

Human – **C**omputer **I**nteraction



Chapter 2 (Part 2)

Techniques used in the Analysis, Design, and Evaluation Phases in HCI Design

KEY CONCEPTS

User:

- Represents several profiles with varied characteristics
- Has specific goals/tasks (e.g., searching for a book)
- Tasks can be repetitive, occasional, time-constrained, or risky

Task:

- What the user wants to achieve
- Must be analyzed in context (frequency, duration, sensitivity)

Context:

- Refers to the environment and constraints of use
- Public systems → ease of use
- Entertainment → attractiveness
- Industrial systems → productivity
- Critical systems → zero-risk performance
- Mobile context → portability, simplicity

THE THREE MAIN PHASES IN HCI DESIGN

Phase	Goal	Example Techniques
Analysis	Identify user needs, tasks, and context	Interviews, Focus Groups, Observation
Development (Design)	Build part or all of the interface	Brainstorming, Storyboarding, Prototyping
Evaluation	Measure usability and satisfaction	A/B Tests, Cognitive Walkthroughs, Usability Testing

INFORMATION-GATHERING TECHNIQUES

Used throughout HCI design to collect data about:

- Users → to build personas
- Tasks → to model user workflows
- Interfaces → to identify ideas, strengths, and weaknesses

Choose a technique based on:

- Project context
- Type of users
- Current phase (analysis, design, evaluation)



TECHNIQUES FOR THE ANALYSIS PHASE

BRAINSTORMING (IDEA STORMING)

Goal: Generate a large number of creative ideas.

Protocol:

- Small group with diverse roles and expertise
- Time-limited (\approx 1 hour)
- Focus on a specific design problem

Procedure:

- Generate as many ideas as possible — record all without judging
- Group and vote on ideas by quality
- Do not ignore unusual or bold ideas

 Best for early idea generation.

FOCUS GROUP

Goal: Understand users' motivations, preferences, and expectations.

Protocol:

- Define 5–6 key topics
- Limit group size (7–10 participants)
- Record the session (video/audio)
- Use whiteboards or assistants to capture notes

FOCUS GROUP

Procedure:

- Icebreaker activity
- Remind participants of the rules
- Discussion with increasingly detailed exercises
- Synthesize results and discuss findings

• Outcome:

- Global understanding of user motivations
- Discovery of new ideas through group dynamics

WIZARD OF OZ METHOD

Goal:

Test a system that does not yet exist by simulating missing functions.



Protocol:

- Suitable for complex or expensive systems
- A “wizard” (human operator) performs actions instead of the system

WIZARD OF OZ METHOD

Procedure:

- The wizard interprets user inputs
- The wizard simulates system responses

Example:

- DIALORS project (1984) — early voice-based ticket booking system

Usefulness:

- Collects user reactions before real development
- Now less common (due to modern prototyping tools)

CARD SORTING



Goal:

- Build or test the information architecture of an interface.

Protocol:

- Representative users (individually or in small groups)
- Conduct several rounds (3–10) until results converge
- Prepare cards, each containing a concept or feature

CARD SORTING

Procedure

Validate card labels (rewrite if needed)

Group similar cards

Name each group formed

Analysis:

Statistical (most frequent groupings)

Qualitative (based on observation)

STORYBOARDING (SCENARIO MAPPING)

Goal:

Create a realistic description of how the system is used.

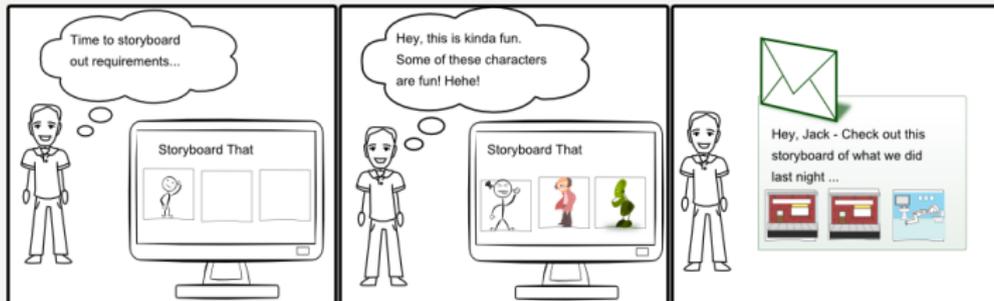
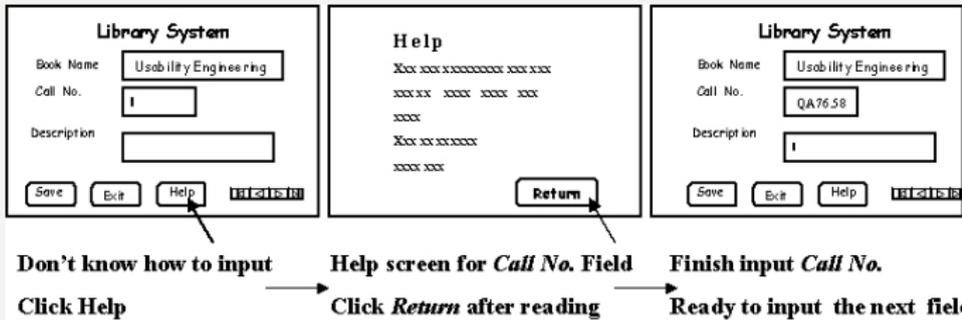
Protocol:

- Adapted from cinema storyboards
- Offers an overall view of interactions for completing a task

Procedure:

- Identify existing or typical user tasks
- Create usage scenarios (mix normal and unusual events)
- Include both successful and failed outcomes

 Helps visualize user flow before prototyping.





TECHNIQUES FOR THE DESIGN PHASE

PARALLEL DESIGN

Goal:

Create multiple interface ideas and combine their best parts.

Protocol:

- Individual or group-based design sessions
- Each participant designs an interface (paper or digital)

Procedure:

- Each designer creates an independent interface
- Compare and discuss all designs
- Keep the strongest ideas from each version



Encourages creativity and reduces design bias.

PARALLEL DESIGN

Preferences

Set Preferences On:

Cache and Network

Cache

Memory Cache: 600 Kilobytes

Disk Cache: 1000 Kilobytes

Disk Cache Directory: c:\netscape\cache

Verify Documents: Once per Session Every Time Upon Expiration

Network Connections

Network Buffer Size: 4096 Kilobytes

Connections: 8 (Maximum number of simultaneous network connections)

Netscape: Preferences

Cache and Network

Cache

Memory Cache: 2000 Kilobytes

Disk Cache: 2000 Kilobytes

Cache Directory: /u/hagan/.cache

Verify Documents: Once per session Every time Upon expiration

Network

Network Buffer Size: 16 Kilobytes

Connections: 20 (Maximum number of simultaneous network connections)

Preferences

Cache and Network

Cache

Cache Directory: Bayou\System Folder...\Netscape f:\Cache f

Cache Size: 2 86M available

Network

Connections: 4 (Maximum number of simultaneous network connections)

Buffer Size: 4 Kilobytes

CARD SORTING (IN EARLY DESIGN)

Goal: Structure the information architecture (menus, categories).

- Users organize content cards into logical groups.
- Designers use results to design navigation and labeling.

Supports logical and user-friendly information organization.

PROTOTYPING

Goal: Create tangible versions of the interface to test and refine ideas.

Types of prototypes:

- **Low-fidelity:** Paper sketches or wireframes (quick, cheap).
- **Mid-fidelity:** Digital mockups (basic layout and navigation).
- **High-fidelity:** Interactive prototypes (near-final visuals and logic).

TECHNIQUES FOR THE DESIGN PHASE

Technique	Goal	Output
Brainstorming	Generate creative ideas	List of potential features or layouts
Card Sorting	Organize information	Site map, menu structure
Storyboarding	Visualize user tasks	Illustrated user flow
Prototyping	Build and test early interface versions	Mockups and prototypes
Parallel Design	Compare multiple solutions	Best combined design

In the design phase, you often combine several techniques:

Brainstorm → Storyboard → Prototype → Parallel Design → Test



TECHNIQUES FOR THE EVALUATION PHASE

COGNITIVE WALKTHROUGH

Goal:

Evaluate usability by imagining the user's thought process.

Protocol:

Define scenarios with clear tasks and context

Procedure:

- Evaluate by simulating user actions step by step
- Does the user understand messages and system behavior?
- Interpret results and identify difficulties



Useful for testing clarity and learnability.

OBSERVATION

Goal:

Identify problems during real or simulated use.

Protocol:

In the lab or real environment

At least two users act independently

Procedure:

- Define a specific mission (task or scenario)
- Decide what to measure
- Observe the user performing the task
- Record (notes, audio, video, digital logs)

Tips:

Can include “think-aloud” method

Two observers improve accuracy

A/B TESTING

Goal:

Compare two design versions for performance.

