The Stuffness of Research Through Design

David Chatting
Goldsmiths,
University of London
david.chatting@gold.ac.uk

This essay questions the inquiring power of *stuff* in a Research through Design (RtD) practice (Zimmerman, Forlizzi and Evenson, 2011; Gaver, 2012). I will introduce the concept of *stuffness* as a way through which this may be discussed. This contributes to the *RtD in Situ* workshop at DIS 2020 (Jenkins *et al.*, 2020) which continues a thread of conversation of doing *thing*-based design research initiated at CHI 2016 (Jenkins *et al.*, 2016, 2017, 2020; Andersen *et al.*, 2019).

In posing a Research through Design inquiry, one might first simply ask into what we are inquiring, what is the current state of the world – what is hegemonic? Then by what means we are attempting this inquiry – how is it is facilitated by the design and deployment of these things that we are making? This essay seeks to offer some reflections on ways of framing these two questions; the consequent question of what form this knowledge takes and how it facilitates design alternatives is left hanging, for now. Unfinished then as it is, this essay necessarily represents a work in progress.

This essay is written in the context of my ongoing thesis work in which I use the practices of exploratory hacking to open the home network as a site for design intervention and my long-term practice of RtD.

While the distinction with between *things* (and in particular the *things* we can reasonably design and make as researchers) and other scholarly products

The Shearing Layers

Site - This is the geographical setting, the urban location, and the legally defined lot, whose boundaries and context outlast generations of ephemeral buildings. […]

Structure - The foundation and load-bearing elements are perilous and expensive to change, so people don't. These are the building. […]

Skin - Exterior surfaces now change every 20 years or so, to keep up with fashion or technology, or for wholesale repair. […]

Services - These are the working guts of a building: communications wiring, electrical wiring, plumbing, fire sprinkler systems, HVAC (heating, ventilating, and air conditioning), and moving parts like elevators and escalators. They wear out or obsolesce every 7 to 15 years. […]

Space Plan - The Interior layout—where walls, ceilings, floors, and doors go. Turbulent commercial space can change every 3 years or so; exceptionally quiet homes might wait 30 years.

Stuff - Chairs, desks, phones, pictures; kitchen appliances, lamps, hairbrushes; all the things that twitch around daily to monthly. […]

(Brand, 1995, p. 13)

seems intuitively productive, in my view *thing* is unhelpfully complicated by notions of *thingness* (Brown, 2004) and distinctions between objects and things (Heidegger, 1967). Instead, in the context of situated interaction, I turn to Brand's description of *stuff*, "*Chairs, desks, phones, pictures; kitchen appliances, lamps, hairbrushes; all the things that twitch around daily to monthly*". *Stuff* is the fastest changing of Brand's Shearing Layers, layers of ever slower paces of building infrastructure: *Space Plan*, *Services*, *Skin*, *Structure* and *Site* (Brand, 1995, p. 13) – see side panel. Stuff then operates within the constraints of and is enabled by some infrastructural context; stuff also has an implied physical scale and mobility. Borrowing from Actor Network Theory (ANT) (Michael, 2016) these infrastructures can be recast as a complex interplay of techno-social actors – it is here in this assemblage that the subject of our inquiry is likely to reside. Once understood, our future designs may then seek to operate within or unsettle this network.

In HCI our concern is often then with *computational stuff*; stuff that is described by or describes computational processes that act in the world. Odom et al. frame some computational *stuff* as *research products* (Odom *et al.*, 2016) and describes the four qualities of such designs: *inquiry driven, finish*, *independence* and *fit* – see side panel. This essay offers an alternative interpretation of research products which emphases *inquiry driven* to reveal present hegemonic phenomena, rather than forming future oriented designs per se. *Finish*, *independence* and *fit* can then all be read as ways in which the research product integrates with (or deliberately disrupts) the reality of the present world, in an attempt to interrogate it over the period of the study. This relatively subtle shift and focus on hegemony suggests research products could be seen as a practice of Adversarial Design (DiSalvo, 2012).

With an Adversarial Design framing, research products successfully reveal the world by working in it. That computational stuff *works* is a complex judgement that goes beyond simple technical specification which demonstrates that through the process of design the assemblages that constitute this reality have been partially understood. By working the research product should then seek to disclose a richer picture. Alternatively, imaginative concepts, speculations and props might be deliberately insulated from the world at large, where play is enclosed within a *magic circle* (Huizinga, 1955; Andersen and Wilde, 2012).

There are some tensions within the research products category that complicates the simple designation of stuff. Small, highly interactive, wireless devices seem distinct from larger things that have a calmer interaction style, they seek to become *part of the furniture* and tend to be larger and less mobile. I prefer instead then to think about *stuffness*; the degree of mobility and independence from infrastructure (and so from networks of actors). In these terms, the *hook* has a higher degree of stuffness than the *table-non-table* (Odom *et al.*, 2016).

