

The Process of Interaction Design

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Objectives

Consider what doing interaction design involves.

Explain some advantages of involving users in development/design.

Explain the main principles of a user-centered approach.

Present a simple lifecycle model of interaction design.

Ask and provide answers for some important questions about the interaction design process.

Recap: Interaction Design

"the practice of designing interactive digital products, environments, systems, and services" (Cooper et al. 2014)

"the process that is arranged within existing resource constraints to create, shape, and decide all use-oriented qualities (structural, functional, ethical, and aesthetic) of a digital artifact for one or many clients" (Löwgren and Stolterman 2007)

Cooper, A., Reimann, R., Cronin, D. and Noessel, C. (2014). About Face: The Essentials of Interaction Design, 4th Edition. John Wiley & Sons, Inc.
Löwgren, J. and Stolterman, E. (2007). Thoughtful Interaction Design: A Design Perspective on Information Technology. The MIT Press.

Overview

What is involved in Interaction Design?

- User involvement

- What is a user-centered approach?

- Four basic activities**

Some practical issues

- Who are the users?

- What are 'needs'?

- Where do alternatives come from?

- How to choose among alternatives?

Process and lifecycle models

- User-centered design

- Participatory design

- Socially-aware design

Lifecycle models

What is involved in Interaction Design?

It is a process:

- a goal-directed problem solving activity informed by intended use, target domain, materials, cost, and feasibility

- a creative activity

- a decision-making activity to balance trade-offs

Generating alternatives and choosing between them is key

Different approaches:

- user-centered/human-centered design, activity-centered design, systems design, and genius design

Why involve users

Expectation management

- Realistic expectations, no surprises, no disappointments

- Timely training

- Communication, but no hype

Ownership

- Make the users active stakeholders

- More likely to forgive or accept problems

- Can make a big difference to acceptance and success of product

User involvement

During design:

Member of the design team

*As users, testers, informants, and **partners** (→ codesign)*

Full time/part time

Short term/long term

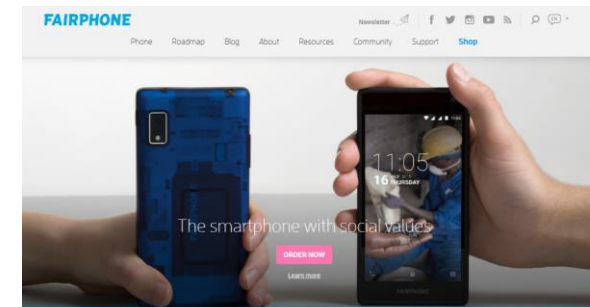
Newsletters, blogs, etc.

Reach wider selection of users

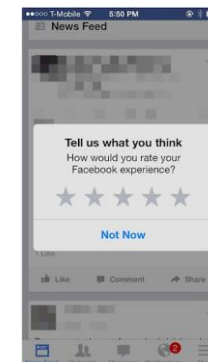
Need communication both ways

User involvement after product is released

Combination of these approaches



We're producing a phone to improve the electronics value chain. One step at a time.



User-centered approach

User-centered approach is based on:

Early focus on users and tasks: directly studying cognitive, behavioral, anthropomorphic & attitudinal characteristics

Empirical measurement: users' reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analysed

Iterative design: when problems are found in user testing, fix them and carry out more tests

What are reasons for involving users in the design process?

What are possible forms of user involvement?

Four basic activities in Interaction Design

Establishing requirements

Who are the users/stakeholders? What are their “needs”

Designing alternatives

How to generate alternatives? How to choose among them

Prototyping

What are different kinds of prototypes and techniques for generating them?

Evaluating

What are important qualities to evaluate? How to evaluate?

A simple interaction design lifecycle model

(Preece et al. 2015)

