# THE VALUE OF THE NON-USER: DEVELOPING (NON-)USER PROFILES FOR THE DEVELOPMENT OF A ROBOT VACUUM WITH THE USE OF THE (NON-)PERSONA

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## ABSTRACT

This contribution explores non-user integration in a product development context of the development of a vacuum robot in order to analyse users as well as non-users of a product. While user profiles like the persona have been part of product development and product design for years, the non-user has not been widely explored.

Within this contribution the known concept of the persona is extended and further developed to the non-persona, a profile that describes non-users and why they do not use a certain product, in this case the vacuum robot. Including the non-user in product development offers the chance of addressing yet unidentified product requirements and therefore opening the product up to a bigger audience.

This template works for both users and non-users and can be used to include both sides in a development project.

**Keywords**: User centred design, Integrated product development, Human behaviour in design, non-user, non-persona

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# 1 INTRODUCTION

The integration of the user in product development and its positive impact on idea generation has been widely accepted (Hippel, 1976; Cooper and Kleinschmidt, 1986; Murphy and Kumar, 1997). Methods like user journeys from marketing (Lemon and Verhoef, 2016), the journey map (Doorley *et al.*, 2018) or personas (Nielsen *et al.*, 2015) are used to compile and visualise user feedback. Human-centered approaches like Design Thinking (Brenner *et al.*, 2016) and Scrum (Sutherland and Schwaber, 1993) integrate the user in every development phase with methods like co-creation (Ind and Coates, 2013).

While the user has been defined extensively (Gardan, 2017; Kurosu, 2011), product rejection and the non-user have not been explored as thoroughly (Ribak and Rosenthal, 2015; Wyatt, 2003; Miles, I., Thomas, G., 1995; Rogers, 1983; Barsch *et al.*, 2019; Satchell and Dourish, 2009; Augustin *et al.*, 2020).

Based on types of non-use (Augustin *et al.*, 2020) and reasons for non-use (Augustin *et al.*, 2021) this contribution explores how use as well as non-use can be integrated into product development projects.

Personas (Cooper, 2004) communicate user's needs, wants and wishes as well as giving an insight into their frustrations with a product while the non-persona is the persona's counterpart: a tool to visualise product rejection. By using both personas and non-personas, product development gains a more comprehensive insight into the product at hand.

Within the scope of a qualitative study this contribution compares the answers of users and non-users of vacuum robots to gain a better insight into adoption and rejection of products and how those can be integrated into product development with the help of personas (Cooper, 2004) and non-personas (Augustin *et al.*, 2021). By including non-use in product development a product or service can be improved significantly for current users as well as winning over non-users, which has the potential to significantly increase market reach and customer satisfaction.

# 2 NON-USE IN PRODUCT DEVELOPMENT

To comprehensively define non-use, a distinction needs to be made between types of non-use and reasons for non-use. Types of non-use describe product experience and the willingness to use, while reasons for non-use focus on influencing factors for non-use.

In Section 2.1 the non-user map is discussed, giving a broad overview of the different kinds of non-use and how non-use and use are connected, therefore including both aspects within the map. Section 2.2 defines the reasons for non-use within different influencing frameworks. Concepts of how to integrate the non-users and their requirements into product development are discussed in Section 2.3.

## 2.1 Types of non-use

The non-user map in Figure 1 describes different types of non-use, summarizing definitions derived from literature as well as adding new definitions (Augustin *et al.*, 2020). Vertically non-use is divided into four areas concerning product experience: whether the non-user or user is currently using the product, might use it, has used it in the past but has stopped, or has never used it before. The diagonal axis visualises the level of willingness to use a product or service, starting at the top right with "wanting to use" and ending on the bottom left with "do not want to use".

The different categorisations of non-use are then structured across the map, according to how frequently the product or service is used and whether the use is voluntary or not. The grey shading visualises the gradual transition from user to non-user.

The need to address both use and non-use in this map is illustrated with the two following types of use/non-use:

- Unconnected use: users of a competitor's product, therefore using the product but not the one the company in question is selling. These are users for one company, but non-users for all others and therefore worth looking into
- Compelled use: involuntary use or using a product out of necessity/lack of choice, i.e. a specific computer for work. These users would stop using the product and choose a different one if they could, therefore making them non-users.

