4 Configuration

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Methods for studying science and technology, like their research objects, are both already made and always in the making. With respect to technology studies in particular, we have by now a powerful toolkit of conceptual and practical resources to bring to the analysis of objects, ranging from individual artefacts to socio-technical systems, historically and in contemporary formations. To name just two examples among many, Haraway's 'cyborg' alerts us to the history of nationalist and military technoscience as a crucible for contemporary conjoinings of bodies and machines, while also opening up generative resources with which to investigate particular cases in ways that retheorize the nature of human-non-human entanglement (Haraway, 1985/1991). Law's trope of 'heterogeneous engineering' both expands and further specifies how scale is enacted in and through complex socio-technical assemblages, as they draw together and multiply entities through time and across space (Law, 1987). Offered as an addition to this toolkit, the device of *configuration* has two broad uses. First, as an aid to delineating the composition and bounds of an object of analysis, in part through the acknowledgement that doing so is integral not only to the study of technologies, but to their very existence as objects. And second, in drawing our analytic attention to the ways in which technologies materialize cultural imaginaries, just as imaginaries narrate the significance of technical artefacts. Configuration in this sense is a device for studying technologies with particular attention to the imaginaries and materialities that they *join together*, an orientation that resonates as well with the term's common usage to refer to the conjoining of diverse elements in practices of systems design and engineering. In what follows, I attempt to elaborate the sense of configuration as a tool to think with about the work of drawing the boundaries that reflexively delineate technological objects, and as a conceptual frame for recovering the heterogeneous relations that technologies fold together. I offer two case studies of socio-technical projects that, while not done through the trope of configuration, can be read as demonstrations of the sensibilities that it recommends.

Interrogating the trope

How might we reverse engineer the device of configuration, to see what it is made of and what work it can do? We could begin by noting its ambiguity as at once action and effect; as a mode of ordering things in relation to one another (Law, 1994), and the arrangement of elements in a particular combination that results. If we examine the trope as a kind of artefact itself, we see at its pivotal centre the *figure*. To figure is to assign shape, designate what is to be made noticeable and consequential, to be taken as identifying. In Castañeda's words:

> To use figuration as a descriptive tool is to unpack the domains of practice and significance that are built into each figure . . . Understood as figures, furthermore, particular categories of existence can also be considered in terms of their uses – what they 'body forth' in turn. Figuration is thus understood . . . to incorporate a double force: constitutive effect and generative circulation.
>
> (Castañeda, 2002: 3)

Figuration, in other words, is an action that holds the material and the semiotic together in ways that become naturalized over time, and in turn requires 'unpacking' to recover its constituent elements. It is also, however, a mode of production, as the circulation of figures implies their recontextualization, multiplicity and at least potential transformation. So figuration comprises both a method through which things are made, and a resource for their analysis and un/remaking. I develop this method's particular relevance here for the careful tracking of what Haraway names projects of 'materialised refiguration' (Haraway, 1997: 23). More specifically, it was Haraway who most forcefully posed the question of whether it might be possible to formulate new strategies for improving the conditions of humans by reimagining relations of human and machine, rather than premising authentic human existence upon their principled and permanent separation (Haraway, 1985/1991; see also Downey and Dumit, 1997: 7). My own work has been concerned with the question of how humans and machines are figured together – or *con*figured – in contemporary technological discourses and practices, and how they might be *re*configured, or figured together differently (Suchman, 2007).

Reanimating the figure

A first step in our method is to reanimate the figure at the heart of a given configuration, in order to recover the practices through which it comes into being and sustains its effects. Reanimating a figure requires attention to its rhetorical constitution as 'category of existence', and to the forms of embodiment that stand as its instances. As one example, Ahmed (2000) mobilizes figuration as a tool to examine the politics of identification, specifically the discursive practices that constitute the figure of 'the stranger'.

