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Published in:
International Journal of Design

Published: 01/12/2020

Document Version
Publisher's PDF, also known as Version of record

Multiple Intelligibility in Constructive Design Research: *The Case of Empathic Design*

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This paper studies intelligibility in constructive design research, in which the main instrument of knowledge creation is design. Constructive design research is situated between design practice and research, meaning it has to build on practices that make it intelligible to many audiences. We call this *multiple intelligibility*, examining it through the case of an empathic design program in Helsinki, Finland. The case focuses on how the designers in the program have managed to build a practice that is intelligible for different audiences. By looking into the practical grounds of the research program as a topic of analysis, we study theoretical practices that create connections to research, methodic practices that create a connection to practice and recipient design practices that lie at the heart of intelligibility in empathic design. Based on the findings of the case, we suggest policies for constructive design research to manage multiple intelligibility across different audiences.

Keywords **–** Intelligibility, Constructive Design Research, Research through Design, Empathic Design, Service Design.

Relevance to Design Practice **–** When design practice is turned into a research tool, researchers often need to be intelligible to many audiences simultaneously. This paper illustrates how one research program has been built to assure multiple intelligibility and suggests policies for constructive design researchers to manage intelligibility across different audiences.

Citation: Lee, J-J., Koskinen, I., & Whalen, J. (2020). Multiple intelligibility in constructive design research: The case of empathic design. *International Journal of Design, 14*(3), 55-67.

Design Research and Intelligibility

Over the last two decades, design research has gone through a practical turn. For example, the notion of research-through-design (Frayling, 1993) has framed the possibility of design research being done through making objects, interventions, processes and the like to gain knowledge (Bang, Krogh, Ludvigsen, & Markussen, 2012; Gaver, 2012; Zimmerman, Forlizzi, & Evenson, 2007). In craft, the preferred term has been practice-based research (Biggs, 2002), while in industrial design, its methodology has been elaborated under the title constructive design research, where "construction—be it product, system, space, or media—takes centre place and becomes the key means in constructing knowledge" (Koskinen, Zimmerman, Binder, Redström, & Wensveen, 2011, p. 5).

One of the unique features of this kind of design research is that it is often done in collaboration with industry, NGOs or government. Because it leads to design results, it is relatively easy to attract industrial interest to fund such research, but this can lead to problems in terms of audience. When research turns constructive, it can face multiple audiences with demands that are wildly divergent and sometimes exclusive. To whom is research targeted, whose interests does it intend to serve and whose language does it use? As Koskinen and Krogh (2015) have noted, designers can also be

> accountable to other parties outside the realm of art, such as manufacturers, product safety administrators, management, financing and marketing of offices, current users and future generations, all of whom might either benefit from or struggle with the results and ambitions of design. In other words, design is always accountable to a plethora of various audiences. (p. 121)

In their paper, Koskinen and Krogh report several borderline issues that stem from accountability analyzing some of the confusion that exists on these borderlines to learn how they have been resolved. Their advice was first to write to designers, only then to secondary audiences such as scientists or artists, and not to go too far from the base in design. The risk is losing credibility while, as the quote above suggests, the expectations among designers are already complex.

Taken to the extreme, this policy is inward-looking and works against its purpose. This paper complements *accountability* with another concept, which is *intelligibility*. Researchers can seldom control who reads their papers. If they only target other designers, they make it hard for outsiders to understand what they are after. This defeats the purpose of constructive design research, which creates outcomes that are usable not only for designers,

Received Oct. 31, 2019; **Accepted** Oct. 21, 2020; **Published** Dec. 31, 2020.

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but also for audiences as diverse as engineers in product design, medical doctors in graphic design, banks in service design and so on. Our proposal in this paper is that designers should think very seriously about how to make their research *intelligible* to their secondary audiences. For example, they do not need to be accountable to business analysts in service design, but their work must make sense to them. If it does not, the MBAs in the bank will find it hard to see the designers' work as a rational, predictable and meaningful endeavor (see Garfinkel, 1967). If deemed unintelligible, in the worst case it will be seen as bad practice by practitioners and bad research by researchers, and just baffling by its secondary audiences.

Recently, issues related to intelligibility have been discussed in design research with the emergence of research-through-design and constructive design research as a dominant mode of design research. Existing discussions have focused on relations between practice and theory, relations or alliances between written text and non-textual artifacts, or explorations into alternative yet legitimate modes to convey practice-based knowledge to an academic audience (e.g., see Gaver & Bowers, 2012; Joost, Bredies, Christensen, Conradi, & Unteidig, 2016; Pierce, 2014). Earlier, researchers in critical design discussed challenges in making their work triply intelligible, as in the *Presence* project (Gaver, Hooker, & Dunne, 2001), which has gained a following in research, design practice and art. More recent discussions are related to research-through-design, especially in the Human-Computer Interaction (HCI) community. This community has been exploring formats and methods for knowledge presentation and dissemination that are valid for the research world yet still intelligible and relevant to the practice world and even to the public, across artifacts, concepts, research papers and exhibitions (see Anderson et al., 2019; Gaver, 2012; Pierce, 2014; Odom et al., 2018). For example, Gaver and Bowers proposed an annotated portfolio as a way to build theories, or ground theories, on the process of making or the artifacts made (Bowers, 2012; Gaver, 2012; Gaver & Bowers, 2012). Further, since 2014, ACM conference of Designing Interactive Systems (DIS) has introduced a new "Pictorials" track as a venue for design proposals, conceptual design studies and experiments, and other ways of presenting design research artifacts (Pierce, 2014).