Use and non-use are not easily separated and an overview needs to account for people's movement within definitions and a certain fuzziness between them.
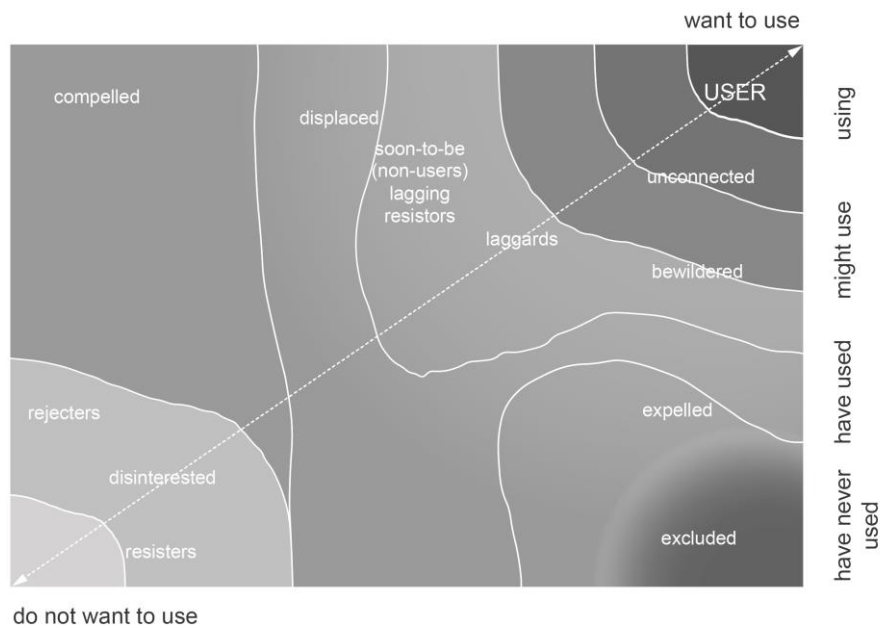
*Figure 1. Non-user map (based on Augustin et al., 2020)*

## 2.2 Reasons for non-use

Types of non-use were defined to visualise product experience and willingness to use. To examine non-use further and address what factors influence the types of non-use, the reasons for product rejection need to be analysed as well.

The reasons for non-use found in literature are visualised in Figure 2, divided into the three dimensions individual, interaction and product (Jiang *et al.*, 2000; Ali *et al.*, 2016). The three frameworks that influence these dimensions are personal, social and societal and the marketplace. The personal framework is often discussed in literature (Kahma and Matschoss, 2017; Marjan Bazhan *et al.*, 2015) and includes personal data like age, gender or race, economic status including financial means, personality and how those relate to decision-making as well as habits, beliefs and routines. The term decision making within the personal framework relates to the individual's character, i.e. how that person views change, how rational or emotional they are or what information they seek before making a decision. Decision making in a larger scale is then influenced by all aspects of the framework, such as the social framework (Laumer *et al.*, 2014). It covers the individual's environment, encompassing family, friends, work, religion and the broader context of culture. The marketplace describes the product-related side of influencing factors, like the number of products available, quality and price, switching cost, safety and maintenance.

Literature discussing IT implementation mentions the three categories people-oriented, systems-oriented and interaction theories (Jiang *et al.*, 2000; Ali *et al.*, 2016), referencing the person, the product and the interaction between the two. These are added to the overview in Figure 2 as individual, interaction and product. Reasons for non-use associated with interaction are accessibility, ease of use, usefulness, understandability, expectations and marketing.
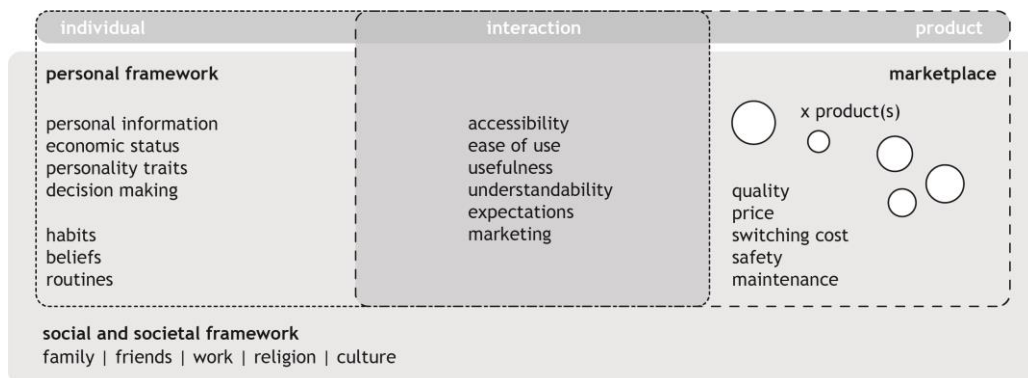


*Figure 2. Reasons for non-use (Augustin et al., 2021)*

The degree of how easily these can be influenced by product development differs significantly, especially since the personal and social frameworks are difficult to address from a product standpoint. However, the importance of being aware of all of the influences and reasons for non-use is valuable to product development.

