Empathy in Design Scale: Development and Initial Insights

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ABSTRACT

Empathy towards users is crucial to the design of user-centered technologies and services. Previous research focused on defining empathy and its role in the design process for triggering empathy for end-users. However, there is a lack of empathy measurement instruments in design. Most previous work focused on designers, overlooking the need for other stakeholders to develop empathy towards the users to break organizational silos and deliver high-quality user-centered services and products. In this contribution, we share the preliminary stages of the development of an empathy scale for service design. We build on empathy literature from psychology and design to define 18 items representing four empathy dimensions. We report on the definition of these dimensions and their underlying items, and present preliminary studies in which we reviewed the first version of the scale with experts and stakeholders.

CCS CONCEPTS

• **Human-centered computing** → Human computer interaction (HCI); HCI design and evaluation methods; Interaction design; Interaction design process and methods; User centered design.

KEYWORDS

Empathy, Empathic Design, Scale Development, Measurement tool, Service Design

1 INTRODUCTION

Users nowadays expect personalized experiences from products and services. To deliver such experiences, designers require a solid understanding of user needs, values and desires. Over the last decades,

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empathy has gained importance in HCI and design [11, 20, 40, 43] for it allows designers to put themselves into their users' shoes [19, 26], feel more engaged towards the users and better understand their experiences and perspectives [7, 9]. The field of empathic design, which emerged in the 1990s [24], employs research methods (e.g., design probes or journey maps) that allow the designers to immerse themselves in the user experience, to enhance their understanding of the users' experience and ultimately to choose between simple intuitions and suitable concepts [20]. Empathic research can yield data to serve designers as inspiration [30].

While the importance of empathy-building in the design process is undisputed, it is unknown to which degree designers and other key stakeholders in an organization are empathic with the users. More precisely, no suitable tools are currently available to support an assessment of empathy and empathy building within service or product development. Reflecting on frameworks and methods for measuring empathy, particularly in the design context, this work-in-progress presents the first steps undertaken to build and validate an empathy scale for service design. It outlines the final steps towards a standardized tool for designers to measure empathy at various stages during the design process in a cost-efficient way, suitable for research and industry alike.

The future Empathy in Design Scale aims at providing a quantitative measure of empathy in design, under the form of a standardized self-reported measure. In industry, the scale intends to be a tool supporting the user-centered maturity of an organization by assessing and developing employees' curiosity and empathy towards users. In academia, our scale will provide a standardized and quantitative measure of empathy in design, relevant to investigate and model several variables, for instance the influence of empathic tendencies on the success of design interventions.

1.1 The Concept of Empathy in Psychology and Design

Design research bases its understanding of empathy on philosophy, psychology, and neuroscience literature, which define the concept of empathy in various ways. In their review, Cuff et al. [6] list not less than 43 definitions of empathy in psychology and eight underlying themes to scope this concept. These themes also align with the definition of empathy in design [21]. The most common distinction is made between cognitive and affective empathy, where cognitive empathy is "the ability to ascribe mental states to others, such as beliefs, intentions, or emotions" [29] or "to understand another's feelings" [6]. In contrast, affective empathy involves "affects on the part of the "empathizer" (i.e., the person who empathizes towards
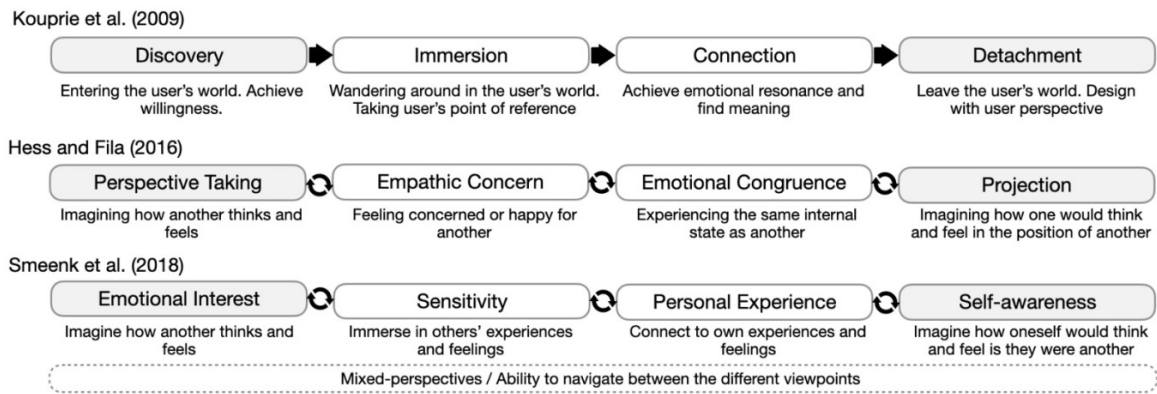
Figure 1: Synthesis of the main frameworks of empathy in design and their overlaps