While the above-mentioned studies explore alternative concepts and formats for knowledge communication and publication, our question in this paper takes a more grounded approach, looking at the practical basis of design researchers' day-to-day work dealing with different audiences within their projects. What do constructive design researchers *actually do to make their work intelligible* when they communicate to many audiences? We aim to answer the question by taking a closer look at what has been practically done in the Helsinki research program. Our analytic sensibility and insights into intelligibility are decisively informed by ethnomethodology (see Button, 2000; Button & Sharrock, 1999; Sharrock & Randall, 2004). Ethnomethodology has been introduced to design by Louis L. Bucciarelli (1988) and Graham Button and Wes Sharrock (see Button, 2000; Button & Sharrock, 1999; Sharrock & Randall, 2004; see also Szymanski & Whalen, 2011). While their seminal work has added a new angle to the study of design—as an alternative to rationalistic, cognitive approaches (e.g., see Pugh, 1986)—it has not yet been turned to explicating the practical grounds of design research.

The basic claim of ethnomethodology is that to hold each other intelligible, people have to produce their actions using the same methods their audience uses in making sense of these actions. Otherwise, they face the risk of being unintelligible and, by implication, irrational or even offensive because they see the breach as an attack on the very assumptions of normal order on which they build their lives (e.g., Garfinkel, 1967; Lynch, 1993). Informed by this notion of intelligibility, this paper looks into one research program in constructive design research, aiming to explicate what design researchers actually do to make their work intelligible to different audiences.

The Case of Empathic Design

The case we examine is empathic design, a research program that saw daylight at the end of the nineties in Helsinki, Finland (see Mattelmäki, Vaajakallio, & Koskinen, 2014 for a brief history). We chose the empathic design program as a case for several reasons. Focusing on one research program over its history as a unit of analysis allows an extensive examination at several levels of granularity yet with an overarching context and pattern. Studying one research program may limit our argument, but given its history over two decades, the empathic design program is extensive enough to develop our argument. The program is also varied enough to provide pointers to how multiple intelligibility works in other long-term programs of constructive design research. We come back to this question later in the discussion.

Elizabeth Sanders of SonicRim and Jane Fulton Suri and Alison Black of IDEO (Black, 1998; Dandavate, Sanders, & Stuart, 1996; Segal & Fulton Suri, 1997) gave empathic design its name, but it was turned into a design research program in industrial design in the former University of Art and Design Helsinki, now a part of Aalto University (see Koskinen,

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Battarbee, & Mattelmäki, 2003). Empathic design was a response to a question the information technology industries kept posing toward the end of the 1990s. While emotions had become an issue in the IT industry, the engineering and cognitive science approaches to emotions were not able to convey the subjective, situational qualities of human emotions to the design process. They could not help designers imagine and feel the emotions users might experience. A more embodied, social and interpretive approach was required. Empathic design emerged from this need, emphasizing human's empathic ability to understand another person's feelings and experiences as central for design. Designers in Helsinki built empathic design on an interpretive approach for making sense of how other human beings experience the world, based on interpretive sociology (Blumer, 1969).

This theoretical basis gave empathic design a distinctive identity. In the early days of the program, there were several attempts to capture emotions for design. These approaches ranged from technical attempts (Picard, 1997) to cognitive and ecological psychology (Blythe, Overbeeke, Monk, & Wright, 2003; Overbeeke, Wensveen, & Hummels, 2006). In contrast, empathic design followed symbolic interactionists and ethnomethodologists (Bailey, 1983; Hochschild, 1979; Katz, 2000; Kemper, 1981; Rosenberg, 1990; Schachter & Singer, 1962; Shott, 1979; Whalen & Zimmerman, 1998), who studied emotions in social interaction and saw emotions in interpretive and thus essentially cultural terms.

The program evolved in several phases (see Mattelmäki et al., 2014; see Table 1). Initially, the main question of the program was how to capture emotions for design with methods like cultural probes (Gaver, Dunne, & Pacenti, 1999), contextual inquiry (Beyer & Holtzblatt, 1997) and experience prototypes (Buchenau & Fulton Suri, 2000). This work was published between 2003 and 2006 (see Koskinen et al., 2003; Mattelmäki, 2006). By about 2004, the main question shifted to how to make this knowledge useful in industry. The answer came from various types of co-design methods that were developed to build support for design ideas. After 2007, the program started to experiment with artistic methods to create more radical concepts for future ways of living. The research program has grown from four researchers in 2000 to now well over 20 full-time researchers, while branching out from product and interaction design to textile, interior, service and social design.

The history of the program suggests about how the empathic design program has been able to be intelligible to multiple audiences. Initially, it built on methods from industrial design practice and used these in collaborations with industry. Over the next few years, the program found a theoretical ground and soon afterwards collaborated with the art world. Over the last decade, the program has expanded to services and the government. While the unit of analysis in this paper is the research program as a whole rather than individual projects, looking at key projects of the program shows that the development and application of empathic design methods have been central in engaging industry partners and later the government and grassroots communities, with the work also published as research articles (see Table 1, column *Outputs*).