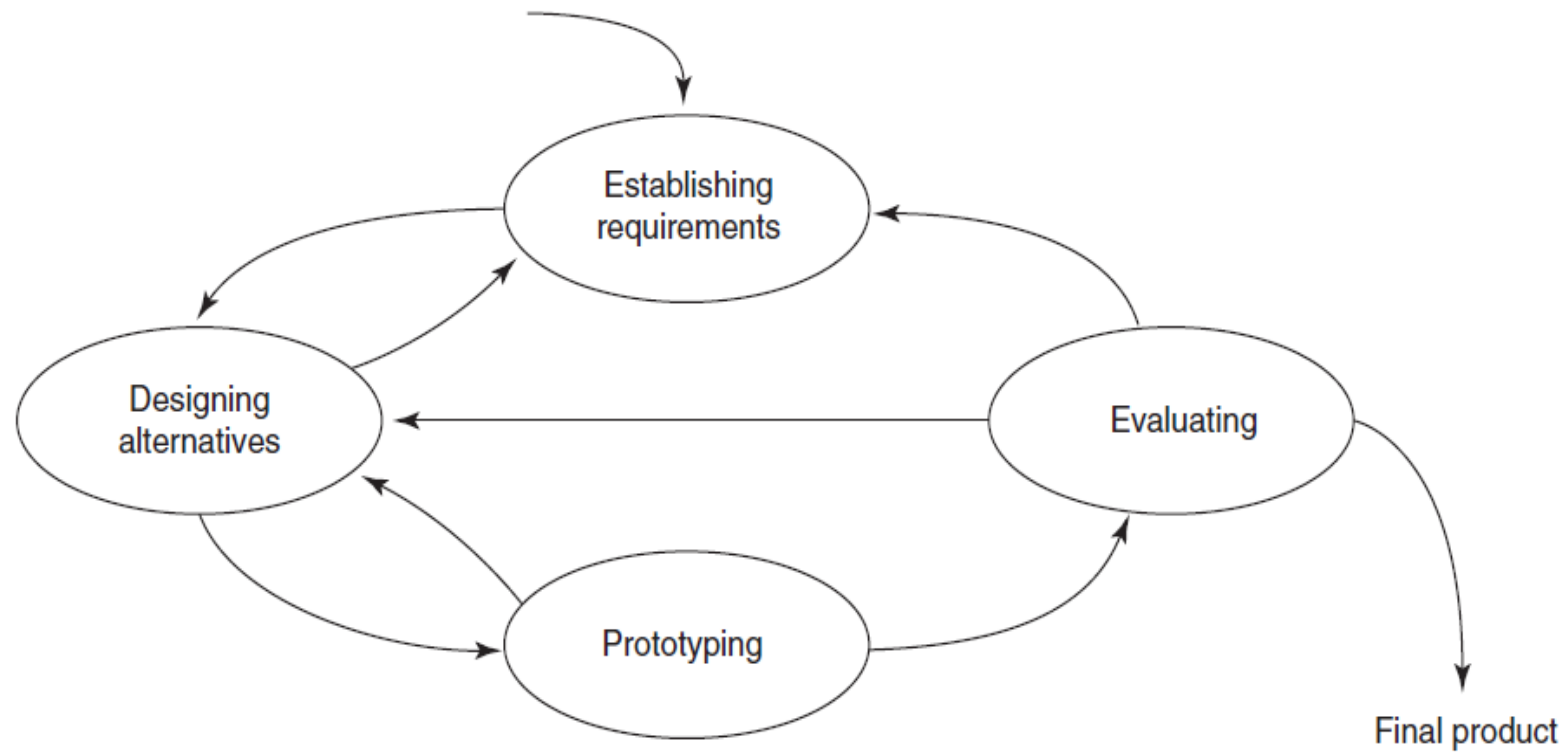


Figure 9.3 A simple interaction design lifecycle model

Who are the users/stakeholders?

Not as obvious as you think:

- those who interact directly with the product
- those who manage direct users
- those who receive output from the product
- those who make the purchasing decision
- those who use competitor's products

Three categories of user (Eason, 1987):

- primary: frequent hands-on
- secondary: occasional or via someone else
- tertiary: affected by its introduction, or will influence its purchase

Who are the stakeholders?



What do we mean by 'needs'?

Users rarely know what is possible

Users can't tell you what they 'need' to help them achieve their goals

Instead, look at existing tasks:

- their context

- what information do they require?

- who collaborates to achieve the task?

- why is the task achieved the way it is?

Envisioned tasks:

- can be rooted in existing behaviour

- can be described as future scenarios

How to generate alternatives

Humans stick to what they know works

But considering alternatives is important to 'break out of the box'

Designers are trained to consider alternatives, software people generally are not

How do you generate alternatives?

- 'Flair and creativity': research and synthesis

- Seek inspiration: look at similar products or look at very different products

How to choose among alternatives

Evaluation with users or with peers, e.g. prototypes

Technical feasibility: some not possible

Quality thresholds: Usability goals lead to usability criteria set early on and check regularly

- safety: how safe?

- utility: which functions are superfluous?

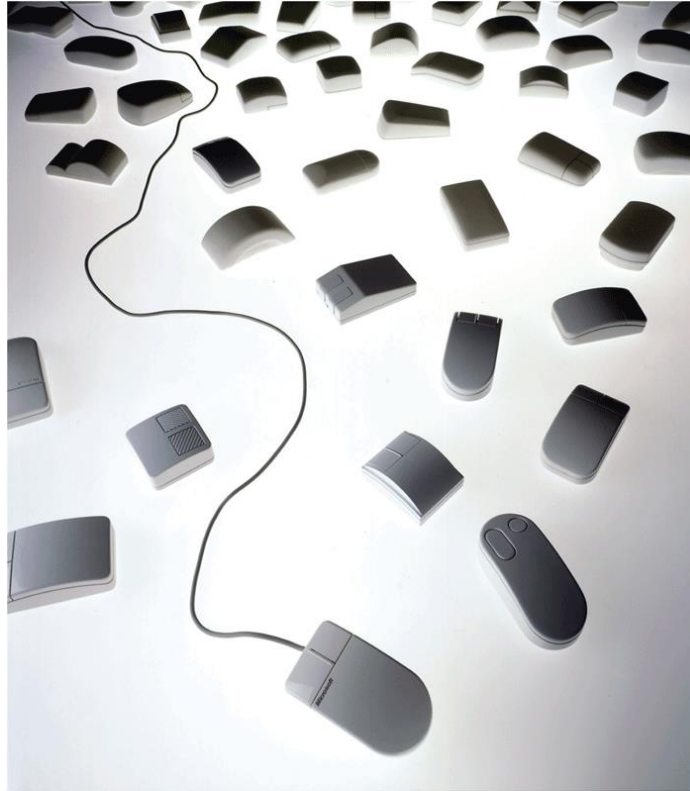
- effectiveness: appropriate support? task coverage, information available

- efficiency: performance measurements

- learnability: is the time taken to learn a function acceptable to the users?

- memorability: can infrequent users remember how to achieve their goal?

Testing prototypes to choose among alternatives



Explain four basic activities in
Interaction Design

User-centered design

User-Centered Design (UCD)

User Centred Design (UCD) is now used to encompass a variety of methods followed by HCI practitioners (and others).

Human Centred Design (HCD) is a closely related term, sometimes used to emphasise generality of humans and avoid narrow focus on traditional notions of “user”.

Guidelines in ISO 13407 (1999), Human-centred design processes for interactive systems.

Typical features of methods for UCD/HCD are:

- most importantly, active user involvement
- iterative design and evaluation of solutions
- a multi-disciplinary approach
- appropriate split between users and technology

User-Centered Design (Norman 1988)

Originally proposed by Norman (1988) as a philosophy of putting users and usability ahead of aesthetics.

7 principles:

1. Use knowledge both in-the-world and in-the-head
2. Simplify task structure
3. Bridge gulfs of execution and evaluation
4. Get mappings right
5. Exploit constraints
6. Design for error
7. When all else fails, standardize

User-Centered Design (Norman 1988)

3. Bridge gulfs of execution and evaluation



Image Source: Norman (2013). DOET: Revised and extended edition.