Citing Marx's analysis of commodity fetishism, in which objects appear as autonomous figures endowed with a life of their own, she extends his argument to include fantasy as well as materiality, arguing that the stranger enacts an instance of what she names 'a fetishism of figures' (ibid.: 4; see also Benjamin, 1968; Taussig, 1993; Graeber 2005). Insofar as the stranger is not an ontological being but a relational effect, she argues, the identification of an other as a stranger is an act not of failure to recognize, but of recognition (Ahmed, 2000: 26). Ahmed is interested in understanding how difference is constituted in and through particular 'strange encounters', in a way that resists universalizing the figure that those encounters affect. Her aim, more specifically, is to account for the complex relationship between histories of colonialism and contemporary modes of identification as familial and strange. To recover that complexity, she argues, requires restoring the social relations that are concealed by stranger fetishism, 'to consider how the stranger is an effect of processes of inclusion and exclusion, or incorporation and expulsion, that constitute the boundaries of bodies and communities' (ibid.: 6). Within and between entities, practices of association and differentiation are fundamental.

So how might we bring this process of reanimation to bear on the study of technologies? The answer is already present, of course, in Ahmed's reference to the fetishized object, but she give us further suggestions as well. Ahmed's analysis, and particularly her careful attention to enactments of inside and outside, has relevance for thinking about how other kinds of figurations, including boundaries between the human and non-human, are made. In the centre of her attention are questions of identification and difference, how lines of delineation are drawn around inside(r)s and outside(r)s. Similarly, every artefact enacts its singularity through delineations of that which it incorporates and those things that are beyond its bounds. Following Castañeda (2002), figuration alerts us to the need to recover the domains of practice and significance that are presupposed by and built into particular technological artefacts, as well as the ways in which artefact boundaries are naturalized as antecedent rather than ongoing consequences of specific socio-technical encounters. These are the ontological politics of design and use, and of technology development more broadly.

Configuring socio-material assemblages

Configuration, then, brings things together – at once reiterating the separate existence of the elements assembled, and drawing the boundaries of new artefacts. It alerts us to attend to the histories and encounters through which things are figured into meaningful existence, fixing them through reiteration but also always engaged in 'the perpetuity of coming to be' that characterizes the biographies of objects as well as subjects (see Daston, 2000: 1). Building upon contemporary theorizing, configuration places further emphasis on thinking about the discursive and material together (see Barad, 2007: 91,

171–2). But this device for social theory resonates as well with configuration's currency in the everyday language of information systems engineering. The past several decades have seen an expansion of this latter sense of configuration, redefining systems development from a technical project comprising the arrangement of hardware and software components, to the implementation of extensive organizational infrastructures across myriad and often incommensurate imaginaries and practices. To think through how configuration can work as a methodological device in this respect, I turn to two exemplary cases of ethnographic research into making complex information systems, one based on the West Coast of the US, the other in the state of Andhra Pradesh in southern India.

From 1993 to 1998, Judith Gregory followed a project to design and implement a comprehensive electronic health record software package for the largest health maintenance organization (HMO) in the US (Gregory, 2000, 2009). The software prototype, an attempt to project a future path for the HMO's clinical information systems and broader infrastructure development, was designed by a state-of-the-art clinical informatics software company. Gregory's focus was on communication and coordination among members of the HMO's multi-disciplinary care teams, and between them and the system's developers. A key insight from Gregory's analysis came from her observation that at the heart of the extensive discussions and labours of design that comprised the electronic health record prototyping project were what she termed 'multiple logics', each with a rationality of its own. The HMO's management dreamed of a system for decision-making and control that would finally make it possible to grasp, inventory and standardize the workings of this vast organization in a way that would both cut costs and serve patients more efficiently. The software design company was committed to pushing the technical state of the art in health information systems, including the introduction of forms of automated expertise into diagnosis and treatment, while medical researchers imagined a system that would make it possible to eradicate clinical mistakes, and contribute to the creation of a sound scientific foundation for clinical practice. The health workers, finally – physicians and nursing staff alike (albeit differently) – demanded a system for maintaining patient records that would serve their needs and those of their patients in the practice of clinical care. And all of this took place in the context of a health care regime in the US characterized by deepening tensions between economic and social use values of medicine and related institutions.

