The Measure of Empathy in Design: How Do We Trigger Empathy among Designers and Beyond?

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ABSTRACT

Research in HCI and design position empathy as a key factor of a successful user-centred approach, supported by the emergence of empathic design methods. However, there is a dearth of empathy measurement tools to investigate the actual ability of design methods to trigger empathy among designers and beyond within the organization. For service stakeholders, a measurement tool would facilitate understanding the value of empathy for breaking silos in the organization and delivering high-quality services and products. The Empathy in Design Scale, a self-reported tool under development, aims at measuring the impact of empathic design methods within an organization. In this paper, we share our preliminary work on triggering and measuring service stakeholders' empathy (e.g., employees of service companies) in the context of a national railway service. We discuss the added value and limitations of a standardized measure of empathy and its implications to bring the field forward with new perspectives and opportunities.

CCS CONCEPTS

• **Human-centered computing** → **HCI design and evaluation methods**; **User centered design**.

KEYWORDS

empathy, empathic design, empathic methods, measure, service design

1 INTRODUCTION

Design research identifies empathy as one of the key factors of the user-centred design approach [9, 53]. Building empathy towards the end-users allows designers to gain a more comprehensive understanding of the users' journey and overall experience [23, 33]. The expression "empathic design" emerged in the 1990s [8], with

this approach being described as having the potential to spark innovation [31]. Empathic design relies on empathic methods that look at what people do, ask people to participate in the design process, and encourage designers to try things themselves [48]. Many of these methods are now commonly applied in user research, such as observation and generative methods [44]. According to [30, 31], these methods help designers better empathize with users. They aim to inspire them and are the source of solutions later in the design process [25]. Moreover, they can be used to trigger other service stakeholders' empathy [28].

While design literature claims the importance of empathy and develops empathic methods to be used in the design process, few studies only [51, 52] include an empirical measure of empathy to validate the effectiveness of these methods [10]. How can we know what we do not (really) measure? Why does the field lack specific measurement tools to examine whether empathy was effectively triggered and to which extent? In Industry, the investment in user research and in-depth exploration of users' needs is not taken for granted and professionals often need to prove the added value of empathic approaches. Organizations hence valorize Key Performance Indicators (KPI) and Return-On-Investment (ROI) [3, 37] to guide decisions. The undisputed value of qualitative user research methods seems insufficient to overcome these difficulties, especially in organizations with lower user experience (UX) maturity. How can we convince such organizations that empathic methods will support them in designing user-centred oriented solutions in the long run?

A key part of UX maturity relies on the involvement of all relevant stakeholders within an organization in user-centred processes. As pointed out by Kalbach [21], such a process should not be limited to frontline personnel only but rather every employee in a company must empathize with the end-users of their products or services. Empathic methods have the potential to support the involvement of everyone by creating personal connections and helping people within the organization to understand the impact of their daily work on the customer experience. Yet here again, which empathic methods are best suited to diffuse a user-centred culture to an entire organization? How can we scale up the use of these methods to allow a level of co-ownership within a company? How can we empirically measure the impact of interventions using empathic

methods in order to showcase the value of empathic design methods to organizations?

To address the questions and consolidate previous research work on developing empathic approaches within industrial contexts [35, 39, 41, 43, 45], we focus on assessing whether empathic methods actually generate empathy in designers and service stakeholders alike. Through an industrial partnership, we are deploying several empathy methods in a railway company (see section 3), which aims at increasing its UX maturity by raising awareness for user experience among its employees. These methods are interventions designed to generate empathy. In order to assess the impact of these interventions, we are developing an Empathy in Design Scale to serve as a standardized quantitative empathy measurement tool [10]. The scale items are based on four dimensions of empathy in design [16, 25, 46]. The scale can be used both with designers and employees. We consider empathy measurement in a design process as (a) a relevant and useful metric to establish a baseline of the UX maturity and user-centred practices in an organization, (b) a way for designers to empirically measure the impact of their interventions at the scale of an organization in a cost-efficient manner, (c) a mean to showcase the value of empathic design methods to organizations, grounded in empirical data, and to potentially lead to a higher commitment for the user-centred approach. Based on these indicators, the organization can devise targeted interventions to increase all employees' empathy with the users.