To delve into the issues and achievement of multiple intelligibility in constructive design research, we illustrate them through the key projects and publications from the empathic design program and, more importantly, the shifts identified across those projects. Our analytic foci are on the actual practices that have made multiple intelligibility possible and what kinds of negotiations have been involved in this. From our observation, we believe the answer lies in part in the methodic and theoretical foundations of the program. These have involved several types of practical negotiations and the progression towards multiple intelligibility has not stemmed from any one base, whether methodical or theoretical.

Methodic Intelligibility

Perhaps the most important way to assure intelligibility in empathic design has been to build on methods. Empathic design has used a variety of methods over the years, but the main thrust has been the idea that research methods have to be intelligible to practicing designers. The underlying logic has been twofold. First, this assures that the methods work in industry. Second, as this reasoning went, these methods are better for many tasks in a product development discipline than the more typical social science methods that build on observation, interviews and surveys that produce detailed information about people but are much less useful in understanding how the material world has been put together.

This logic was first voiced in the introduction to *Empathic Design* (Koskinen et al., 2003), the key book from the early years of the program. The introduction listed some of the key policies behind methods, including user-centeredness but also several other qualities that were relevant for the consolidating program. Empathic design methods were to be:

- *Visual and tactile*, providing designers with inspiration, not just data.
- *Deliberately cheap and low tech* and, as such, easy to adopt in the real world where money is scarce.
- *Interpretive.* To be able to design effectively, designers need to understand how people understand themselves.
- *Playful and fun.* When exploring new ideas, users are almost invariably asked to imagine and dream in a future world created by designers. To be rewarding such exercises must be fun.
- *Tested in reality.* We report cases from real product and concept development because we believe that this is the best way to make sure the methods that we propose work where they should—at the front line of imagination in the corporate reality.
- *Targeted at the fuzzy front end*, as Cagan and Vogel (2001) from Carnegie Mellon University have called the early phases of product development (Koskinen et al., 2003).

Empathic Design explored probing, storytelling, visual methods, immersive methods typical for inclusive design, as well as design techniques like sketching, building mock-ups and constructing prototypes. It also touched upon field research methods from ethnomethodology. The book has been widely read in design schools and has served as an inspiration to dozens of students in Helsinki.

The spirit carried over to several other studies. As the program grew, these design-based methods also faced many different types of audiences and their expectations. Some studies targeted communication scholars and philosophers (e.g., Koskinen, 2007). Some became HCI papers (e.g., Battarbee, 2004; Kurvinen, 2007). Several studies were written for companies and the government (e.g., Soini, 2015; Vaajakallio, 2012), others for the medical community (A. Júdice, 2014) and yet others for industrial designers (Mattelmäki, 2006). As a rule, the methodic backbone made these studies intelligible for their readers.

One of the most dramatic examples may be the *Vila Rosário* project, by Andrea and Marcelo Júdice, who worked on a tuberculosis treatment program in Vila Rosário, which is about 20 km north of downtown Rio de Janeiro (A. Júdice, 2014; M. Júdice, 2014). In this project, a part of their doctoral project at Aalto University, they collaborated with doctors who were running an identification and treatment program in the village. They studied the village with probes and ethnographic methods, and at one point collected requirements for possible mobile and web-based devices. One of the methods was the Italian-Finnish designer and computer scientist Giulio Jacucci's *Magic Things* (Iacucci, Kuutti, & Ranta, 2000). The doctors, who were working in Vila Rosário pro bono, were well-known experts in tuberculosis, some of them having published in journals like *Nature*. When the Júdices used the term "magic things" while giving people blocks of foam or wood to imagine ways out of problems in everyday life, the doctors' first

Table 1. Key projects of the empathic design program in Helsinki and their aims, methods used, outputs and key audiences.