The result of this initiative was the dream of a system that would be all things to all users. But the figure of a singular electronic health record, Gregory argues, obscured the multiple logics at play. One way to think about those logics is through the disparate subject/object configurations that animated them, and which actors differently located within the project were aiming to realize through the system's design: the figure of the effective manager made possible through the comprehensive decision support system, the innovative design company with its leading edge prototype, the researcher with a perfect database

prescribing error-free clinical practice, and the care provider with an always ready-to-hand patient record. By following the project as it unfolded across locations, Gregory was able to recover the multiplicity of the object in development, the actors' abiding faith in the possibility of its configuration as one, comprehensive system, and the in-built contradictions that such a singularity implied. Gregory's own analytic figuration of this as an 'incomplete utopian project', moreover, names a wider class of initiatives that fail to recognize and acknowledge not only that multiple logics exist within the domains that a system must inhabit, but that they may imply deeply incommensurate directions for system design. Crucial here is the recognition that agencies of subjects and objects are figured together – thus the stakes, the reason that the specificities of configuration matter so much to the actors involved.

So what does this analysis imply for the possibility of configuring effective health information systems? Do we conclude that the design of a workable electronic patient record is impossible? Rather than taking this as the logical conclusion, Gregory explores the possibilities of an alternative approach to information systems development, one that might be able to cope with the multiplicities, and contradictions, that are the reality of complex health care institutions. Among other resources from science and technology studies, she draws inspiration from philosopher of science Helen Verran's experience as a mediator in land rights negotiations between the Yolgnu Aboriginal community and Australian pastoralists during the same period in which Gregory was engaged in her study (Verran, 1998). In reflecting on these negotiations, Verran urges that the recognition of multiplicity and difference, while a crucial first step, is not enough to enable the creation of livable socio-material arrangements. The latter requires what she calls 'working knowledges together'; that is, negotiating the creation of new, *partially shared* imaginaries without – and this is crucial – relying on one homogenizing translation into a dominant party's terms.

The politics of cultural historical imaginaries need to be on the table, in other words, whether the project is negotiations over land or the design of information infrastructures. And identifying those politics may require reanimating the figurations that hold particular relations of persons and things – with land, or with information – in place. Which brings me to the second case, another ethnographic investigation of health information systems development, but very differently located. During 2003 and 2004, C. R. Ranjini, then a PhD student at Lancaster University, undertook the daunting task of tracing out the socio-technical networks involved in a series of initiatives to implement a new health information infrastructure across primary health care centres in rural Andhra Pradesh, one of the poorest regions of southern India (Ranjini and Sahay, 2006; Ranjini, 2007). In 1999, the government of Andhra Pradesh imagined a future for economic and social development in the state through their 'Vision 2020' document. This policy document, developed in consultation with McKinsey and Co., included an IT subsection stating that: 'Andhra

Pradesh will leverage information technology to attain a position of leadership and excellence in the information age and to transform itself into a knowledge society'. With respect to health, 'Vision 2020' included an ambitious programme to stabilize population growth and to improve nutrition, sanitation, personal hygiene, and disease control and prevention, particularly with respect to maternal and infant health. All agreed that these visions could only be realized through a serious commitment to delivering primary health care to the 73 per cent rural population of the state. These initiatives were part of the response, by the technology-savvy Chief Minister of the State at the time, to a series of 'millennium development goals' set out by the United Nations and World Bank. Needless to say, the monetary stakes for the state in meeting these goals were significant.