In this contribution, we introduce our approach using empathic design methods to develop employees' curiosity and empathy towards users as part of the design process. We discuss the opportunities and rationale behind assessing empathy more broadly among various stakeholders within an organization, beyond the usual boundaries of the design team.

2 THE CURRENT STATE OF EMPATHY IN DESIGN

Design research bases its understanding of empathy on philosophy, psychology, and neuroscience. It defines empathy through various concepts [9, 10]: cognitive (i.e., "to understand another's feelings") vs. affective (i.e., "the experience of emotion, elicited by an emotional stimulus") [6], empathy vs. similar emotions (e.g., sympathy, compassion, tenderness or pity) [2, 14], trait of personality (i.e., some people being more empathic than others [6]) vs. state (i.e., empathy is a state of mind that people can control and modify [18]). For Kouprie and Visser [25], empathy starts with the willingness and motivation to understand the users.

The role of empathy in the design process has been acknowledged by HCI and experience design literature [9, 24, 49, 53] as well as among practitioners [7, 20, 26]. Empathy supports the engagement towards the users to better understand their experiences and perspectives [7, 8]. The notion of empathic design emerged in the 1990s with Leonard and Rayport [31] arguing that empathic design sparks innovation. It employs methods and techniques allowing designers to immerse themselves in the user experience, enhance their understanding of their users' experience, and get inspired for designing suitable concepts instead of simple intuitions [10, 36, 50]. Suri [48] classify empathic methods according to three different goals: looking at what people do, asking people to participate, and

trying things ourselves. These are aligned with Sanders and Stappers [44]'s design principles to get an empathic understanding of what people say, do, or make. Koskinen et al. [24] (p.10) defined the characteristics of empathic methods: *visual and tactile*, *deliberately cheap and "low tech"*, *interpretive*, *playful and fun*, *tested in reality*, and *targeted at the fuzzy front end*. Lee [30] adds that empathic methods should include *creative components*. In reality, multiple design methods may qualify as empathic methods, as for instance:

- making the users' voice accessible to the design teams and other stakeholders through tools that synthesize the users' experience (e.g., personas or journey maps [28]),
- enabling immersion in the users' world (e.g., design probes [12, 35]),
- using multimedia supports to share raw data (e.g., convivial toolbox [44] or video-documentary [36]),
- prototyping or roleplaying to experience the users' point of view [34].

Surma-aho and Hölttä-Otto [49] define five categories of approaches to empathy in design: *empathic understanding* (i.e., understanding of others' experiences), *empathic design research* (i.e., methods used to understand others' experiences), *empathic design action* (i.e., user-centred conception and generative methods), *empathic orientation* (i.e., designers' *"conscious preference for a human-centred evidence"*), *empathic mental processes* (i.e., processes by which designers are empathic towards users). Three frameworks [16, 25, 46] are generally cited (Figure 1) to represent the empathic process in design.

These theories and frameworks of empathy in design offer new perspectives for measuring empathy. However, to the best of our knowledge, there are no design-specific tools to date [10]. The design field mainly uses psychology scales to measure empathy, such as the Empathy Quotient [1] (e.g., used by [52]). In service design, the service quality tool SERVQUAL [38] is commonly used and includes a few items labelled as empathy. There is a small number of studies measuring designers' empathy during the design process, for instance Chang-Arana et al. [5]'s investigation of empathy accuracy in an early-phase design and ideation task. Given the lack of a specific empathy measurement tool in design [5], the authors resort to common design methods adapted to assess empathy as in [5, 51, 52]. Despite the relevance of these approaches, they might not meet industrial needs. Furthermore, existing work majorly focuses on the empathy of the designers towards users rather than addressing empathy-building in a larger frame involving other stakeholders in an organization. Empathy measurement tools should be further developed and consolidated to bring the field forward with new perspectives and opportunities [49].

