



The *Doing* of Datafication (And What this Doing *Does*): Practices of Edification and the Enactment of New Forms of Sociality in the Indian Public Health Service

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Abstract:

In this paper, we offer a performative, praxeological account of ongoing attempts to cultivate practices of datafication in the Indian public health service. In particular, we distinguish between two broad forms that such practices took—systematic practices of datafication and edifying practices of datafication—that involve data being enacted or performed in different ways. We explore the power of these different kinds of datafication practices by examining what their doing *does* and demonstrate how each—by enacting particular kinds of subject and object positions—is deeply implicated in the (re)production of different forms of human sociality. Describing these socialities as “authoritarian-bureaucratic” and “dialogic”, we explore the distinctive kinds of moods and affectivities that they generate. We conclude by drawing out some of the implications for research and practice.

Keywords: Datafication, Practice Theory, Performativity, Edification, Rorty, ICT4D, IS Innovation.

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1 Introduction

The most interesting emerging religion is Dataism, which venerates neither gods nor man—it worships data. (Harari, 2016, p. 350)

Data today is certainly “big”. From “big data” (Mayer-Schönberger & Cukier, 2013; McAfee & Brynjolfsson, 2012) to business analytics (Davenport, 2013) and evidence-based management (Briner, Denyer, & Rousseau, 2009; Pfeffer & Sutton, 2006), “data optimism” (Harari, 2016)—or a belief in the potential of bigger and better data for enabling innovative new forms of organizing and managing—seems to be on the rise. So too are discourses on international development in which digital data and associated technologies are often presented as a means of accelerating economic development and bridging the so-called digital divide between the Global North and South (Compaine, 2001; Green, 2013; Hilbert, 2013; UNCTAD, 2015).

Notwithstanding this renewed excitement about the relationship between data and organizational innovation, however, more skeptical commentators have raised concerns that point to important theoretical and empirical challenges (see Learmonth & Harding, 2006; O’Neil, 2013). In particular, we lack insightful in-depth, empirical studies that provide rich illustrations of processes of data-driven organizational innovation and how they develop over time. Moreover, extant theoretical understandings of these phenomena seem less than adequate.

In this paper, we offer some conceptual purchase on such phenomena and their associated dynamics, which we develop and illustrate in the context of an in-depth empirical study of an ambitious attempt at data-enabled organizational innovation in the Indian public health service. Thus, we address what Heeks (2014, p. 16) has identified as a pressing contemporary challenge for ICT4D research: how we might leverage the potential of digital data through their “effective use in development policy and practice decisions and actions”.

To this end, we offer a performative, praxeological analysis of emerging practices of data use for managing public healthcare delivery in India. We argue that this kind of analysis offers a promising approach to theorizing the role of data in processes of organizational knowing because it avoids the trap of treating “data” as an unproblematic “given” or as something that faithfully reflects an underlying organizational reality. Our account of *practices of datafication* has the merit of ensuring that we do not unbundle “data” from the practices that constitute them. We explore how data are performed differently in different kinds of data cultures and demonstrate how this difference can lead to very different ways of disclosing the world. By drawing on Richard Rorty’s notion of *edification* to supplement our praxeological approach, we further clarify some distinctive practices of organizational knowing that may be associated with datafication initiatives and consider the kinds of subject and object positions that such practices may enact.

We summarize our research questions as follows:

RQ: How might we understand what role that data may play in facilitating organizational innovation in the Indian public health service and beyond? More specifically, what kinds of datafication practices are likely to be promising and what are their broader effects?

We address important conceptual and empirical lacunae in the ICT4D literatures by offering both a sophisticated theoretical approach for understanding datafication and its possible implications and an in-depth empirical illustration of innovative datafication practices in an Indian healthcare context.

The paper proceeds as follows. In Section 2, we critically examine popular assumptions about the role of data in processes of organizational innovation. In Section 3, we offer an alternative approach to thinking about these phenomena. In Sections 4, 5 and 6, we introduce our empirical work in India and report on some different practices of datafication associated with the implementation and use of health management information systems (HMIS). In Section 7, we offer an analysis of the Indian case before we explore the broader implications of our findings for understanding practices of datafication in Section 8. We conclude with a short coda in Section 9, where we consider how the notion of edification may offer interesting ways of enlarging conceptions of development, and of rethinking the relationship between ICT4D and mainstream IS research.

2 Data, Decision Making, and Organizational Knowing

*Better information, better decisions, better health.*¹

The slogan above illustrates a general optimism that prevails in development circles and beyond regarding the potential of data/information to enable organizational innovation. This way of thinking often assumes the relationship between the availability of more/better-quality data and innovative forms of organizing/managing is self-apparent: better data leads to improved decision making, which, in turn, implies better healthcare outcomes. While slogans such as “information for action” and “evidence-based public health” are popular and intuitively appealing, one might advise caution on both empirical and theoretical grounds.

For a start, we lack in-depth empirical studies that illustrate how these data are actually used in practice and the forms of organizational innovation in which they may be implicated (Braa & Sahay, 2012). We might partly explain this lack by the difficulties in generating good data in development contexts. Indeed, as Braa and Saha (2012, p. 248) state: “In reality, countries struggle more with getting to the first step of generating quality data rather than...exploring ways to actually use the data”.

The evidence we do have, however, is not encouraging. For instance, Latifov and Sahay (2013, p. 215) claim that one can characterize most HMIS in developing countries as being “data-led” (i.e., “with vast amounts of data being routinely collected, but with limited evidence of them being used ‘for action’”). They argue that such countries have made little progress in moving from “data-led” to “action-led” IS and blame an overly narrow focus on technology at the expense of broader social and organizational issues.

This kind of criticism has a familiar ring to it. Since the emergence of the ICT4D research stream in the late 1980s, scholars have repeatedly drawn attention to the diverse, inconsistent, and frequently unanticipated outcomes associated with the implementation and use of IS in development settings (Avgerou & Walsham, 2001; Heeks, 2010; Thompson & Walsham, 2010; Walsham & Sahay, 2006). Moreover, a large body of research points to unfulfilled expectations and enormous challenges associated with such projects (Dodson, Sterling, & Bennett, 2013; Madon, Sahay, & Sudan, 2007; Noir & Walsham, 2007; Walsham & Sahay, 2006; Westrup, 2012). In a comprehensive review of empirical studies of IS initiatives in India, for example, Walsham (2010, p. 16) draws attention to “the crucial need for major attitudinal and institutional change in order for an ICT-based initiative to be successful” while conceding that reforming Indian administrative culture would be “enormously difficult to achieve”.

Noir and Walsham (2007) powerfully illustrate these challenges in their account of an HMIS initiative in the Indian public health system, which was designed to deliver improvements through “supporting decision-making based on access to reliable, accurate and timely health data” (p. 320) and “empowering local level managers to use information to take local decisions” (p. 327). What seemed like a rational and straightforward attempt to improve healthcare management turned out to be much more complex and disappointing in practice due partly to what the authors call the “institutional myth of technology” (i.e., “the idea that technology is synonymous with process rationalization and progressive modernity in every application and context” (p. 314)). The power of this myth means that IS initiatives often primarily serve a symbolic/ceremonial function (i.e., as a means of establishing development initiatives as “modern, rational and appropriate” (p. 314)), thus securing organizational legitimacy and access to resources. In the case reported by Noir and Walsham, the HMIS was undermined by poor (faulty, inaccurate, untimely) reporting of data by health workers, who merely exhibited “ceremonial conformity” with prescribed practices of use. The seductive symbolism associated with such technology means that stakeholders may readily accept popular deterministic claims that “mask and exacerbate the grave inefficiency and ineffectiveness in the Indian healthcare sector” (Noir & Walsham, 2007, p. 329) and deflect attention from the effort required to use data skillfully and foster sustained practice change.

Research in the literature on evidence-based healthcare (EBHC) has also challenged these kinds of technical-rational myths around data, management, and decision making. Wieringa, Engebretsen, Heggen, and Greenhalgh (2017, p. 1), for example, critique the scientific assumptions that portray EBHC as having liberated healthcare from “an authority-based past to a more rationalist, scientific grounding” and contend that the movement has failed in its modernist agenda to “purify” clinical reality into a dichotomy of objective ‘evidence’ from nature and subjective ‘preferences’ from human society and

¹ This was the slogan of the Health Metrics Network (Braa & Sahay, 2012, p. 9)—a global partnership established under the auspices of the WHO in 2005 with the objective of strengthening national health information systems. The logic explicitly connects improvements in healthcare outcomes with improvements in information production and use for decision-making purposes.

culture". Far from being purified, the evidence/knowledge that underpins clinical decision making is "relentlessly situated and contextual", which means that EBHC should be re-conceptualized as a situated practice rather than "as a sequence of research-driven abstract decisions" (Wieringa et al., 2017, p. 1). Thus, we see a need for more sophisticated and grounded accounts of the role of data in practices of organizational knowing; accounts that are sensitive to the particularities of the institutional contexts that embed such technologies and to the practices required to capitalize on the availability of better data.

One promising starting point for thinking about the role of data in practices of organizational knowing is Zuboff's (1988) influential analysis of the *informatization* of work. For Zuboff, ICT features a key capacity to *informate* organizations: to generate and integrate a whole host of (often real-time) digital data sources about their operations. Moreover, the ability to integrate, aggregate, and visualize these data as they change over time offers one the prospect of radically altering the nature of work and its management. Informatization results in one's creating an *electronic text* that, Zuboff claims, constitutes a more accurate and comprehensive depiction of organizational processes than previously possible. While one may use this electronic text to increase centralized forms of monitoring and control, Zuboff warns of the limitations of de-personalized, data-based forms of management and points instead to a more optimistic prospect. Used differently, data can help workers to better understand organizational phenomena by enabling them to "more fully grasp their own reflections, learn from what they could now see, and increase their opportunities for autonomous action" (p. 319). In other words, these data may constitute the keystone of a new learning environment that empowers workers to act more knowledgeably and autonomously in their local settings.