Through extensive fieldwork, Ranjini traced the rhetorical figurations and practical realities of four information technology initiatives for health care launched during this period. One aim of her analysis was to move beyond any simple evaluation of whether the projects she studied were successful or not. Rather, like Gregory, she worked to identify the multiple actors, relationships, labours and contradictions that shaped the implementation and sustainability of these projects. Her study focused on the practices of women health assistants and other staff at primary health centres. Along with patient care, record keeping is a major preoccupation for primary health care workers. As Ranjini describes it:

> In Andhra Pradesh, an army of health assistants, most of them women, routinely collects enormous amounts of health data. Each health assistant maintains 13 to 15 registers, which have to be updated regularly. By manually calculating aggregates in each of these registers, each health assistant produces about 15 different reports every week. These weekly reports are again aggregated at the end of each month to produce monthly reports. Thus, health assistants devote an enormous amount of time to collecting, manually processing and reporting health information.
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> (Ranjini, 2007: 97–8)

Ranjini's ethnography includes an account of a day spent traveling, largely by foot, with a health assistant to a village in the latter's jurisdiction in order to update a household survey taken some years earlier – an accurate demographic database being a prerequisite for the ministry's dreams of demonstrating systematic achievement of the millennium goals. Her study creates a picture of the enormous, painstaking and in many practical respects impossible labours of information production in Andhra Pradesh. She looks as well at what becomes of these reports at the district and state level, where reports that do not produce the improvements set by targets mandated by the international funding agencies are met with threats of job loss and humiliating public reprimand. As one of Ranjini's informants at the state level explained,

'Targets are for motivating the workers. The whole thing is about reward and punishment. If they do not achieve targets, they are punished. [Of course], there is no reward. The reward is not being punished' (Ranjini, 2007: 113).

Ranjini's observations of district meetings revealed no opportunity for health workers or supervisors to provide explanations as to why targets could not be met, or to inform the setting of more appropriate ones. These accountability practices had the predictable result; namely, health workers and supervisors worked to produce the numbers required, through practices of manipulation, under- and over-reporting. They did this not through any malice or negligence, but through a combination of self-protection and a desire to continue the work of delivering primary health care, in the face of unrealistic targets and inadequate resources, and in the face of an information 'flow' characterized exclusively by directives from the top that, despite the enormous numbers of reports, systematically discouraged the provision of information regarding realities on the ground. As Ranjini concludes:

> The primary concern of the staff was to present positive accounts of performance on record rather than portraying the actual realities of their work . . . In many respects, the existing accountability regime is part of the problem. That is, targets and grading systems are set up to make people accountable, but targets in turn create 'good reasons' to falsify the data (to avoid punishment). As long as accountability is understood in terms of discipline and punishment rather than learning and co-development, it creates these effects.
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> (Ranjini, 2007: 132)

So what would it mean to challenge this figuration of a 'knowledge society', and to associate health workers and information in very different configurations? Rather than elements of a data collection machinery aimed at demonstrating the effectiveness of state response to goals set by international institutions, workers would need to be refigured as those most knowledgeable about primary health care delivery and the information needed to support it. During her fieldwork, Ranjini observed two instances where primary health workers effectively reconfigured local information systems for planning health services in their communities. In the first case, this involved drawing out relevant information from records already available; in the second, elaborating those records through further data gathering. In both cases, this was work specific to an immediate health care campaign, which repaid the workers' efforts with resources enabling more effective health care provision. Rather than peripheral components outside of and in service to the health information system, health workers were figured as central to its operation. The health information system, in turn, was figured as an integral part of their practice. These reconfigurations, in turn, enabled new agential possibilities for the provision of primary care.

