



POLITECNICO DI MILANO



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MAKING THINGS HAPPEN: EXPERIMENTS IN PROTOTYPING FROM A HOSPITAL DESIGN LAB

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ABSTRACT

In this paper we focus on design experimentation and prototyping within a hospital design lab. We describe how things designed within this environment act as socio-technical entities that support the work of the hospital. In this research, healthcare is viewed as a socio-material assemblage, and the hospital as a complex, heterogeneous community needing to deal constructively with problems brought into its orbit by the public. User issues, such as how to become a 'patient', how to find experts, toilets or food; how long to expect to wait for treatment - even how to leave the building - are barriers to building 'patient-centeredness' and developing a 'culture of care'. They become matters of concern for administrators, who are keen to make hospitals more friendly and approachable. Drawing on new materialist approaches and using ethnographic research methods we show how the prototyping work in the DHW Lab builds a platform for collaboration between healthcare experts and users, through the material agency of 'prototyped things'. We argue that the prototypes act as participants in experimental assemblages that bring together user and expert mindsets and help move healthcare design from 'what is' to 'what could be'.

KEYWORDS

Healthcare. Human-centered design. New materialism. Things.



INTRODUCING THE DHW LAB

“Care, and healthcare, is about taking care of humanity. Health is personal and universal—it may be the one value everyone cares about” (Jones 2013, p.iv).

The Design for Health and Wellbeing Lab (DHW Lab) is focused on enhancing health outcomes and healthcare experiences by improving products, services and systems through design-led, human-centred approaches. The Auckland University of Technology’s Faculty of Design and Creative Technologies collaborated with Auckland District Health Board to establish the DHW Lab, which is unique in that it is physically located within New Zealand’s largest hospital. This allows students and staff direct access to healthcare professionals in the hospital environment, and invites them to solve ‘real’ problems as part of undergraduate, postgraduate and staff research projects.



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The DHW Lab combines the design-led research and teaching activity of the university with the hospital's commitment to exploring innovative solutions to complex healthcare issues. Ongoing collaboration within the Lab is facilitated by the physical qualities of the space itself—open, dynamic, experimental—which encourage the participation of its visitors in the design process. Integrating multiple skills, sources of knowledge, expertise, technical resources and artefacts, the DHW Lab in the hospital is, we argue, part of a 'socio-material assemblage' — or, in the ancient etymological sense of the word, a "Thing" (Björgvinsson et al., 2012) — in which both human and nonhuman actors are unified into an organizational whole.

Operating with a light, flexible, dynamic approach the DHW Lab facilitates the formation of interdisciplinary teams around each specific project. Each project is approached using design-led methodologies, with a strong focus on rapid experimentation. Broad research themes include: how we might better position users' 'voice' in healthcare design and delivery; develop ethical frameworks to more effectively support healthcare design; develop and implement strategies to integrate design-led methodologies, methods and processes into healthcare products, services and experiences; and how design-led frameworks may better support learning and transformation within healthcare organizations.

The DHW Lab is a response to the growing body of evidence showing that design can contribute positively to healthcare experiences for patients, families and staff, as well as improving health outcomes (Jones, 2013). In healthcare design and innovation there are two main research frameworks. These are

both foundational for the DHW Lab. 'Evidence-based design' encompasses enhancements to services, systems, products and facilities through basing decisions on credible research to improve outcomes (Yoder, 2008). The model for evidence-based design evolved from 'evidence-based medicine' (EBM), the 'gold standard' for clinical practice that attempts to integrate "the best available evidence from systematic research" (Stichler & Hamilton, 2008, p.1) with individual clinical expertise and patient values. The current strategy for implementing evidence-based research in the hospital is through 'lean service redesign', which embraces evidence-based principles focused on measuring and monitoring efficiency and meeting service demand (Westwood & Silvester, 2006). This rational approach attempts to improve the patient experience – for example by reducing waiting times – using the least amount of resources possible (Ng, Vail, Thomas, & Schmidt, 2010). This method draws on quantitative research to reach the 'best practice' for patient safety and organizational performance (Stichler & Hamilton, 2008). It differs from other design processes by the type of evidence that informs the decisions, leaving no room for assumptions or a trial and error process, as a small decision can have a significant impact on a patient's life and the time spent in the hospital (Huntman, 2013).

The other design research framework used by the Lab generates evidence through human-centred design (HCD), using qualitative research methods to understand the day-to-day experiences of patients. In HCD patient-centred design approaches, designers and researchers collaborate and learn from users/patients to meet their product/system/service needs.