3 OUR APPROACH TO EMPATHY DEVELOPMENT AND MEASURES IN DESIGN

According to Roto et al. [42], designing a service implies *"a holistic approach used to orchestrate the whole service journey considering customers, service providers, and other relevant stakeholders"* (p.1). Involving employees in a design process can make them ambassadors of a user-centred culture [27]. Holistic empathy-building research has been done in this direction by [35, 39, 41, 43, 45]. Yet how can we judge the effectiveness of a design intervention relying on empathy? What are the tools at our disposal to establish a
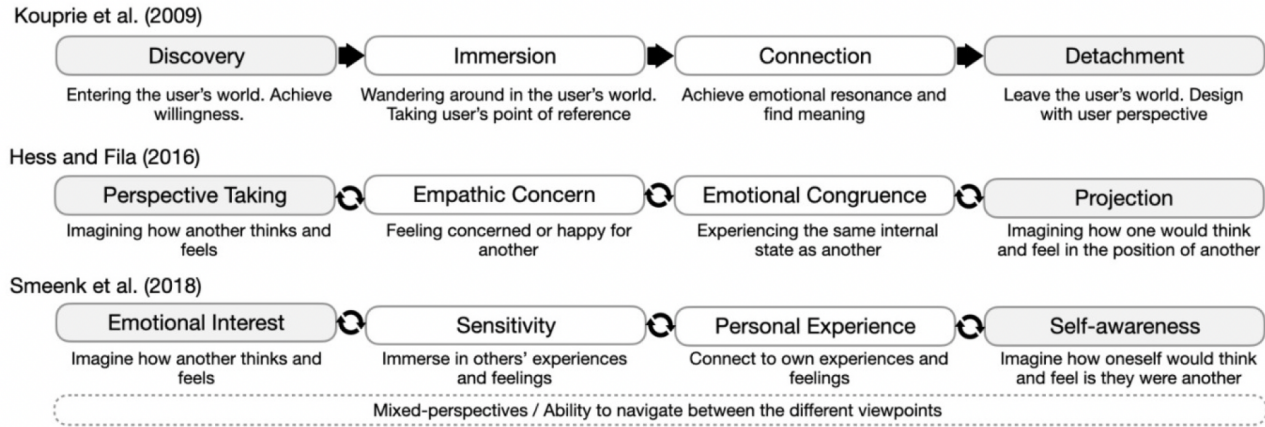
Figure 1: Synthesis of the main frameworks of empathy in design and their overlaps [10]

baseline before the intervention and a measure of the outcomes of the intervention? To judge the effectiveness of an empathy design intervention, we argue that the following points need to be addressed: (a) establishing a baseline to start from in a given service design context, (b) measuring the impact of deployed design methods on the level of stakeholders' empathy after the intervention and a few months later. Additional measures related to empathy can complement the process. Our research is part of an industrial research project on passenger experience with a railway company. In this context, we have the opportunity to investigate the previous points in an industrial field.

We aim to trigger service stakeholders' empathy towards users through empathic design methods to facilitate the adoption of a user-centric approach inside service companies supporting design decision-making and to support the designers' teams. Table 1 presents the methods we are currently deploying within the organization (Table 1).

To prove the effectiveness of the methods deployed at a large scale, we are developing a standardized scale of empathy in design. Our preliminary 18-items empathy in design scale (under development [10]) includes four dimensions, based on key frameworks of empathy in design [16, 25, 46]: *Emotional Interest/Discovery* (EI), *Sensitivity/Immersion* (S), *Personal Experience/Connection* (PE), *Self-Awareness/Detachment* (SA). The Empathy in Design Scale will be used for measuring railway service stakeholders' empathy before and after empathic interventions. In addition to the scale, we will use a common qualitative analysis approach to assess and double check the truth empathy increase. The participants' discussions generated during the design interventions will be analyzed to detect language elements that reveal the employees' empathy towards the passengers.

4 DISCUSSION

4.1 Triggering Empathy towards Users beyond the Design Team

A key part of UX maturity relies on the involvement of all relevant stakeholders within an organization in user-centred processes. Such a process should not be limited to frontline personnel only but rather every employee in a company must empathize with the end-users of their products or services [21], and more specifically those taking decisions. Empathic methods have the potential to support the involvement of everyone by creating personal connections and helping people within the organization to understand the impact of their daily work on the customer experience [22].

