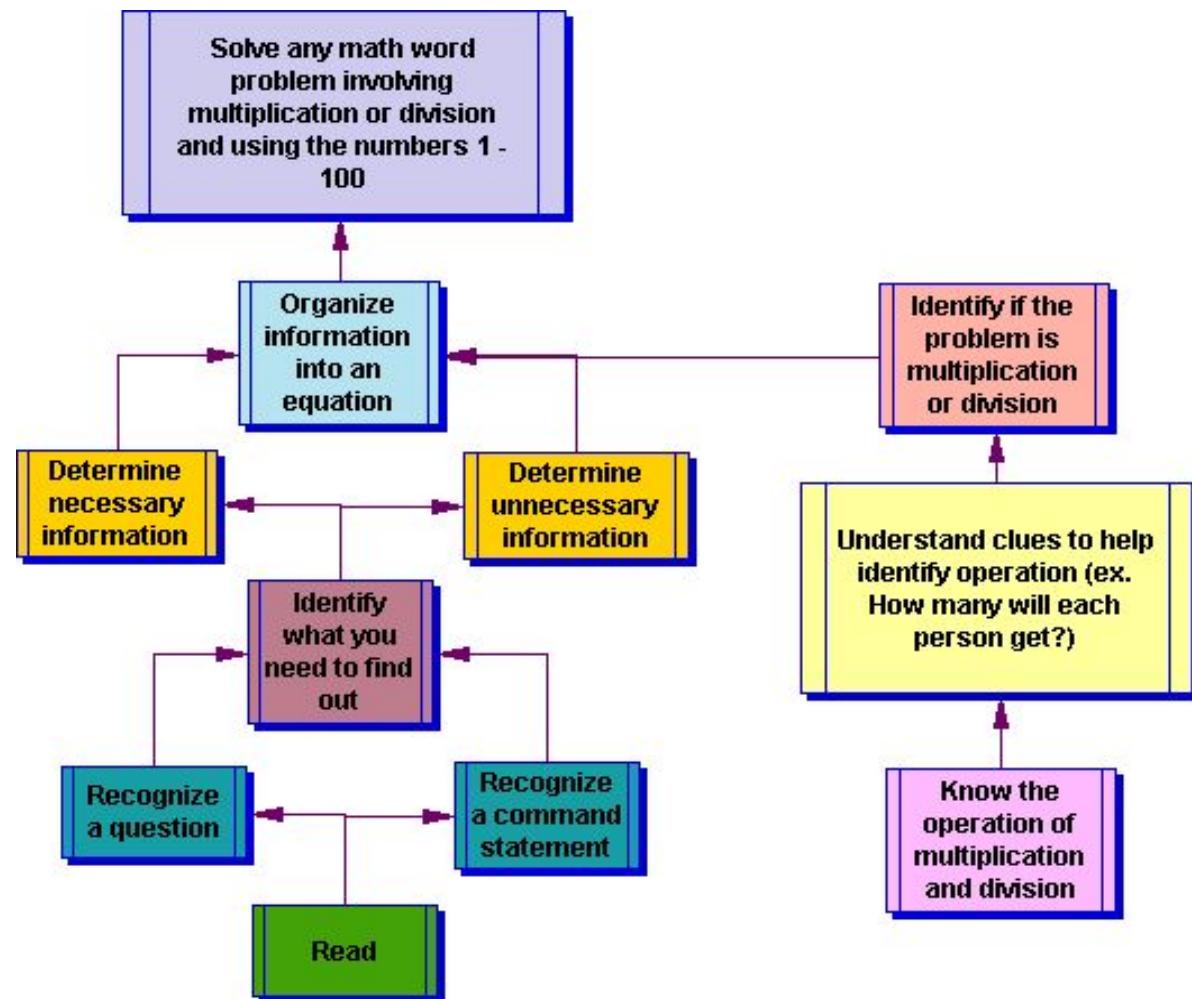
---- GOMS:

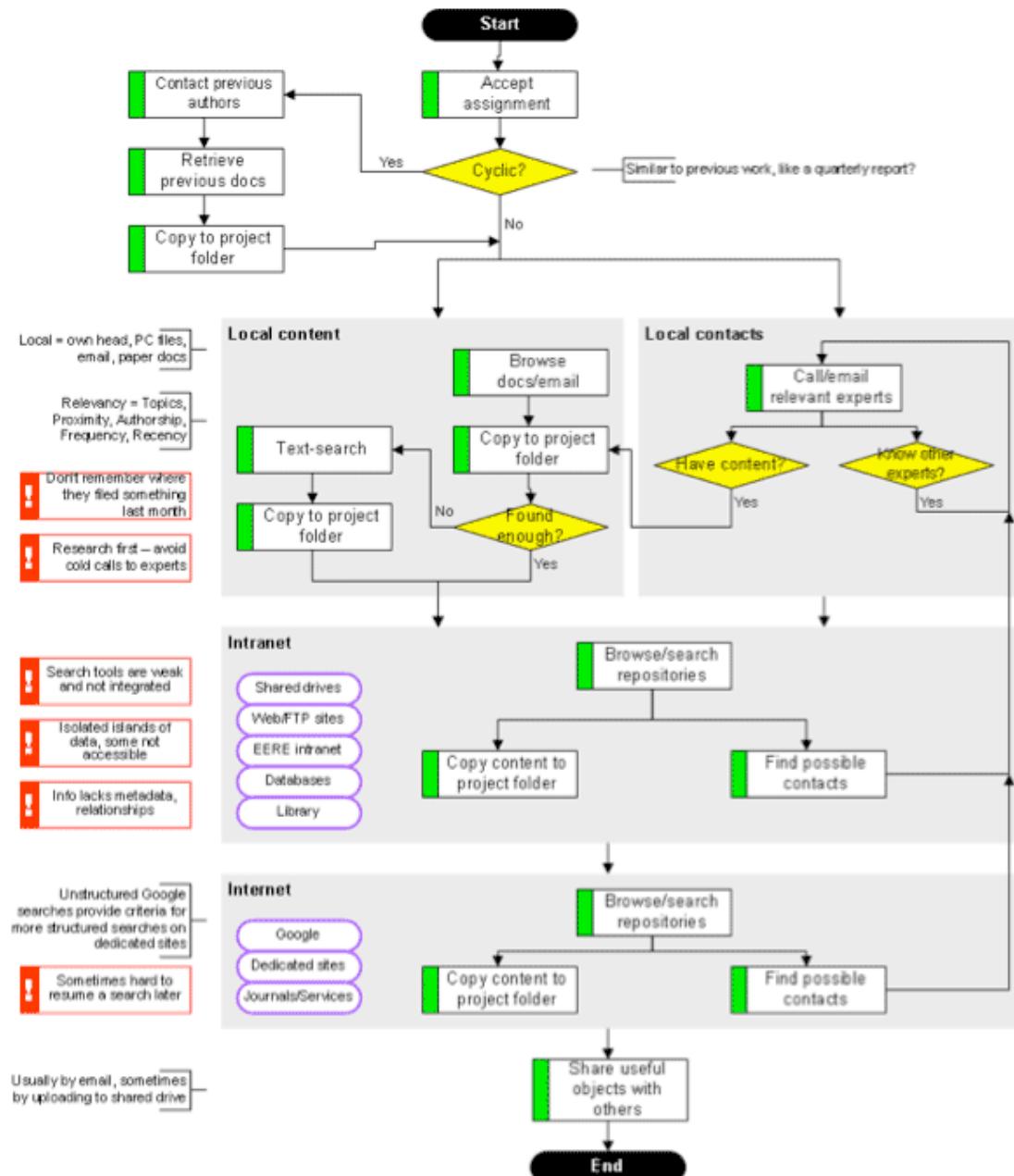
Goals,
Operations,
Methods
and Selection Rules

- Task Analysis: create a representation of tasks

---- GOMS: Goals, Operations, Methods and Selection Rules

Example of Hierarchical Task Analysis





- **Task Analysis: create a representation of tasks**

- GOMS: Goals, Operations, Methods and Selection Rules

- 1 Determine the sequence in which tasks are performed, so that it's easier to point out where breakdowns occur
- 2 Need to observe a number of users to determine task trees
- 3 Several task trees can be used to determine how a procedure takes place

-Cognitive Walkthrough (used to inspect an existing system or an early prototype by experts)

- The expert goes through an interface performing a set of tasks
- Gather data on learnability, ease of use and support of action
- Try to match actions to goals: how do the users go about achieving their goals

-Cognitive Walkthrough

As the walkthrough proceeds, the evaluators ask the following four questions:

- * Will the users try to achieve the right effect? For example, their task is to print a document, but the first thing they have to do is select a printer. Will they know that they should select a printer?
- * Will the user notice that the correct action is available? This relates to the visibility and understandability of actions in the interface.
- * Will the user associate the correct action with the effect to be achieved? Users often use the "label-following" strategy, which leads them to select an action if the label for that action matches the task description.
- * If the correct action is performed, will the user see that progress is being made toward solution of the task? This is to check the system feedback after the user executes the action.

