Process of interaction design

User-centred design

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Contents

• The nature of interactive systems design
• The four processes involved in design:
  – understanding, design, envisionment, evaluation
• The centrality of evaluation in human centred design
• Understand the scenario-based design approach
• Develop scenarios and personas
• Understand the scenario-based design method.
Digital products ...

• are rude
  – ask patronizing questions like “Are you sure”, “Do you really want”?

• require people to think like computers

• Why is so?
  – ignorance about users
  – conflicting interests
  – the lack of a process
The evolution of the software development process

- Programmers build / test
- Managers Initiate
- Programmers build
- QA test
- Designers “look and feel”
- Designers design
- Programmers build
- QA test
- Users mandate
- feasibility
- bug report

- Managers Initiate
- Product
- Code
- Spec
- Users
Figure 1 — Interdependence of human-centred design activities
What is human-centered design?

• Approach to systems design and development that aims
  – to make interactive systems more usable
  – by focusing on the use of the system and
  – applying human factors/ergonomics and usability techniques

• Human-centred term is used to emphasize the impacts on a number on stakeholders
  – „user-centred“ and „human-centred“ are used synonymously
What is a user-centered approach?

User-centered approach is based on:

– Early focus on users and tasks
  • User’s strength, limitations, preferences and expectations are taken into account when specifying which activities are carried out

– Empirical measurement
  • users’ reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analysed

– Iterative design
  • problems are found in user testing, fix them and carry out more tests
The processes of user-centered design (UCD)

- Envisionment
- Understanding
- Evaluation
- Design: conceptual and physical
Core characteristics of UCD

Users involved through the development

Clearly documented user goals

Iterations
Understanding

Envisionment

Evaluation

Design:
conceptual and physical
Degrees of user involvement

• Member of the design team
  – Full time: constant input, but lose touch with users
  – Part time: patchy input, and very stressful
  – Short term: inconsistent across project life
  – Long term: consistent, but lose touch with users

• Newsletters and other dissemination devices
  – Reach wider selection of users
  – Need communication both ways

• User involvement after product is released
• Combination of these approaches
Importance of involving 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
Understanding users’ needs

• Taking into account
  – what people are good and bad at
  – what might help people in the way they currently do things
  – what might provide quality user experiences

• Listen to what people want and get them involved

• Use tried and tested user-centered methods
Some practical issues

• Who are the users?
• What do we mean by ‘needs’?
• How to generate alternatives
• How to choose among alternatives
• How to integrate interaction design activities with other models?
Who are the users/stakeholders?

• Stakeholder
  – individual or organization having a right, share, claim or interest in a system or in its possession of characteristics that meet their needs and expectations (ISO 9241-210:2010)

• Not as obvious:
  – 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?

- Suppliers
- Local shop owners

Managers and owners

www.id-book.com
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
Understanding Design: conceptual and physical Evaluation Envisionment Understanding
Conceptual design

• What?
  – what information and functions are needed for the system to achieve its purpose
  – what someone will have to know to use the system.

• Clear conceptualization of a design solution and how that conceptualization will be communicated to people
  – User story, rich picture
  – Use-cases, entity-relationship models
Conceptualization of needs: rich picture

Figure 2 Rich Picture of Web Design Consultancy

- Professional Society of Web Designer
- Expectations Standards
- Potential Clients
- Marketing
- Competitor Companies
- Marketing
- Current Clients

FISHY WEB INC.
- Profit?
- Long term reputation?
- Need more time
- Work
- If only I had more powerful tools

Director
- Data
- Strategy Documents
- Resources
- Administration
- Need more time

Web Analyst
- Problems
- Solutions
- Concepts
- HTML Coder

Good job done dirt cheap
Focus? Bias?

Analysts
Physical design

• How?
  – how people will work: the look and the feel
  – structuring interactions into logical sequences
  – clarifying and presenting the allocation of functions and knowledge between people and devices.
Envisionment

• Designs need to be visualized
  – to help designers clarify their own ideas
  – to enable people to evaluate them

• Appropriate medium for
  – the stage of the process,
  – the audience and
  – available resources

• Sketches, mockups, prototypes
PERSONAS AND SCENARIOS

NAME: Vivica Parker
AGE: 32
OCCUPATION: Journalist
PROFILE:
Born in Washington, DC
Lives and works in New York City (far from family)
Lives by herself in a small apartment
Has a driver’s license
Calls parents and older brother on weekends
Works for an online art magazine and is currently in charge of writing a blog about graffiti. In order to do that she needs to do the following tasks:

- Walk/drive around the city
- Take pictures
- Talk with artists and keep record of that info (place, time, people)
- Work day/night
- Share the collected information with editor and magazine’s readers

To do her job, usually carries notebooks, camera and cell phone to keep in touch with her editor.