Psychology theories on empathy debate the possibility for people to become more empathic. In this controversy, some researchers conceptualize empathy as a trait of personality (i.e., some people are more or less empathic and this trait does not change across time [6]), while others consider empathy to be a capacity, (i.e., it is considered as a state which can evolve over time [6]). Although people show more or less empathic traits, research has shown it is a skill that can be trained [9]. In the empathy meaning logic of a personality trait, using empathic methods to increase empathy levels in individuals does not make sense. For the purpose of a user-centred design process, we thus try to trigger empathy from the empathy state perspective. In organizations with a low UX maturity, existing design resources (e.g., small team size, sometimes even a team of one [4]) are often insufficient to create and sustain an effective user-centric approach. Designers need to identify "allies" (also called ambassadors) among the stakeholders [27] with a user-centred mindset such as those who are showing an initial interest in user experience. These allies hold precious value as they have the potential to participate in democratizing the user-centric approach and advancing the empathy level of the entire organization. Empathic methods could contribute to the progressive spread of the user-centric culture and consequently increase the number of allies.

Staging passengers' journey maps under the form of a physical installation [28]	
By synthesizing and making accessible users' raw data, journey maps support building empathy within an organization [22]. We introduce physical journey maps as physical installations staging user research data and insights through various mediums and sensory modalities to represent the journeys of the users of a service or a product [28]. We designed Xpressia, a physical and interactive journey map, staging the experience of railway passengers. Through this immersive installation, employees interact with various data showcasing passengers' experiences in order to develop their sensitivity towards passengers. A call-to-action invites employees to ideate solutions to improve the service and supports the awareness and co-ownership of their role in the passenger experience.	
Co-designing the future of a railway service	
Collaboration and direct contact with the users can generate an empathic understanding of users' experiences Sanders and Stappers [44]. We asked railway employees and passengers to ideate on the future experience of passenger information and co-design an information poster. While designing the service with users, employees received direct user experience inputs pertaining to the part of the service experience designed. It facilitated how employees could envision users' understanding and experiences.	
Love and break-up declarations to the service	
Usually part of a design probe kit [12], the love and break-up letter technique stages a fictional relationship between users and a product to better understand their attachment to technologies or services [13]. It further allows triggering emotional user expression and collecting engaging data. We first asked passengers to make declarations of love or break-up to their railway company. The audio recordings of the declarations will next be anonymized and shared with some employees, who will be invited to interpret what needs the passengers express and to define how their work might impact these passengers' need fulfillment. This empathic method should trigger employees' sensitivity towards users and their self-awareness.	*Dear CFL,* *Here we are taking stock of our four-year relationship.* *I must admit that four years ago I often wanted to break up with you. And yes, my journeys between xx* and xx* do not contain only good memories. Sometimes you were late. Sometimes a bit too often for my taste. And then unfortunately, you did not go directly from xx* to xx*. At least, my move to xx* made the two of us relive a honeymoon. My daily journeys between xx* and xx* are a bliss.* *If ever you have a problem, which can happen, I take the bus. As for my Saturday trips to xx*, I can't complain either. Delays are rare. I always find a seat. You are relatively proper despite the number of admirers you have every day. And the best, you don't cost me anything for Valentine's Day.* *The only downside between you and me is that it is a little complicated for me to go to xx* on weekends to see my parents. If you improved this point, I would be very happy. And if you continue like this, who knows, maybe one day we will celebrate our golden wedding anniversary together. Keep it up.* **Anonymized data*

Table 1: Description of our approach and ongoing studies

However, the need to be empathic towards users varies according to the job missions and the needs for achieving a user-centred service. The intended empathy level would depend on a given stakeholders' position (e.g., job missions) and experience in the company (e.g., seniority, direct or indirect contact with customers, being themselves users of the service). Being too empathic can be counterproductive as [50] argued. Being too empathic can make designers forget their design concerns: the empathy trap [47]. Designers are more or less immersed in the world of users according to the stage of the empathic design framework [25]. Beyond the designers' team, this operating mode should be the same for the stakeholders who may also be exposed to the same empathy trap. Wishing to make stakeholders more empathic would imply that they all need to be fully empathic towards users. Yet some reluctant stakeholders might believe this is not a priority in their job: some job positions or missions can be perceived as unrelated to users or as not having any decision power over the service experience. It is essential to share the vision that everyone is part of the process that makes and impacts the end-user experience and that setting an empathic mindset can help employees give meaning to the service they deliver.