Configuration as a method assemblage

As a practice of figuring things together, we might consider configuration as one form of what John Law has named a 'method assemblage' (Law, 2004). Methods, Law argues, are enactments that make relations between what is *present* (including knowledges, representations, subjects and objects) and what is *absent* or part of the latter's 'hinterland' (both *manifestly*, for example in the form of things articulated as 'context' for what is present, and *othered*, in the form of an open-ended horizon of the unremarkable and/or repressed). In this sense, the method assemblage of configuration could be understood as a device for articulating the relation between the 'insides' of a socio-technical system and its constitutive 'outsides', including all of those things that disappear in the system's figuration as an object (see also Newman, 1998). In his ethnography of engineering as a discipline, Bucciarelli (1994) formulates the difficulty of reanimating the figure of the engineered object to recover its lost contingencies:

> Standing before the machine, its deterministic functioning so dominates our thought that alternative, more open and complex descriptions of process are rarely forthcoming. The artifact is a rationalization of itself, one that excludes alternative forms and speaks to us thus: 'I am a working, efficient, marketable machine. Knowing how I work, understanding my underlying form as the scientific principles that govern my doings, and reading my documentation (though don't be too distracted by the latter) you can reconstruct the decision-making process that made me (or rather that allowed me to make myself)'.
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> (ibid.: 14)

The same criteria that Law identifies as defining the Euro-American imaginary of the nature that precedes culture – independence, anteriority, definiteness and singularity – could be said to hold for the technoscientific imaginary of the engineered object. Law's elaboration of an alternative ontology of multiplicity and indefiniteness resonates deeply for a project of reconfiguring relations of humans and the built world. At the same time, unlike the phenomena that are the objects of the natural sciences, socio-technical artefacts are imagined as made, not discovered. Rather than being enacted as antecedent to and independent of the practices of their making, they are figured within design and engineering discourses precisely *not* as already existing and independently agential, but as emerging from and dependent upon the actions of their (human) makers. In this sense, configuration as a critical device calls for a kind of alternate respecification to discovery; a recognition of the historical anteriority of even the most innovative objects, and the material agencies that shape practices of design.

To take configuration as a method assemblage means acknowledging the enacted rather than given nature of delineations of inside and outside, with

respect both to object and to subject boundaries. The configuration of an artefact, on Akrich's account, is a 'function of the distribution of competences assumed when an object is conceived and designed', the particular 'geographies of responsibility' implied (Akrich, 1992: 207). Woolgar (1991), in investigating professional practices of computer system development, has famously proposed that 'by setting parameters for the users' actions, the evolving machine attempts to configure the user' (Grint and Woolgar, 1997: 71). The sense of configuring developed by Grint and Woolgar is not of the user as an individual actor, but rather the incorporation of the user into the socio-material assemblage that comprises a functioning machine. It is in this sense that objects make subjects. But just how specific and determining is the user's configuration, in either design imaginaries or specific situations of use? While the tropes of use as 'de-scription' (Akrich, 1992) and of 'configuring the user' have been tremendously generative and are widely cited within the STS literature, they also, on my reading, raise a set of further questions. Both, despite their careful attention to the contingencies of design and use, leave in place an over-rationalized figure of the designer as actor, and an over-estimation of the ways and extent to which definitions of users and use can be inscribed into an artefact. As I believe both Akrich and Woolgar would readily agree, there is no stable designer/user point of view, nor are imaginaries of the user or settings of use inscribed in anything like a complete or coherent form in the object. For tropes of configuration and de-scripting to align with their subjects and objects, I am suggesting we need to see the designer's view of the user as at once more specific, and less. More, in that it is specifically located within the various sites, imaginaries, exigencies and practices that comprise professional design. Less, in that artefacts are characterized by greater open-endedness and indeterminacy with respect to the question of how they might be incorporated into use. The 'user' is, in other words, more vaguely figured, the object more deeply ambiguous. On this understanding, the fixity of an artefact is an effect of reiterative enactments of a particular subject/object configuration, while fluidity articulates the inherent multiplicity of objects in ways that facilitate their travel (Suchman, 1994, 2002; de Laet and Mol, 2000). Somewhat counter-intuitively, the latter turns out to require a more intimate understanding of the possible circumstances of an artefact's use; not in the sense of a predictive model or comprehensive specification, but of an appreciation for what needs to be made contingent and the kinds of agencies required for the artefact's ongoing (re)configuration.