While clearly offering a rich and thoughtful analysis of the potential of ICT and data to transform important aspects of organizational life, Zuboff (1988) has less to say on the circumstances under which one might unlock this potential. Moreover, research has also critiqued her work (see Kelly, 2005) for its intellectualist/cognitivist (Dreyfus & Dreyfus, 2005) and representationalist (Tsoukas, 1998) conceptualization of the relationship between data, knowing, and managing. While she points to the potential of data to informate organizations and change the nature of work, her intellectualist account of knowledge as abstract symbols processed by disembodied minds obscures the important ways in which forms of knowing are embodied in specific practices that materialize data in distinctive ways. By failing to unpack the different kinds of practices that enact "data" as "data" in the first place (and, by so doing, contributing to the constitution of distinctive ways of knowing), she obscures their performative power.

The need to challenge the taken for granted "givenness" of data, not least on political grounds, is a point that Gitelman and Jackson (2013, pp. 2-3) has also discussed:

Data are always already "cooked" and never entirely "raw"... The phrase raw data...has understandable appeal.... Data are apparently before the fact: they are the starting point for what we know.... Starting with data often leads to an unnoticed assumption that data are transparent, that information is self-evident, the fundamental stuff of truth itself.... Our zeal for more and more data can become a faith in their neutrality and autonomy, their objectivity.

This quote points to the need to reconsider conceptions of data as a given "thing" that unproblematically reflects an underlying reality and to focus instead on how data are made and what this making does. In other words, we need to attend to the ways in which data are "cooked"—to the practices through which they are enacted (Introna, 2013), performed (Butler, 1990), or materialized (Barad, 2007) as specific kinds of phenomena. Thus, in this paper, we shift analytical attention from *data* to (the inevitably political) *practices of datafication* that enact them as data in the first place (i.e., as particular kinds of objects that can act in the world in particular ways). This shift in focus requires a distinctive conceptual vocabulary, which we discuss in Section 3.

3 Practice Theory and Edification: A Performative Approach to Datafication

In this section, we synthesize a performative, practice-based approach to theorizing datafication as an ongoing accomplishment that enacts, or discloses, the world in distinctive ways. To obtain further clarity on practices of datafication, we introduce Richard Rorty's (1979) concept of edification.

3.1 Practice Theory and Performativity: Emphasizing the Doing of Datafication

Theories of social practice (see Bourdieu, 1990; Nicolini, 2013; Orlikowski, 2007; Schatzki, Knorr Cetina, & Von Savigny, 2001) offer one promising way to avoid the "thingification" (Introna, 2013) of "data" as we

discuss in Section 2. In particular, by treating practices as the basic unit of social analysis, the kind of *praxeological* approach (Reckwitz, 2002) that we advocate here provides a rich, processual ontology of social phenomena that resists the impulse to unbundle data from the practices that enact it as such. In short, this kind of approach—as Introna's (2013, 2015) and Orlikowski and Scott's (2008) writings on sociomateriality illustrate—is committed to a *performative ontology of becoming* in which social practices, as dynamic and irreducible assemblages that are always in the process of being further articulated, enact or disclose (Spinosa, Flores, & Dreyfus, 1997) worlds in distinctive ways.

A key starting point concerns the conceptualization of a social “practice”, which must extend beyond mere patterns of human behavior. Reckwitz (2002), for example, suggests that we understand practices as comprising several interconnected—or what Barad (2007) would term “intra-acting”—elements; namely, forms of bodily activities, forms of mental activities, “things” and their use, and background knowledge in the form of understanding, know-how, states of emotion, and motivational knowledge. While each of these elements is considered necessary to the enactment of a practice, they do not exist as separate, isolatable, atomistic components that precede their relations with one another, and one cannot reduce a practice to any single one of them. Thus, for example, a praxeological approach does not permit one to analytically unbundle “technology” from the kinds of mental and physical activities, knowledge/skills, and affective dispositions that enact it in a particular way; hence, the focus moves from describing a “generic”, idealized/espoused technology to following the ongoing, temporal-spatial articulation of multiple technologies-in-practice (see Orlikowski, 2007).

Practices are performative, which is to say that their enactment is constitutive of distinctive kinds of subject and object positions. Thus, enacting a practice involves not only carrying out actions (doings) but also individuals' being constituted as particular kinds of subject through these repeated doings (i.e., the practice performatively enacts a distinctive way of being in the world (this is what the doing *does*)). Moreover, the particular pattern of behavior that constitutes a practice may be realized in a variety of different styles (Spinosa et al., 1997), and individuals—as carriers of practices—are formed at the nexus of the different practices in which they are (or have been) invested. Thus, through the practices in which we invest ourselves, we are enacted or configured as the kinds of subjects who understand, want, and desire in specific ways. Thus, we can say that practices produce distinctive forms of human *sociality* (see Long & Moore, 2014); that is, distinctive *ways of being-in-the-world-with-others* (both human and nonhuman).

The concept of sociality emphasizes the kinds of affective structurations that practices produce. Following Heidegger (1962, 1995), we might understand the affective dimensions of a particular form of sociality as moods: pre-cognitive dispositions that dispose individuals to specific kinds of engagements and orientations (Solomon & Flores, 2003). Put differently, individuals' practices attune them to the world in distinctive caring ways and solicit particular actions/responses from one another (Spinosa et al., 1997). Becoming skilled in a specific practice involves becoming increasingly sensitive to the distinctions of meaning and worth (meaningful differences) that are intrinsic to the practice itself (Borgmann, 1984), which discloses (or opens up) the world in particular concerned ways.

Thus, to talk of “data” in these performative terms is to say, paraphrasing Butler, that data “ought not to be conceived as a noun or a substantial thing...but rather as an incessant and repeated action of some sort” (1990, p. 112). In other words, we can avoid the thingification of data by conceiving it instead as a kind of doing. Practices of datafication, then, produce not only subject positions (e.g., manager, managed) but also object positions. The enactment of data in the form of a university league table, for example, enacts other relational object positions such as a “top-tier ranking” or a “middle-tier ranking”. How different practices of datafication enact “data” as specific kinds of objects in distinctive forms of sociality (which also include a range of other related object and subject positions) is, therefore, an important matter for empirical investigation. To facilitate this empirical project, however, we need some conceptual tools to help further unpack practices of datafication and relate them to the broader practices of organizational knowing in which they are typically embedded.

3.2 From Systematic to Edifying Practices of Inquiry: Toward an Enlarged Perspective on Datafication

In *Philosophy and the Mirror of Nature*, Richard Rorty (1979) draws a contrast between two distinctive approaches to philosophical inquiry (or ways of knowing): *systematic* and *edifying*. Systematic inquiry, which has dominated the Western tradition since Plato, focuses on *epistemology*—a foundationalist and representationalist project that “attempts to get to the bottom of things, to mirror nature and achieve certainty” (Llanera, 2011, p. 109). Against this mainstream epistemology-centered project of systematic

inquiry, Rorty posits *edifying* approaches to inquiry as an important alternative. Edifying approaches shift the emphasis from epistemology to *hermeneutics* in which holistic forms of engagement, interpretation, and self-development become central. The importance of this hermeneutical project is based on Rorty's contention that "re-describing ourselves is the most important thing we do" (1979, p. 358).

In coining the term *edification*, Rorty draws explicitly on Gadamer's (2004) hermeneutics and specifically his concept of *Bildung*—understood as education or self-formation:

Since "education" sounds a bit too flat, and Bildung a bit too foreign, I shall use "edification" to stand for this project of finding new, better, more interesting, more fruitful ways of speaking. (Rorty, 1979, p. 360)

For Gadamer, our knowledge is necessarily prejudiced because we are always already "thrown" (Heidegger, 1962) in a set of historical traditions that shape our ways of thinking, talking, doing, and experiencing the world. Yet, these background configurational practices can never be fully transparent to people. However, while we are inevitably prisoners of our limited horizons of understanding, we can be open to confronting and revising the prejudices associated with them through edifying practices of inquiry, which we can understand as:

The process in which one emerges from particularistic points of view by encountering alien practices, other cultures, and one's own historical past.... [I]t proceeds only insofar as one immerses oneself in that which is other and then is able to integrate that otherness into oneself.... [I]f one is to become gebildete (cultivated or edified), one must get out of oneself as far as possible. (Warnke, 2003, p. 110)

The notion of a *conversation* is Rorty's (1979, p. 377-378) metaphor of choice for describing the process of edification:

The point of edifying philosophy is to keep the conversation going rather than to find objective truth.... [It is] against attempts to close off conversation by proposals for universal commensuration through the hypostatization of some privileged set of descriptions.

Rorty's (1979) emphasis on conversation and hermeneutics signifies a democratic and pluralistic sensibility. One of the most significant challenges of hermeneutical work concerns the risk of failing to grasp the extent to which the otherness that we encounter diverges from our own horizons of understanding (i.e., how we might avoid parochial projections of meaning). Warnke (2003) reviews Gadamer's (2004) attempts to address this issue with regard to interpreting texts and highlights some important conditions that we need to fulfill to mitigate such dangers.

First, we must be *receptive* and open to the possibility of learning something new from the text. This involves cultivating a sensitivity to a text's alterity and acknowledging "that what another person tells me... is generally supposed to be his own and not my opinion" (Gadamer, 2004, p. 268). Gadamer also emphasizes the importance of a *sympathetic* reading of the text (i.e., we must assume that the text is, or could be, true—we must give it the benefit of the doubt, at least provisionally). For simplicity, we might say that the notion of *receptiveness* captures both an openness to learning from and a sympathetic disposition toward a text.