User-Centered Design (Norman 1988)

3. Bridge gulfs of execution and evaluation

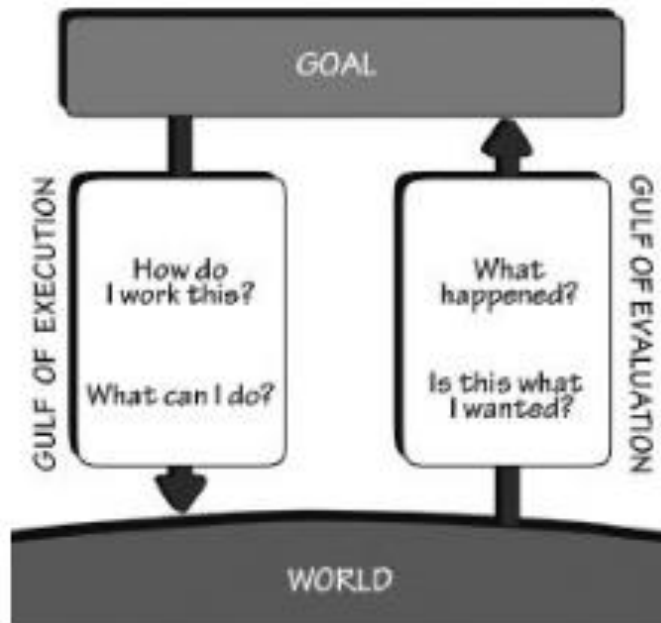
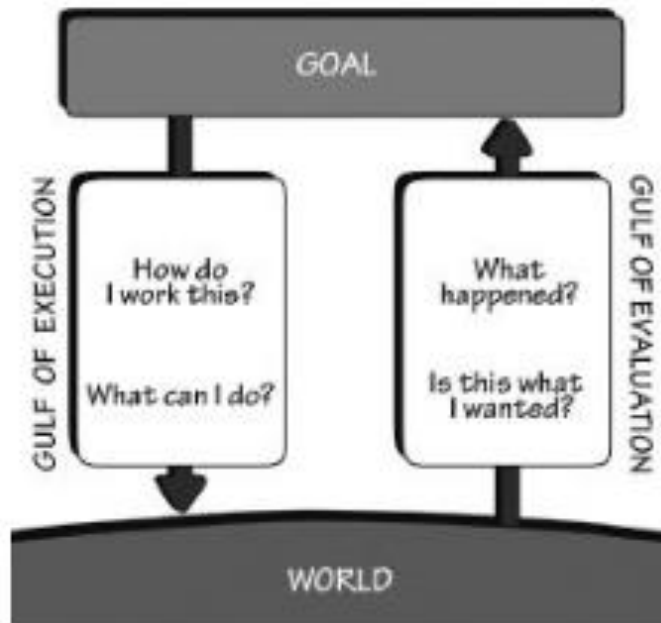


Image Source: Norman (2013). DOET: Revised and extended edition.

User-Centered Design (Norman 1988)

3. Bridge gulfs of execution and evaluation



Signifiers/affordances,
constraints, mappings,
conceptual model

Feedback,
conceptual model

Conceptual model

Usually highly simplified explanation of how something works

Doesn't need to be complete or accurate



Image Source: Norman (2013). DOET: Revised and extended edition.

Human-centered design (HCD) vs. Activity-centered design (ACD)

Some people use UCD and HCD interchangeably

But: people are not just “users”; non-users are also affected by design

→ some people use HCD to denote a more humanistic approach to design

Norman (2005) criticized a too narrow approach to UCD/HCD as detrimental and advocates for Activity-centered design:

“The problem, however, is that HCD has developed as a limited view of design. Instead of looking at a person's entire activity, it has primarily focused upon page-by-page analysis, screen-by-screen. As a result, sequences, interruptions, ill-defined goals — all the aspects of real activities, have been ignored.”

See: [Human-Centered Design Considered Harmful](#) and [HCD harmful? A Clarification.](#)

Some methods used in UCD

Requirements

- Field studies: ethnography, contextual inquiry

- User interviews, surveys

Analysis

- Scenarios

- Task Analysis

- Card sorting

Design

- Participatory Design

Evaluation

- Usability evaluation

- Focus groups

- Formal heuristic evaluation

Field studies

To understand the task and any existing solution, it's important to study it in context.

Ethnography

- anthropological study; detailed, passive recording
- observer tries to understand social culture
- influential in CSCW (Computer Supported Cooperative Work)

Contextual Inquiry

- applied form of ethnography, design task in mind
- builds models:

 - sequence: steps in a task, triggers to initiate*

 - physical work environment, e.g. office plan*

 - flow communication between people*

 - cultural codes of practice, expectations, values*

 - artefact structure and use of objects in process*

- output suggests tasks, communication channels, physical and cultural constraints.

Scenarios

A scenario is an informal description of an interaction, perhaps with a real-world setting.

Scenarios can:

- be elaborated down to low-level interactions
- suggest desirable constraints such as response time, error behaviour
- motivate choice of use-cases
- help validate formal models of system design

May make use of personas, prototypical users

Based on composite/hypothetical user

Pose questions: “how would Betty react if. . .”

Non-essential details help things appear real, avoid designers falling into “if it was me” trap.

Scenarios – Example

Alice, an elementary school teacher, still remembers the time when she had to maintain various accounts at different social network, photo sharing or messaging services in order to keep in touch with her friends. Today, when she wants to send a short message to one of her friends, she does not have to worry which social network or messenger he is using. When she takes a photo with her camera or browses her own photo gallery, she can share a photo without having to switch to the client of the photo sharing service or enter their site. She does not have to worry that the principal sees potentially embarrassing pictures of her last birthday party because the fellow teachers that are within her circle of friends are aware that those pictures are not meant to be distributed at work.

Last week, Alice received a reminder from her local government agency, informing that her passport is soon expiring. The reminder contained a list of necessary documents together with the new specifications for the passport photograph. When browsing her photo gallery, Alice is now able to automatically verify if a photo is a valid passport photograph.

Later in the afternoon, she has an online meeting, where she and other teachers discuss the learning process of students, exchange didactic material, review test results, etc. Until some time ago, Alice was forced to use the commonly agreed upon Content Management System to upload files or discuss cases in a forum. Now, she is able to use the same tools that she uses for e.g. sharing photos and videos or chatting with her friends. The files produced during the online meetings or other activities are organized in a manner that suits Alice's needs, while other teachers organize them according to their needs. Although Alice is using some tools she also uses for private purposes, she is always aware of the work context when engaged in activities with other teachers.

Participatory Design

Participatory Design brings user(s) fully into the whole design process.