Example

- IDC MedCap Project
- <http://www.medcap.eu/index.html>
- Development of interactive systems for training medical students on how to perform spinal anaesthesia
- Studying the procedure in detail

Example

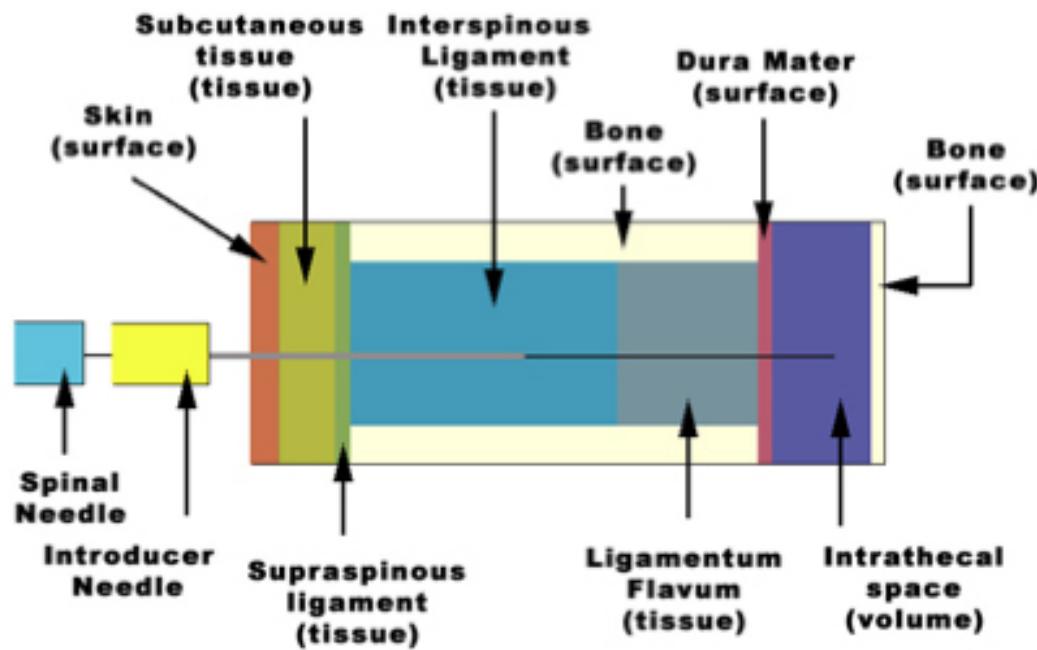


Figure 1. A conceptual, 2D cross-section of the human back showing each layer that the introducer and spinal needle has to penetrate. It also illustrates if the layer is modelled as a surface or a tissue (volume).

Example

- Formal documentation of how the trainees are instructed to the procedure
- Design of a haptics simulator for training