Steen (2011) identifies two main tensions in HCD practice; the balancing of practitioners' knowledge with users' knowledge, and

the balancing of a current and past focus with future focused solutions; “a tension between a concern for what is versus a concern for what could be” (Steen, 2011, p. 48). Representing these as axes on a quadrant diagram – expert knowledge vs. user knowledge: “what is” (research) vs. “what could be” (design) – Steen plots how these tensions are present, in differing ways, in six HCD approaches to design; participatory design, ethnography, the lead user approach, contextual design, empathic design and co-design. He argues that there is no way to resolve these inherent tensions. Designers, if they want to achieve the ambition of HCD of “being open towards others and of jointly learning and jointly creating” (Steen, 2011, p. 56), must cope with these tensions by critically reflecting on their own role in the distribution of power and agency in the research process.

This view of HCD aligns with social science approaches in which evidence-based research methods in healthcare are criticised for excluding the questions “evidence of what, and according to whom?” (Lambert, Gordon, & Bogdan-Lovis, 2006, p. 2620). These critiques are also applied to Lean design methods. For example, Waring and Bishop (2010) tear down any semblance of objectivity in Lean healthcare practices by showing how contingent and open to negotiation they are. All co-designing practices, whether HCD or Lean, have their discursive elements, and it seems inevitable that analyzing them will draw us into a trap that Latour calls the ‘modernist constitution’; the opposition between what is “social, symbolic, subjective, lived and what [is] material, real, objective, and factual” (Latour, 2008, p. 6). This dualism is at the foundation of evidence-based design, as well as its debunking in social science critique. We take this contradiction between epistemologies of design as an example of the impasse that impelled Latour to try to “devise another

powerful descriptive tool [...] whose import then will no longer be to debunk but to protect and to care..." (Latour, 2004, p. 232).

Since the development of Actor Network Theory in the 1970s and 80s, Latour and others have attempted to reconsider the Aristotelian hylomorphic model of creation. This predisposes us to think that "making begins with a form in mind and a formless lump of "raw material," and ends when form and matter are united in the complete artifact" (Ingold, 2012, p. 432). Instead, the 'new materialists' urge us to

read creativity 'forwards' as an improvisatory joining in with formative processes, rather than 'backwards', as an abduction from a finished object to an intention in the mind of an agent (Ingold, 2010, p.3).

DEMATERIALIZED DESIGN: REMATERIALIZED THEORY

'New materialism' is a theoretical movement in the human and social sciences that tries to recognize the dynamic and vital relation between objects and their social milieu. It emerged in the late 20th century as part of the perpetual rewriting of philosophical modernity (Dolphijn & van der Tuin, 2012, p. 117) . The intention is to create a new conception of how "matter" is entangled with our everyday meaning-making and the production of scientific knowledge. There are a variety of new materialist approaches, but all address three main areas of concern (Cudworth & Hobden, 2014). Firstly, they are object-oriented (Harman, 2010). Objects are conceived as 'things'; vital gatherings of energy-matter that are constantly in flux. Secondly, they contemplate a reality in which human life is inextricably entangled with non-human processes. Thirdly, they "acknowledge the subjectivity of humanity in a world where the

human is not necessary” (Cudworth & Hobden, 2014, p. 3). *Unnecessary* does not mean *unimportant*. Political theorist William Connolly writes,

Of course, we accept the idea that only humans reflect deeply upon mortality and the place of the human estate in the cosmos. But we resist the tacit judgment that this frees us from thinking closely about the complex relations between the human estate and a host of nonhuman processes with variable degrees of agency. It, rather, accentuates the latter need (Connolly, 2013, p. 400).

What might it mean to decenter the human from human-centered design? As human designers and researchers, we feel obliged to pay attention to these ideas¹. In the next paragraphs we speculate on the question: How was the object excluded from design thinking?

In his book *The Sciences of the Artificial* (1969), Herbert A. Simon introduced an entirely new way of thinking that placed human activity at the heart of design, instead of the form and aesthetic appeal of objects. By emphasizing the link between problem solving and design, Simon’s account gave rise to a tradition of design studies over the next two decades that began to shift focus from the objects of design onto the cognitive processes that shaped them (Kimbell, 2009). Subsequent debates in design theory became concerned more with how designers think, what they do, and how they do it, and less with the objects they make.

¹ We appreciate Nikolas Rose’s (2013, p. 4) wry comment that “‘constructivism’ is passe, the linguistic turn has reached a dead end and a rhetoric of materiality is almost obligatory”.