Protocol:

- Two interface versions differ by one variable (e.g., button color)
- Define a measurable goal (e.g., clicks, purchases)
- Choose a metric to compare results

Procedure:

1. Randomly show users one version
2. Count completed goals for each version



Used for quantitative, data-driven evaluation.

A/B TESTING



Click rate :

52 %



72 %

ERGONOMIC AUDIT

Goal:

Evaluate the interface using expert knowledge.

Protocol:

- Ideally, several independent experts
- Compare and discuss results
- In practice: one ergonomics expert + one domain expert

Advantages:

- Quick to perform
- Helps prioritize improvements
- Lower cost, but lacks direct user feedback

INTERVIEWS AND SURVEYS

Goal:

Identify usability problems or new design opportunities.

Protocol:

- Representative users, interviewed in their real environment
- Prefer recording (audio/video) over note-taking
- Duration \approx 1 hour
- Maintain interviewer neutrality

Procedure:

1. Use semi-structured questions (for analysis)
2. Use direct questions (for evaluation)
3. Rephrase to confirm understanding

Result:

- Qualitative insights — interpret carefully (no statistics)



INTERVIEWS AND SURVEYS

Prénom

Nom

1. As-tu déjà utilisé un ordinateur ? oui non
2. est-ce que tu utilises souvent un ordinateur ?
plusieurs fois par semaine / 1 fois par semaine / 1 fois par mois / moins
3. Qu'est ce que tu fais avec l'ordinateur ?
 des jeux des jeux éducatifs des dessins des maths
 autres matières autre
4. Est-ce que tu aimes les mathématiques ?
pas du tout beaucoup



Appreciation générale

5. Utiliser AMBRE était
très difficile très facile
très ennuyeux très agréable
6. As-tu eu du mal à savoir comment te servir du logiciel ?
 pas du tout un peu beaucoup tout le temps
7. As-tu eu l'impression d'être perdu(e) ?
 jamais au début parfois souvent
8. Qu'est ce que t'as paru difficile ? (quelles difficultés as-tu rencontré ?)

.....
.....

Problèmes de compréhension

9. As-tu eu des difficultés à comprendre les consignes ? oui non

TRACE ANALYSIS

Goal:

Study **real user behavior** while performing tasks.

Protocol:

- Choose trace type and collection method

Procedure:

1. Record traces (paper, video, log files, etc.)
2. Analyze both qualitatively and quantitatively

Types of Traces:

- Paper notes → single point of view
- Video/audio/eye-tracking → detailed, time-consuming
- Digital logs → automatic data analysis



Combines with observation and inspection methods.

Trace Analysis





**CASE STUDY:
“IHM-ÉCOLO” – ECO-
FRIENDLY MOBILE
APP**

CASE STUDY: “IHM-ÉCOLO” – ECO-FRIENDLY MOBILE APP

Project: Application for identifying recyclable waste

Features:

- Detect waste via photo, category, or keyword
- Indicate the correct recycling bin
- Include map features for bin locations and collaborative updates

Target Users:

- General public, smartphone users

Technical Platform:

- Smartphone with camera

IHM-ÉCOLO – ITERATIVE DESIGN APPROACH

Method: iterative, prototyped, persona-based, with early evaluation

First Iteration

- **Analysis:**
 - Questionnaire & survey to build personas and scenarios
 - Brainstorming for main ideas and functions
- **Design:**
 - Interface prototyping and promotional website
- **Evaluation:**
 - Cognitive walkthrough using personas and scenarios

SCENARIO EXAMPLE:

- Ahmed, 22, finishes breakfast and wonders where to throw his empty milk bottle.
- He opens the recycling app, takes a photo, and sees the correct bin type.

Metrics:

- Execution time and number of steps (ideal: 4 actions)