Taking configuration as a method assemblage means recognizing the contingency and incompleteness of artefacts as irremediable (Garfinkel and Sacks, 1970; Lynch, 1993; Garfinkel and Rawls, 2002), both in terms of a system's description (presupposing as it does 'hinterlands' that it does not, and could not, fully specify) and of its implementation (presupposing always further practices of design-in-use). Even while taking up the call for a more 'user-centred' design, however, many professional designers have continued to locate themselves in ways that reinforce their status as at once primary to

the artefact's configuration, but also outside of its boundaries. 'The user' in this method assemblage assumes the position of the manifestly absent, while the labours of configuration in use are othered. The exceptions to this rule, for example within the field of participatory design, work instead from the premise that artefacts – particularly computationally based devices – comprise a medium or starting place elaborated in use (Ehn, 1988; Greenbaum and Kyng, 1991; Schuler and Namioka, 1993; Aanestad, 2003; Simonsen *et al.*, 2008). Rather than holding stable and separate the identities of 'designer' and 'user', the latter work as categories describing persons differently located, at different moments, and/or with different histories and future investments in projects of technology development.

'Agency', Barad observes, 'is not an attribute but the ongoing reconfigurings of the world' (Barad, 2007: 141). The notion of configuration is central as well to Knorr Cetina's analysis of the mutually shaping arrangements of scientists, instruments, objects, and practices aimed at the production of observably stabilized instantiations of 'reality effects' (Knorr Cetina, 1999: 26–33). Considered over time, she argues, configurations comprise what are commonly termed skills or expertise: 'The alignments . . . work through the body of the scientist, but they also involve a drastically rearranged environment, a new life-world in which new agents interact and move' (ibid.: 219; see also Pickering, 1995). Configuration is a practice enacted always from within, in other words, however much its objects may be figured as 'out there' and its concerns focused on how to delineate their relations and boundaries. As Barad reminds us, we are always already inside the worlds that we take as the objects of our actions (see also Ingold, 2008). Like the scientist enfolded within the apparatus, 'we' (whether positioned as designers or users) are internal to the technologies that engage us and with which we engage.

Conclusion

Configuration, I have suggested here, is part of a toolkit for thinking about constitutive and generative, reiterative and (potentially) transformative material-semiotic conjoining. In the case of technology, configuration orients us to the entanglement of imaginaries and artefacts that comprise technological projects. The latter include the 'incomplete utopian projects' identified by Gregory and clearly present in the ICT for development initiatives described by Ranjini, which power the imaginary of a perfect health information system perpetually deferred. They include as well, and as instructive counter-examples, the kinds of modest configurations for care generated out of health workers' own imaginaries and material agencies. The differences between these underscore the question of differential capacities for the articulation and movement of technological imaginaries and enabling resources, as well as the complex relationship between the scale of projects and their effects.

Like any tool, configuration is not a device with inherent boundaries, nor does it carry its own inner logics and instructions for use. While normative

methods are designed to define and police boundaries, configuration as a method assemblage aims to articulate method in a way that opens received and/or congealed relations to being reenacted differently (see Law, 2004: 84). And as is the case for the artefacts that the trope of configuration might help us to interrogate, the device generates effects only within a method assemblage comprising an open-ended horizon of socio-material arrangements that it at once presupposes and helps to sustain or transform. Recognizing the simultaneously reflexive and generative character of configuration, as well as the leakages and entanglements that configurational objects obscure, would effect, in Law's terms, a more 'generous' method (ibid.: 40–1). An orientation to configuration reminds us to reanimate the figures that populate our socio-material imaginaries and practices, to examine the relations that they hold in place and the labours that sustain them, and to articulate the material semiotic reconfigurations required for their transformation.

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