Finally, attention focuses on the importance of applying the *principle of the hermeneutic circle* as a means of reconciling holistic and partial understandings:

We must presume that the text composes a unity of meaning and that, if our interpretation of one of its parts conflicts with our interpretation of another, we must revise one or the other in order to be consistent. (Warnke, 2003, p. 112)

Above all, one must remain sensitive to (and resist) the temptation to "capture" the strange by colonizing it with one's familiar categories and distinctions. One must resist the impulse to subjugate it and instead encounter the strange Other with hospitality (Kearney, 2003), which involves curiosity, openness, vulnerability, tact, and patience. Thus, one should not appropriate the Other but transform oneself through one's engagement with it.

This kind of engagement is not easy because it may force one to abandon positions that we find reassuringly safe and comfortable. It involves *movement*—what the philosopher of education Jan Masschelein (2010) calls *practices of exposure*—which embraces the discomfort of displacement and exposure. Such practices involve "ex-position, being out-of-position" (2010, p. 44), and giving oneself up to such movement means embracing uncertainty and contingency:

It does not tell us where to go, but pushes us to move from where (and who) we are.... It is a paradoxical activity: to be commanded by something, which is not yet given, but on the way to being given, something which is literally presenting itself, in the course of the way that one is following.... It is a practice undertaken "to risk one's very formation as a subject" (Butler, 2001). (Masschelein, 2010, p. 46)

Therefore, curiosity and the love of conversational intercourse and wisdom rather than the allure of argument and foundational knowledge/truths drive edifying conversations. Those interested in edification are acutely aware of the historical contingency of any claims to "knowledge", and an openness to the wonder of the world and to new ways of being accompany this humility.

With edifying practices of inquiry, therefore, the emphasis shifts from representing the world (with a view to domesticating it) to cultivating the skills to experience it more fully. Edification entails a particular orientation to the world. It demands mastery of specific kinds of practices (or styles) of engagement, which hold the prospect of disclosing new worlds (Spinosa et al., 1997) or at least disclosing the world in ways that are alien to the practices associated with systematic inquiry.

The synthesis of this theoretical perspective coevolved with our empirical work—its contours gradually taking shape as we struggled to make sense of our experiences in the field. We now turn to these experiences. We begin by describing the background and context to our research endeavors in India. We then describe recent HMIS-related reform efforts in State C (we have anonymized all names) and demonstrate how the ideas we outline above can provide useful theoretical insight into contrasting practices of datafication and their associated effects.

4 Research Approach

This research project began in 2007 when we were invited by a development non-government organization (IS-NGO) to visit several sites in State B, where efforts were underway to implement an ambitious, state-wide, digital datafication project. Fieldwork formally commenced later that year, and we can broadly divide our subsequent research engagement into three phases (see Table 1).

Table 1. Research Timeline

Period	Field work	Comment
Phase one (2007-2010)	States A, B, D, and E	Fieldwork undertaken in States D and E with several return visits made to States A and B
Phase two (2011-2014)	Ongoing contact (face-to-face meetings and Skype calls/emails) with IS-NGO	Fieldwork suspended
Phase three (2014-)	State C	Ongoing contact with health officials in this state

In phase one (2007-2010), with the guidance and support of IS-NGO, we chose a selection of research sites in what we identified as some of the most progressive states in India from the point of view of HMIS implementation. This phase involved fieldwork in four states (A, B, D, and E), which varied in terms of geography, size, demographics, and so on. Despite significant early optimism in each case, however, all experienced serious difficulties with their implementation and capacity-building programs and continued to struggle to foster innovative new practices of data use. Consequently, our research focus changed from concerns with data use to issues relating to early-stage HMIS implementation at these locations. Although frustrating at the time, this fieldwork helped develop our understanding of the HMIS initiatives, the broader public health reform program, and the cultural context of Indian public service organizations. This hard-won background understanding proved crucial in shaping our orientation to subsequent field research in State C.

In phase two (2011-2014), we were forced to largely suspend our field research because political circumstances had changed at many of our field sites and IS-NGO faced significant challenges in sustaining implementation efforts there. When our work resumed in 2014, we negotiated our access to fieldwork in State C largely independently of IS-NGO. Following a presentation at an international public health conference elsewhere in India, we were invited by officials to visit State C to study their implementation efforts and provide feedback.

Over the course of our research, we have drawn on a range of ethnographic methods. As well as interviews and informal discussions, we have attended training workshops, meetings, and visited many health facilities (see Table A1, Appendix). We created research notes to capture our reflections during/after interviews, and we ritually discussed our impressions and developing understandings at the end of each day. We also benefited from access to a wealth of documentary sources through our associations with IS-NGO and their local partners, which included a voluminous collection of documents, reports, and presentations relating to HMIS reform programs, such as strategy documents and action plans, situational analyses of the local health system, training and publicity materials, progress reports, data analysis reports, communications between states and districts, reports on specific local challenges, and so on.

We traveled within states and spoke with public health officials and staff at different levels. Between field trips, we continued to collect data through ongoing meetings with key informants (in person, via phone, and/or via email). As such, we conducted many hours of interviews and informal conversations and spent many more hours observing public health workers and officials in the course of their activities. We are grateful for having had the opportunity to develop a number of deep and lasting relationships with key informants over the course of our long involvement with the project, and we recognize that these relationships were crucial to our ability to offer a fair and nuanced analysis of a complex empirical context. Table A1 (see Appendix) summarizes our fieldwork to date.

Because we focus on the developments in State C in this paper, we provide a more detailed account of our fieldwork there in Table A2. We recorded and transcribed approximately 30 hours of formal interviews in State C that we supplemented with countless hours of informal discussions with key informants and with observations of training workshops, review meetings, and public health facilities. We worked hard to remain attentive to all that went on around us and to maintain sensitivity to the needs of those we observed and our ethical duty of care to them.

A grounded, *thematic* approach to theory development drove our analysis (see Braun & Clarke, 2006; Urquhart, 2013; Walsham, 1995). As such, we focused on identifying important themes from the research testimony we gathered and on unpacking and developing them by drawing on relevant theoretical traditions. As we outline above, a praxeological social ontology that emphasizes the performative, or disclosive, power of social practices shaped our theoretical sensitivities. We followed a hermeneutical approach (Klein & Myers, 1999) to interpret our empirical materials and develop our theoretical narrative. By iterating constantly between these grounded data and broader theoretical concepts, our conceptual perspective gradually began to take shape.

In the case of State C, for example, we were initially struck by the importance of themes relating to openness, vulnerability, non-judgmental questioning, and conversational intercourse. As a result, we read extensively around these concepts in order to develop them in a praxeological way. After some time pursuing these threads and interrogating them in relation to our empirical material, we found our way to Richard Rorty's work and became particularly drawn to his conception of edifying practices of inquiry. These ideas appeared to resonate extremely well with our experiences in the field and helped us think about our research testimony in sharper and more discriminating ways. Established canons of good practice for performing this kind of interpretive analysis guided our entire research process (see Klein & Myers, 1999).

One can see that our developing our research narrative involved a complex and difficult process that relied on skill, intuition, and hard-earned sensitivity to the intricacies of the empirical context in which we were embedded. Mindful of these challenges, we spent many hours sharing our insights and interpretations with those involved and others with experience of this empirical domain. We found the drafting of memos and reports to be a helpful means of developing our interpretations and opening them up to others' critical scrutiny. As such, we are confident that the analysis we offer here constitutes a thoughtful and fair account of events and experiences in the field—the outcome of careful and painstaking consideration of a range of different perspectives and sources of evidence.

5 Data, Datafication, and Attempts to Transform the Indian Public Health Service

In this section, we describe some key features of the Indian public health system and attempted reform programs to provide context for the case study of State C that we recount in Section 6. We first review the traditional datafication practices in Indian public health and draw attention to some of the key inefficiencies

and deeply institutionalized cultural practices. We then introduce two key elements of the reform program before concluding by pointing to some critical ongoing challenges.

5.1 The Public Health System and Traditional Practices of Datafication

The Indian public health system stretches from the Government of India (GOI) right down to rural villages. It comprises six key organizational levels: the national government, the state government, the district, the community health center (CHC)—sometimes called the “block”, the primary health center (PHC), and the subcenter (SC). The district level provides the middle-level management layer that links the health infrastructure at the state and local levels. The district chief civil surgeons, or (district/chief) medical officers (DMOs), manage these units and are responsible for implementing, monitoring, and reporting on the various initiatives and programs. A number of district program managers (DPMs) assist them.

Actors across the various levels require different types of data and information to support their different work and management processes (see Figure A1). While the management of individual patients requires very granular data on individual encounters (diagnosis, treatments etc.), managers at higher levels (facility managers, state and national planners, and policy makers) typically want more aggregated data in the form of indicators. In India, the traditional system for data collection was paper based. In addition to the data mandated by the national statistics division, however, each vertical health program, project, or initiative typically demanded (often at the behest of donor agencies) the collection of its own specific dataset, which resulted in vast amounts of data being collected in what became a fragmented and duplicative system. The resulting database was widely acknowledged to be inaccurate, inconsistent, incomplete, untimely, and largely unused (Braa & Sahay, 2012; Lippeveld, Sauerborn, & Bodart, 2000; Sandford, Annet, & Cibulski, 1992).

Because there was an emphasis on data as a means of reporting (rather than analysis) and as a form of reprimand and control (rather than improving the quality of care; see Braa & Sahay, 2012), misreporting was endemic. One public health doctor, for example, explained how health workers frequently misreported (or “beautified”) the data to avoid being reprimanded. Moreover, we heard many accounts of officials who, when hearing of poor performance, responded by issuing letters of admonishment and threat with little engagement with, or regard for, the particularities of the specific problem or context. Research has well documented these kinds of punitive management practices as characteristic features of Indian public administration (see Corbridge, Harriss, & Jeffrey, 2013; Corbridge, Williams, Srivastava, & Véron, 2005).