INTERESTS:
Amateur theater actress since she was 23
Travel and merge in different cultures
Architecture

ACTIVITIES:
Did research on ancient Egyptian architecture
Member of the Art Society of NY

TECH EXPERIENCE:
Basic knowledge about operating systems
Uses the Internet frequently either for personal or business purposes

TECH ATTITUDE:
Always open to new technology, but she feels annoyed with complex applications and discards them very often
Tends to feel numb using the latest high-tech gadgets and needs time to get used to them

GOALS & SITUATED BLOGGING NEED:
Needs to keep track of her location and time when she (a) finds and photographs graffiti and street art for her blog and (b) conducts audio interviews of artists and enthusiasts
Needs to have a quick way of keeping track of content gathered from separate locations in order to post articles before editorial deadlines
Personas

- Personas are concrete representations of the different types of people that the system or service is being designed for.
- Indicate aims, meaningful activities
- Designers create personas so that they can envisage whom they are designing for.
Mari

- age 23
- aerobics instructor
- training seriously for first marathon
- her usual training partner has moved away
- she leads a wild social life and tends to burn the candle at both ends
- she’s got a targeted schedule
- companion is very proactive in pace making and motivation

1. She’s set up a long-term schedule with her HFC to enable her to run her first marathon in under 4 hours.
2. This includes target goals such as what times she should be running long distances by which stage of the regime.
3. The HFC adapts to maintain the regime when Mari’s social circumstance impacts her ability to train.
4. If she runs too far or too fast the companion will advise that this may have a negative impact on her training and may result in potential injury.
5. Explicit instructions in real time run (‘ok, now we’re gonna push hard for 2 minutes....ok, well done, let’s take it easy for the next 5....etc.’)
6. The HFC has access to her social schedule (through social companion?) and suggests going to a party the night before a long run may not be a great idea.
7. At the actual marathon her HFC becomes a motivating force and gives her real-time advice (eg, ‘there’s a hill coming up, pace yourself’, it knows this from a run plug-in she bought for the HFC).

The types of personas

- Goal-directed persona
- Role directed persona
- Engaging persona
- Fictional persona
Goal directed persona

• What user will do while using product? – the process of achieving their goals

1. Persona
Defines who the story is about. This main character has attitudes, motivations, goals, and pain points, etc.

2. Scenario
Defines when, where, and how the story of the persona takes place. The scenario is the narrative that describes how the persona behaves as a sequence of events.

3. Goal
Defines what the persona wants or needs to fulfill. The goal is the motivation of why the persona is taking action. When that goal is reached, the scenario ends.

https://www.interaction-design.org/ux-daily/48/four-different-perspectives-on-user-personas
Role persona

- reflects the part that users play in their organizations or wider lives
- Where will the product be used?
- What’s this role’s purpose?
- What business objectives are required of this role?
- Who else is impacted by the duties of this role?
- What functions are served by this role?
Engaging personas

- incorporate both goal and role directed personas
  - examine the emotions of the user, their psychology, their backgrounds and make them relevant to the task in hand

[Persona card]

Peter

| Works as product manager for a mid-sized company. |
| Is 35 years old, holds a marketing degree. |
| Has got experience working as a product owner on software products with agile teams. |
| Has had some Scrum training. |

| Has managed mature products successfully. |
| Now faces the challenge of creating a brand-new product. |
| Wants to leverage his agile knowledge but needs advice on creating innovative product using agile techniques. |

https://www.interaction-design.org/ux-daily/48/four-different-perspectives-on-user-personas
Fictional Personas

- Emerges from the experience of the UX design team
- Designer makes assumptions based on the past interactions with the user and products to deliver a picture of what, perhaps, typical users look like.
- An initial sketch of user needs rather than a detailed portrait
USING SCENARIOS THROUGHOUT DESIGN
Scenarios

- Scenarios are stories about people undertaking activities in contexts using technologies.