Context: improve work environment, not system

Typical methods:

brainstorming

storyboarding

workshops

pencil and paper exercises

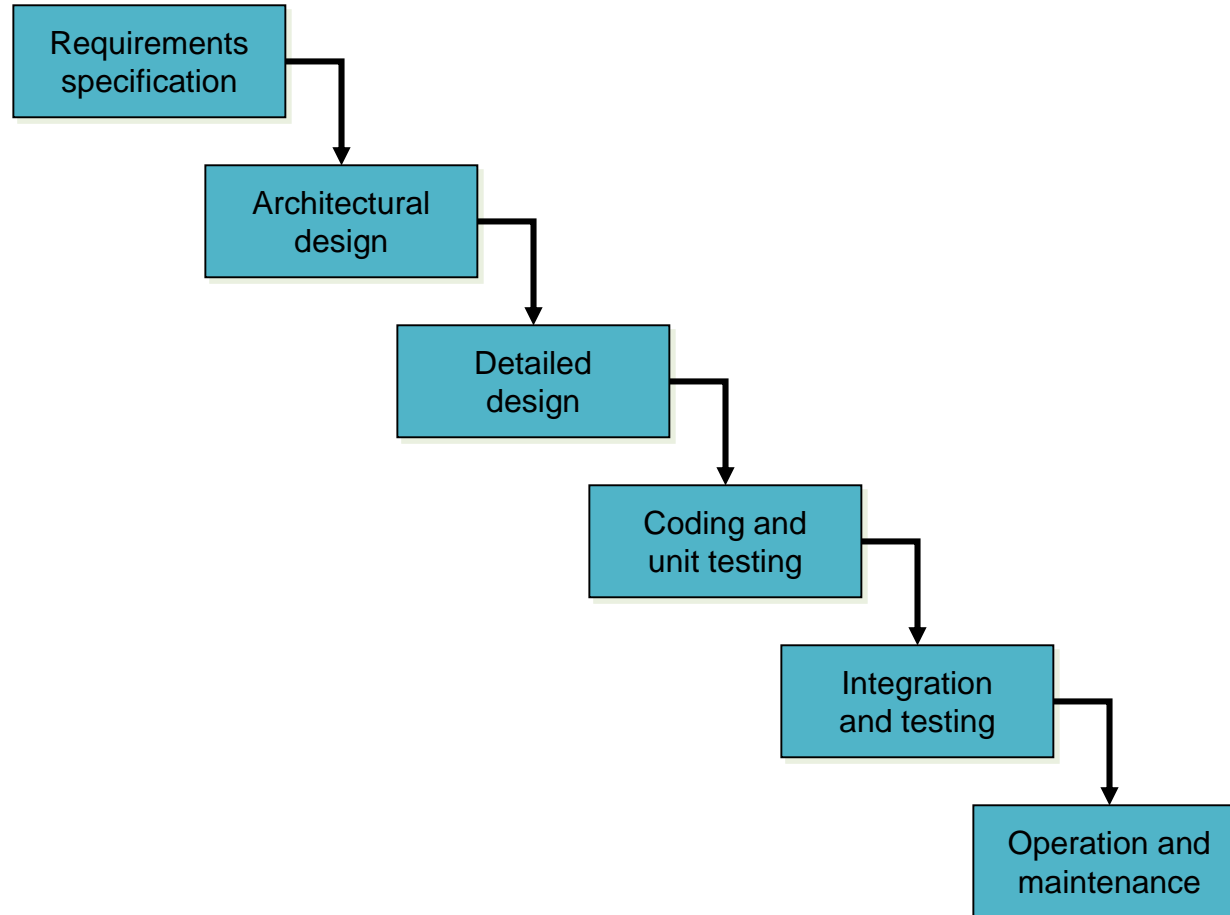
Like ethnography, makes users feel valued and encourages them to “own” the products.

List the main characteristics of a user-centered design approach.

List and explain methods that are often applied in user-centered design.

