



**Aalto-yliopisto  
Aalto-universitetet  
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**Human-Computer Interaction**

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# **Improved Human-centred design model for a software company**

*Homework #4*

**Aitor Urruticoechea Puig**

[aitor.urruticoecheapuig@aalto.fi](mailto:aitor.urruticoecheapuig@aalto.fi)

Student N°101444219

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## Contents

<b>1 Introduction</b>	<b>2</b>
<b>2 Improved Human-Centred Design Process</b>	<b>2</b>
2.1 Understand and specify the context of use . . . . .	3
2.2 Specify user requirements . . . . .	3
2.3 Produce design solutions to meet user requirements . . . . .	3
2.4 Evaluate designs against requirements . . . . .	4
<b>3 Reflections</b>	<b>5</b>
<b>References</b>	<b>5</b>

## List of Figures

1 Proposed HCD process built from ISO standards [2]. . . . .	2
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## Acronyms

**AI** Artificial Intelligence. 2, 3

**HCD** Human-Centered Design. 1–5

**HCI** Human-Computer Interaction. 3

**HIRU** Humman-computer Interacter that Reaches the User. 2–4

## 1 Introduction

Humman-computer Interacter that Reaches the User (HIRU) is a (made up) company that commercialises a product of the same name. HIRU is an Artificial Intelligence (AI)-based assistant based on multi-platform operation. Rather than a static, one-device tool that its competitors push for, the goal of this product is to transcend operating systems, platforms, and uses; pushing for a universal helper that is omnipresent in the user's life. HIRU needs to perfectly bridge the interaction between the user and any device, from the smartphone to the laptop and from the Bluetooth speaker to the smart fridge; it should potentially be able to replace, if need be, any other interaction device from screen to keyboard. This would not only boost accessibility but also allow for multitasking in a way previously not even conceived.

Currently, however, and as many such start-ups, the Human-Centred Design (HCD) process is quite bare-bones and not in line with the consensus good-practices of the field. The main design principle is trial-and-error, with most testing performed by the very same engineers coding and designing the application; and little-to-no input is actually obtained from potential users or heuristic-based approaches.

## 2 Improved Human-Centred Design Process

HIRU is clearly now on the second half of the double-diamond design process [1]. From a very wide range of potential, AI-based applications or even AI-based intelligent assistants; HIRU is already a concrete idea that now needs expansion during development and re-concretion during delivery. In this second phase, it is of utmost importance to involve users in every step made. Design thinking should also implement, alongside with other ideation and creativity techniques that put the human in the HCD process.