someone) [29] and is concerned with "the experience of emotion, elicited by an emotional stimulus" [6]. Despite this distinction, both forms of empathy are related and interdependent [15]. It is also important to distinguish empathy from other emotional states such as sympathy, compassion, tenderness or pity, to only mention a few [2]. Another debate is whether empathy is a trait of personality - some people being more empathic than others - or a state, meaning that being empathetic or not changes according to the context [6]. According to Hodges and Biswas-Diener [15], empathy is a state of mind that people can control and modify. Likewise, empathy does not trigger direct behavioral response but rather the behavioral motivation to act or not act (empathy does not go hand in hand with prosocial behavior) [6]. This motivation is key in the design literature [14, 21, 35, 36].

In design, empathy has been used as "a defining characteristic of designer-user relationships when design is concerned with user experience [44]. Surma-Aho et al. [41] present a comprehensive review of the concept of empathy. For the sake of brevity, we will refer to the main frameworks we build on in the present contribution (Figure 1).

Kouprie et al. [21] introduced a four-phase framework for empathic design based on the work of psychologists like Stein [40] or Rogers [34]. The model illustrates a deliberate act of stepping in and out of others' lives as the designers appeal to both their cognitive (grey on Figure 1) and affective empathy (in white on Figure 1). First, they approach the users' world through *discovery*. This triggers designers' curiosity and willingness to understand users' experiences. Then comes the *immersion* where the designers internalize the users' point of reference without judging them. During the *connection* phase, the designers reflect on their own experiences to understand users. In the final *detachment* phase, they regain distance to find solutions and ideate.

Likewise, Hess and Fila [14] define two axes to scope empathy: *affective experiences* vs. *cognitive processes*, *self-oriented* vs. *other-oriented*. Their combination results in four dimensions: (a) *perspective-taking* when designers imagine how the users think and feel (cognitive, other-oriented), b) *empathic concern* when designers feel concern for the users (affective, other-oriented), (c) *emotional congruence* when designers experience the same emotional state as

users (affective, self-oriented), (d) *projection* when designers imagine how they would think and feel if they were the users (cognitive, self-oriented). Based on this taxonomy of empathy, Smeenk et al. [35, 36] describe five factors of empathy: *emotional interest*, *sensitivity*, *self-awareness*, *personal experience*, and *mixed perspective*. Designers' *emotional interest* is when they choose to be receptive to users' emotions and interaction contexts. The *sensitivity* develops while the designers are in contact with the users. S*elf-awareness* refers to the ability of designers to distinguish their own experience from the one of the users. When designers are familiar with the use context, they might appeal to their *personal experience* and reflect on it. Finally, the *mixed-perspective* is the ability to navigate between these viewpoints to empathize with the users.

Each of these frameworks contributes to the conceptualization of empathy in design. Overall, these offer worthwhile foundations to develop tools for measuring empathy in design, which development and consolidation should be further explored scientifically [41].

1.2 Measuring Empathy in Psychology and Design

Dozens of empathy measurement scales have been developed in the fields of psychology, among them the popular Empathy Quotient [1], the Interpersonal Reactivity Index [8], Hogan's scale [16], or Escalas and Stern's scale [12]. Most of them are used in psycho-diagnostics to better understand empathy competences or responses [28, 32], for instance in the context of behavioral disorders or early childhood education [6]. The format of these tools is generally based on statements assessing several facets of empathy, with affective or cognitive empathy being the dominant dichotomy. The ratings are made using Likert scales of agreement (e.g., [1, 8]) or dichotomous Yes/No choices [39]. Scenario-based tools asking respondents to infer the characters' emotional state are also used, for instance with children [27, 31].