Figure 3.10 Scenarios throughout design

- **Abstract**
- **Specify Design Constraints**
- **Formalize Design**
- **Stories**
- **Conceptual Scenarios**
- **Concrete Scenarios**
- **Use Cases**

Use for:
- What people do and what they want
- Generating ideas and specifying requirements
- Envisioning ideas and evaluation
- Specification and implementation
Usability engineering life cycle (Soul Greenberg)

**Goals:**
- Articulate: who users are, their key tasks

**Methods:**
- Task centered system design
- Participatory design
- User-centered design

**Evaluate**
- Psychology of everyday things
- User involvement
- Representation & metaphors

**Brainstorm designs**
- Participatory interaction
  - Task scenario walk-through

**Refined designs**
- Graphical screen design
  - Interface guidelines
  - Style guides
- Usability testing
  - Heuristic evaluation

**Completed designs**
- High fidelity prototyping methods
  - Usability testing

**Products:**
- User and task descriptions
- Throw-away paper prototypes
- Testable prototypes
- Completed designs

- Alpha/beta systems or complete specification

**Usability engineering life cycle:**
- Soul Greenberg
TASK ANALYSIS
Herbert Simon and behavior

• if we change the environment, we change the behavior.

• Design transforms existing situations into (hopefully) preferred ones.
All design is redesign

• We ought to have a really good sense of what the existing situations are and
• what preferred means for the users.
• “Preferred” has to do with both the user’s goals and the point of view of a designer.
Explicit activity analysis

• Gives a conceptual representation
• This helps to understand the domain, and helps you communicate and discuss with other stakeholders
• Having this intermediate, conceptual representation makes it easier to be creative because you’re taking a couple small leaps instead of one big one
Envisionment process

1. Review conceptual scenarios
2. Develop design ideas
   – Concrete scenarios
   – Interaction sequences
   – Experiment with different metaphors
3. Explore design ideas with potential users
4. Develop wireframes
5. Iterate and gradually make more concrete the design through prototyping and evaluations

2017.10.03 09:08
Goals, tasks, actions

• Task is
  – user goal
  – ordered actions with which user achieves the goals
The outcome of activity analysis

• What are the steps?
• What are the artefacts?
• What are the goals? (how you’ll measure success)
• What are the pain points?
Example: steps

- Unlock driver's door
- Take a seat behind the wheel
- Insert key in ignition switch
- Turn key fully clockwise
- When engine starts, release the key
- Artefacts
  - key, car, door-lock, ignition switch
Example: pain points

• In the narrow version:
  – necessary to put the key in? It’s already in the car. Why not just drive off?

• In the slightly broader framing, the pain point could be
  – needing a car to get bread. (Alternatively, bread could be delivered, or you could walk/bike/...)

2017.10.03 09:08
Task analysis

• **A task is the sequence of steps a user will follow to achieve a specific goal.**

• **Job analysis is**
  – the identification of all tasks
  – a person performs as part of a job role
    • or to achieve some overall goals.
Task analysis

• Task descriptions are often used to envision new systems or devices
• Task analysis is used mainly to investigate an existing situation
• It is important not to focus on superficial activities
  What are people trying to achieve?
  Why are they trying to achieve it?
  How are they going about it?
• Many techniques, among others popular is Hierarchical Task Analysis (HTA)
Activity analysis is easiest for...

- Workflows like doing taxes or travel
- planning
- Repeated activities, like scheduling (why does it take 17 emails?)
Task analysis techniques

• Stories
• Storyboards
• User cases
• Hierarchical task analysis
• Navigation maps
Task descriptions

• Stories, scenarios
  — an informal narrative story, simple, ‘natural’, personal, not generalisable

• Use cases
  — assume interaction with a system
  — assume detailed understanding of the interaction

• Essential use cases
  — abstract away from the details
  — does not have the same assumptions as use cases

• Storyboards
“The Thomson family enjoy outdoor activities and want to try their hand at sailing this year. There are four family members: Sky (10 years old), Eamonn (15 years old), Claire (35), and Will (40). One evening after dinner they decide to start exploring the possibilities. They all gather around the travel organizer and enter their initial set of requirements – a sailing trip for four novices in the Mediterranean. The console is designed so that all members of the family can interact easily and comfortably with it. The system’s initial suggestion is a flotilla, where several crews (with various levels of experience) sail together on separate boats. Sky and Eamonn aren’t very happy at the idea of going on vacation with a group of other people, even though the Thomsons would have their own boat. The travel organizer shows them descriptions of flotillas from other children their ages and they are all very positive, so eventually, everyone agrees to explore flotilla opportunities. Will confirms this recommendation and asks for detailed options. As it’s getting late, he asks for the details to be printed so everyone can consider them tomorrow. The travel organizer prints out a summary of the different options available.”
Use case for travel organizer