The attentiveness to design methods through the 1960s and 1970s gave way to a more generalized understanding of “design thinking”, in which the link between design and the social sciences helped create scope for collaborations between design firms and social scientists. For example, Elizabeth Sanders, a trained anthropologist credited by many design theorists as a pioneer in “participatory design”, was employed by a design firm in 1982 to help shed light on the specific needs of its clients. Her job was, as she puts it, “to know the user and to translate that knowing into principles and prescriptions that the designers with whom I worked could understand and use,” (Sanders, 2002, p. 1). She was in many ways the ‘interface’ between the designers and their clients, collecting the primary data that helped inform the design of the object.

But this “user-centred” approach, she argued, still over-privileged the role of designer. Sanders sought to develop a “participatory design” which, by contrast, invited the user into a process where the roles of designers, social scientists, and end-users would shift and blur. In this model, the user is more directly and proactively engaged as a participant in the development of the product. This is part of a movement she called “Postdesign” (Sanders, 2002, p. 1), where inspiration and ideation are drawn from the user’s experience by unpacking their thoughts, feelings, dreams and aspirations. A new role for designers was created, “i.e., to learn how to access and to understand the dreams of everyday people and to create the scaffolds or infrastructures on which these people can express their creativity” (Sanders, 2001, unpagged).

There is more to this process of ‘dematerializing’ design than we

have room to explain here, however, what emerges from the past forty years of design literature is the sense that objects, once the whole *raison d'être* of the field, have receded to the theoretical backdrop of design. That people and processes have taken their place is interesting, because, paradoxically, the same period has been characterized by the opposite shift in the social sciences: towards materiality. In this paradigm, scholars in a range of disciplines counteract a position of anthropocentrism by placing objects, rather than people, at the centre of their analysis.

One way to experiment with this new materialist thinking and try to re-introduce the object to design thinking is to zoom in on the material agency of the prototyped 'thing'. Archeologist Lambros Malafouris (2013) suggests in his 'theory of material engagement' that we distinguish between 'agency', as in the agentic capacity of non-human animals or inanimate objects, and a distinctly human "...sense of agency'— that is, conscious agency" (Malafouris, 2013, p.214). This distinction allows a more equal, non-anthropocentric understanding of the 'constitutive intertwining' between agents and things. Malafouris points out that "[a]gency and intentionality may not be properties of things; they are not properties of humans either; they are the properties of material engagement" (Malafouris, 2013, p.18).

Does a theory of material engagement help us to understand how prototyping 'makes things happen' in the DHW Lab? At least one case study in the design of healthcare technology has already shown how

users and technology co-become during the prototyping of an emerging technology [...] In this view, both users and prototype are mutually defined and, in the process, define

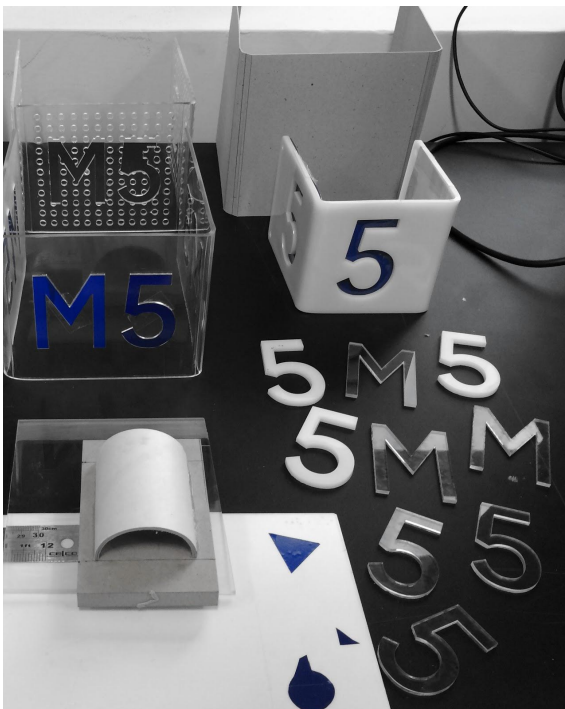
the collective producing the prototype—user and delineate the collective proceeded by the innovation (Wilkie, 2013 p.3).

Thinking about prototyping as a process of material engagement, rather than an imposition of designers' intent on inert matter, we can follow how socio-technical assemblages gained agency during the prototyping processes of the DHW Lab.