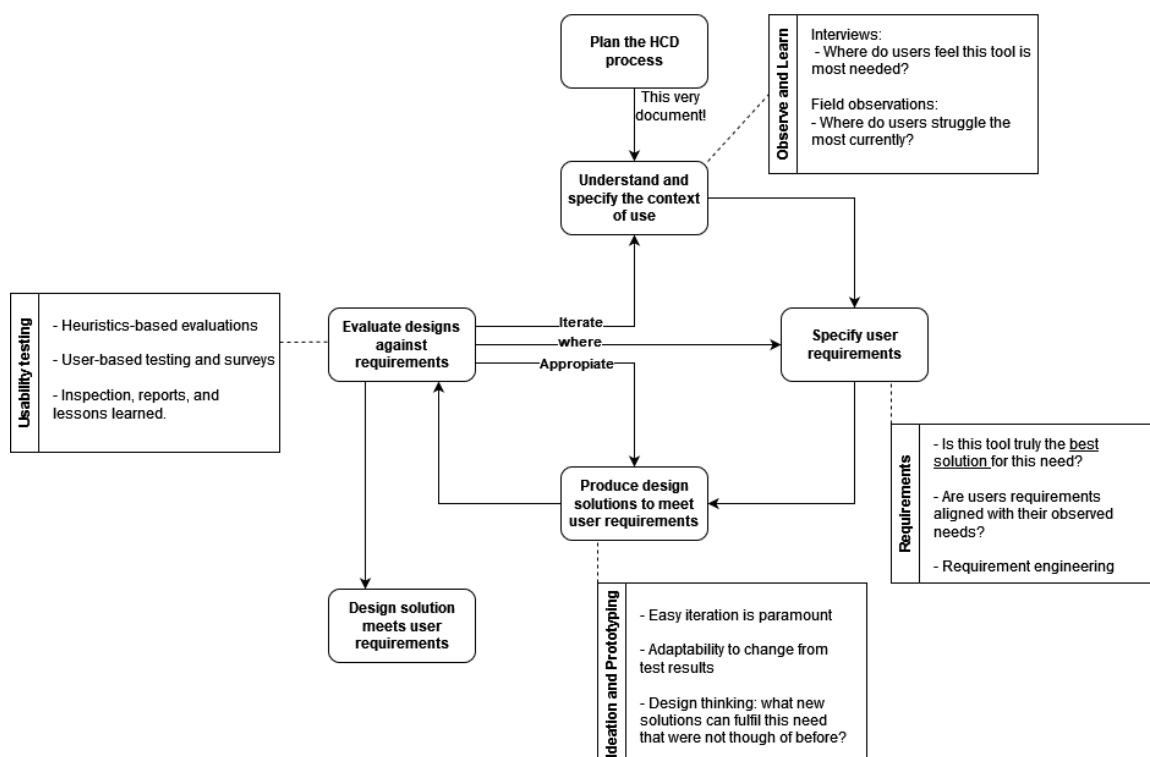


Figure 1: Proposed HCD process built from ISO standards [2].

Focusing on the process itself, one needs to take into account that this is a small company. Complex and intricate processes would be counterproductive as they would be hard to implement and even harder to follow with limited resources. It is for that reason that, instead, the proposed HCD process is built upon the very basics of Human-Computer Interaction (HCI) design processes: ISO standards [2]. From there on, specific steps and guidelines have been built and drawn to adapt it to the specific necessities for HIRU. The global process can be seen in Figure 1.

## **2.1 Understand and specify the context of use**

In this very first step, it is of utmost importance to develop empathy with the user. The design team needs to fully understand how the user comes to terms with interacting with the different appliances right now, what shortcomings they face, and where do their requests for improvement come from. This last step is crucial, for it will be what enables a thoughtful evaluation of their needs and how they translate into requirements for the next step. For the very nature HIRU is thought for, interviews with the potential user base will be the backbone of this step. Many times AI-based companies mistake the tools they design for the actual needed solution the users require. Rather than forcing them to use HIRU, the key is getting to know how HIRU needs to be like for it to be useful and thus used.

The second pillar of this step will be “field” observations. This is the needed counterpart to the interviews and, as said before, to truly understand where the answers to the interviews come from. The team will need to observe a wide variety of users utilise the very tools HIRU intends to replace or serve as an aid to. This will highlight the shortcomings of said tools and shed light into the potential gaps HIRU can actually help overcome.

## **2.2 Specify user requirements**

When coming up with user requirements stemming from the learning outcomes of the previous step, it is crucial that, even before everything else described here, a step back is taken. The key question before the requirements can be even begin to be discussed is if HIRU is truly the best solution for the problems that the users are facing. Again, rather than discussing how can HIRU help, the focus must be put on whether or not better solutions exist. If that is the case, then a full step back needs to be taken: maybe the user base analysed is not the correct target, maybe the problems that were first thought are not even the ones an AI-based assistant can help with, etc. Only once it is clear that HIRU is truly the best solution at hand, the requirements can begin to be drawn.

For that, the empathy built in the previous step needs to be used to correctly contextualise the needs of the user and the proposed solutions they come with. The popular saying goes *“People will tell you they want faster horses, not a car”*; and this very principle needs to be taken into account when analysing the needs stated by users. It is for that very reason that the observations were performed in the first place, for they will now provide the necessary context to make sense of the realities users face. With all that in mind, requirements engineering needs to be used to draw clear requirements in line with the discoveries found; from which the solutions can be designed upon.