5.2 Pressures for Reform and the National Health Mission

As part of a major public health reform program, the National Health Mission (NHM) was established in 2005 and tasked with bringing about “necessary architectural correction in the basic health care delivery system” (Government of India, 2005, p. 4). As it articulates in its mission statement, a major element of the NHM’s strategy focused on “strengthen[ing] capacities for data collection, assessment and review for evidence-based planning, monitoring and supervision” (Government of India, 2005, p. 5). In pursuit of these objectives, missions were established in each state.

IS-NGO has been a key player in HMIS reform efforts: it has worked alongside the NHM in a number of states to develop and implement a well-functioning ICT infrastructure (hardware, software, internet connections, mobile phones etc.) based on free and open source (FOSS) solutions. In parallel, significant effort has gone into capacity-building around data collection and use at the grassroots level. For instance, in an effort to address the data collection problems that we describe above, IS-NGO undertook an extensive and highly politically charged exercise around data rationalization. This exercise has resulted in more streamlined data collection, and, with the introduction of improved data-verification practices, more reliable, timely, and relevant data are now produced in many states. Further, the development of new sets of indicators and feedback reports has created the potential for more expeditious and meaningful engagements with the data. These impressive and hard-won achievements have the potential to be enormously significant for improving the quality of public health services in India.

Supplementing these efforts to improve routine data collection and use, national and state officials directed attention towards strengthening “supportive supervision” (SS) processes at facilities from 2012. Introduced by the World Health Organization (WHO) in the 1990s, SS refers to “a process of helping staff to improve their own work performance...[that should be] carried out in a respectful and non-authoritarian way, with a focus on using supervisory visits as an opportunity to improve knowledge and skills of health staff”. While governments in the Global South had been encouraged to implement this initiative,

oftentimes SS became institutionalized in unintended ways (Marquez & Kean, 2002). Consequently, the WHO urged national governments to redouble their efforts to nurture the cultural sensitivities and practices required to support genuine forms of SS.

5.3 Challenges

Despite witnessing real and notable achievements over the years, we struggled to identify examples of innovative forms of data use that were contributing to meaningful improvements in health service delivery. In the absence of tangible examples, health officials typically offered aspirational accounts (underpinned by the kind of mythical technical-rational assumptions that we discuss earlier) of how better-quality data would soon make a difference. For instance:

This is definitely successful. Analysis can be made easier. I can tell them tomorrow that their indicators are low or going down, and I can tell them what to do. (DMO, State A, 2009)

Aside from the apparent strength of this “institutional myth of technology”, there were further significant barriers to developing effective practices of datafication. First, even in the more progressive states, health workers often faced much more pressing challenges than those concerned with data use. Suffering from years of underinvestment, many public health facilities were struggling to cope with shortages of medical staff and inadequate physical infrastructures (sanitation, electricity, medical equipment and supplies etc.). Unsurprisingly, in this context, HMIS reforms were considered low priority.

Second, the politics of Indian public administration meant that promising reform efforts, which had been painstakingly cultivated over an extended period of time, were sometimes disrupted suddenly when a key official was moved (e.g., health commissioner or NHM mission director). Furthermore, corruption was an endemic part of administrative life, and there was a strong culture of denial and lack of openness. Consequently, any derailing of a reform process, however brief, was difficult to get back on track (Corbridge et al., 2013, 2005).

During the early phases of this research, we were not optimistic about what might be achieved in such a deeply institutionalized cultural context. We changed our view in 2014, however, when we commenced fieldwork at a new location—State C—and began to see much more tangible evidence of the transformative potential of new forms of datafication. In Section 6, we describe some elements of the reform process here and the ongoing efforts to use data in innovative ways.

6 The Emergence of New Practices of Datafication in State C

Dr. Sanjay Kumar’s first direct exposure to the public health system began in 2007 when he served as a district magistrate (chief administrative officer) in State C. In this position, he formed a very positive impression of public health:

I reviewed the programs of different departments and the DMOs all used to say that their district was the best all over State C. (Dr. Sanjay, December, 2014)

In 2008, Sanjay took a leave of absence to enter a PhD program at one of the most internationally renowned schools of public health in the USA. His PhD dissertation focused on Indian maternal health, and, while undertaking fieldwork at grassroots level in State C, he quickly learnt that “health was not working” and his previous understanding was misinformed—facilities had been severely neglected over the years and there were high levels of misreporting.

His doctoral fieldwork brought him in direct contact with public health workers in several districts and facilities who were impressed by his openness, curiosity, and humility:

He got to know a lot of people and the qualities of the people. He had a great understanding of people and building relationships with people. He would send us an SMS at night—at 1am—and ask us to do something. And we could not refuse...and, if I SMS him something, he would reply in those two minutes! He does not have such type of ego that when a small person from a district program calls him.... He has not such type of ego. (Mr. Nabil, DPM, District X, December, 2014)

In 2012, having completed his PhD, Sanjay was appointed as mission director of the NHM in State C—the fifth person to hold this position in five years. Immediately, he set about promoting new kinds of practices at both state and district levels.

6.1 New Practices of Datafication at State Level

From the outset, Sanjay's actions began to make an impression on insiders and outsiders alike:

One of the factors that has played a very critical role in this entire exercise is the presence of the Mission Director, Dr Sanjay. He is the key! (Dr. Sahil, health economist, December, 2014)

The moment he joined he recruited, and revolutionized everything... and the districts felt the pressure. (Professor Arora, public health academic, December, 2014)

He enabled a very agile, flexible environment.... It was easy to get approval, whereas previously there was lots of red tape. (Dr. Ameet, deputy director, NRM, December, 2014)

In 2012, the GOI decreed that gap analysis exercises be carried out in designated “high priority districts” (HPDs). Known as regular appraisal of program implementation in district (RAPID), its objective was to gather data on infrastructure, supplies, and service-delivery practices in an effort to provide ongoing targeted supports in the form of SS. Although State C only had five HPDs, Sanjay immediately extended the RAPID exercise to all 21 districts—an enormously ambitious undertaking both administratively and logistically.

Analysis of the data collected from the first RAPID provided “eye-opening facts” with the majority of facilities assessed as being unfit for purpose. In what was described as an “explosive meeting” that followed, Sanjay told the DMOs that they needed to “call a spade a spade” and to “stop hiding”. He urged them to “be very honest and come out of denial mode, which he led by example:

In February 2013 we had this child surveillance meeting in Tamil Nadu, so people from all over the world came to launch the child survival thing. I made this presentation, fearing very well that my people would not like this presentation. [laughing] My boss was there, she is a very nice lady. The feeling was—don't show what we have not been able to do..., but that day I felt liberated. I did not even look at her! [laughs]... There was a huge crowd. After that meeting, I got liberated. Now I have nothing more to show that we have been hiding for years. [laughing] (Sanjay, December, 2014)

Sanjay recalled the very positive feedback from the international delegates at this meeting—“they said, people in India, they never talk this way!”. Following an international technical consultation meeting in Geneva soon after, a range of international partners committed to assist with the reform efforts with State C; to work alongside the NHM on the technological and organizational reform of data collection, verification, and feedback processes across the state:

They themselves proposed, “we want to help you”.... We needed partnerships. We have almost 25-30 partnerships now and we had almost none three years ago. But the point was that we selected various people who wanted to work with us, depending on their capabilities and our needs. It was not like somebody can impose on us. Unless it is required, unless it is needed, we should not be doing this. (Sanjay, December, 2014)

Locally, however, there was significant resistance:

We were getting brickbats from the State; from different quarters, even the district level—everywhere! But we started getting bouquets [laughs] from the GOI, and from the different international agencies, and that really sort of gave us some motivation.... We really had to suffer. But ultimately the idea was that we had to reduce IMR and MMR by half, so we were so very committed. (Sanjay, December, 2014)

A key priority of HMIS reform in State C was to get grassroots buy-in for using the data effectively, and senior health officials made major efforts to engage with, and support, these people:

Unless we... really promote the use of this data, how do we take it forward? Otherwise, it will be all imposed from the top, and ultimately they will not understand the utility of it. (Sanjay, December, 2014)

Together with the NHM, Professor Arora (a public health academic and collaborator) developed a series of state- and district-level training workshops and, thus, initiated a process of practical education around data use. Professor Arora explained that Sanjay's openness was instrumental in building confidence, promoting engagement, and in creating “a certain atmosphere” at these workshops. Participants were encouraged to “play Sherlock Holmes” with the data, to “share their reflections”, and to “engage in conversations within and between the districts”. Furthermore, public health managers were urged to take

responsibility for decisions taken locally. Professor Arora (and others) were very realistic in their assessments of what lay ahead and cautioned that “culture cannot be changed in a day”.

6.2 Nurturing New Practices of Datafication at the District Level

Following the RAPID, systems and protocols were put in place to enable sustained targeting of resources and supports at all facilities. It became mandatory for the MOs to visit their PHCs and SCs on a monthly basis. In marked contrast with earlier attempted efforts to institutionalize SS, the efforts now focused firmly on supporting, facilitating, coaching, and joint problem solving. Gradually, data collection and analysis began to play a greater role:

Previously, high ranking officials visited subcenters and area, but it was not on the record. Now with the introduction of the checklist, it is on the record so we can check it. And before going to a particular area, we can see what is the particular weakness and we can go and talk about this weakness. And if it requires logistics, we look after this. And if it requires training, we plan for the training. (Dr. Talun, district immunization officer, District X, December, 2014)

Since Dr. Sanjay took over as Mission Director, I visit the field every month. These are now quality visits because we have standards, checklists.... If an ASHA [community health worker] faces any problem at any center or delivery point, she can directly talk to me at any point. She can approach me. During the measles campaign, we distributed cards with my number. (Dr. Che, DMO, District X)

Dr. Nadia (partner to NHM who worked in the area of SS) recalled the considerable reluctance and suspicion she encountered in her early facility visits because staff perceived them as monitoring exercises (i.e., naming and shaming). With time, however, and “as the relationship developed”, suspicion dissipated and health workers came to appreciate the support she offered:

Before this SS nobody was there to help. Now they feel that this helps! (Dr. Nadeen, junior consultant, NHM, December, 2014)

In many instances, infrastructure, equipment, and clinical skills have improved significantly because of the additional resourcing and “on-the-job training” that accompanied SS.