Focus	Projects	Aims	Methods	Outputs	Audiences
Products	eDesign 1999-2001	Methodological exploration into emotional design in interaction design	Prototyping, empathy probes, design ethnography	Various empathic design methods, e.g., empathy probes (Mattelmäki, 2002) & a theoretical concept of co-experience (Battarbee, 2004))	IT companies, design practitioners, research communities of user-centered design (UCD) and human-computer interaction (HCI)
	Luotain (Probe) 2002-2006	Develop methods and tools for user experience and concept design in product design	Design probes, contextual design	Various empathic design methods, e.g., design probes (Mattelmäki, 2006)	Manufacturing companies, hospitals, design practitioners, UCD research communities
	Active@work 2004-2006	Design for wellbeing and work conditions for ageing workers	Design probes, co-design workshops with make tools, video ethnography, personas	Various empathic design methods, e.g., situated make tools (Ylirisku & Vaajakallio, 2007)	IT companies, design practitioners, research communities of UCD and HCI
Services	eXtreme Design 2008-2010	Help service industry companies to co-create services with customers	Co-design, design games, drama, storytelling, role-playing, exhibitions	Various design games for service co-creation, e.g., character game (Vaajakallio & Mattelmäki, 2014) & Storytelling group (Kankainen, Vaajakallio, Kantola, & Mattelmäki, 2011), & empathy tools such as Senior Expo (Johansson et al., 2010)	Service companies, design practitioners, research communities of UCD, HCI, service design (SD)
	Spice 2009-2011	Understand public spaces through narrative concept design	Storytelling techniques, role-playing, narrative prototyping, exhibitions	A toolbox containing method cards including scriptwriting & narrative prototyping (Mattelmäki, Routarinne & Ylirisku, 2011; Viña & Mattelmäki, 2010) & a customer journey booklet, visualized concept ideas	Manufacturing & metro service companies, practitioners from design, scenography, screenwriting & sociology, research communities of UCD, SD, scenography and sociology
	Palvelupolku (Service journey) 2009-2012	Develop cross-sector service networks within a municipality	Co-design workshops with service blueprinting, empathy probes, personas	Service journey toolkit for municipalities (Hakio & Mattelmäki, 2011; Hyvärinen, Lee, & Mattelmäki, 2015)	Municipalities, service companies, NGOs, practitioners from design, management & healthcare, research communities of UCD, SD and management
Society	Wellbeing 365 2011-2012	Design for public services focusing on citizen's wellbeing	Concept design, co-design	Concept ideas for municipalities (Keinonen, Vaajakallio, & Honkonen, 2013; Vaajakallio, Lee, Kronqvist, & Mattelmäki, 2013)	Municipalities, grassroots communities, design practitioners, research communities of UCD and SD
	ATLAS 2012-2014	Create a trans-disciplinary map of service co-development methods	Co-design, design game	ATLAS game for service co-development (Hannula & Irrmann, 2016), design choices framework (Lee et al., 2018)	Service companies, municipalities, government agencies, design practitioners, research communities of SD, service innovation, organizational development
	TEMWISIT (Immigration services) 2015-2016	Redesign immigrants' service journeys and develop a web-based platform	Co-design	Service design tools (Sustar & Mattelmäki, 2017) & design proposals for immigrant services	Municipalities, government agencies, design practitioners, SD research communities

reaction was an incredulous gasp and amused, nervous laughter. Yet, the doctors saw how the Júdices used the method of magic things with local health agents and through the process gained access to the health agents' own environments and built very personal and deep dialogues with them. The doctors recognized that the method produced relevant data far better than surveys and later even promoted the use of these methods in another project related to HIV. Being scientists, they saw the rationality behind the methods, which they found completely intelligible.

This is anecdotal evidence only, but there is one place in the program in which intelligibility has been dealt with systematically. It is Tuuli Mattelmäki's doctoral work that led to her well-known thesis *Design Probes* (Mattelmäki, 2006). The question that drove her project was whether the probes, with a background in the art world, would also work in industry. For her thesis, she conducted several probes studies with companies like Nokia, the elevator manufacturer Kone and the wrist-top computer manufacturer Suunto. During and after the studies, she interviewed engineers and designers with whom she had been working (Mattelmäki, 2005). Her main result was similar to the Júdices's observation. The methods were at first strange to an industry audience, but her interviewees quickly moved past their initial skepticism and although they could not carry out probes by themselves, they understood why Mattelmäki was using probes and saw real value in her methods.

Since those studies, the program has explored several new methods including *Situated Make Tools* (Ylirisku & Vaajakallio, 2007), scriptwriting and scenographic scale models (Mattelmäki et al., 2011; Viña & Mattelmäki, 2010;), *Character Games* (Vaajakallio & Mattelmäki, 2014), *Senior Expo* exhibitions (Johansson et al., 2010) and *ATLAS Game* (Hannula & Irrmann, 2016; Lee et al., 2018; see Table 1). For the empathic design researchers, these methods served as a tool to engage with partner industries, who also contributed the funding, to demonstrate and deliver practical benefits from research experiments. The follow-up interviews which examined the impact of those methods and collaborations found that the company participants had been applying the methods for their internal innovation projects (Pirinen, 2016).

Figure 1. "Senior Expo" exhibition in a company's R&D department from eXtreme Design project (top) **and "ATLAS Game" helping service organizations plan co-creation projects from the ATLAS project** (bottom)**.**

Although methods have been a baseline for research, empathic designers have always believed that methods are not portable from one case to another without fitting them to the specifics of the new project. This was the central finding of Lee (2012), who studied various cases of empathic design methods used in practice and concluded that their application is always conditioned by the context of their use. She found that empathic designers gain sensitivity to the project context from their practical work of appropriating the methods (Lee, 2014). In other words, empathic designers' work for adapting and re-designing the methods contribute to the intelligibility of empathic design methods to different audiences. Awareness of Lee's argument has in part made it easier for empathic designers to negotiate with research and industrial partners.

Theoretical Intelligibility

The choice to repurpose design methods into research methods was not unique in the context of the late nineties. The logic behind this choice had been in the air in concepts like Christopher Frayling's (1993) research-through-design, Nielsen's (1993) usability engineering and in Jane Fulton Suri's (Buchenau & Fulton Suri, 2000) work at IDEO and Elizabeth Sanders's (2000) work at SonicRim. It was also obvious in the *presence* project, which brought together the cognitive psychologist Bill Gaver with the industrial designer Anthony Dunne. Around 2000, the dominant research methods in design came from experimental psychology and ethnography under cognitive, hedonic and ecological psychology in HCI, and from what was called *contextual inquiry* in Silicon Valley. These methods were pushing research firmly towards the social sciences although this trend was not always well received in design practice. To make their research program intelligible to designers, empathic designers in Helsinki resisted the trend, making the deliberate choice to build research on design methods. They spoke about *shadowing* instead of observation, *probes* instead of diary studies and *collages* and mood boards instead of cluster analysis.