4.2 Measuring Empathy in Design

4.2.1 Relevance and opportunities of a quantitative measure of empathy in design. "If you cannot measure it, you cannot improve it". This often-quoted Lord Kelvin's dictum supports, in the HCI field, the argument for the relevance of quantitative measurement in user experience [29]. Quantitative UX measures help designers to *"know*

to what extent targeted qualities of a system have been realized and to predict (or project) what values the system can potentially deliver based on its current state" [29] (p.4). Existing approaches to evaluate empathy in design [5, 51, 52] focus on the design team specifically yet would not meet industrial needs to scale up the measure at an organizational level. Developing an empathy scale will allow a quantitative and standardized measurement of empathy, fulfilling the cost-efficiency requirement. It will enable designers to (a) assess the empathy levels of different stakeholders of service design and to decide on targeted interventions following which they can (b) measure the effectiveness of empathic design intervention [10].

Quantifying the increase in empathy (and expected higher quality of service) due to empathic design methods can underpin the value of an empathic approach in the industry. Although quantifying empathy might seem antagonistic to the value of qualitative data in design culture, the corporate reality is business-oriented [25]. It valorizes Key Performance Indicators (KPI) and Return-On-Investment (ROI) to guide decision-making. Some practitioners and researchers studied how to apply this business logic to user research [3, 37]. The lack of standardized and factual empathy measures makes it difficult for decision-taking stakeholders to accept and roll-out empathic design interventions. Proving the value of empathic methods in companies with a low UX maturity [40] would therefore be a precious help for practitioners.

A relatively easy-to-deploy measure of stakeholders' empathy level, such as with the empathy in design scale, would also help designers identify UX ambassadors within their organization, which in turn would facilitate the creation of a successful design process. Designers would thus benefit from a reliable and valid empathy measurement tool, specific to the design context, to support their empathy-building strategy.

4.2.2 Limitations and risks of measuring empathy in design. Developing a self-reported tool to measure empathy entails numerous challenges. Besides the through construction of the scale which is essential to safeguard its psychometrics properties, these measures are prone to bias [32], particularly the social desirability bias. Social desirability can occur when the test result might be perceived as a measure of performance. In industry, our tool aims at supporting employees (at large, not only frontline personnel) in building empathy towards users of a service or product. It might thus be deemed desirable for an employee to showcase an empathic attitude and "to cheat the test" [15] by presenting themselves in a positive light. For example, in our use case, the railway company strategy places the user in its centre and distributes internal messages to share this vision with employees. To decrease the risk of biased answers, an anonymized administration of the scale is key along with a clear vision and communication about the tool's objective: supporting people's self-growth rather than assessing personnel performance [10].

We see two ethical risks in creating a scale for measuring empathy in companies. First, the empathy measurement tool could be diverted from its primary use to become a tool for assessing the staff. Forcing employees to be empathic would contradict the logic of promoting empathy to deliver a better user-centred service. As mentioned earlier, the need to be empathic towards users also varies according to the job missions and the needs for achieving a user-centred service. Some dimensions of empathy might be useful to all (e.g., emotional interest) while others could be reinforced specifically for frontline personnel. Second, empathy could be perceived by companies as the holy grail of user experience and, rather than improving the service through a user-centric approach, empathy scores might turn into an end in itself with a marking objective. On this subject, some authors criticizes the adverse side of empathy when designing in a capitalistic logic [19] while others point out that empathy in design became more an ideology than a helpful principle [17].

While a tool like an empathy scale allows to measure people's empathy level before and after an empathic intervention, it does not provide insights into why certain interventions are more or less effective. A lack of effectiveness in empathic interventions could for instance be linked to the method itself or to a lack of motivation among the [25]. Similarly, the successful development of a user-centric culture does not only pertain to the use of design interventions using empathic methods. Measuring empathy quantitatively cannot be the only way to support an empathic approach. Indeed, qualitative data providing a richer dataset than quantitative measures [11] and can provide rich insights into the benefits of a specific method on specific dimensions of empathy. The empathy in design scale however fills a gap in the design field and could help designers to prove the value of empathic design interventions and to democratize empathic design methods to industry for facilitating the design of more user-centric services and products.

5 CONCLUSION

In this paper, we introduced our preliminary work: (a) on triggering service stakeholders' empathy through empathic design methods and (b) measuring the effectiveness of these empathic methods through an empathy in design scale [10]. We discussed the pros and cons of measuring empathy in design methods from the academia and industry perspectives. This contribution creates opportunities for new ways of considering empathy in user-centred design and opens new possibilities for the field to leverage empathy beyond the design team.