Surma-Aho et al. [41] review and classify empathy scales according to six categories: *empathic tendencies* self-reporting tools, *beliefs about empathy* self-reporting tools rating the importance of empathy towards others, *emotion recognition* through visual material depicting people's emotions, *understanding mental contents*

(assessing in real-time the valence and intensity of others' emotions), *shared feelings* observed via neuro-sensors, and *prosocial responding* when a situation of hurting others is simulated.

In service design, the most popular measure of empathy is part of the service quality measurement tool SERVQUAL [31]. This standardized questionnaire includes 22 items assessing 5 dimensions using 7-points Likert scales. Empathy is defined as "caring, individualized attention the firm provides its customers". Five items address customer perception of employees' empathy towards them, e.g., "employees of XYZ do not give you personal attention" or "employees of XYZ do not know what your needs are". SERVQUAL has been extensively used for the last decades but also criticized for theoretical and operational flaws [3]. Despite its shortcomings, it is one of the first tools including the employees' attitude when reflecting on empathy towards users.

We see a small number of studies measuring designers' empathy during the design process. Given the lack of an empathy measurement tool, they resort to common UX methods adapted to assess empathy. Van Rijn et al. [33], for example, analyzed the discourse of designers during teamwork, looking for four empathy indicators: empathic expressions (e.g., saying "I think/feel/guess the users think/feel/want…"); own experience (e.g., relating users' needs and experiences to their personal experiences or comparing them to people they know); questioning users' needs and experiences vs. making (false) assumptions; and discussing user facts. Visser and Kouprie [43] tested their framework for empathy design in a workshop with design practitioners. To measure the effectiveness of their intervention, they combined the Empathy Quotient [1] with the observation of specific verbal expressions. They also employed self-reports via ad hoc scales through which designers rated their interest, involvement, inspiration, and empathy in regular intervals over the course of the workshop. They also used experience curves to record the evolution of the designers' empathy. Finally, the empathic accuracy method by Chang-Arana et al. [5] was integrated in the design process. It consists of successive activities: interviews between designers and users are video-recorded. The user watches the recording and annotates key moments by describing their thoughts. Up to 4 weeks later, the designer is shown the video and infers what the user might have thought at each pause point. The researchers assess the similarity between the inferred and actual thoughts on a 3-point scale (i.e., essentially different, somewhat similar, essentially the same). While the empathic accuracy approach is able to assess designers' empathy to a certain degree, it is complex and time-consuming. Responding to this critique, their Quick Empathic Accuracy involves a shortened experimental protocol where a smaller number of entries is reported [25]. An inherent limitation of empathy measurements is their proneness to social desirability bias, as highlighted by Krumpal [22]. In response to that critique, the research team [5, 24] proposed two solutions. First, they used physiological measures, arguably free of biases. Yet it is hard to directly link them to the constructs they measure [41]. Second, they used behavioral measures independent of the designer's subjective evaluation.

Current studies including an evaluation of empathy in design tend to rely on time-consuming methods which, despite their interest, might not meet industrial needs. Furthermore, existing work majorly focus on the empathy of the designers towards users rather than addressing empathy building in a larger frame involving other stakeholders in an organization.

2 EMPATHY IN DESIGN SCALE

2.1 Research Objective

The development of the Empathy in Design Scale aims at providing a quantitative measure of empathy in design, under the form of a standardized self-reported measure. The creation of this tool contributes to filling the gaps in metrics to assess empathy in the context of (service) design as there is to the best of our knowledge no standardized measurement scale of designers' and stakeholders' empathic tendency [41] towards users, specific to (service) design. For industry, the scale intends to be a tool that supports the user-centered maturity of an organization by developing and assessing employees' interest and empathy towards users. For academia, the scale can provide a standardized and quantitative measure of empathy, relevant to investigate and model several phenomena related to design processes.