## 2.3 Translating non-use to the concept of the non-persona

The non-persona (Augustin *et al.*, 2021) describes the persona's counterpart (Cooper, 2004), to additionally visualise the non-user's views and characteristics. As opposed to the affected persona (Karwowski, 2011), which only describes people affected by users, the non-persona includes all non-users of a product. The negative persona or anti-persona (Cooper *et al.*, 2014) describes the group of people the product was not made for (Brangier and Bornet, 2011). It can also be used as a deterring example to keep in mind for product development (Wobig, 2012).

The non-persona shown in Figure 3 is used to visualise all non-users to extend market reach. Some aspects are relevant to both persona and non-persona design, such as demographic data, personality traits, disabilities, interests and hobbies, aspects related to technology, information about daily routines and feedback concerning the product or service (Nielsen *et al.*, 2015).

The two dimensions of types of non-use and reasons for non-use can then be added to the concept of the non-persona. A simple visualisation enables a quickly understandable profile, beginning with the level of resistance to the product or service, the categorisation of non-use and the interest to use. Reasons for partial use or non-use can be further discussed as well as goals and frustrations related to the product.
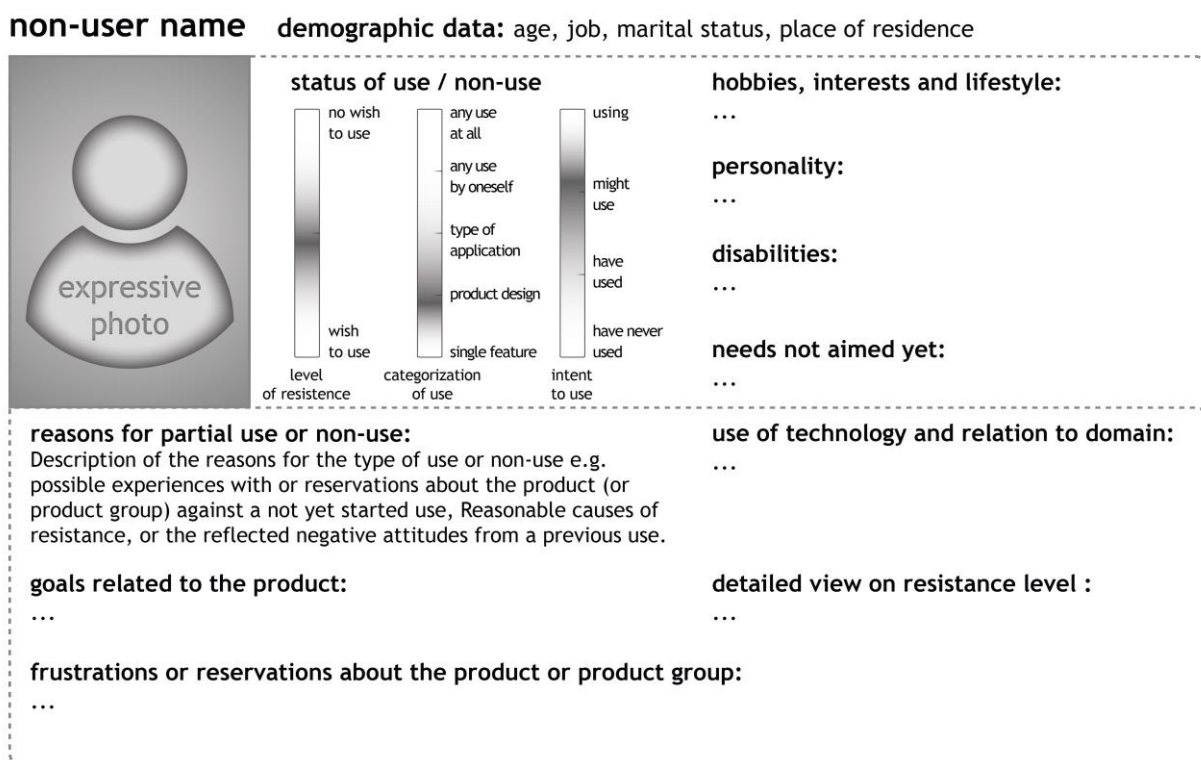