Example

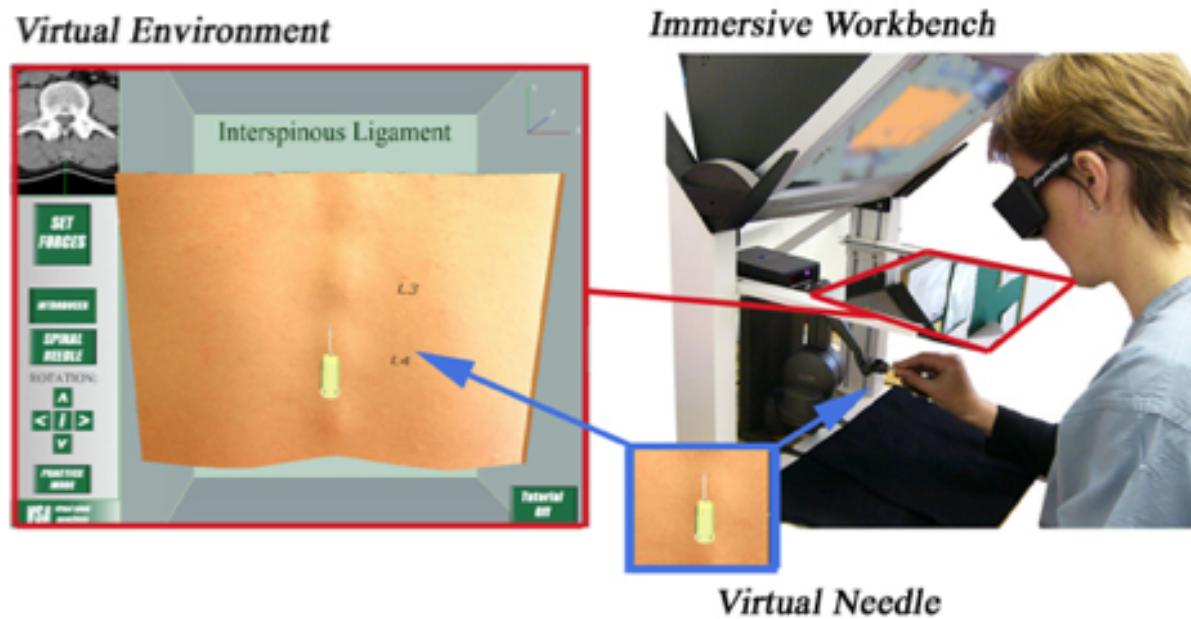


Figure 2. The movement of the haptic device corresponds to the movement of the needle in the virtual environment. An Immersive workbench is used to create intuitive interaction, where a mirror is used to display the virtual environment above the device.

<http://www.medcap.eu/films/MedCAP%20system.wmv>

These methods are useful for studying highly structured systems that rely on the users' performance of a series of established tasks (procedures)

Most of them rely on “Measuring”: quantitative approach.
Also reliance on models of user's behaviour and on expert knowledge

This way of doing user studies HCI has been challenged, as not always performance is the primary concern. What if we need to study more than task execution?

Focus on tasks and performance only vs. focus on broader context of use





THIS IS NOT A RED COURTESY PHONE
PAYPHONE ONLY



THIS IS NOT A RED COURTESY PHONE
PAYPHONE ONLY

Sometimes, the design problem requires looking at more than the execution of tasks...

Cultural context (airport phone)

Social context (the police archive)

Physical context

Need to seek different methods of investigation to study these issues, as formal methods are limited in this respect

Looking at the wider context:

Contribution from the field of Computer Supported Cooperative Work, influence from social science

Use of qualitative approaches: not focused on measurement or modeling, but on understanding other dimensions of activity, such as the reasons for a certain behaviour.

Advantages/disadvantages.

What can quantitative methods do that qualitative methods cannot?

What can qualitative methods do instead?

“From Human Factors to Human Actors” (1991) by Liam Bannon

Ethnography and the Ethnographic methods

...More interest on Ethnographically-based methods in more recent years...

What is Ethnography? It's the practice of documenting human behaviours, situations and practices through fieldwork and the collection of data accounts.

Methodological approach with roots in social science (sociology, anthropology, geography, etc)

Ethnography is grounded on fieldwork

Fieldwork: it means you have to be there, where it all happens. Why?

Data accounts: they are rich and not as straightforward as measurements. It means they have to be interpreted and analysed. It also means that they are taken from the perspective of the observer.

Techniques: Ethnography doesn't have specific techniques attached to it, as far as the data are varied. **Qualitative approach**

Observations/Informal Observations (often video-based)

Note taking and sketching

Shadowing

Conversations (informal)

Semi-structured interviews

Participant observation

Example 1

- Shared Worlds
- SHAPE
- Design of interactive installations in public places: museum, airport

SHAPE

- Interactive exhibition for the Hunt Museum in Limerick
- No other technology present at the time
- Need to understand visitors' experiences as well as the museum's own identity (curators, staff, guides, etc)
- Choice of techniques

SHAPE

- How technology could enhance the visitors experience at the Hunt Museum?
- Understand:
 - the nature of the collection
 - the information available
 - the rationale of the exhibits
 - the role of human guides.