REFERENCES

[1] Simon Baron-Cohen and Sally Wheelwright. 2004. The Empathy Quotient: An Investigation of Adults with Asperger Syndrome or High Functioning Autism, and Normal Sex Differences. *Journal of Autism and Developmental Disorders* 34, 2 (April 2004), 163–175. https://doi.org/10.1023/B:JADD.0000022607.19833.00

[2] Howard Becker. 1931. Some forms of sympathy: a phenomenological analysis. *The Journal of Abnormal and Social Psychology* 26, 1 (1931), 58–68. https://doi.org/10.1037/h0072609 Place: US Publisher: American Psychological Association.

[3] Randolph G. Bias and Deborah J. Mayhew. 2005. *Cost-Justifying Usability An Update for an Internet Age* (interactive technologies ed.). Elsevier.

[4] Leah Buley. 2013. *The User Experience Team of One: A Research and Design Survival Guide 1st Edition.* Rosenfeld Media; 1st edition (July 9, 2013).

[5] Álvaro M. Chang-Arana, Matias Piispanen, Tommi Himberg, Antti Surma-aho, Jussi Alho, Mikko Sams, and Katja Hölttä-Otto. 2020. Empathic accuracy in design: Exploring design outcomes through empathic performance and physiology. *Design Science* 6 (2020), e16. https://doi.org/10.1017/dsj.2020.14

[6] Benjamin M.P. Cuff, Sarah J. Brown, Laura Taylor, and Douglas J. Howat. 2016. Empathy: A Review of the Concept. *Emotion Review* 8, 2 (April 2016), 144–153. https://doi.org/10.1177/1754073914558466

[7] Jonathan Dalton and Trent Kahute. 2016. Why Empathy and Customer Closeness is Crucial for Design Thinking. *Design Management Review* 27, 2 (June 2016), 20–27. https://doi.org/10.1111/drev.12004

[8] Alice Devecchi and Luca Guerrini. 2017. Empathy and Design. A new perspective. *The Design Journal* 20, sup1 (July 2017), S4357–S4364. https://doi.org/10.1080/14606925.2017.1352932

[9] Yumei Dong, Hua Dong, and Shu Yuan. 2018. Empathy in Design: A Historical and Cross-Disciplinary Perspective. In *Advances in Neuroergonomics and Cognitive Engineering (Advances in Intelligent Systems and Computing)*, Carryl Baldwin (Ed.). Springer International Publishing, Cham, 295–304. https://doi.org/10.1007/978-3-319-60642-2_28

[10] Luce Drouet, Kerstin Bongard-Blanchy, Vincent Koenig, and Carine Lallemand. 2022. Empathy in Design Scale: Development and Initial Insights. In *CHI '22 Extended Abstracts*. New Orleans, LA, USA, 7. https://doi.org/10.1145/3491101.3519848

[11] Jodi Forlizzi and Katja Battarbee. 2004. Understanding experience in interactive systems. In *Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques (DIS '04)*. Association for Computing Machinery, New York, NY, USA, 261–268. https://doi.org/10.1145/1013115.1013152

[12] Bill Gaver, Tony Dunne, and Elena Pacenti. 1999. Design: Cultural probes. *Interactions* 6, 1 (Jan. 1999), 21–29. https://doi.org/10.1145/291224.291235

[13] Elizabeth Gerber. 2011. Tech break up: a research method for understanding people's attachment to their technology. In *Proceedings of the 8th ACM conference on Creativity and cognition - C&C '11*. ACM Press, Atlanta, Georgia, USA, 137. https://doi.org/10.1145/2069618.2069642

[14] Sarah Gibbons. 2019. Sympathy vs. Empathy in UX. https://www.nngroup.com/articles/sympathy-vs-empathy-ux/

[15] Joanne M Hemmerdinger, Samuel DR Stoddart, and Richard J Lilford. 2007. A systematic review of tests of empathy in medicine. *BMC Medical Education* 7, 1 (Dec. 2007), 24. https://doi.org/10.1186/1472-6920-7-24

[16] Justin L. Hess and Nicholas D. Fila. 2016. The manifestation of empathy within design: findings from a service-learning course. *CoDesign* 12, 1-2 (April 2016), 93–111. https://doi.org/10.1080/15710882.2015.1135243