2.2 Scale Development Process

2.2.1 Definition and Scope of the Construct. Following the best practices on summated rating scale construction [38], we first conducted a literature review on the definition and scope of empathy to define the dimensions relevant for the evaluation of empathy in a design context. We consider empathy as a state which depends on the context [6] and can evolve over time [15]. Building on the frameworks of empathy in design by Kouprie et al. [21], Hess et al. [14] and Smeenk et al. [35, 37], empathic tendency includes an initial discovery, an immersion into the user's world, a connection with one's own personal experience and a detachment from the users' viewpoint. The ability to navigate within these dimensions, and the underlying cognitive or affective empathy types, is key (labeled mixed-perspective in [35]). From these models, four main empathy dimensions were derived and selected (Table 1) as relevant to cover the construct: *Emotional Interest/Discovery* (EI), *Sensitivity/Immersion* (S), *Personal Experience / Connection* (PE), *Self-Awareness/Detachment* (SA). As a source of inspiration, we also investigated measures of social curiosity [17, 18], as it relates to the *discovery* phase in [21] where empathy starts with the willingness and motivation to understand the users. The *joyous exploration* and *overt social curiosity* from Kashdan et al.'s [17] five-dimensional curiosity scale appear especially relevant in that regard.

2.2.2 Creation of a Pool of Items. Two of the authors independently generated a pool of items for each of the four dimensions. This resulted in 6 to 8 items per dimension (33 in total), with a natural overlap in the content of the items, yet with subtle variance. The authors entered in a discussion to merge or adjust items showing the most redundancy, resulting in 29 items.

When designing a measurement scale, the number and type of response categories has to be carefully considered, as it may influence the psychometric data quality. Good practice is to use five to nine categories [38]. Inspired by [17], the format of the scale was defined as statements to rate on a 7-points Likert scale to indicate "the degree to which these statements accurately describe you or not". All statements were positively formulated, yet we decided to

Table 1: Description of the four dimensions of empathy in design included in the construction of the Empathy in Design Scale (based on [14, 21, 34])

Dimension	Definition
Emotional Interest/ Discovery (EI)	Imagining how users think and feel - Curiosity about the users, resulting in a willingness to explore and discover the users, their situations and experiences.
Sensitivity / Immersion (S)	Direct contact - Taking an active role by wandering around in the user's world, absorbing without judging. Being open-minded and interested in the user's point of reference.
Personal Experience / Connection (PE)	Resonating with the user - Connecting with users on an emotional level, by recalling explicitly upon one's own memories and experiences in order to reflect and be able to create an understanding.
Self-awareness / Detachment (SA)	Stepping back in the role of designer or stakeholder / Correctly distinguishing between the representations of one's own actions, perceptions, sensations and emotions, and those of users [35]

closely monitor whether social desirability biases would require us to alternate between positively and negatively formulated items. Statements here referred to service design, but could be adapted to "product".

2.2.3 Initial Expert Evaluation. We submitted the remaining initial pool of 29 items to 3 experts in Human Computer Interaction (HCI) and checked the scale's face validity by asking them to review each item separately and to categorize it in one of our defined dimensions. They were also invited to assess if the scale and dimensions appeared to be a good measure of empathy in design. These experts were research scientists with various backgrounds (psychology, industrial design, HCI), active in the field of HCI and knowledgeable in service design as well as standardized scale construction. This expert review resulted in a reformulation of several items and a decrease in the number of items from 30 to 17 items. Some items did not reach consensus in terms of face validity or clarity, others were redundant in the dimension measured; we tested both versions to identify the best one.

2.2.4 Initial Version and Pretest. In a next stage, we pretested the initial 17-items version of the empathy in design scale with N=8 participants (5 men, 3 women, aged 23 to 45 (M=35) during individual face-to-face sessions. As our scale is meant to be used by designers and employees of service or product development companies alike, these first tests focused on a population of non-native English-speaking, designers (n=4) or related professionals knowledgeable in user-centered design (n=4 software developers and a sound engineer).

We used cognitive interviewing [4] to investigate how participants interpreted and responded to each item. Beyond ensuring the practical understandability of the items and the answer format, this technique also constitutes a source of construct validity evidence [4, 10]. Each participant was invited to fill out the scale while thinking out loud and prompted to explain their replies. They also rated every item on a 5-points understandability scale from 1 "not understandable at all" to 5 "totally understandable". We thus analyzed their replies to the scale, their explanations and their understandability rating (see supplementary material).