IHM-ÉCOLO – ITERATIVE DESIGN APPROACH

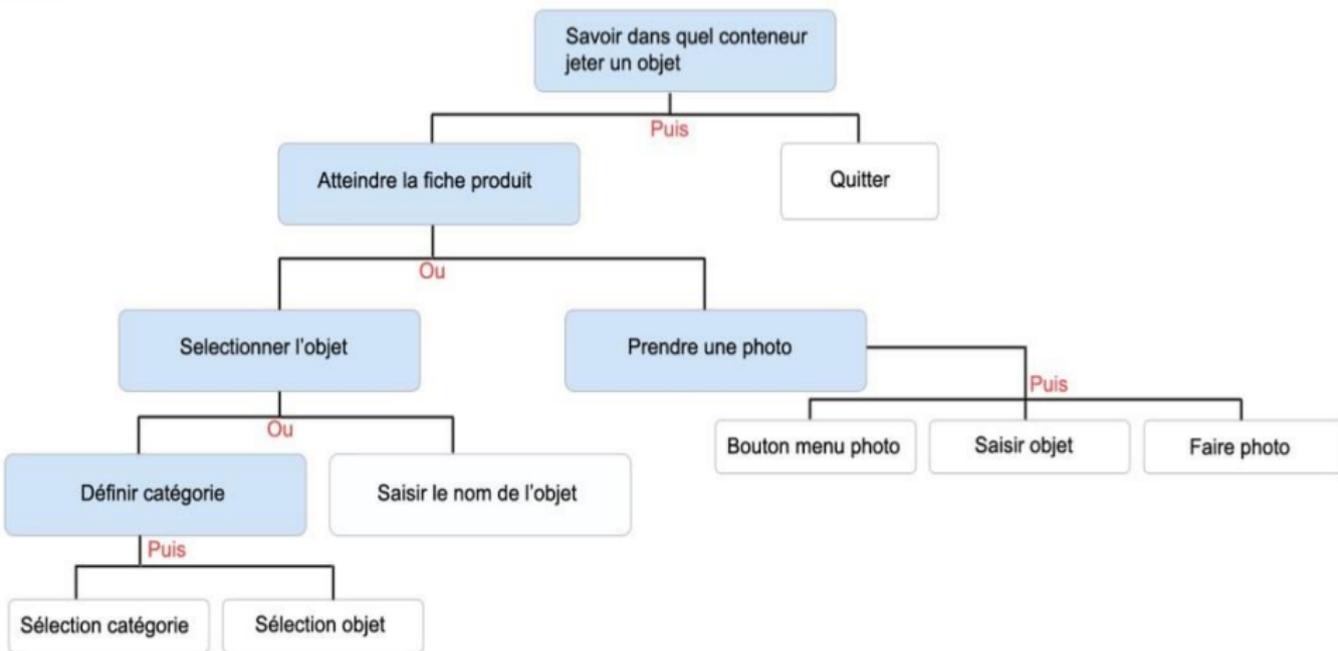
Second Iteration

- **Analysis:**
 - Focus groups to understand user motivations
 - Interviews to define task models
- **Design:**
 - Parallel design to improve weak points
- **Evaluation:**
 - Observation of user interactions



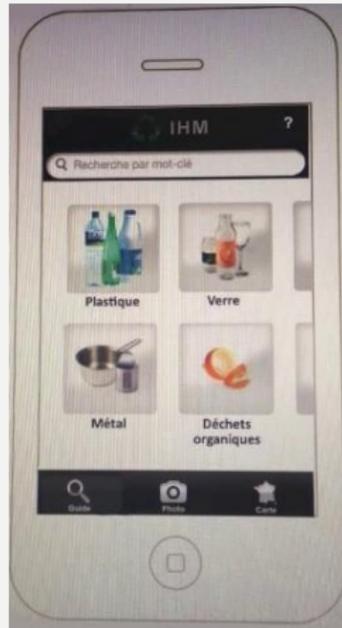
Progressive refinement of interface and usability.

Proposition : IHM-écolo, a mobile application



Task Model for the application (second iteration)

Proposition : IHM-écolo, mobile application (7)



Demonstration Video of the application (IHM-ecolo)

CONCLUSION

- The HCI design method is:

Iterative, Incremental, Prototyped, User-Centered, and Evaluation-Based.

- It relies on **information-gathering techniques** to collect data about:
 - Users
 - Tasks
 - Interfaces
- Choosing the **right technique** depends on:
 - The phase (analysis, design, or evaluation)
 - The context and goals of the project

No strict scientific method — it's empirical, creative, and user-focused.

Conclusion

- I Méthode de conception pour l'IHM \Rightarrow itérative, incrémentale, prototypée, centrée utilisatrice, avec évaluation précoce, et forte relation entre équipe de conception et utilisatrices
- I Pas de méthode scientifique analytique, mais empirique
- I Des techniques de recueil d'informations associées à la méthode afin de récolter des informations sur les tâches, les interfaces, les utilisatrices, etc.
- I Choix pertinent d'une technique selon l'information à récolter, la phase courante, le contexte, etc.