PROTOTYPING AS DISTRIBUTIVE AGENCY

Prototypes are not simply evolving objects, or “objects-to-be”. The processes by which ideas are refined and tested through prototyping have much wider social significance, particularly within the context of a socio-technical assemblage where both human and nonhuman actors are unified into an organizational whole. This is because, as Murray et al. (2010) have argued, “it’s through iteration, and trial and error, that coalitions gather strength (for example, linking users to professionals) and conflicts are resolved (including battles with entrenched interests)” (Murray et al. 2010 p.12). As Harry², a designer at the DHW Lab, told us:

The feeling [among hospital staff] is that they’re not capable of producing the things that we can produce, or that the channels they can go through are always bogged down by everybody else doing things they want to do, or when you’ve got the big vendors or suppliers who are already contracted to do things like signage—they’re not just going to whip up a prototype for you in the same way we would.



² Names of designers have been changed to preserve anonymity.



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Located inside Auckland City Hospital, the DHW Lab is positioned in such a way as to allow the artefacts it produces—prototypes, mock-ups, models, etc.—to act within the healthcare network. They are, in Latour's terms, themselves “actants” in the assemblage (Latour 1996, p. 373), projecting into the public sphere a set of ideas, methods, and processes which link matters of practicality to the abstract, helping create, shape, and manage social links (Rosental 2005).

A common theme running through our interviews is the idea that prototypes themselves can help build a network of professional relationships and start conversation around a culture of care. The DHW Lab's first brief at Auckland Hospital was to design a Journey Map that better communicated care pathways to patients in the Emergency Department (ED). The project began with an initial ‘walk through’ with a senior nurse who showed the designers around ED, introducing them to other hospital staff and explaining how the department operates. During their observations, the designers were shown an existing signage problem and, later, started prototyping a 3D sign that would make ED room numbers visible from multiple angles instead of just one. Although the laser-cut acrylic prototype they produced was, in Harry's words, “quite naff”, it represented something that transcended all of its material, aesthetic, and practical qualities:

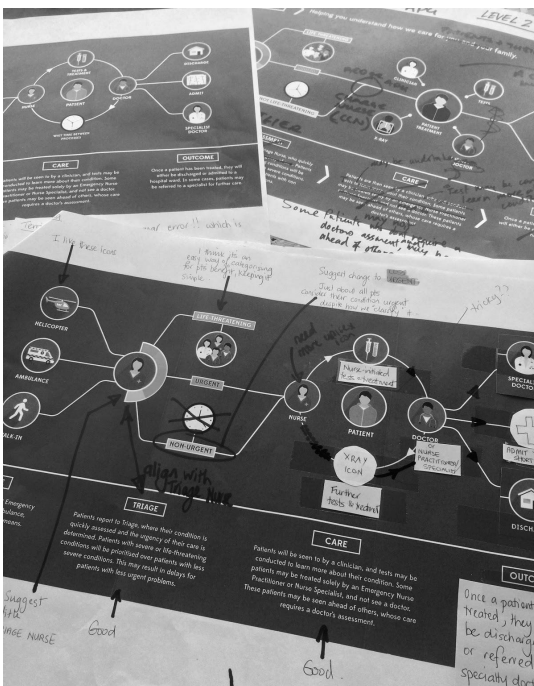
When we took it down to the staff down at ED to talk about the Journey Map, it really excited them and they wanted to know what it was all about, how we made it, and to get it up on the wall to test. As soon as we did place it up on the wall, just to see what it looked like, you could tell immediately that staff and other people in the environment and the ward—it got their attention and they started asking questions: ‘Oh,

what's that for? Is it going to light up?' So that, to us, was kind of the beginning of our, of building our co-design methodology.

Harry and Blake, a second DHW Lab designer, developed further iterations of the sign by involving hospital staff in the process, testing different typographies, materials, colours, and sizes until a batch of seven were made for the first seven rooms in ED. Through a number of interactions with ED staff, a methodology developed around what Harry called a "living project". "We never treated it as a finished product," he says. "It was always a prototype and still is a prototype." The prototyped sign, Blake remembers, "served well to give us confidence and to deal with people, and to actually go into a clinical area and test something with people." The sign not only helped the designers build working relationships within ED, but also transmitted their evolving design methodology across other wards and departments in the hospital, generating conversation around the value of human-centred design. As Harry recalls:

Another staff member or a project member saw [the sign] in the department and could see it transferable to the ward he was working in with staff in reducing fall risk... for elderly patients. We were basically asked if we could design and manufacture a number of signs for their department, for their bathrooms and showers.