Process lifecycle models

The waterfall model



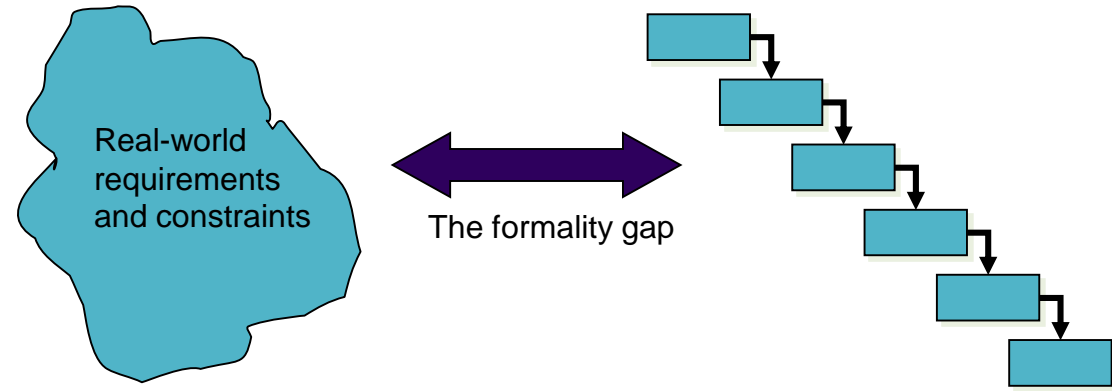
Verification and validation

Verification

designing the product right

Validation

designing the right product



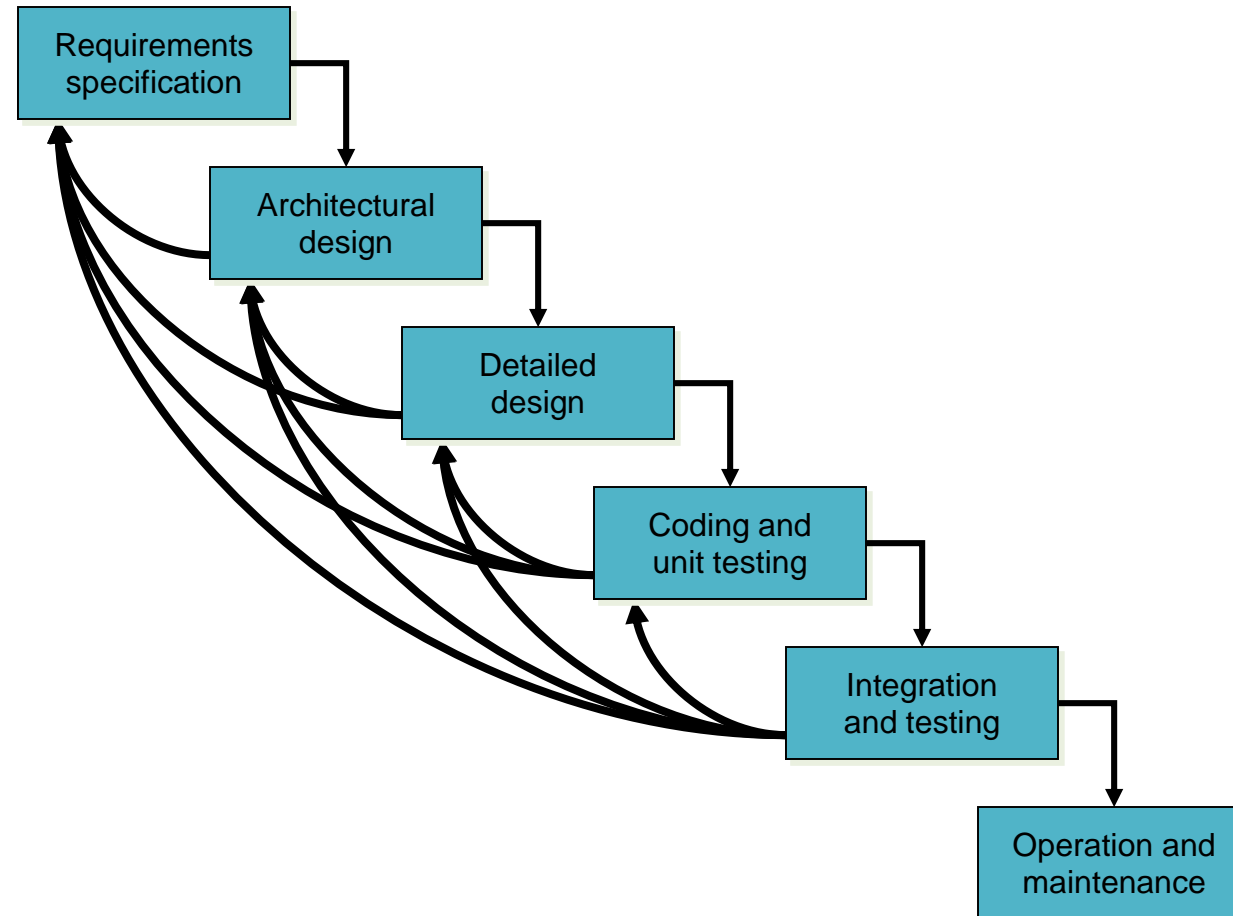
The formality gap

validation will always rely to some extent on subjective means of proof

Management and contractual issues

design in commercial and legal contexts

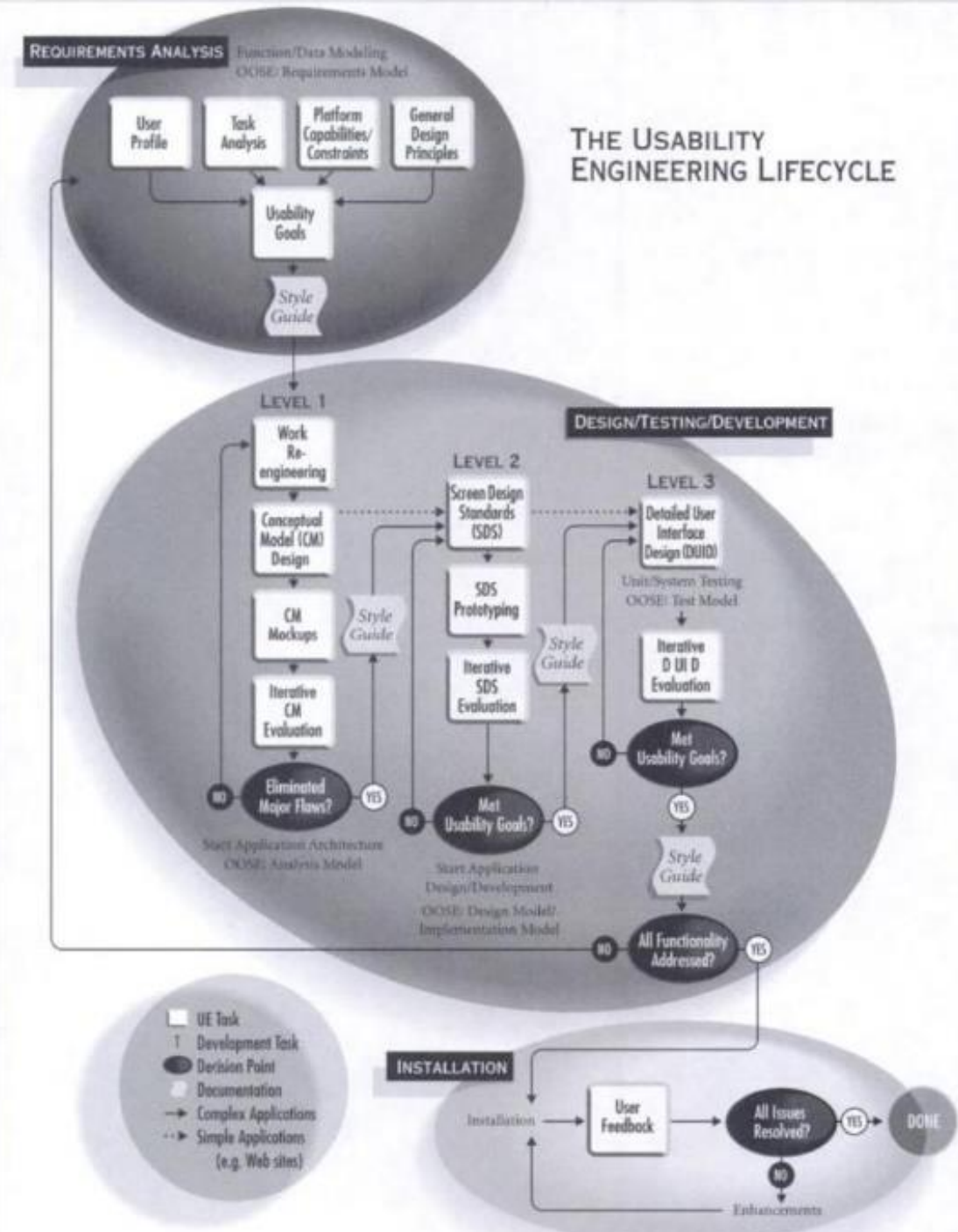
The life cycle for interactive systems



lots of feedback!

Usability Engineering

Mayhew, D. J. (1999). The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. Morgan Kaufmann Publishers Inc.