District-level staff gradually began to use the increasingly reliable and timely data to raise issues, to occasion engagement and conversations, and to attune health workers to the broader goals of the public health system:

If births are 100 in a month but immunizations given are 104, then we can ask why this is so? If fewer immunizations are given and the data is 94/100, we ask what happened here? All this is discussed in the monthly meeting and we figure out why it is the case. (Dr. Bakur, DMO, District Y, December, 2014)

The data is allowing us to raise different issues. The thinking has changed; the mindset has changed; and now it is all about delivering services to the people. In the past, we did not think like this. (Dr. Bakur, DMO, District Y, December, 2014)

Apparent evidence of poor performance was no longer immediately met with public rebuke and punishment:

Nobody will be blamed. This is the main message; nobody will be blamed for anything. The first rule is a no blame game. (Dr. Che, DMO, District X, December, 2014)

It could be a training issue—and if it is, then we provide training. If the ANM is well trained and not doing her job, then it could be a logistical or an institutional issue—and then we take measures according to that. We never blame unless she has done something bad intentionally. (Dr. Talun, district immunization officer, District X, December, 2014)

District officials could point to tangible evidence that the availability of more reliable, consistent, and timely data was helping to improve public health delivery practices. Taken together, these practices were implicated in a much broader change of sentiment regarding the role of health workers and officials in the delivery of services. Now that efforts were being made to properly resource facilities and support health workers on the ground, there was talk of a new *confidence* as people assumed greater ownership of their work and begin taking initiative locally. A new sense of hope and optimism began to emerge that things were beginning to change for the better:

All this is going on, and it is very exciting times. And all these people are very motivated!
(Sanjay)

State C is exciting. There is a lot of scope. (Dr. Nadia, partner to NHM)

The whole mindset has been changed in the last 4-5 years. Now everybody talks about how we deliver the services to the people.... It is really remarkable. Previously, we did not bother about this. Now, we see how we can help them and this is positive change.... The political commitment is there. They are really talking in these terms, and they are saying that it is our duty to change the system. (Dr. Bakur, DMO, District Y)

7 A Perspective on the Transformation in State C: From Systematic to Edifying Practices of Datafication

In this section, we reflect on the case we outline in Section 6 to draw out some important distinctions and to develop a language to discuss practices of datafication and what they enact. We explore two distinctive kinds of practices of datafication (i.e., systematic and edifying) and examine the kinds of subject and object positions that they produce (i.e., the forms of sociality). First, we take the systematic practices of datafication that were deeply institutionalized in most of the locations we visited around India. We then analyze the changes experienced in State C. We argue that we can understand these changes as the cultivation of new, edifying, practices of datafication.

7.1 Systematic Practices of Datafication and the Reproduction of an Authoritarian-bureaucratic Sociality

Over the course of our fieldwork since 2007, we were frequently struck by the consistency of the cultural practices that we encountered in the public health service in India. We might broadly depict these focal practices as *authoritarian-bureaucratic*. For instance, there was a strict delineation of hierarchical authority to which almost everyone with whom we interacted acquiesced and deferred. There was a distinct impersonality and detachment about hierarchical interpersonal relationships, which manifested in a culture of reprimand and risk aversion. Although there was little tolerance for errors or oversights ostensibly, people were routinely and publicly admonished, sanctioned, or humiliated for perceived missteps, and such incidents were often knowingly overlooked as inconvenient truths (e.g., as with the “beautification” of data associated with the traditional routine data-collection system).

These practices appeared to enact distinctive subject and object positions and, thus, constituted what we might call an *authoritarian-bureaucratic sociality*. Within such practices, for instance, people were enacted as managers and subordinates whose ways of being (i.e., their orientation to the world or their ways of knowing and desiring) were mediated by bureaucratic rules and authority relationships. Among managers, this enactment produced, among other things, a desire for control and the reduction of ambiguity; impersonality, harshness, and impatience in dealings with subordinates; and an emphasis on formal analyses and bureaucratic rules. Among subordinates, such practices produced conservatism and risk-aversion; a preoccupation with secrecy/closedness or denial, hiding, and spinning; and a deference to authority.

In the context of this kind of sociality, practices of datafication took on distinctive forms, and data were enacted as a *didactic arbiter*. This is to say that data were materialized as an object to which one might look for an independent source of truth—or as an arbiter between competing claims to truth. It was didactic in the sense that the data were seen to speak for themselves, or reveal themselves, in an unambiguous way. Importantly, this object position opened up the possibility for particular forms of action (e.g., the impulse to look to this didactic arbiter as a source of comfort (a “comfort blanket”)—that which offered reassurance that all was well (e.g., that public health services were being delivered effectively)).

Managers also used the didactic arbiter as a form of coercion or threat (a “big stick”). In many of the states we visited, data from the new HMIS were often materialized as a “big stick” that superiors used to beat those who had the misfortune to be associated with poor indicators on the superiors’ dashboards. These practices exemplified the traditional impersonal, detached mode of organizing that is emblematic of bureaucracy.

Moreover, health officials understood this didactic arbiter as providing a “mirror” of organizational life (detached, objective, and politically neutral)—an electronic text (Zuboff, 1988) that should facilitate improved monitoring of organizational practices and the development of a clearer understanding (or “helicopter view”) of events and their interrelationships. One could look to data as a means to facilitate

improved, “evidence-based” forms of decision making and control from a distance. The left-hand column in Table 2 summarizes this analysis.

Unsurprisingly, due to the extent to which authoritarian-bureaucratic practices were institutionalized in the health service, systematic practices of datafication dominated in the vast majority of our fieldwork sites in India. While we did see nascent glimpses of alternative practices of datafication in a couple of isolated contexts, nowhere came close to the manner in which State C shone as an exemplar of different practices’ producing a different kind of sociality.

Table 2. Practices of Datafication

	Systematic practices of datafication	Edifying practices of datafication
Key constitutive practices	<p>Closedness, detachment, and conservatism</p> <ul style="list-style-type: none"> • Forms of hiding, secrecy & denial - careful management of outward appearances • Forms of detached, impersonal interaction based on hierarchical position • Deferring to established authority & reproducing the status quo 	<p>1) Exposure</p> <ul style="list-style-type: none"> • Forms of movement or displacement that pull us out of our comfort zones • Forms of critical scrutiny that compel us to seek out other perspectives <p>2) Receptiveness</p> <ul style="list-style-type: none"> • Forms of generous & non-judgemental attentiveness • Curious & sympathetic disposition <p>3) Hermeneutic Reframing</p> <p>Experimenting with new ways of thinking and acting</p>
Form of sociality produced	<p>Authoritarian-bureaucratic sociality</p> <p>Bureaucratic: directiveness and rule following</p> <p>Authority produced through delineated hierarchical position</p> <p>Tendencies towards reprimand and risk aversion</p>	<p>Dialogic sociality</p> <p>Democratic: conversation, mutual exploration, and learning</p> <p>Authority produced through demonstrated situated expertise</p> <p>Tendencies towards openness and experimentation</p>
Associated moods	<p>Fear and closedness</p> <p>Resignation</p>	<p>Curiosity & openness</p> <p>Trust & hope</p>
How data is materialized	<p>Data as a “didactic arbiter”</p> <p>Didactic => data “speaks for itself”—its meaning is given</p> <p>Arbiter between competing claims to truth</p> <p>The “didactic arbiter” may be used as “comfort blanket” or a “big stick”</p>	<p>Data as a “strange interlocutor”</p> <p>Strange => meaning not transparently given</p> <p>Reveals itself through patient engagement with it</p> <p>The “strange interlocutor” may be used as an “agent provocateur”</p>

7.2 Edifying Practices of Datafication and the Production of a Dialogic Sociality

These systematic practices of datafication, along with their associated authoritarian-bureaucratic form of sociality, were also deeply institutionalized in the health system in State C. What is fascinating, however, is the extent to which health workers cultivated alternative *edifying* practices of datafication in this state, and the way in which they seemed to produce a different kind of sociality—a *dialogic* sociality. Clearly, Sanjay, as a skilled carrier of these edifying practices, played a crucial role in demonstrating their power to others and in enacting this new form of sociality.

Drawing on the theoretical ideas that we outline in Section 3.2, we can identify three main categories of edifying practices: practices of *exposure*, practices of *receptiveness*, and practices of *hermeneutic reframing*.

7.2.1 Practices of Exposure

From our first meeting with representatives from State C at the international conference, we were struck by the unusual and refreshing attitude they appeared to adopt. The presentation they delivered on the progress of HMIS-enabled public health reform in their state was not the usual bland, boastful, and uncritical pitch that we had become accustomed to hearing from such officials. Rather, they offered a measured and modest account: while they did point to important achievements and progress, they also drew attention to issues with which they continued to struggle. Within two months of meeting them and with very little negotiation around access, we were able to begin our fieldwork in State C.