*Figure 3. Development of the non-persona*

Using both the persona and non-persona can facilitate a more thorough overview of necessary product features, product feedback, how purchase decisions are made and what factors influence those decisions. The case study in Chapter 3 compares what information can be translated to a persona vs. a non-persona and what added value the non-persona can offer to product development.

## 3 QUALITATIVE CASE STUDY: USE AND NON-USE OF ROBOT VACUUMS

To develop the non-persona further as well as validate the concept, the non-persona needs to be fed with real data within a case study and compared to a persona.

The case study of this contribution is the non-use of vacuum robots. The general setup of the case study is discussed in Section 3.1. Within this case study, two groups were defined: the non-users of the vacuum robot (=users of regular vacuums, battery-powered vacuums, brooms, etc.) and the users of vacuum robots. Both groups were interviewed and their answers translated into personas and non-personas, of which one of each will be discussed further in this chapter. Section 3.2 will be discussing the persona and Section 3.3 the non-persona.

## 3.1 Case Study Setup

Within four weeks in the fourth quarter of 2020, 31 people were interviewed, 19 being non-users and 12 being users of robot vacuums, as shown in Figure 4. Interviews were conducted over the phone and took between one and two hours each. Due to the nature of the explorative qualitative study, all questions were open-ended. The conducted phone interviews were noted within a prepared questionnaire to simplify the process. The dialogues began with a short briefing of the interviewees, they were assigned an anonymous number and received a quick outline of the interview ahead.
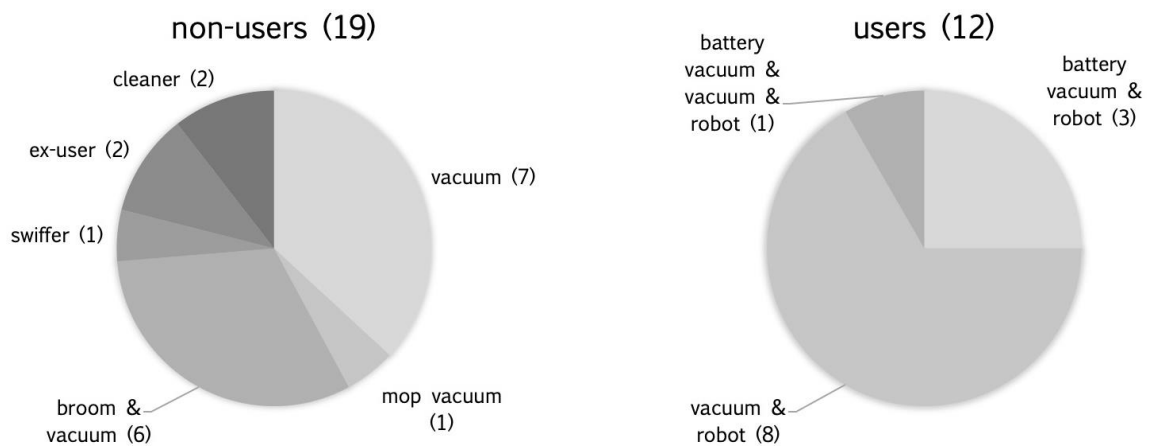