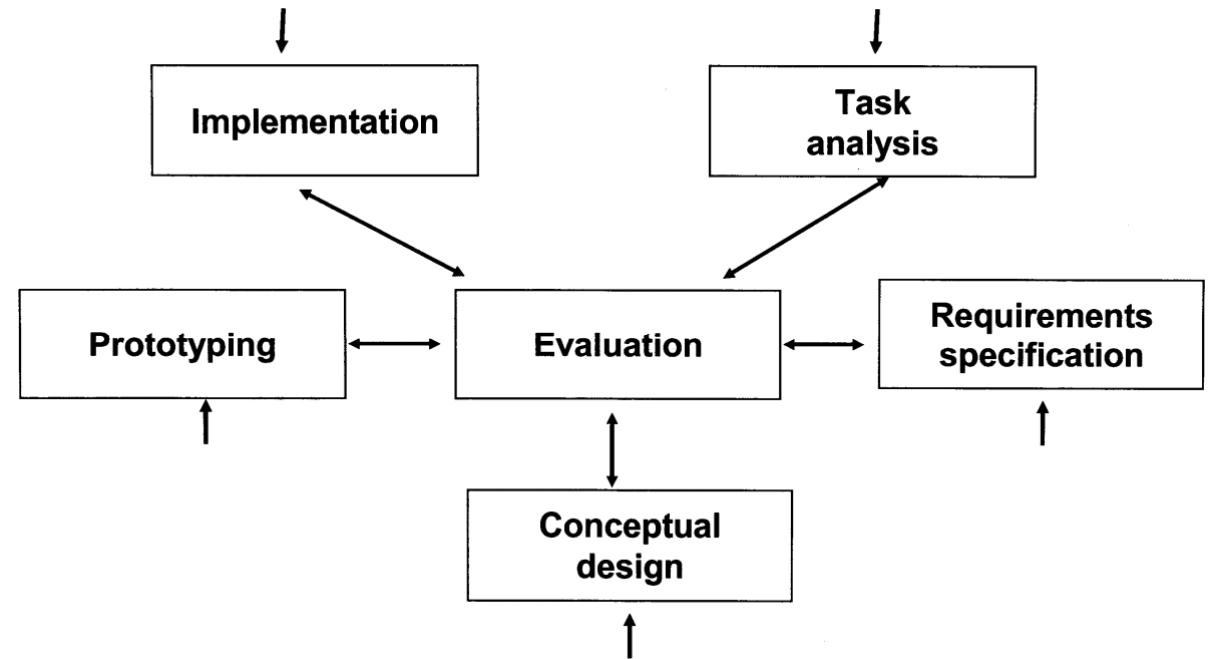
Star lifecycle (Hartson and Hix 1989)

Evaluation is at the center of activities

Interconnected via the evaluation activity

No particular ordering of activities.
Development may start in any one of the activities

Derived from empirical studies of interface designers



ISO 9241-210:2010 Ergonomics of human-system interaction, Part 210: Human-centered design for interactive systems

(formerly ISO 13407)

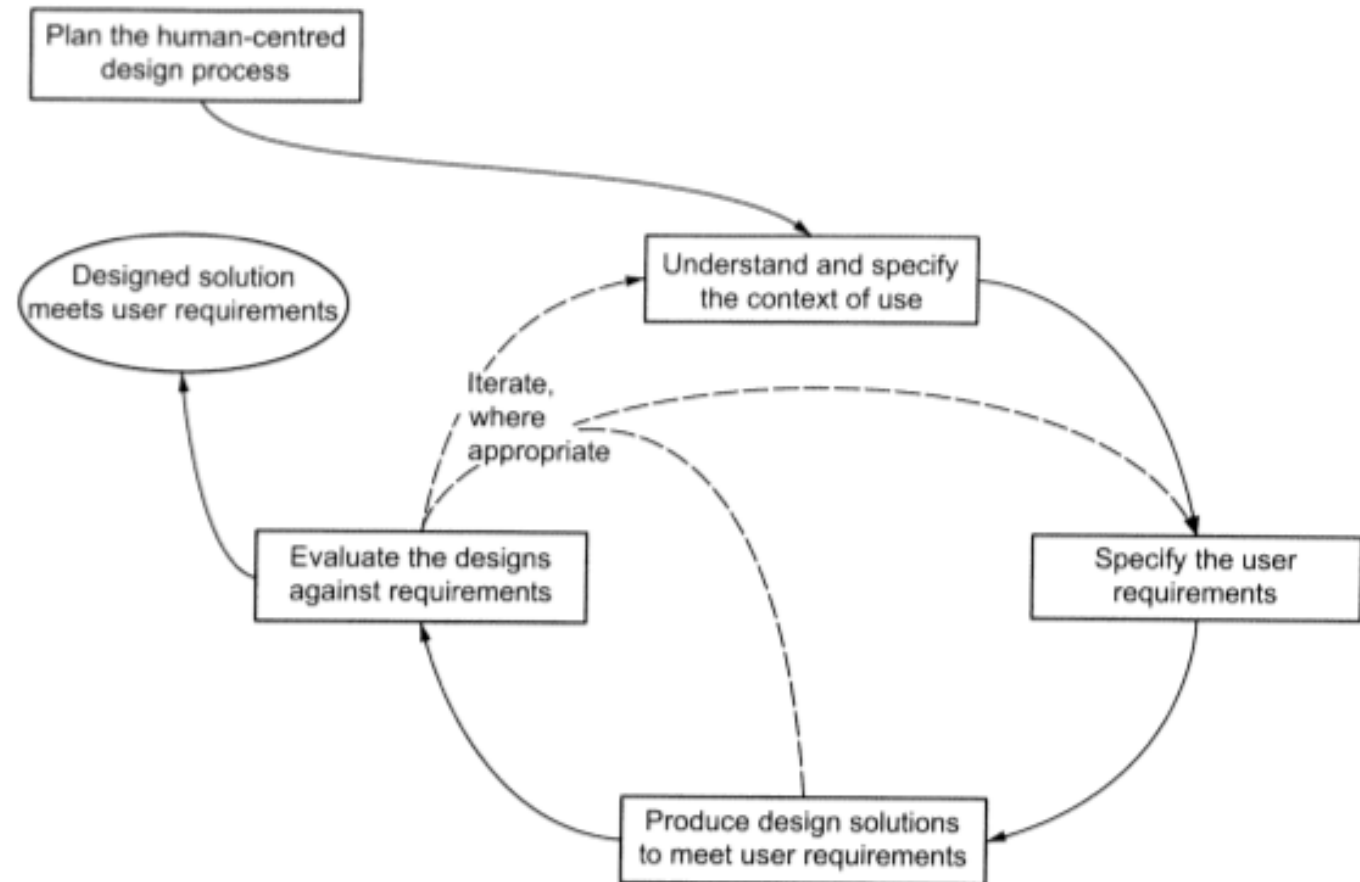
Specifies 4 human-centered design activities which are central to a system development project:

- Understand and specify the context of use (including users, tasks, environments);

- Specify the user requirements in sufficient detail to drive the design;

- Produce design solutions which meet these requirements;

- Conduct user-centred evaluations of these design solutions and modify the design taking account of the results.