The level of openness, lack of suspicion, and quiet confidence that we encountered here was unprecedented in our years of interacting with officials in other states and districts in India. Moreover, such practices of exposure continued to be highly visible during our fieldwork in State C, where we encountered similar kinds of openness in a variety of different quarters. We soon realized, however, that Sanjay was a key figure in modeling and cultivating such practices. Sanjay's personal biography demonstrated a marked restlessness and engagement with alternative ways of thinking and doing. This kind of movement exposed him to radically different practices and ways of life. Perhaps most impressive of all, however, was his fearlessness in confronting the data that presented a very bad impression of the condition of State C's health service and his willingness to share these data openly. In the culture of secrecy and spin that thrives in the authoritative-bureaucratic kind of sociality that we describe above, such a move appeared daring if not outright reckless. He was adamant about the need to expose shortcomings and weaknesses. By doing so, he drew attention to problems that could not be neglected and created opportunities for learning and soliciting offers of help. This openness certainly attracted attention not least from embarrassed others in the health service. Sanjay was resolute enough to be able to withstand such "brickbats" and endure "explosive meetings", however, and was soon emboldened by the support and offers of assistance that he received from the GOI and outside agencies. Without such an open approach, it is difficult to see how Sanjay could have mobilized such an impressive network of partner agencies.

Sanjay spoke repeatedly about the sense of liberation he felt once he made the data about poor health service performance publicly available. Of course, Sanjay's initial "otherness" from State C's public health system helped produce this liberation: as a relative newcomer, he was not personally responsible for, or implicated within, the flawed practices that he wanted to expose. We have good reason to assume that this role as a "stranger", however temporary, both allowed him to see things with different eyes and feel little fear in drawing attention to them. Regardless, the mood of liberation and hope was infectious and seemed to feed a sense of excitement and optimism that was very palpable among many of the people with whom we spoke.

We can find a further example of an important practice of exposure in the open way with which Sanjay engaged with subordinates. In a manner that was distinctly countercultural, Sanjay did not pretend to have the answers to important questions or a clear sense as to what must be done. His comfort in exposing his vulnerability and uncertainty as a leader was disarming and impactful.

7.2.2 Practices of Receptiveness

By practices of receptiveness, we mean practices that promote forms of generous and non-judgmental attentiveness in engagements with others. Central to this is a curious and sympathetic disposition to the other—that the other has something different and interesting to say and that they should be given space and encouragement to articulate it. A deputy director described how he was caught off guard in his early interactions with his superior by the way in which the supervisor asked him for his views on what should be done and to talk about different possibilities. He emphasized how unusual and countercultural being consulted in this way by such a senior official was and described the positive impact it had on him. Long used to receiving and responding to directives in an unquestioning way, he described how this new and alien mode of engagement made him feel valued and respected in a way that he had not experienced previously. Gradually, as their relationship developed, he became comfortable enough to offer ideas that were not yet fully formed, confident in the knowledge that these would be received sympathetically and that Sanjay would offer help in developing the line of thought rather than dismissing it imperiously out of hand.

These practices of receptiveness were also modeled and reinforced at the state and district data workshops, which Professor Arora facilitated. At these events, he encouraged people to engage with the data in a patient and open-minded way—to avoid jumping to conclusions and to use the data to raise questions and to open up collective learning dialogues.

We were consistently struck by the ways in which officials and health workers alike described their experience of the power of such alien practices. They spoke about them with an energy and enthusiasm that we had encountered only rarely before in the Indian health service. Moreover, as they experienced the power of such practices, many seemed to appropriate them and try to incorporate them into their own way of being and style of management. As we outline in Section 6, people reported very positive outcomes from such an approach: engaged and sympathetic conversations brought new issues to light on the back of which novel supports and helpful interventions were developed. Such interventions could take account of the specifics of particular contexts and became the basis for ongoing collaboration and engagement between facilities and district management. Furthermore, this new mode of engagement

encouraged staff at the facilities to take more active responsibility for finding, and owning, solutions to local problems, which led the development of a new confidence among health workers.

7.2.3 Practices of Hermeneutic Reframing

These new conversations and forms of attentiveness, based on practices of exposure and receptiveness, fueled new practices of hermeneutic reframing. We found multiple examples of people's struggling to reconcile holistic and partial understandings of the operations of the public health system and being forced to revise these understandings in order to resolve inconsistencies. A key feature of these new practices was their emphasis on an openness to change ways of thinking and doing. On assuming his role as NHM state mission director, for instance, Sanjay found himself rethinking and reworking some of the deeply institutionalized practices in the public service. For example, he did not use the conference in Tamil Nadu as an opportunity to boast or to put a positive spin on the performance of the public health system in State C but instead reframed it as an opportunity to make some of the problems public—to learn and to ask for help.

The RAPID exercise, and the subsequent fraught collective conversations around it, prompted a general reframing of the source of performance problems in public health facilities. Rather than place the blame on lazy and underperforming staff, health officials reframed the problem as one concerned more with lack of adequate infrastructure, training, and support. With a new emphasis on supporting, facilitating, joint problem solving, and coaching, traditional authoritative-bureaucratic forms of management softened as senior district officials began to follow Sanjay's lead by paying regular visits to facilities and making concerted efforts to build relationships with fieldworkers on the ground.

By enacting different kinds of subject and object positions, these new edifying practices of exposure, receptiveness, and hermeneutic reframing appeared to contribute to a radical revision of conceptions of management and what might be achieved by transforming public healthcare. The practices constituted a form of *dialogic sociality*, which emphasized conversation and mutual exploration over directiveness, relationship building and engagement over impersonality and hierarchical detachedness, openness over secrecy, and an emphasis on the authority of situated expertise over hierarchical position.

In this context, practices of datafication take different forms, and data is enacted as a *strange interlocutor*. Data are materialized as something that is not transparently given but which must be revealed through its active incorporation in ongoing social intercourse. Data as interlocutor helps shape conversational contours by resisting or supporting specific threads. Unlike the didactic arbiter, data are materialized as something ambivalent or equivocal—something that one can read in multiple ways. For instance, this strange interlocutor could be cast in the role of an *agent provocateur*. Instead of didactically declaring or defining what the world is like, the *agent provocateur* provokes questions, offers hints, and invites a learning conversation.

The notion of *strangeness* points to the danger of assuming that existing frames of meaning can easily incorporate the object. Its strangeness, or ambiguity, demands that it be shown hospitality, that its otherness be respected, and that one should engage it with patience and curiosity (receptiveness). That is, one should work with it so that it might reveal itself rather than domesticating it in conventional frames of understanding.

In conclusion, we reflect briefly on the substance of the edifying practices themselves and on the effect they seemed to have on health workers. For us, one of the most striking aspects of our work in State C was the manner in which people responded to these kinds of practices—or what the doing of such practices *does* in producing this new dialogic sociality. In visiting a number of districts around the state, we were struck by the extent of progress that had been made and by the authenticity and modesty with which people spoke. They expressed genuine enthusiasm about how things were changing and about their new-found hope that it was possible to deliver public health services in a better way. A longstanding mood of resignation changed into one of hope and vitality. Having witnessed the invigorating effect of these practices, it was difficult not to share this optimism.

8 Discussion: The *Doing* of Datafication (and What this Doing Does)

The case narrative and analysis that we offer above clearly reinforce some of the themes that we highlight in Section 2. For instance, our experience supports the view that HMIS reforms in India have been mostly “data-led” rather than “action-led” (Latifov & Sahay, 2013) and bears testament to the severe challenges associated with generating quality data in these contexts (Braa & Sahay, 2012). Although significant progress has been made recently in relation to this latter issue, the broader difficulties with reforming Indian administrative culture (Walsham, 2010, p. 16) remain. We can also affirm that the continuing strength of the

“institutional myth of technology” (Noir & Walsham, 2007) means that expensive forms of “ceremonial conformity” with HMIS still go unchallenged as do dominant technical-rational assumptions that regard better decision making and health outcomes as an inevitable result of the availability of better data.

Our paper’s main contribution, however, comes from our empirical account and theoretical analysis of the extraordinary reform process in State C between 2012 and 2015. While rich empirical accounts of practices of data use are rare, a unique strength of the State C case is that it provides credible illustrations of genuinely innovative practices of datafication (in a notoriously difficult institutional context) and insights into how such practices were cultivated and what their doing did.

Key to developing these insights was our synthesizing a novel praxeological approach to understanding the relationship between data and forms of organizational knowing. Specifically, we demonstrate the potential of a performative idiom for helping one think differently about data and its use—to offer insight into distinctive ways in which data may be enacted within different kinds of social practices. This approach shifts attention away from the notion of data as an unproblematic “raw” or pre-formed “thing” to focus instead on the practices that continue to materialize it as such.

A further important contribution is our use of Richard Rorty’s work to distinguish between *systematic* and *edifying* practices of datafication (i.e., two distinctive ways in which data is enacted and incorporated into broader practices of organizational knowing) and their associated forms of sociality. By attending to the particular ways in which data are enacted, we draw analytical attention to deeply institutionalized focal practices that prevail in specific contexts. Thus, in understanding how datafication typically operates (and will likely continue to operate) in the Indian public health service, we must attend to the kinds of systematic practices of datafication that prevail (i.e., those that continue to reproduce the distinctive kind of authoritarian-bureaucratic sociality that we describe in Section 7.1). In such contexts, we can appreciate the difficulty of envisaging a new datafication if prevailing practices continue to enact data in familiar ways. There may have been great progress with the digitalization of the old paper-based system in our Indian example, but, if the broader practices of datafication endure, the organizational significance of these efforts is questionable. In this case, it is not difficult to imagine that better data may not, indeed, result in better health outcomes.