[17] Ann Heylighen and Andy Dong. 2019. To empathise or not to empathise? Empathy and its limits in design. *Design Studies* 65 (Nov. 2019), 107–124. https://doi.org/10.1016/j.destud.2019.10.007

[18] Sara D. Hodges and Robert Biswas-Diener. 2007. Balancing the empathy expense account: strategies for regulating empathic response. In *Empathy in Mental Illness*. Cambridge University Press, Cambridge, 389–407. https://doi.org/10.1017/CBO9780511543753.022

[19] Matthew Holt. 2011. The Limits of Empathy: Utopianism, Absorption and Theatricality in Design. *The Design Journal* 14, 2 (June 2011), 151–164. https://doi.org/10.2752/175630611X12984592779926

[20] Icons8. 2019. Empathy in UX Design: What It Is and Why It's Important. https://uxplanet.org/empathy-in-ux-design-what-it-is-and-why-its-important-3f6a8919ef10

[21] Jim Kalbach. 2017. *Rapid Techniques for Mapping Experiences*. http://learning.oreilly.com/library/view/rapid-techniques-for/9781492049159/ch01.html

[22] Kate Kaplan. 2016. Journey Mapping in Real Life: A Survey of UX Practitioner. https://www.nngroup.com/articles/journey-mapping-ux-practitioners/

[23] Westley Knight. 2019. Building Empathy. *UX for Developers* (2019), 83–101. https://doi.org/10.1007/978-1-4842-4227-8_7 Publisher: Apress, Berkeley, CA.

[24] Ilpo Koskinen, Tuuli Mattelmäki, and Katja Battarbee. 2003. *Empathic Design - User Experience in Product Design*.

[25] Merlijn Kouprie and Froukje Sleeswijk Visser. 2009. A framework for empathy in design: stepping into and out of the user's life. *Journal of Engineering Design* 20, 5 (Oct. 2009), 437–448. https://doi.org/10.1080/09544820902875033

[26] Sampath Kumar. 2017. The Role of Empathy in Understanding Users. https://www.uxmatters.com/mt/archives/2017/12/the-role-of-empathy-in-understanding-users.php

[27] Carine Lallemand and Guillaume Gronier. 2018. *Méthodes de design UX*. https://www.eyrolles.com/Informatique/Livre/methodes-de-design-ux-9782212673982/

[28] Carine Lallemand, Jessie Lauret, and Luce Drouet. 2022. Physical Journey Maps: Staging Users' Experiences to Increase Stakeholders' Empathy towards Users. In *CHI '22 Extended Abstracts*. New Orleans, LA, USA, 7. https://doi.org/10.1145/3491101.3519630

[29] Effie Lai-Chong Law. 2011. The measurability and predictability of user experience. (2011), 9.

[30] Jung-Joo Lee. 2014. The True Benefits of Designing Design Methods. *Artifact* 3 (Dec. 2014), 5.1–5.12. https://doi.org/10.14434/artifact.v3i2.3951

[31] Dorothy A Leonard and Jeffrey F. Rayport. 1997. Spark Innovation Through Empathic Design. *Harvard Business Review* (1997). https://doi.org/10.1142/7638

[32] Cynthia A. Lietz, Karen E. Gerdes, Fei Sun, Jennifer Mullins Geiger, M. Alex Wagaman, and Elizabeth A. Segal. 2011. The Empathy Assessment Index (EAI): A Confirmatory Factor Analysis of a Multidimensional Model of Empathy. *Journal of the Society for Social Work and Research* 2, 2 (Jan. 2011), 104–124. https://doi.org/10.5243/jsswr.2011.6 Publisher: The University of Chicago Press.

[33] Ariel Liu, Victoria Schwanda Sosik, and Khadine Singh. 2018. Building Empathy: Scaling User Research for Organizational Impact. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, Montreal QC Canada, 1–7. https://doi.org/10.1145/3170427.3174352

[34] Alaa Makki. 2020. *Design Method to Enhance Empathy for User-Centered Design: Improving the Imagination of the User Experience*. Master of Design. Carleton University, Ottawa, Ontario. https://doi.org/10.22215/etd/2020-13882

[35] Tuuli Mattelmiiki and Katja Battarbee. 2002. Empathy Probes. *Department of Product and Strategic Design University ofArt and Design Helsinki UIAH Hameentie 135 C FIN -00560 Helsinki* (2002), 6.