Meanwhile, the designers were in the process of developing a map for the original brief and found that clinicians had tended to both view and address problems in ways that differed from the principles of human-centred design. For example, one clinician, in trying to understand a communication issue in ED, had



laboriously pulled together quantitative data surrounding the many processes of the department, presenting these in the form of a flow diagram that was, as Blake puts it, “ridiculously in-depth”:

And comparing what that was—the way the hospital was thinking about processes like that, mapping out pathways — compared to our... approach... Just how long they’re willing to invest in something to try and understand what’s going on. [Our approach was] kind of, I think, a bit of fresh air for them.

The prototype, when it was presented back to ED staff, generated collective discussion around patient-centredness, the appropriateness of incorporating clinical jargon and, specifically, whether or not the word “triage” should be included on the Journey Map. Interestingly, the clinicians were reluctant to do away with the word even when presented with the testimony of the designer’s observations, which revealed that most visitors to ED did not understand it. Even so, the Journey Map prototype catalysed constructive debates of this kind, becoming a more-than-instrumental ‘actant’ that altered the course of events, and produced effects beyond the intention of the designers. It caused clinicians to re-examine the suitability of using specialist language in ED, a department where people are quite often anxious, frustrated, and in pain.

Prototypes communicate and participate by binding different stakeholders together (Björgvinsson et al., 2012), but they also play a part in negotiating a particular design methodology. One of the concerns the designers had when they started at the DHW Lab was the potential for their skillsets to be undermined by a co-design methodology in which everyone—designers,

stakeholders, and end-users—contributed equally to the design process. But the process of making prototypes enabled them to both preserve and demonstrate the value of their skillsets while incorporating the perspectives and insights of multiple stakeholders. “We want to hear what [the stakeholder’s] opinions are and we aren’t just going to impose our creative style,” says Blake. As the prototyped 3D sign was made and tested, it helped the designers

... [find] that balance between extreme, pure co-design and conventional design in isolation, [to a position] where everyone can contribute thought or valuable insight to the creative process along the way.

Through the process of prototyping the 3D signs and Journey Map, the artefacts produced by the DHW Lab designers formed a “stabilising narrative” around the problem in which these different modes of engagement were brought into alignment, introducing a new cultural practice that explores hospital-based design problems in ways that emphasise human-centredness and experimentation. Hospital staff, for example, were recognising that the prototypes represented not only an evolving object of design (though they recognised this on one level, of course), but also certain processes and principles that differed from the algorithmic and bureaucratised hospital procedures. “The idea is that we test things out,” says Harry, “and we keep improving things [through feedback] until we arrive at... principles, or best practice.”

This process of reaching a “fairly resolved” design object requires input from these two important, but often incompatible, modes of engagement. But the distributed agency of socio-technical assemblages amounts to what Bjögvinsson et al.,

(2012) call “infrastructuring”. As a controversial design Thing, the “infrastructure” democratizes the voices of many different stakeholders and brings together these opposing viewpoints, approaches, and matters of concern in ways that lend, in this particular case, validity to a heuristic, participatory approach to design in the hospital. As Harry sees it,

People really appreciated that [the Lab] was here and able to facilitate these creative solutions that people had been wanting to implement for so long, and also for them to know that there’s a channel, a new channel to run those sorts of things through, as well as knowing that we have a collaborative methodology—we want them to be involved and I think that gets them excited because they realise that there’s change and that they’re able to be a part of it.

The DHW Lab’s prototypes clearly acted as “Trojan Horses” (Macdonald, 2013) in the way they penetrated an institutional context often characterised by hierarchy and dominance (Foucault, 2007). Once inside, they established links and facilitated collaboration between designers and hospital staff, which in turn helped shape the socio-technical assemblage. Further, new opportunities for infrastructural growth were enabled through these prototypes as they directed conversation towards human-centredness and experimentation. Harry, for example, was on his way down to ED with the Journey Map when one of the hospital signage installers gestured to the map with a nod, saying “You can still get really lost in this place. [The hospital] could do with some more signage like this.”

We conclude with this barely perceptible nod to the agency of prototyped things in the ‘constitutive intertwining’ of materials,

machines, designers, signage installers, hospital users, and clinical staff that is the assemblage of emergency healthcare. While we recognize that the prototypes themselves have no sense of agency, we believe that paying closer attention to how they 'make things happen' will help to revitalize design thinking.



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