Agile process models

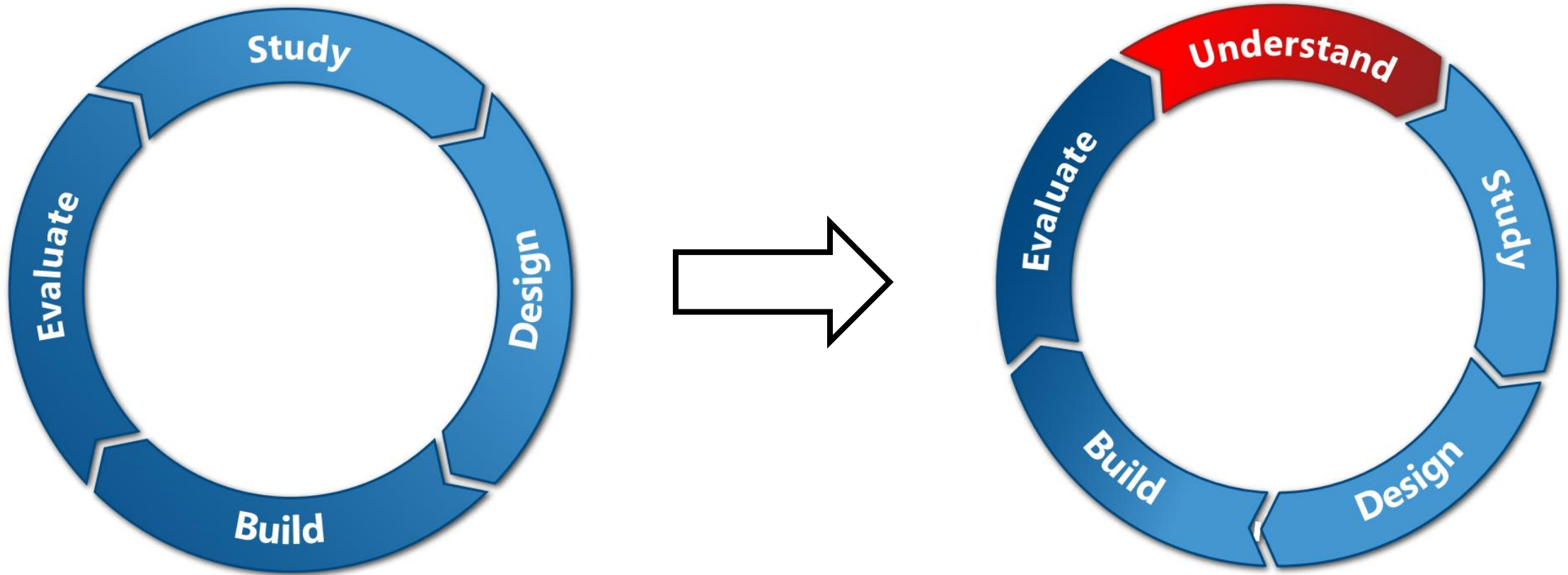
Integrating with agile software development is promising

- it stresses the importance of iteration
- it champions early and regular feedback
- it handles emergent requirements
- it aims to strike a balance between flexibility and structure

But:

- Agile processes often development-driven
- Possible frictions between early roll-out and thorough evaluation

Human-Centered Design according to Harper et al.