[36] Chris McGinley and Hua Dong. 2011. Designing with Information and Empathy: Delivering Human Information to Designers. *The Design Journal* 14, 2 (June 2011), 187–206. https://doi.org/10.2752/175630611X12984592780005

[37] Kate Moran. 2020. Three Myths About Calculating the ROI of UX. https://www.nngroup.com/articles/three-myths-roi-ux/

[38] A Parsu Parasuraman, Valarie Zeithaml, and Leonard Berry. 1988. SERVQUAL: A multiple- Item Scale for measuring consumer perceptions of service quality. *Journal of retailing* (Jan. 1988).

[39] Dev Patnaik. 2009. *Wired to Care: How Companies Prosper When They Create Widespread Empathy*. FT Press. Google-Books-ID: fJ39wFbl6kYC.

[40] Kara Pernice, Sarah Gibbons, Kate Moran, and Kathryn Whitenton. 2021. The 6 Levels of UX Maturity. https://www.nngroup.com/articles/ux-maturity-model/

[41] Carolien E Postma, Elly Zwartkruis-Pelgrim, Elke Daemen, and Jia Du. 2012. Challenges of Doing Empathic Design:. (2012), 12.

[42] Virpi Roto, Val Mitchell, Stuart Cockbill, Jodi Forlizzi, Jung-Joo Lee, and Effie L-C Law. 2020. Introduction to Service Design for UX Designers. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society*. ACM, Tallinn Estonia, 1–3. https://doi.org/10.1145/3419249.3420074

[43] Elizabeth B N Sanders. 2009. Exploring Co-creation on a Large Scale: Designing for New Healthcare Environments. In *Designing for, with and from user experiences*. TU/Delft, The Netherlands.

[44] Liz Sanders and Pieter Jan Stappers. 2012. *Convivial Toolbox: Generative Research for the Front End of Design* (1er édition ed.). BIS Publishers B.V., Amsterdam.

[45] F Sleeswijk Visser and PJ Stappers. 2007. Who includes user experiences in large companies?. In *Designing with people. Proceedings of the 4th International Conference on Inclusive Design*. Royal College of Art, London, 1–5. https://research.tudelft.nl/en/publications/who-includes-user-experiences-in-large-companies

[46] Wina Smeenk, Janienke Sturm, and Berry Eggen. 2018. Empathic handover: how would you feel? Handing over dementia experiences and feelings in empathic co-design. *CoDesign* 14, 4 (Oct. 2018), 259–274. https://doi.org/10.1080/15710882.2017.1301960

[47] Robin Stern and Diana Divecha. 2015. How to Avoid the Empathy Trap. https://greatergood.berkeley.edu/article/item/how_to_avoid_the_empathy_trap

[48] Jane Suri. 2003. Empathic design: Informed and inspired by other people's experience. *Empathic Design: User Experience in Product Design* (Jan. 2003), 51–57.

[49] Antti Surma-aho and Katja Hölttä-Otto. 2022. Conceptualization and operationalization of empathy in design research. *Design Studies* 78 (Jan. 2022), 101075. https://doi.org/10.1016/j.destud.2021.101075

[50] Andres Tellez F. and Juanita Gonzalez-Tobon. 2019. Empathic Design as a Framework for Creating Meaningful Experiences. *Conference Proceedings of the Academy for Design Innovation Management* 2, 1 (Nov. 2019). https://doi.org/10.33114/adim.2019.03.408

[51] Helma van Rijn, Froukje Sleeswijk Visser, Pieter Jan Stappers, and Aslı Deniz Özakar. 2011. Achieving empathy with users: the effects of different sources of information. *CoDesign* 7, 2 (June 2011), 65–77. https://doi.org/10.1080/15710882.2011.609889 Publisher: Taylor & Francis _eprint: https://doi.org/10.1080/15710882.2011.609889.

[52] Froukje Sleeswijk Visser and Merlijn Kouprie. 2008. Stimulating empathy in ideation workshops. In *Proceedings of the Tenth Anniversary Conference on Participatory Design 2008 (PDC '08)*. Indiana University, USA, 174–177.

[53] Peter Wright and John McCarthy. 2008. Empathy and experience in HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08)*. Association for Computing Machinery, New York, NY, USA, 637–646. https://doi.org/10.1145/1357054.1357156