Figure 4: Overview of non-users and users

Figure 5 visualizes the age and gender distribution among interviewees and whether they are users or non-users. Prominently, most interviewees are younger than 40 years old, with most robot vacuum users being under 30 and making up a large portion of the left hand of the graph.
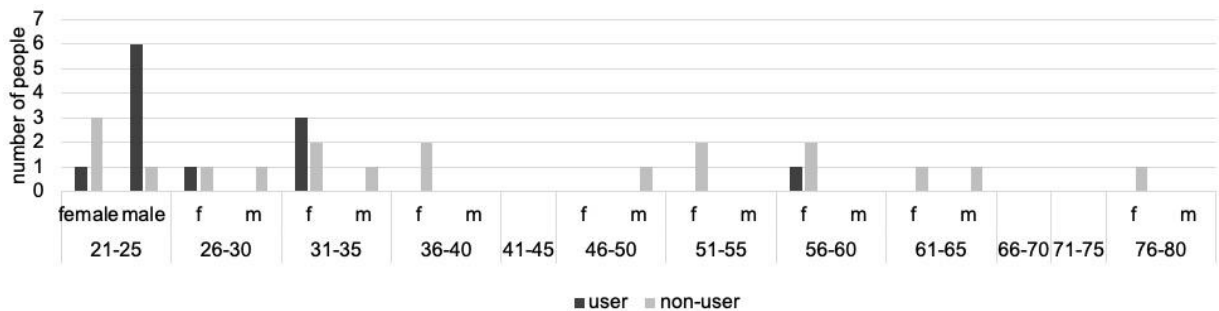


Figure 5: Overview age, gender and (non-)use

The interview itself was divided into a line of questions for vacuum users and another for non-users, both focused on product usage (past and present), product experience and product purchase. Cleaning preferences, personal data and questions about the living situation complete the questionnaire. The last part of the interview process is the data summary, which the interviewer did once the interview was over, consisting of analysing the questionnaire and breaking it down into an excel sheet that holds all aspects relating to non-use of the product and its translation to product features.

Finally, answers were categorized according the interviewees' reasons for use or non-use of the product and they were marked within the non-user map.

All users and non-users are marked on the map in Figure 6 according to their product experience and willingness to use the robot vacuum. The users and non-users can be sorted into 5 clusters: one group

in the bottom left who does not want to use the vacuum robot, a group in the bottom right who cannot use it but would like to (i.e. their apartments are to small), one on the left who do not want to use it but might (if they had the chance). One cluster is very close to use and would like to become users and the last cluster of five people are happily using the product.
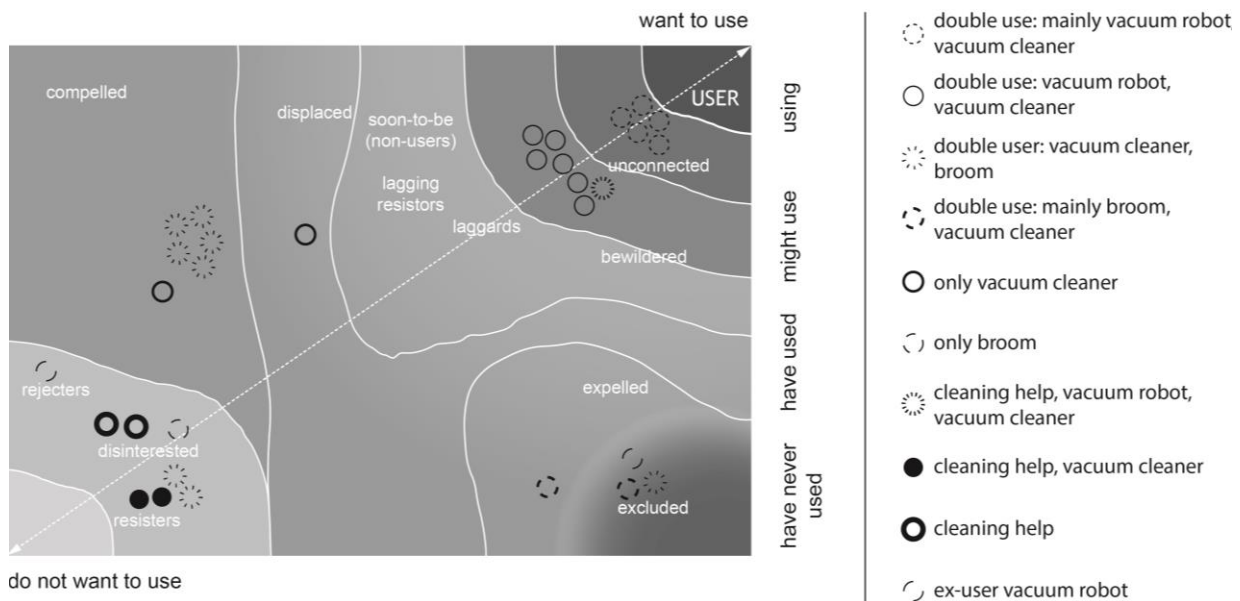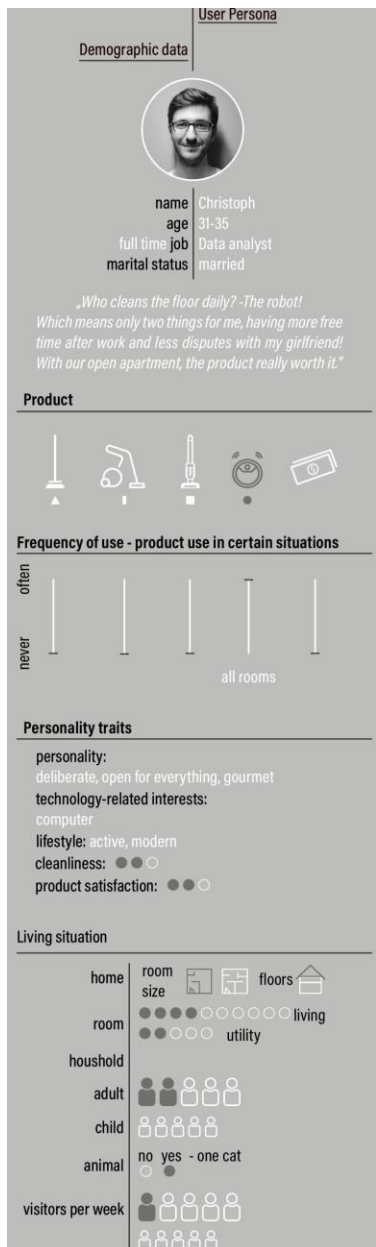