We also explain how innovative new edifying practices of datafication were successfully cultivated in State C in spite of the traditional hold of deeply institutionalized systematic practices. In this context, we highlighted the crucial leadership role played by a key individual (Sanjay) who modeled and cultivated new practices in skillful ways. One obvious way of making sense of this process would be to cast Sanjay in the role of the heroic leader who, by dint of his extraordinary personal qualities, achieved this impressive cultural transformation. While we are not averse to this kind of analysis (for examples and illustrations in other ICT4D contexts, see Andrade & Urquhart, 2010; Renken & Heeks, 2013), a praxeological approach would treat “personal qualities” not as expressions of some essential traits of an individual but as products/enactments of practices just like everything else. As such, we draw attention to Sanjay’s initial positioning as a stranger (i.e., the manner in which he initially stood outside of the historical cultural practices of the health system), to his senior status in a culture that was enacted in such a hierarchical way, and to the affective power of the practices that he skillfully mastered and modeled to others on an ongoing basis. The importance of Sanjay’s skill and his positioning vis-a-vis specific networks of practice is reinforced by accounts from well-placed informants, which suggest that the reform process has slowed since he was relieved of his health portfolio in mid-2015. While these events are outside the scope of our study (given that we focus on the 2012-2015 period), they do point to the difficulties of sustaining such innovations over extended periods of time.

A focus on the power of particular kinds of practices draws attention to what their doing *does*. What we found particularly noteworthy in the testimony of those who embraced these new practices was the way in which they described their experiential affect: only after they experienced them first-hand (e.g., the experience of being asked for one’s view in a sincere way by a superior) did they realize how impactful they were. Thus, we see this affective power (i.e., related to how one is made to feel, or affectively configured, by a practice) as a key feature that explains how practices move and are institutionalized.

We also unpack, in a grounded way, edifying practices as a broad category of practice. Specifically, we draw attention to and provide illustrations of practices of *exposure*, *receptiveness*, and *hermeneutic reframing*, and we believe that these conceptual categories may have significant analytic potential in other empirical contexts. Moreover, the naming and specification of these kinds of edifying practices offers an enlarged perspective on the kinds of skills required to use data well. While the influential “decisionistic” conception of the relationship between data and forms of organizational knowing places a narrow

emphasis on technical-rational skills, the notion of edifying practices point to others that do not tend to figure so prominently in management education programs (e.g., relational skills around conversations, attentiveness, and relationship building).

In our analysis, we specifically do not suggest that these new edifying practices swept all before them and that the traditional authoritarian-bureaucratic sociality was completely displaced. Rather, we talk about how this kind of sociality softened as an alternative *dialogic* one began to emerge. We see the complex balance between kinds of focal and marginal practices to be a matter for empirical investigation in any given context. One of the most satisfying and surprising things about our fieldwork in State C was being able to see first-hand how these new edifying practices began to take hold. Mere months earlier we would have struggled to believe that it was possible to institutionalize such practices in the Indian public health system. It seems that this finding may be important because it suggests that, although administrative reform may well be “enormously difficult to achieve” (Walsham, 2010, p. 16), it is not impossible if certain kinds of practices are skillfully nurtured.

Key to explaining the appeal of particular practices is the way we link the forms of sociality that they produce with distinctive kinds of mood and affectivity. Again, one of the most striking features of the changes in State C was how moods of optimism and hope seemed to take root in many places we visited, which drove out previous moods of resignation. These moods, combined with others—such as a sense of liberation and trust at the new openness—seemed to produce a contagious energy and excitement that we had not witnessed in any other state. Again, this emphasizes the importance of attending to what the doing of particular practices does in terms of producing distinctive and consequential kinds of affective social structurations.

In conclusion, we feel confident that those with no experience of the Indian public health system or low- and middle-income countries (LMICs) will recognize the social and organizational dynamics that we depict here). As we argue above, organizations everywhere are struggling to capitalize on the increasing quantities of data that they produce, and the juxtaposition of systematic and edifying practices of datafication offers a promising way of understanding data use in less decisionistic terms. This juxtaposition suggests opportunities to open up new modes of organizational knowing (or, more accurately perhaps, modes of organizational *being*) because dialogic forms of engagement facilitate situated, collective sensemaking. Unlike Zuboff (1988), however, we see forms of datafication that promise empowerment less a matter of management choice than one concerned with the skillful cultivation and institutionalization of particular kinds of edifying practices. We hope these ideas might offer one basis for more mature and realistic kinds of “data optimism” (Harari, 2016).

9 Coda: Edification, ICT4D, and IS Research

Development is crucial for us all, both individually and in terms of the groups, organizations and societies to which we belong. We can learn from each other about how to develop, and development is not something which can be reduced to ‘best practice’ transferred from the ‘developed’ to the ‘developing’ countries... our focus should be on how to make a better world with ICT, and thus a more developed world for us all. (Walsham, 2005, p. 14)

Walsham’s is just one of a range of voices in the literature that have called for broader and more context-sensitive conceptualizations of the “D” in ICT4D because, they argue, conventional approaches to development tend to narrowly focus on measurable economic outcomes (see also Kleine, 2010; Sahay, 2016; Walsham, 2012; Zheng, 2009). Sahay (2016, p. 171), for instance, urges researchers to embrace more holistic approaches that move beyond an emphasis on economic efficiency and productivity by attending to:

Broader development aims such as empowerment, realizing potentials, strengthening our trust in systems, supporting environment, improving access and quality of health care and education, enhancing human dignity, and many such more.

With such critiques in mind, we suggest that conceptualizing development as a practice of edification may offer a promising avenue for future research that will help researchers to avoid overly narrow conceptualizations of development and to treat it instead as a multi-level and multi-faceted phenomenon. Following Walsham (2005), for instance, we might say that an enlarged conception of development should encompass personal development, which all ought to experience regardless of income level. Moreover, development as edification might be helpfully understood as a hermeneutic process consisting in patient and receptive forms of exposure—ongoing becoming that involve efforts to understand oneself in the

context of strange Others and to learn how to cultivate the right kinds of mood for growing and engaging with the world differently and ethically.

Similarly, the notion of edification might offer a way of reimagining the potential value of ICT4D research and its relationship with mainstream IS discourses. While we would wholeheartedly endorse the notion that mainstream IS can benefit substantially from greater diversity in the kinds of social organizations that researchers study and in the approaches they employ to study them, we must be mindful of the practical and ethical challenges involved. The critical, postcolonial literature that has emerged from social anthropology and elsewhere, for example, draws attention to the difficulties and political dangers of such inter-cultural engagements (see, in particular, Grimshaw & Hart, 1994; Law & Lin, 2015; Said, 1994, 1996). Thus, while we might agree about the benefits of facilitating productive conversations between different “worlds” (i.e., encounters between “mainstream” research contexts and “strange” Others), a more substantive question remains as to how we might do so in a mutually enriching and ethical manner.

In this context, the ideas around practices of edification that we outline here and, indeed, the broader hermeneutical tradition may have much to offer in shaping and enriching such efforts. These have been very helpful in shaping our own engagements with Indian culture and in helping us understand and re-orientate ourselves to the many difficulties and frustrations that we have encountered in the course of this work over the years. Moreover, it has helped us realize that it may not be so much about our transforming the contexts in which we do our research but about allowing these contexts to seep in and transform us.

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References

- Andrade, A. D., & Urquhart, C. (2010). Mavens, mavericks or social connectors: Computer-mediated information seeking behaviour in rural societies. *Human IT*, 22(1), 1-28.
- Avgerou, C., & Walsham, G. (2001). *Information technology in context: Studies from the perspective of developing countries*. Brookfield, USA: Ashgate.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.
- Borgmann, A. (1984). *Technology and the character of contemporary life: A philosophical inquiry*. London: University of Chicago Press.
- Bourdieu, P. (1990). *The logic of practice*. Stanford: Stanford University Press.
- Braa, J., & Sahay, S. (2012). *Integrated health information architecture: Power to the users*. New Delhi: Matrix.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
- Briner, R. B., Denyer, D., & Rousseau, D. M. (2009). Evidence-based management: Concept cleanup time? *The Academy of Management Perspectives*, 23(4), 19-32.
- Butler, J. (1990). *Gender trouble*. Abingdon, Oxon: Routledge.
- Butler, J. (2001). What is critique? An essay on Foucault's virtue. In S. Salih (Ed.), *The Judith Butler reader*. Oxford: Blackwell.
- Compaine, B. M. (Ed.) (2001). *The digital divide: Facing a crisis or creating a myth?* Cambridge, MA: MIT Press.
- Corbridge, S., Harriss, J., & Jeffrey, C. (2013). *India today: Economy, politics and society*. Cambridge: Polity.
- Corbridge, S., Williams, G., Srivastava, M., & Véron, R. (2005). *Seeing the State: Governance and Governmentality in India*. Cambridge: Cambridge University Press.
- Davenport, T. H. (2013). Analytics 3.0. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/12/analytics-30>
- Dodson, L., Sterling, S. R., & Bennett, J. K. (2013). Considering failure: Eight years of ITID research. *Information Technologies & International Development*, 9(2), 56-64.
- Dreyfus, H. L., & Dreyfus, S. E. (2005). Expertise in real world contexts. *Organization Studies*, 26(5), 779-792.
- Gadamer, H.-G. (2004). *Truth and method*. London: Bloomsbury Academic.
- Gitelman, L., & Jackson, V. (2013). Introduction. In L. Gitelman (Ed.), *"Raw data" is an oxymoron* (pp. 1-14). Cambridge, MA: The MIT Press.
- Green, J. (2013). Big data: The key to economic development? *Wired Magazine*. Retrieved from <https://www.wired.com/insights/2013/03/big-data-the-key-to-economic-development/>
- Grimshaw, A., & Hart, K. (1994). Anthropology and the crisis of the intellectuals. *Critique of Anthropology*, 14(3), 227-262.
- Harari, Y. N. (2016). *Homo deus: A brief history of tomorrow*. London: Harvill Secker.
- Heeks, R. (2010). Do information and communication technologies (ICTs) contribute to development? *Journal of International Development*, 22(5), 625-640.
- Heeks, R. (2014). *Future priorities for development informatics research from the post-2015 development agenda*. Retrieved from <http://www.seed.manchester.ac.uk/subjects/idpm/research/publications/wp/di/>
- Heidegger, M. (1962). *Being and time*. Oxford: Blackwell.