The choice came with a price, however. The price was that it alienated researchers, an equally important reference group to empathic designers. Although most of them could see the logic of working with design methods, it also created distance to research-world practices. This was in part written into the foundations of concepts like research-through-design (Frayling, 1993) and it was also voiced strongly in *presence* project (Gaver et al., 2001), which made the point that design is aesthetically accountable, the criteria for success in design being a good piece of design, not the methods they produced. Empathic design had to find a way to make sure its work did not drift so close to design practice that research audiences would lose interest in it.

The answer came from a series of theoretical choices that were meant to make the program intelligible for researchers. At the outset, the program built on consumer psychology (Keinonen, 1998) and usability studies (Säde, 2001), but in 1998-2000, design research was switching from cognition to emotion, exploring new theories in the process, including hedonic and ecological psychology (Blythe et al., 2003; Jordan, 2000; Overbeeke, 2007). When empathic designers faced this shifting theoretical landscape, they saw an opportunity to experiment theoretically. In *Empathic Design* (Koskinen et al., 2003) alone, they experimented with Maslowian psychology, evolutionary economics, cognitive psychology and Jerome Bruner's cognitive interpretation of stories, but also ethnomethodology, pragmatism and symbolic interactionism.

Soon after, the program found its theoretical articulation in Katja Battarbee's (2004) work, built explicitly on Herbert Blumer's (1969) symbolic interactionism to understand how emotions work in human interaction. The roots of her articulation were in *eDesign* project, which initially studied how sensors could collect emotional data from mobile phones but took an interpretive turn in a steering group meeting in 2000 (the turn has been described earlier in this paper and Mattelmäki et al., 2014). Battarbee's formula has been repeated in many studies ever since, including Ahde-Deal's (2013) and Paavilainen's (2013) studies into the use of design products years after their purchase, Ylirisku's (2013) Goffmanian study (Goffman, 1963) of design as a framing process, and even more recently Kosonen's (2018) exploration into designers' identity construction informed by G. H. Mead (1964), Wu's (2017) ethnomethodological study (Garfinkel, 1967) of collaborative services. This theoretical grounding connected empathic design to pragmatic philosophy and also consumer studies through symbolic interactionism. It also gave the program depth. The actual design pieces got their meaning from frameworks like Battarbee's *co-experience* and Ylirisku's *framing*. These, in turn, were grounded in interactionism through Blumer and Goffman and to pragmatism, which grew in unison with symbolic interactionism at the University of Chicago. The result was flexibility. For example, Petra Ahde-Deal designed interactive jewellery that would qualify as a design on its own, although it was more than that because of the theoretical scaffolding she built around it. Due to this scaffolding, her design pieces also functioned as design illustration of theoretical and philosophical thinking.

As the years went on, the relationship between theory and methods became more explicit. In *Design Research through Practice*, Koskinen et al. (2011) introduced a methodological interpretation of the prevailing design research, which foregrounded the methodological principles behind design methods and explicated the relationship between methods and theory. They argued that in successful research programs, theory is always present, but usually resides in the background. Here, design research is like any other research. Philosophical and theoretical ideas are always there and make research intelligible for those who know them, but the actual research work is done with theories that are directly relevant to the topic at hand, not with high-level theoretical or philosophical abstractions. As the book showed, the visible top of design research usually consists of design pieces and frameworks that connect to design practice, but this does not have to come at the cost of conceptual, theoretical and philosophical depth. The program approached design in particularistic, social and dialogical terms (see Krogh & Koskinen, 2020).

For example, design research can look and feel so much like design that in some cases, most notably Marcelo Júdice's PhD thesis (2014) on creating design solutions such as posters, comics, and games for health-related communication in Vila Rosário, the line between design and research becomes blurred. Yet, theories are there and shape research and design approach alike. It is clear that Marcelo Júdice's thesis was crucially shaped by interpretive work in the empathic tradition. His design work built on fieldwork, his design approach aimed at making designs that are intelligible in Vila Rosário and his research tool became graphic design. This connection was clear to any researcher who had studied anthropology, or who had been reading natural language philosophy that shaped the early years of participatory design (see Ehn, 1988). For anyone familiar with the Wittgensteinian roots of participatory design or Paolo Freire's pedagogy of the oppressed (Freire, 2005), Júdice's work illustrates how research can shape design and push it from arguments to the material world. Although empathic design built on design methods, this theoretical layer also made it intelligible to researchers, who could see constructs familiar to them in the program.