1. The system displays options for investigating visa and vaccination requirements.
2. The user chooses the option to find out about visa requirements.
3. The system prompts user for the name of the destination country.
4. The user enters the country’s name.
5. The system checks that the country is valid.
6. The system prompts the user for her nationality.
7. The user enters her nationality.
8. The system checks the visa requirements of the entered country for a passport holder of her nationality.
9. The system displays the visa requirements.
10. The system displays the option to print out the visa requirements.
11. The user chooses to print the requirements.
Alternative courses for travel organizer

Some alternative courses:

6. If the country name is invalid:
6.1 The system displays an error message.
6.2 The system returns to step 3.

8. If the nationality is invalid:
8.1 The system displays an error message.
8.2 The system returns to step 6.

9. If no information about visa requirements is found:
9.1 The system displays a suitable message.
9.2 The system returns to step 1.
Example use case diagram for travel organizer

Travel agent

Traveler

- Identify potential vacations
- Retrieve visa requirements
- Retrieve vaccination requirements
- Update travel details
Example of sequence diagram

Sequence diagrams decompose use case
2017.10.03 09:08
Example essential use case for travel organizer

retrieveVisa

USER INTENTION
find visa requirements
supply required information
obtain copy of visa info
choose suitable format

SYSTEM RESPONSIBILITY
request destination and nationality
obtain appropriate visa info
offer info in different formats
provide info in chosen format
Task analysis

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  How are they going about it?
• Many techniques, the most popular is Hierarchical Task Analysis (HTA)
Hierarchical Task Analysis

• Involves breaking a task down into subtasks, then sub-sub-tasks and so on. These are grouped as plans which specify how the tasks might be performed in practice

• HTA focuses on physical and observable actions, and includes looking at actions not related to software or an interaction device

• Start with a user goal which is examined and the main tasks for achieving it are identified

• Tasks are sub-divided into sub-tasks
Example Hierarchical Task Analysis

0. In order to buy a DVD
   1. locate DVD
   2. add DVD to shopping basket
   3. enter payment details
   4. complete address
   5. confirm order

plan 0: If regular user do 1-2-5.
         If new user do 1-2-3-4-5.
Example Hierarchical Task Analysis (graphical)

Buy DVD

plan 0:
if regular user do 1-2-5.
if new user do 1-2-3-4-5.

locate 1
add DVD to shopping basket 2
enter payment details 3
complete address 4
confirm order 5
Storyboards

• Often used with scenarios, bringing more detail, and a chance to role play

• It is a series of sketches showing how a user might progress through a task using the device

• Used early in design
Storyboards
Storyboarding isn’t about “pretty pictures”
it’s about communicating ideas
Let's check out places in SF...

1. Show interactions

We're in SF!

Develop a setting
LET'S TRY OUT BURMESE SUPERSTAR. ANIL RATED IT & IT SOUNDS COOL!

SURE.

SHOW SATISFACTIONS

FINALLY, BE CREATIVE! YOU DON'T NEED TO BE AN ARTIST TO GET A POINT ACROSS.
Scenario storyboard

Part of the storyboard for a photographer’s website
Storyboards Should Convey

• Setting: people involved, environment, task being accomplished

• Sequence:
  – What steps are involved?
  – What leads someone to use the app?
  – What task is being illustrated?

• Satisfaction
  – What’s motivates people to use this system?
  – What does it enable people to accomplish?
  – What need does the system fill?

Sketching

• Sketching is important to low-fidelity prototyping

• Don’t be inhibited about drawing ability. Practice simple symbols

Hartfield, Winograd, 1996
Navigation maps

- Focus on how people move through the site or application
- Each page is a box or heading
Example of mobile phone annotated navigation map
### A comparison of task analysis techniques

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Mobile Apps Life Cycle

1. Discovery
2. Adoption
3. Trial
4. Abandonment or Long-Term Usage

Many apps are abandoned.
Bibliography

- All available in the VU MIF library
  - chapter 1. Goal-directed design
  - chapter 3. Beginners, intermediates, experts