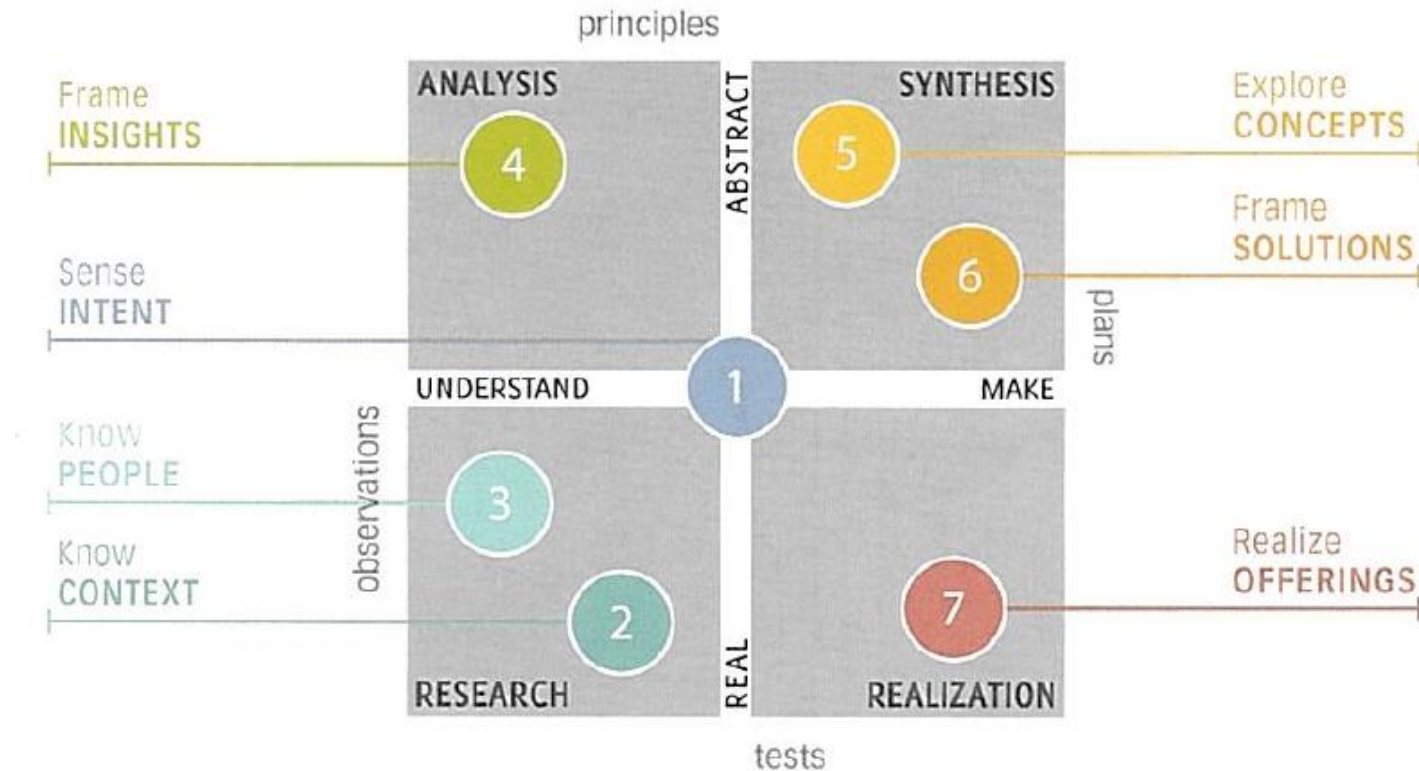


[Harper, R., Rodden, T., Rogers, Y. and Sellen A. (2007). Being Human: Human-Computer Interaction in the Year 2020. Microsoft Research Ltd.]

Stage 1: Understand

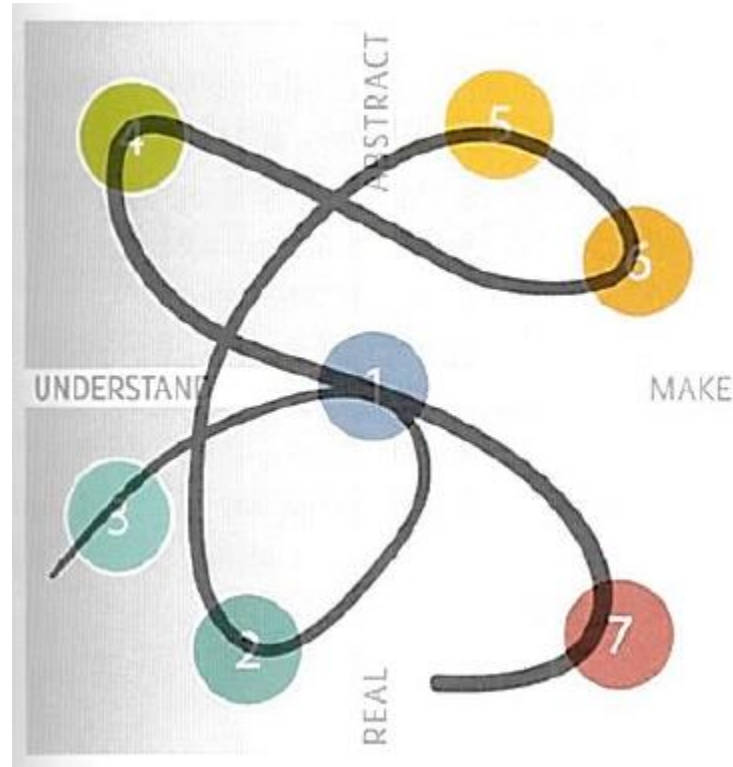
The initial – and new – stage we suggest is to **focus on human values and to pinpoint those that we wish to design for and to research**. This will require reflective thought and conceptual analysis drawing on other disciplines, which might include those as diverse as philosophy, psychology, art, literary theory, cultural studies, anthropology, sociology or design. It will also mean talking to stakeholders, including users as well as those involved in developing or designing the technology in question (if this is the goal) to ascertain what kinds of enduring value they believe their users will get from their technology; and what kinds of users and what domains are of interest.

Design processes for Innovation



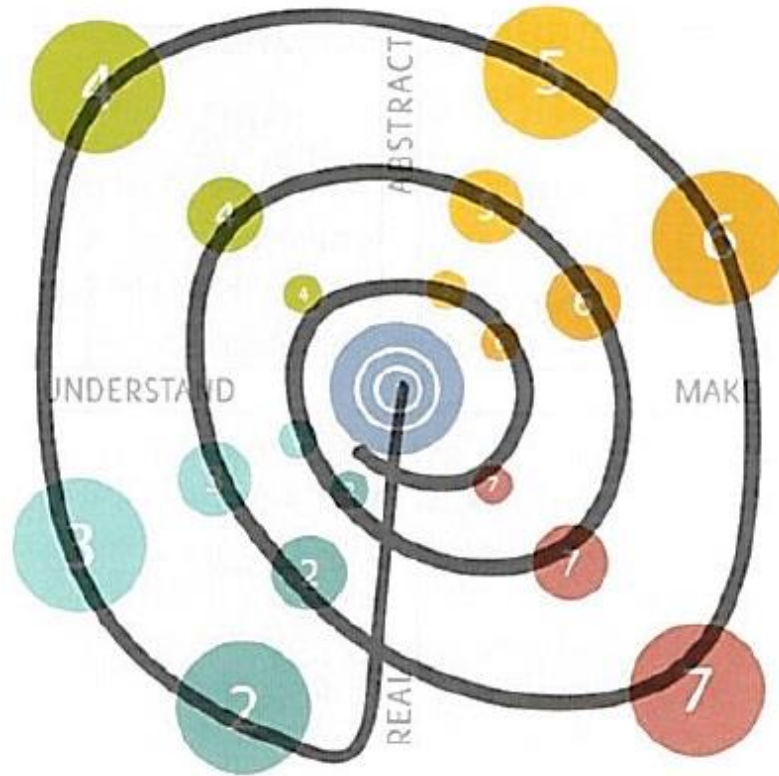
[Kumar, V. (2013). 101 Design Methods – A Structured Approach for Driving Innovation in Your Organization]

Design processes for Innovation



[Kumar, V. (2013). 101 Design Methods – A Structured Approach for Driving Innovation in Your Organization]

Design processes for Innovation



[Kumar, V. (2013). 101 Design Methods – A Structured Approach for Driving Innovation in Your Organization]

How do you think user-centered design might be incorporated into a company's development process?

Objectives

Consider what doing interaction design involves.

Explain some advantages of involving users in development.

Explain the main principles of a user-centered approach.

Present a simple lifecycle model of interaction design.

Ask and provide answers for some important questions about the interaction design process.

References

Where not stated otherwise, slides based on:

Preece et al. (2015). Interaction Design – Beyond Human-Computer Interaction, 4th edition. Chapter 9: The Process of Interaction Design.

Dix et al. (2003). Human-Computer Interaction, 3rd edition. Chapter 6: HCI in the software process.