Some research products manipulate their stuffness by taking the form of furniture, for instance: the *Drift Table* (Gaver *et al.*, 2004), *Ritual Machine II* (Kirk *et al.*, 2016) and *table-non-table* (Hauser *et al.*, 2018). The *Slow Game* (Odom *et al.*, 2018) demonstrates an interesting tension between the physical properties of something that might twitch coupled with a slow

Research Products

Inquiry driven: a research product aims to drive a research inquiry through the making and experience of a design artifact. Research products are designed to ask particular research questions about potential alterative futures. In this way, they embody theoretical stances on a design issue or set of issues.

Finish: a research product is designed such that the nature of the engagement that people have with it is predicated on what it is as opposed to what it might become. It emphasizes the actuality of the design artifact. This quality of finish is bound to the artifact's resolution and clarity in terms of its design and subsequent perception in use.

Fit: the aim of a research product is to be lived-with and experienced in an everyday fashion over time. Under these conditions, the nuanced dimensions of human experience can emerge. In our cases, we leveraged fit to investigate research questions related to human-technology relations, everyday practices, and temporality. Fit requires the artifact to balance the delicate threshold between being neither too familiar nor too strange.

Independent: a research product operates effectively when it is freely deployable in the field for an extended duration. This means that from technical, material, and design perspectives an artifact can be lived with for a long duration in everyday conditions without the intervention of a researcher.

(Odom et al., 2016, p. 3)

interaction style that avoids it being turned to clutter. Few designs find ways to move entirely away from stuff into the slower infrastructural Shearing Layers; with the exception maybe of Desjardins' camper van (Desjardins and Wakkary, 2016) in which all the Shearing Layers are to be found, excluding perhaps site.

Previous work, especially in the domestic space, has employed *living-labs* to explore infrastructural design, notably The Aware Home (Kidd *et al.*, 1999). Yet these are typically still labs, controlled environments within a kind of magic circle. These difficulties of design at the infrastructural level in HCI can be seen to be a problem (Edwards, Newman and Poole, 2010).

For good pragmatic reasons, many design research studies of novel computational stuff in situ often tend to artefacts with a high degree of stuffness: smaller devices are typically easier to fabricate; intense interactions quicker to study; and technical independence of operation more likely to succeed. Yet without deeper entanglements in the network the inquiring power of this stuff seems diminished; both in what can be learnt in the process of its design and in its deployment.

However, it is almost impossible to conceive of *computational stuff* that works without engaging with any networks of infrastructures in the world, even if only for its electrical power. Although, as Auger point out, simple use of infrastructure may not itself represent a critical inquiry, "*Electricity, as a form of energy, comes through sockets on the wall that deliver a seemingly endless supply. These ubiquitous and generic sockets determine the design of every electrical product, providing a neat end to the designer's role and responsibility.*" (Auger, Hanna and Encinas, 2017, p. 6). Often infrastructures are in ANT terms *black boxed*, "*A black box contains that which no longer needs to be reconsidered, those things whose contents have become a matter of indifference*" (Callon and Latour, 1981, p. 285). A challenge then is to design stuff that critically engages with the technical and social infrastructures of the world, in ways that are revealing for our inquiries.

The use of communications infrastructure is now a common feature in both commercial and academic *computational stuff* which increasingly incorporates networking, likely with connectivity to the Internet – these are the so-called Internet of Things (IoT). This further entangles the artefact with the techno-social world at large. As DiSalvo comments, "*The design of ubicomp is the design of connectedness. More than just exchange and expression between objects, this connectedness extends outward to enrol people, other entities in the environment, and even the environment itself.*" (DiSalvo, 2012, pp. 92–93).

The combination of stuff and the Internet represent a powerful form of inquiry, which might be achieved with a fairly high degree of stuffness; consider the locatedness and connectedness of the Datacatcher (Boucher, 2016).

However, as with electrical power, the Internet can be engaged with abstractly through the use of network APIs (Application Programming Interfaces). My explorations of hacking the Amazon Kindle (Gatehouse and Chatting, 2020) are attempts to critically engage with it networks. My faltering attempts to change its wallpaper were frustrating but revealing of a complex

hidden infrastructure of authority. This form of inquiry is focused on the process of struggle in Research through Design, rather than a finished outcome. An unanswered question is then how such agonistic practices can be embedded into research products, as well as research processes? This is the subject of my ongoing thesis work exploring the home network.

While describing a work in progress, this essay has suggested that *stuff* is a useful lens through which to view Research through Design things. Further, that by manipulating the *stuffness* of these in situ designs the inquiry can interrogate and reveal aspects of the hegemony. Lastly, that Internet connected stuff can operate in ways beyond their apparent physical affordances and offer new forms of inquiry. In doing so I have suggested an alternative way of seeing research products.

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