By around 2010, the theoretical background had become second nature to the researchers at the core of the program. Most publications the researchers produced had references to theories, for example, Kurvinen's (2007) work on prototyping social actions and Lee's (2012) exploration into designer's practical actions with methods based on ethnomethodology (Garfinkel, 1967) as well as Ylirisku's (2013) work on design framing as a social process based on Goffman's (1963) interactionism. Yet these references were usually pushed so far into the background that empathic designers started to hear the question of what had happened to empathic design more and more often. As a response to these questions, Mattelmäki, Vaajakallio, and Koskinen wrote a paper in 2014 (Mattelmäki et al., 2014) overviewing the evolvement and transitions of empathic design for almost 15 years in terms of focus and research themes, including its recent transition into service and social design. As they explained, its problems had shifted over the years from making sense of experience to communicating to various stakeholders and to building a response to recent calls to turn design into a tool for radical innovation (Verganti, 2009). Interactionist ideas from Blumer were internalized into the discourse of the empathic design research community to an extent they did not need to be explicit anymore.

Recipient Design: *Intelligibility for the Singapore Government*

In the second half of the noughties, design saw a significant shift from its traditional base in graphics, products, spaces and smart devices to services. In empathic design, the shift started with a series of projects around 2007 and took about 10 years. For us, this shift provides a large enough but not too large corpus. Our focus here is on six studies, all done in Helsinki. They were *eXtreme design* (2008-2010), *Spice* (*Spiritualizing Space*; 2009-2011), *Palvelupolku* (*Service Journey*; 2009-2012), *Wellbeing 365* (*Helsinki World Design Capital*; 2011-2012), *Atlas* (*A Map for the Future Service Co-development*; 2012-2014), and *TEMWISIT* (*Immigration Services*; 2015-2016). As the last two columns of Table 1 suggest, the outputs and audiences have expanded dramatically over the years from methods for industry to services and government. The service design projects involved multiple layers of stakeholders, typically project sponsors from the government or companies, multi-disciplinary research partners from different institutes, NGOs, citizen communities and so on (e.g., see Hyvärinen et al., 2015; Keinonen et al., 2013; Lee et al., 2018; Vaajakallio & Mattelmäki, 2014). The program had to make itself intelligible to a group of new audiences and it did so successfully.

There was an added problem, however. The above-mentioned studies were all done in Helsinki by local researchers. Although the designers managed to make themselves intelligible to the government and local communities there, this could be attributed to a shared cultural background. This hypothesis can be examined with a case in which one of the designers took the program to Asia. When the empathic designer moved to Singapore, she faced a style of paternalistic governance combining perfectionist ideals with soft-authoritarian methods (Tan, 2008). For them, the idea that empathy can be an important resource in building up the government was foreign (Ng, 2014).

Efforts to understand citizen's needs had been around in a few government organizations in Singapore, but the methods used were demographics and benchmarking of the best practices from overseas (Ng, 2014). Seeing the rising number of cases of design collaborations in the UK and Australian governments, one ministry in Singapore took a bold step to explore the benefits of using design methods. In 2014, they launched a collaboration with the empathic design research team in a local university.

One of the collaborations aimed to train public officers in user research and design methods built on empathy. Together with the ministry's innovation department, the empathic design team launched a project-based learning platform consisting of design projects and a series of training workshops where more than thirty officers from five different departments joined over six months. The research team planned to use the ATLAS game, originally developed by the empathic designers in Helsinki, in the first workshop for the ministry officers to co-create a project plan. The team firstly ran a pilot session with the innovation department, soon observing the officers' skepticism and resistance to the game and the co-creation. The officers, who were more used to a meticulous planning chart and a survey involving several thousands of people, felt uncertain about the dynamic structure of the game and design methods that involved only a handful of people.

The remedy taken by the team was to readjust the methods based on what is intelligible and orderly to the public officers. They developed a design capability mapping tool (Yeo & Lee, 2018) to be answered by the public officers before playing the ATLAS game and learning the design methods. The design capability mapping tool contained multiple questions and answering options, through which the officers could self-realize their current perceptions and experiences with design methods for user involvement, prototype testing and so on. By presenting various options for the choice of design methods and levels of design capabilities, the mapping tool was targeted to help the officers to plan what learning they wanted

to gain from the training. The mapping outcomes were presented in a bar chart and scores, in combination with team personas that highlighted project teams' working styles, strengths and areas of improvement.

Figure 2. Singapore ministry officers answering the design capability mapping tool (upper) **and constructing a project plan using ATLAS game** (lower) **as part of the training program.**

Later, the team conducted interviews to examine the effectiveness of the mapping tool. It found that the tool provided the public officers with an understanding of the benefits and underlying philosophies of the design process and methods (Yeo & Lee, 2018). Another finding was that the mapping tool enabled a dialogic process between the research team and the ministry. The researchers learned about the public officers' current experiences, which informed how to tailor the training workshops. The officers were able to have a clearer understanding of the learning objectives of the workshops and the benefits of empathic design methods. In Junginger's (2015) term, the tool worked as a "conversational piece" between the empathic designers and the ministry officers.

Since 2014, the research team has conducted a series of collaborative design projects with various departments of the ministry on different topics, including redesigning of the service center, the employment process of foreign domestic workers and job redesign for older workers (see Lee, 2020). The very first project started with the congestion problem in the ministry's service center. Before the project, the ministry asked Lee's research team to design new spatial solutions or signage systems, but the team persuaded them to firstly use empathic design methods to investigate the visitor's needs and the root problems of each project. Her research team found a need to infuse the public officers with empathic thinking towards their customers and designed the project process in a way that the public officers, from frontlines to middle management, could join in the design activities, such as user interviews, co-creation workshops and prototyping tests.