*Figure 6: Robot vacuum (non-)user map*

## 3.2 Persona of a robot vacuum user

The design of the template works for both persona and non-persona and can be used to compare findings. The template is divided into two columns: the left side representing personal information with demographic data, a quote from the interview, what product is used and how frequently it is used, personality traits according to the interview and an overview over the living situation (if relevant to the product). The right side summarises the information about the specific factors for use or non-use. The three frameworks of reasons for non-use, as discussed in Section 2.2, are added as well as the non-user map from Section 2.1. Reasons for use or non-use can also be specified in this section. While the information translated into the (non-)persona comes from real interviews, the demographic data is anonymised, so the actual person behind it remains unknown. Photos used can be stock photos that visualise a person matching the demographic data.
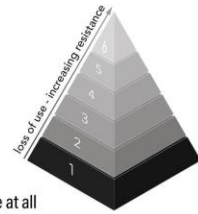
The left column of the persona in Figure 7 gives an overview of personal data and given conditions, in this case, personal data about Christoph, what he thinks about the robot, how frequently he uses it (very often and in all rooms) as well as personality traits like being open and active and his living conditions, a six-room apartment, where he lives with his partner.

The right column gives an overview of the most critical information gathered in the user interview. The most important influencing factors for use are valued from 1-3, meaning the most relevant are economic status, usefulness and ease of use. The resistance level is zero, because Christoph is using all functions of the product. Christoph's main critiques of the robot are summarised: it gets caught under furniture, cables are pulled in, the collecting container is small, low speed, etc. His reasons for use are then summarised in bullet points: he likes that the robot cleans daily and while he is gone, it works well for pollen removal during summer and it also has a wiping function. Christoph falls within the category of "using the product" and "wanting to use the product" on the (non-)user map at the bottom of the page.

*Figure 7: The persona*

## 3.3 Non-Persona of a non-user

This section discusses the non-persona of a vacuum robot non-user shown in Figure 8, with a similar structure to the persona discussed in Section 3.2. David uses the classic vacuum with a cord as well as a broom. He is family oriented and pragmatic and cares about sustainability. His apartment consists of five fairly small rooms and he lives alone. He has never used a vacuum robot, but would use it if his household happened to have one. Influencing factors for non-use are mostly David's habits since he has only used a classic vacuum cleaner and grew up with it. His family has a significant impact on him since he is very family-oriented, and the children who visit him do not like vacuum robots and are afraid of them. Lastly, he does not want to invest a lot of time into a new product. His user resistance level is relatively high, because he rejects the product altogether. His reasons for non-use are rather practical, his rooms are very small and winding, and he is worried the robot would get stuck very often. Since he is aware of living sustainably, keeping all doors open for the robot to clean the apartment, he would lose the heat from his living areas. He also likes the flexibility of the classic vacuum cleaner and is worried that his dog's hair might be too much for a small robot to clean up. Within the non-user map, he falls between the categories of the disinterested and resisters. He has never used the product and does not intend to, but since he is open to using it (if he was gifted a vacuum robot), he does not fall in the far left corner of "does not want to use".