SHAPE

- Ethnographic method has been used for conducting field studies: informal observation sessions (paper accounts), observation sessions with video footage, analysis of video recordings.
- Informal observations of visitors moving through the museum
- Analysis of the different museum spaces
- areas and features of the museum were favoured by the visitors, and where interesting interactions occurred among visitors
- Multiple relationships in between objects

SHAPE



SHAPE

- Open interviews and conversations
- Participation in museum activities (e.g. cleaning of artefacts)
- Walkthrough and narratives

Shared Worlds at Shannon Airport

- Design of a fun installation to act as a social catalyst (bringing people together) in the space
- Video observations: effective in capturing important information about the use of space, resources, flow, timeline of activities

Shared Worlds at Shannon Airport



Shared Worlds at Shannon Airport



Shared Worlds at Shannon Airport

Interviews with passengers, visitors and staff

Passengers and visitors were asked if they were regular users of Shannon; what they thought of it; if they knew anything about the local history; any improvements they would make to Shannon Airport

Staff were asked about the airport as a workplace, their time there, the experiences they face in dealing with a high-anxiety space

SHAPE and Shared Worlds

- Both projects had an open-ended design brief
- Functionality was secondary to engaging user experience
- Creative element: seek inspiration as well as information

Example 2

- NomadS Project: investigating the relationship between nomadic work, tangible artefacts and the physical environment
- How do mobile workers organise their activities in a variety of locations? How do they make a workplace out of a location?
- Study of a team of sales representatives working for a joinery company
- Transition between a paper-based system to a technology-supported system (PDA)
- Evaluation of PDA tool and suggestions for improvement

NomadS

- How to study the reps' activities on the move?
- Shadowing

NomadS



NomadS

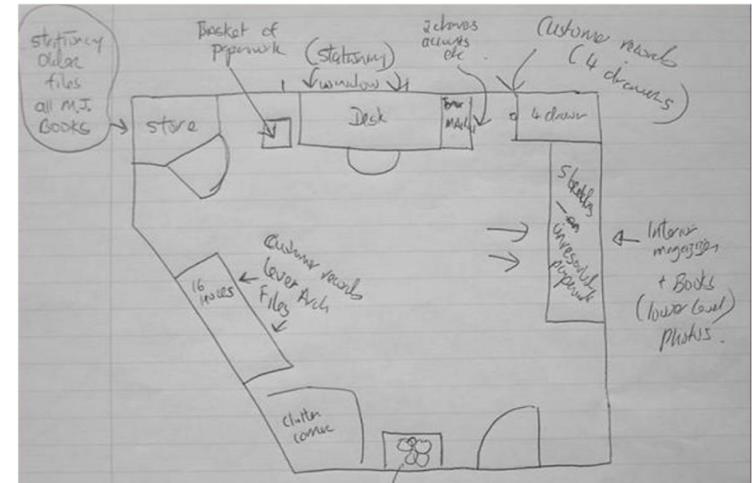
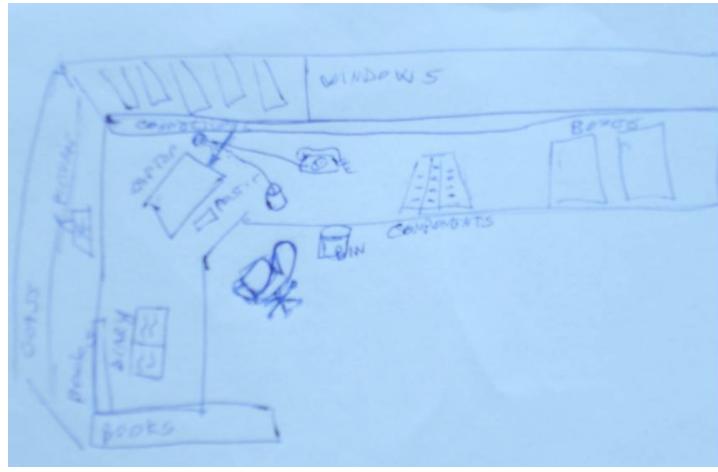


NomadS



NomadS

- Mapmaking and drawings



NomadS

- Studying the artefacts and resources that are used in the process

NomadS

- Studying the artefacts and resources that are used in the process



Ethnography is not a theory, but a **methodological approach** to describe phenomena, not predict them or explain them from a particular perspective.

Describing phenomena, revealing existing practices, gaining useful insights for design

Challenge of understanding work for design (Book “Fieldwork for Design” by Randall, Rouncefield and Harper).