The subsequent history of the empathic design team in Singapore shows the effect of these strategies. The ministry signed a *memorandum of understandin*g for a long-term collaboration program with her team. On the completion of each project, customer insights and design outcomes were exhibited in the ministry's headquarter building for several months and presented to the ministry's top management meetings led by the permanent secretary. The intelligibility of her work within the Singapore government became clear later when other ministries and government agencies engaged her team for similar design projects and training programs.

Figure 3. Exhibition of the design outcomes in the ministry's headquarter building.

What made empathic design intelligible to the government in Singapore? We believe the answer has several roots. Firstly, based on the ethnomethodological underpinning of empathic design methods, empathic designers build methods that make sense to different audiences. The empathic design team in Singapore combined training in empathic design methods with an evidence-based, quantitative measurement tool to make the entire training program rational and orderly to the public officers. Although the public officers had doubts about the scientific rigor of the methods due to the small sample size, their observations through the collaboration projects saw them realize how the methods work and how the alternative mode of gaining customer insights is relevant to their work. Materials collected by the team were "thick" (Geertz, 1973) enough to convince them to relate the methods and findings to their work. Secondly, the team's practical work of designing the methods and project process built a continuous dialogue with the ministry officers, which helped them to gradually build an understanding of what makes sense to the officers and the ministry's design legacies (Junginger, 2015). This, in turn, informed the design of the collaborative programs, methods to be used and ways to communicate with the ministry. Thirdly, intelligibility was achieved in practice in negotiations and collaboration with the audiences. The empathic designers in Singapore persistently worked with the ministry's innovation

department, organizing a series of meetings for reframing the project briefs (for example, changing the project goal from redesigning of the space and sign system of the service center to empowering customers for self-help) and pilot sessions to tailor and co-develop methods and activities.

Discussion

Over the last two decades, design research has turned practice into a research instrument. The turn has come under many names, but beyond terms like research-through-design, practice-based research, and constructive design research lie the basic idea is that design can be seen as a form of knowledge creation (Biggs, 2002; Frayling, 1993; Koskinen et al., 2011). With this turn, design researchers have had to find ways to make themselves clear to many new types of recipients while also keeping intact the base of their research in design practice. Unless they can do this, they face the problems touched upon by Koskinen and Krogh (2015) in their work on design accountability. In this paper, we have expanded their argument by noting that behind accountability lies intelligibility, which pays off when constructive design researchers to pay attention to it. The gist of the argument is that they can hold themselves accountable to design, as Koskinen and Krogh (2015) argued, but also gain new audiences by making themselves intelligible to other audiences, including public officers in one of our cases. If we are correct, researchers need to find methods to make their work rational, orderly and predictable to both designers but many types of secondary audiences.

How does the concept of intelligibility help us to understand empathic design and through it, design research more generally? Our main point is that it helps us understand the shifts described in this paper. Namely, only the methodic part of the program was designed to make the program accountable to designers (e.g., *eDesign* project; 1999-2001), *Luotain* project (2002-2006) in Table 1). It was targeted at designers to solicit their interest. The repercussions of design accountability, however, were that it led to problems with other types of audiences, especially research audiences, that were equally relevant to the program. As our account in this paper progressed from methods to theoretical work, it also shifted from accountability to intelligibility. Some design audiences in CSCW were familiar with ethnomethodology, but few designers were interested in or familiar with Blumer's interactionism. Yet it provided a powerful way to communicate with research audiences who could recognize familiar patterns of argumentation behind the methods (e.g., see Battarbee, 2004; Kurvinen, 2007). When the program was taken to Singapore, it faced a top-down and risk-averse management culture which could hardly be more different from the program's original context in Helsinki. Yet, the methods and forms of dialogue used rendered the empathic design team intelligible and helped them to surpass several major cultural gaps and allowed the audiences in the Singaporean government to see value and relevance in the program. What was conveyed in this process was the humane worldview of the empathic design program, which gave the researchers enough credit to expand the pilot project into several larger projects and to communicate to the top management. In Singapore at least, the empathic designers have been trying hard to convey not just the value of user-centered research, but equally importantly how the program can provide a new approach and what it takes to conduct research effectively using empathic techniques.

The problem we have been dealing with in this paper is not novel, but it has become timely in design research. The dilemma we describe has become important with the emergence of research-through-design and constructive design research as a dominant mode of design research. Previously, dominant modes of design research did not have to face demands from multiple audiences the same way as constructive design research. For example, art historians clearly wrote to research audiences and transferred knowledge to students in the classroom. Constructive design research, however, transfers knowledge in several ways, therefore work to achieve multiple intelligibility is inherent in constructive design research.