## **2.3 Produce design solutions to meet user requirements**

From the foundations laid by the requirements engineered in the last step, now design ideas need to flourish. Instrumentally, they need to allow for quick and easy iteration, for they are bound to change with the very next testing phase, and their adaptability to the required changes will determine their

potential future. Also, quite relevantly for a new company, even the final solution that ends up being the output of this HCD process will very probably need change and iteration again in just a few years, and that is in the best-case scenario.

Also in this step it is critical to re-evaluate the possibilities of different solutions that could potentially fulfil the requirements better than what one had initially in mind. Maybe HIRU as a classical assistant with only voice to communicate is too limiting for the identified needs, and should also rely on image? Should an alternative to speaking to the assistant be considered for certain steps? Could any change better fulfil the requirements, other than the original idea?

## **2.4 Evaluate designs against requirements**

Once the design solution is obtained, rigorous testing and evaluation needs to be performed so that iteration can be done with strong basis and understanding of shortcomings. In early iterations, heuristics-based evaluations [3] can be a lot more inexpensive and less time-consuming to perform when compared to extended testing involving users; while still shedding light on many of the potential improvements, as well as revealing which design choices helped the most in making the system usable. However, these cannot and should never completely replace user-based evaluations, even if the proposed solution passes all the usability heuristics with flying marks.

A similar process of user evaluation to that used to identify their needs should be used. Not only this would metaphorically close the design process, but also be quite telling on how their habits and methods have evolved when compared to those used before the design solution was implemented. Crucially, both heuristics and user-based learning outcomes, the so-called “lessons learned” of this evaluation phase need to be the baseline of any iteration that results from this; but importantly have to be appended to the lessons learned of previous evaluation phases that happened in the past. This is the only way to avoid falling into the same mistakes that were once identified and that can otherwise be missed in other evaluation steps due to the inherent variability of the results obtained when using user-based feedback.

### 3 Reflections

The benefits of using HCD approaches when developing interactive systems and services, while hard to quantify, are huge in every sense of the word. The paramount advantage of adopting HCD methodologies lies in its ability to enhance the overall usability and user experience of the final product. Putting the user at the very centre of the process, and taking into account their feedback while contextualising their experiences gives invaluable data that, paradoxically, is sometimes not valued enough. It is this very data and learning what allows designers to tailor solutions that align more closely with the intricacies and rarities of human cognition and interaction. This, in turn, makes the user experience more smooth, seamless, and overall more effective and satisfactory. Plus, by integrating this philosophy from the very beginning of the design process, one can not only create more user-friendly interfaces but also mitigate the risk of usability problems and costly redesign processes for issues that could have been identified from the very beginning.

Despite its clear benefits, HCD-based processes requires that established companies restructure and rethink their ways of doing. Resistance to change within entrenched corporate structures, resource constraints in terms of time and budget, and the need for sustained commitment to HCD principles can be sometimes insurmountable challenges that not every company or organisation is willing to face. Nonetheless, overcoming these challenges by embracing its clear benefits can make any company achieve a position with nearly-infinite potential to gain significantly (growth, prestige, etc) by delivering products that align closely with user needs and expectations.

### References

1. NESSLER, Dan. *How to apply a design thinking, HCD, UX or any creative process from scratch* [online]. Medium, 2018 [visited on 2023-11-21]. Available from: <https://uxdesign.cc/how-to-solve-problems-applying-a-uxdesign-designthinking-hcd-or-any-design-process-from-scratch-v2-aa16e2dd550b>.
2. *ISO 9241-210:2019 - Ergonomics of human-system interaction* [online]. ISO, 2019 [visited on 2023-11-21]. Available from: <https://www.iso.org/standard/77520.html>.
3. NIELSEN, Jakob. *10 Usability Heuristics for User Interface Design* [online]. Nielsen Norman Group, 1994 [visited on 2023-11-03]. Available from: <https://www.nngroup.com/articles/ten-usability-heuristics/>.