*Figure 8: The non-persona*

## 4 DISCUSSION

This chapter will summarise areas of improvement that became apparent during the case study as well as aspects of the template that worked well. The template that was developed for this case study worked well for both the persona and the non-persona. Comparing the user's product criticism and the non-user's reasons for non-use of the robot vacuum in this particular example, it can be noted that there are little commonalities. The user's feedback is rather specific to certain functions of the robot, while the non-user's reasons for non-use are more general and concerning their living situation. The biggest similarity is the robot's tendency to get stuck or be obstructed by obstacles like furniture or carpet. A correlation between personality traits and influencing factors for use and non-use can be observed, i.e., Christoph being open-minded and into computers and therefore wanting to use a robot. David however is old-fashioned and pragmatic, therefore not liking the idea of purchasing a new product that might need more attention. Both persona and non-persona are very information dense and need to be streamlined significantly, since it is a challenge to understand it within one glance. Information that may be condensed or excluded are aspects like the living situation on the bottom left of the template, frequency of use and the interview summary at the top right. The non-user's criticism of their product can also be excluded, since it has no effect on the vacuum robot. Personality traits and

influencing factors for non-use correlate and therefore need to visually correlate as well. The most relevant aspects of the non-persona are reasons for non-use, influencing factors for non-use and the non-user map. The most useful information gathered from the persona is the user's product criticism, which can be directly integrated into product development. Other details from the interviews that can be added to the template to be more informative: time spent on cleaning, how much time is spent at home, type of flooring and type of contamination (how much needs to be cleaned and which areas specifically).

Another approach could be to combine the two profiles to enable a direct comparison between the two and highlight differences and similarities. The persona could be distilled to product criticism and type of use, it could also be added onto the non-persona in place of the non-user's criticism of the regular vacuum. Ultimately both profiles could be used separately, but if non-use as well as use need to be addressed, then the non-persona can encompass both in a condensed version of itself. To successfully communicate the spectrum of non-use, a new profile design was needed rather than simply adding onto the existing persona concept. It was observed that most interviewed users were in fact multi-users, meaning many people were using more than one product. For example, some users utilized both a robot vacuum as well as a cordless vacuum and sometimes even a classic vacuum as a third option. The (non-)persona template cannot accommodate multiple products at this stage, other than marking the product on the left-hand side. There may have to be more room for multi-users and, therefore, more product feedback. The user resistance level was difficult to pinpoint during interviews and was mostly evaluated by the interviewer rather than the interviewees themselves.

The qualitative nature of this study needs to be taken into account when discussing the most important findings. By analysing 31 users and non-users, the lessons learned cannot be transferred to other products or taken as generalities of non-use. The reasons for non-used discussed 2.2 were found to encompass all reasons found during the interview and do not need to expanded. The non-user map in 2.1 was a useful tool to summarise all interviews, but when used within the template to only visualise one person, it does not communicate a lot of information. However, the map can be used to select areas of research before conducting interviews to predefine types of non-use that are of special interest in order to limit research efforts.

## 5    SUMMARY AND OUTLOOK

This contribution discusses non-use and its potential for as well as its integration into product development. Within a qualitative case study, the different aspects of use and non-use of a robot vacuum were analysed and translated into personas and non-personas. A template was created and applied to gather feedback about its implementation. The template is divided into two columns that address personal data and given conditions of the living space as well as a summary of the interview with the (non-)user. Within this case study, the non-persona has proven to be a useful addition to the widely accepted persona by communicating reasons for non-use, type of non-use and influencing factors for non-use. These communicate new areas of improvement for the product discussed. Adjustments need to be made concerning the template's size and information density.

While this contribution visualises how non-use can be translated to a non-persona, further case studies need to be conducted for the template to be improved. Specific areas that need to be analysed are the possible combination of the profiles and to include use as well as non-use when building personas. Different product types need to be analysed to explore the possibility of a more general template that is not product specific to support a more flexible implementation and minimise the effort to adapt the template to each individual use. Different visualisations and methods of integrating non-use into product development need to be explored further, the persona only being one of them. Additional approaches can diversify the integration of non-use into development projects and consequently improve a product significantly.

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