The last two decades have introduced the tension between practice and research to the very heart of design research and it is felt in many ways. Among empathic design practitioners, for example, Tuuli Mattelmäki has constantly been wavering between being a practitioner versus being a researcher, and this tension was at the heart of the argument about design accountability published earlier in this journal (Koskinen & Krogh, 2015). It has also been at the very heart of some well-known failures to establish long-living research programs in design schools. For example, while research at HfG Ulm and slightly later at London's Royal College of Art was at first a welcomed development, it lost support among students and management when it turned so academic that practitioners lost interest in it (Maldonado, 1984; McIntyre, 1995). The well-known fate of the design methods movement provided another cautionary tale to the empathic design group (see Alexander, 1971: Jones, 1984).

Navigating these tensions, the group has created a few policies that help it to keep the program intelligible to multiple audiences. Those policies have evolved slowly over the years. While we speculate different programs within constructive design research deal with particular contexts, those policies may provide some pointers for constructive design research to manage multiple intelligibility across different audiences. This includes:

- *Building on design-relevant methods.* Research should be based on methods that either come from or at least are related to methods designers use in industry. This renders their activities intelligible to design audiences (see Koskinen et al., 2003);
- *Having a theoretical base,* which helps researchers to communicate with academic audiences and gives an identity in research debates (see Mattelmäki et al., 2014);
- *Doing recipient design.* Pay close attention to the interests and intellectual vocabularies of target audiences (see Sacks, Schegloff, & Jefferson, 1974), and the use of methods that render themselves orderly to different audiences;
- *Building a dialogic process* through practical actions and negotiations around design methods and ideas, preferably with new types of audiences. This process helps the audiences see the values and purposes of the program;

- *Being accountable to design.* To maintain its relevance to design, this policy has offered an in-built brake to empathic design. If design practitioners have said to researchers that they are going so far that they are becoming unimportant to design, this policy has told them to slow down. This has made research slower but kept it connected to its primary design audience (see Koskinen & Krogh, 2015).

Empathic design is but one constructive research program. What does it say about the issue of multiple intelligibility in other programs? Firstly, we believe our analysis is not specific to any particular methodology in constructive design research. Although most work in the empathic design has built on field research, it has also been home to artistic explorations for instance (see Mattelmäki et al., 2014). Its theoretical base lies mostly in symbolic interactionism, which often works with surveys and laboratory experiments. There is no reason to assume empathic design should eschew them either. Secondly, we believe any form of constructive design research will be of interest to many audiences. By implication, it has to decide how it defines these audiences and creates a mix out of them. Thirdly, there may be differences that have their origins in the technical matrix of research (see Lynch, 1993). Research coming from the more technical end of design builds on scientific theories and technological choices that make generalization almost trivial. If an algorithm is written in Singapore, there is no need to doubt its mathematical validity in Brazil. Even if this were the case, however, the human components of design might still not be *portable* (Lee, 2012) from one context to another. For instance, Joep Frens's (2006) rich interaction camera could in principle have been done anywhere on the planet. His rich interaction framework, however, probably depends on local circumstances and, as the empathic design program has stressed, these circumstances are usually social. In Vila Rosário, for example, it was clear that notions of trust to authority typical to the Nordic capital of Helsinki would be grossly wrong.

Conclusion and Future Work

We discussed in this paper how one research program in constructive design research has dealt with intelligibility across the design practice, the research and more recently atypical audiences of design research, such as government. Taking the empathic design program from Helsinki as a case, we applied an analytic lens to empathic designers' practical work to make their work multiply intelligible over its twenty-year-old history.

The issue of intelligibility we have described in this paper is particularly important to a discipline like design that has making things at its core. Fields like the life sciences or literature criticism create knowledge through interpretation, description, explanation and sometimes prediction. Although artists, for example, are subjects to art historians, art historians can do their job without making artworks. Although constructive design research aims to produce knowledge rather than create designs, it is impossible to imagine it without design. This is the crux of the difference between design research and other research fields and the reason we believe the importance of building its internal discussion on intelligibility within design research.

Overall, this paper has seen intelligibility as a skillful accomplishment. What is at stake is more than just understanding; at stake is a sense of essential order and, by implication, a trust in the ability of anyone here—the distinct communities of design researchers and design practitioners—to make practical sense of what they see. As Lynch's (1993) ethnomethodological interpretation of science has demonstrated, the concern always has to be those situated discourses and practices that make any program intelligible in the first place. Here we have focused our attention on two constitutive beliefs in the program. Firstly, its methodic foundation that has been designed to communicate with designers and secondly, its conceptual foundation that communicates to research audiences. We have also shown how the program has been made intelligible to atypical users of design knowledge such as the public sector.

This paper does not intend to claim that these practices are the only solutions to intelligibility, or that our finding applies to every constructive design research program. Yet we believe that those practices are necessary conditions any program has to consider if it wants to work between research and practice. As a method for doing this, our suggestion is to take intelligibility seriously and turn it into a critical topic to be addressed rather than something that can be taken for granted. By looking into the situated and discursive background of research, constructive design researchers can gain several insights into how their craft actually works, how it differs from design practice and how it also differs from other types of design research. These questions, however, are empirical and a matter for future research. Future research should study other programs in constructive design research to examine whether there are similarities and differences in their work to deal with the critical issue of intelligibility and how differences are related to the particular approaches or practical contexts of each program.

Acknowledgments

We would like to thank the anonymous reviewers for their valuable comments. Jung-Joo Lee acknowledges the funding support by the Singapore Ministry of Education Academic Research Fund (R-290-000-012-114).

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