We noted some issues related to the comprehension of key terms or errors or ambiguity in the wording of the statement. While 5 out of 17 items were rated with very high understandability scores of either 4 or 5 (EI1, EI3, EI4, SA2, SA4), the variance was higher

for the remaining 12 items. The average understandability score proves relatively high nevertheless for 7 other items collecting a mean score above 4 (EI2, S1, S2, S4, SA3, PE2, PE4). The items with the lowest understandability score are S5 (M=3.25, SD=1.67), PE1 (M=3.25, SD=1.75) and SA1 (M=3, SD=1.51). The main question from participants regarding S5 'I go to the field to feel in touch with users' was that it felt very personal "to feel in touch" which we did not consider problematic as affective empathy is touching upon personal aspects. Another minor comment, justifying a low understandability score for a respondent, was the sound proximity between "field" and "feel" which we solved by adding "in order to" between these words. Finally, it seems like "going to the field" can be a research jargon and more insights are needed on non-designers. The original item PE1 read: "I often consider and reflect on my own experiences and feelings". However, including a mention of frequency ("often") in the item was creating issues with the answer scale. One participant said, "if you mention "often" in the item, then it's a score of 2 or 3. Without "often" I would put that higher but this confuses me a bit". The same item was hard to understand without context (M=3.25, SD=1.75), and some participants lost the focus on the experience of the service and rated how reflective they were overall in the context of their everyday life. The reformulated version omits "often" and clarifies the context: "When thinking about the service, I consider and reflect on my own experiences and feelings". We also contextualized and refined the instructions to refer more explicitly to the participant's professional context. Item SA1 originally read "I imagine how I would think and feel if I were a regular user rather than an employee" (understandability score M=3, SD=1.51). The addition of the adjective "regular" aimed at distinguishing end-users from the respondent, especially when employees can be users of the service company they work for (e.g., transportation company). This was not well understood and we removed it from the revised item. Besides these adjustments, the term "sensitive" in S1 ("I am sensitive to the experiences of users") was overall understood (M=4, SD=1.2) but triggered confusion in German speakers ("false friend" in German). As the term originated from the theory and no perfect unambiguous synonym could be found, we decided to see how a more diverse group of respondents would react to it. Item S2 "pay attention, without judging, to how users experience the service" was well understood (M=4.25, SD=0.89) yet had a complex sentence construction. "Pay attention"

Table 2: Experimental version of the Empathy in Design Scale

Instructions: The table below includes statements related to your professional context. Please use the 7-points scale* to indicate the degree to which these statements accurately describe you or not. Respond spontaneously: there are no right or wrong answers, only your perspective matters.

Item code	Item
	Emotional interest/Discovery (EI)
EI1	I am interested to learn about users' experiences and needs
EI2	I imagine how users think, feel or behave in different situations
EI3	I am curious about users' experiences and needs
EI4	I want to learn about users' experiences and opinions about the service
	Sensitivity/Immersion (S)
S1	I am sensitive to the experiences of users
S2	I observe without judging how users experience the service
S3	When thinking about the service, I take the users' point of reference
S4	I immerse myself in the user's world
S5	I go to the field in order to feel in touch with users
S6	I am concerned about the experiences of users
	Personal experience/Connection (PE)
PE1	When thinking about the service, I consider and reflect on my own experiences and feelings
PE2	The experiences and feelings of users resonate with my own
PE3	I understand the users' experiences because I know how it feels
PE4	I compare users' experiences with the ones of people I know
	Self-awareness/Detachment (SA)
SA1	I imagine how I would feel and think if I were a user rather than an employee
SA2	I am aware that my experiences as an employee are different from the ones of users
SA3	I realize that there are similarities and differences between my experiences and the ones of users
SA4	I understand why users perceive things differently than I do as an employee

* The 7-points of the scale are: 1/ Does not describe me at all 2/ Barely describes me 3/ Somewhat describes me 4/ Neutral 5/ Generally describes me 6/ Mostly describes me 7/ Completely describes me

was also slightly too strong to reflect the sensitivity stage in empathy building. We reformulated it into "I observe without judging how users experience the service".

Finally, we looked at the distribution of pretest answers on the scale to explore the sensitivity of our scale (i.e., the capacity to discriminate between individuals with different levels of empathy). Several items showed a skewed tendency with high agreement scores, especially items from the self-awareness dimension. Our sample composition (designers or engineers trained in user-centered design) might explain this tendency. It is however a strong point of attention in future steps of the scale development, where we need to ensure that common survey biases such as acquiescence or social desirability [22] would not affect the psychometrics properties of our tool. Finally, we reintegrated an item that was previously discarded (S6) because the variable was not covered anymore but theoretically relevant, resulting in an 18-items experimental version (Table 2).

2.3 Experimental Version

Table 2 presents the 18-items experimental version of the scale, resulting from the initial stages of scale development. This scale will be administered to an adequate sample of respondents to conduct item analyses.

3 DISCUSSION AND FUTURE WORK

In this work, we presented the first steps undertaken to build and validate an empathy scale in design. While we build on previous work in psychology, we propose a tool adapted to research and practice in design, which will be cost-efficient and usable by designers and non-design professionals alike (employees within an organization). As a work-in-progress, the present contribution entails several topics for discussion. Developing a standardized evaluation instrument requires a lot of attention to the psychometrics properties of the tool. What is a good evaluation scale? Research standards establish that a good evaluation scale is valid (it measures what it intends to measure), reliable (the measure is consistent) and sensitive (it discriminates between individuals) [38]. The initial qualitative steps of development reported in this paper set a crucial basis to enable good psychometric properties to be verified in the upcoming stage of scale development (i.e., administration to an adequate sample size and item analysis). Some observations made by the experts or during the pretests will also be tested. This is the case for instance for the distribution of answers on the 7-steps of the scale (an indicator of the scale's sensitivity), or for the understandability of the items by a non-specialized sample of participants (representing other stakeholders than designers). Regarding the dichotomy between cognitive vs. affective empathy, we noticed that it is not so much at the subscale level (e.g., discovery being a

cognitive empathy stage and immersion relying on affective empathy) but items in each dimension might cover one or the other. Statistical analyses and factor loadings will provide more insights into this observation.

3.1 Limitations

Limitations of the present scale relate to the general problem of measurement bias. Although self-report instruments are efficient to collect data, this approach is prone to biases [26]. Two of them are of particular attention: the acquiescence bias and the social desirability bias. To reduce the biases produced by the former, one can use item phrases in opposite directions. Some will be positively phrased (e.g., "I am interested to learn. . .") and some negatively (e.g., "I am not curious about. . ."). We did not adopt this strategy yet, in an effort to maximize understandability: rating negative phrasing requires indeed more attention. It could however be implemented at a later stage, depending on the outcomes of the statistical item analysis. Social desirability is another issue that can occur when the results of the test might be perceived as a measure of performance. In industry, our tool aims at taking stock of the user-centered maturity level of the company and supporting employees (at large, not only frontline personnel) in building empathy towards users of a service or product. It might thus deemed desirable for an employee to showcase empathic tendencies and "to cheat the test" [13] by presenting themselves in a positive light. Measures exist, especially in personality inventories, to make self-report instruments resistant to faking. Other best practices include anonymization (and reassuring communication) in the administration of the scale, and a clear vision shared by the management that the measure is meant for self-growth supported by the company rather than assessment of personnel.

3.2 Future Work

In future work, we will follow the next stages of scale development. This includes the administration of the scale on a large sample size and underlying item analyses. A crowdsourcing platform will be used as it offers worthwhile sampling features to recruit designers and employees working in the service industry. However, we will later seek confirmation on another sample (based on an ongoing study [23]) where social desirability would be at a higher risk to decrease the sensitivity of the scale. In terms of convergent validity (i.e., how closely the new scale is related to other measures of the same construct), we intend to administer two dimensions of the social curiosity scale (which we hypothesize as close to our discovery subscale) as well as a scale from psychology. Behavioral or task-based measures, collected in an in-situ context, will be compared to the scores of the scale in future studies in collaboration with an industrial partner. Discussions around the usefulness of the tool for industry and potential use scenarios are already ongoing and we intend to elaborate further on that topic. Creating a method that is both suitable for research and industry applications entails some challenges that we will address with care [42].

The future Empathy in Design Scale aims at providing a quantitative measure of empathy in design, under the form of a standardized self-reported measure. The creation of this tool contributes to filling the gaps in metrics to assess empathy in the context of service and product design. In industry, the scale intends to be a tool supporting the user-centered maturity of an organization by assessing and developing employees' curiosity and empathy towards users. In academia, our scale will provide a standardized and quantitative measure of empathy in design, relevant to investigate and model several variables, for instance the influence of empathic tendencies on the success of design interventions.

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