- Heidegger, M. (1995). *The fundamental concepts of metaphysics—world, finitude, solitude*. Bloomington, Indiana: Indiana University Press.
- Hilbert, M. (2013). *Big data for development: From information-to knowledge societies*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2205145
- Introna, L. D. (2013). Epilogue: performativity and the becoming of sociomaterial assemblages. In F.-X. de Vaujany & N. Mitev (Eds.), *Materiality and space: Organizations, artefacts and practices* (pp. 330-342). Basingstoke: Palgrave Macmillan.
- Introna, L. D. (2015). Algorithms, governance, and governmentality: On governing academic writing. *Science, Technology and Human Values*, 41(1), 17-49.
- Kearney, R. (2003). *Strangers, gods and monsters: Interpreting otherness*. London: Routledge.
- Kelly, S. (2005). New frontiers in the theorisation of ICT-mediated interaction? Exploring the implications of a situated learning epistemology. In *Proceedings of the 26th International Conference on Information Systems*.
- Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, 23(1), 67-88.
- Kleine, D. (2010). ICT4 what? Using the choice framework to operationalise the capability approach to development. *Journal of International Development*, 22(5), 647-692.
- Latifov, M. A., & Sahay, S. (2013). Challenges in moving to “health Information for action”: An infrastructural perspective from a case study in Tajikistan. *Information technology for development*, 19(3), 215-229.
- Law, J., & Lin, W.-y. (2015). *Provincialising STS: Postcoloniality, symmetry and method*. In *Proceedings of the Conference of the Society for the Study of Science and Society*. Retrieved from <http://www.heterogeneities.net/publications/LawLinProvincialisingSTS20151223.pdf>
- Learmonth, M., & Harding, N. (2006). Evidence-based management: the very idea. *Public Administration and Development*, 84(2), 245-266.
- Lippeveld, T., Sauerborn, R., & Bodart, T. (Eds.). (2000). *Design and implementation of health information systems*. Washington DC: World Health Organization.
- Llanera, T. A. (2011). Shattering tradition: Rorty on edification and hermeneutics. *Kritike*, 5(1), 108-116.
- Long, N. J., & Moore, H. L. (Eds.). (2014). *Sociality: New directions*. Oxford: Berghahn Books.
- Madon, S., Sahay, S., & Sudan, R. (2007). E-government policy and health information systems implementation in Andhra Pradesh, India: Need for articulation of linkages between the macro and the micro. *The Information Society*, 23(5), 327-344.
- Marquez, L., & Kean, L. (2002). *Making supervision supportive and sustainable: new approaches to old problem*. Retrieved from https://www.k4health.org/sites/default/files/maqpaperonsupervision_0.pdf
- Masschelein, J. (2010). E-ducing the gaze: The idea of a poor pedagogy. *Ethics and Education*, 5(1), 43-53.
- Mayer-Schönberger, V., & Cukier, K. (2013). *Big Data: A revolution that will transform how we live, work and think*. London: John Murray.
- McAfee, A., & Brynjolfsson, E. (2012). Big data: The management revolution. *Harvard Business Review*. Retrieved from <https://hbr.org/2012/10/big-data-the-management-revolution>
- Government of India. (2005). *National rural health mission: Mission document*. Retrieved from http://www.nird.org.in/brgf/doc/RuralHealthMission_Document.pdf
- Nicolini, D. (2013). *Practice theory, work, & organization*. Oxford: Oxford University Press.
- Noir, C., & Walsham, G. (2007). The great legitimizer: ICT as myth and ceremony in the Indian healthcare sector. *Information Technology & People*, 20(4), 313-333.
- O'Neil, C. (2013). *On being a data skeptic*. Cambridge, MA: O'Reilly Media.

- Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies*, 28(9), 1435-1448.
- Orlikowski, W. J., & Scott, S. V. (2008). Sociomateriality: Challenging the separation of technology, work and organization. *The Academy of Management Annals*, 2(1), 433-474.
- Pfeffer, J., & Sutton, R. I. (2006). *Hard facts, dangerous half-truths, and total nonsense: Profiting from evidence-based management*. Boston, MA: Harvard Business School Press.
- Reckwitz, A. (2002). Toward a theory of social practices: A development in culturalist theorizing. *European Journal of Social Theory*, 5(2), 243-263.
- Renken, J., & Heeks, R. (2013). Conceptualising ICT4D project champions. In *Proceedings of the 6th International Conference on Information and Communications Technologies and Development*.
- Rorty, R. (1979). *Philosophy and the mirror of nature*. Princeton, NJ: Princeton University Press.
- Sahay, S. (2016). Are we building a better world with ICTs? Empirically examining this question in the domain of public health in India. *Information Technology for Development*, 22(1), 168-176.
- Said, E. W. (1994). *Culture and imperialism*. New York: Vintage Books.
- Said, E. W. (1996). *Representations of the intellectual: The 1993 Reith lectures*. New York: Vintage Books.
- Sandford, P., Annet, H., & Cibulski, R. (1992). What can information systems do for primary health care? An international perspective. *Social Science and Medicine*, 34(11), 1077-1087.
- Schatzki, T. R., Knorr Cetina, K., & Von Savigny, E. (Eds.). (2001). *The practice turn in contemporary theory*. London: Routledge.
- Solomon, R. C., & Flores, F. (2003). *Building trust—in business, politics, relationships, and life*. Oxford: Oxford University Press.
- Spinosa, C., Flores, F., & Dreyfus, H. L. (1997). *Disclosing new worlds: Entrepreneurship, democratic action, and the cultivation of solidarity*. Cambridge, MA: The MIT Press.
- Thompson, M., & Walsham, G. (2010). ICT research in Africa: Need for a strategic developmental focus. *Information technology for development*, 16(2), 112-127.
- Tsoukas, H. (1998). The word and the world: A critique of representationalism in management research. *International Journal of Public Administration*, 21(5), 781-817.
- UNCTAD. (2015). *Digital development*. Retrieved from http://unctad.org/meetings/en/SessionalDocuments/ecn162015d2_en.pdf
- Urquhart, C. (2013). *Grounded theory for qualitative research: A practical guide*. London: Sage.
- Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4, 74-81.
- Walsham, G. (2005). Development, global futures and IS research—a polemic. *Journal of Strategic Information Systems*, 14, 5-15.
- Walsham, G. (2010). ICTs for the broader development of India: An analysis of the literature. *The Electronic Journal of Information Systems in Developing Countries*, 41(4), 1-20.
- Walsham, G. (2012). Are we making a better world with ICTs? Reflections on a future agenda for the IS field. *Journal of Information Technology*, 27(2), 87-93.
- Walsham, G., & Sahay, S. (2006). Research on information systems in developing countries: Current landscape and future prospects. *Information Technology for Development*, 12(1), 7-24.
- Warnke, G. (2003). Rorty's democratic hermeneutics. In C. Guignon & D. R. Hiley (Eds.), *Richard Rorty* (pp. 105-123). Cambridge: Cambridge University Press.
- Westrup, C. (2012). Problems with solutions seeking problems: Debating ICT for development. *Journal of Information Technology*, 27(4), 344-345.

- Wieringa, S., Engebretsen, E., Heggen, K., & Greenhalgh, T. (2017). Has evidence-based medicine ever been modern? A Latour-inspired understanding of a changing EBM. *Journal of Evaluation in Clinical Practice*, 23(5), 964-970
- Zheng, Y. (2009). Different spaces for e-development: What can we learn from the capability approach? *Information Technology for Development*, 15(2), 66-82.
- Zuboff, S. (1988). *In the age of the smart machine: The future of work and power*. Oxford: Heinemann.

Appendix

Table A1. Fieldwork Timeline

Date	Location	Details
2007		
<i>India field trip 1</i> January (1 day)	State A	Spend one day visiting health centers and hospitals in State A with a local public health doctor (organized by IS-NGO).
2008		
<i>India field trip 2</i> 14 – 20 January	State A	Interviews and informal conversations with local IS-NGO personnel Interviews with district and subdistrict health personnel
21 – 26 January	Delhi	Attend IS-NGO technical team workshops
April (2 days)	EuroCity	Interviews with President of IS-NGO
September (2 days)		Interviews with President of IS-NGO
December (2 days)		Interviews with President of IS-NGO
2009		
<i>Indian field trip 3</i> 7 – 10 January	State A	Interviews and informal conversations with vice president, IS-NGO and IS-NGO coordinators, State A State interviews Director, national rural health mission; state data officer; chief statistician District-level interviews: Interviews with IS-NGO personnel working in State E
12 – 13 January	State E	Attended State meeting to introduce HMIS to senior district personnel (facilitated by IS-NGO) Attended state training of district personnel on HMIS use (facilitated by IS-NGO)
14 January	Delhi	Update interview with president, IS-NGO
15 – 16 January	State D	Interview IS-NGO personnel working in State D Attended state training of district personnel on HMIS use (facilitated by IS-NGO)
8 June	EuroCity	Follow up Skype interview, IS-NGO personnel, State A
10 September	UK	Interview professor with many years' experience of researching in India
16 September	EuroCity	Follow-up phone interview, president IS-NGO
<i>Indian field trip 4</i> 1 – 13 October	State A	Interview with IS-NGO state coordinator, a number of IS-NGO district coordinators, and public health nurses/junior public health nurses in local PhCs
5 November		Attended state training of district personnel on HMIS use Follow-up phone interview, president IS-NGO
<i>Indian field trip 5</i> 23 November – 5 December	State B	State interviews: commissioner of health, medical services and medical education; additional director, family welfare; the joint director, demographic and evaluation; deputy director, maternal and child health; HMIS fellow (NHSRC)*; state demographer; deputy director, vital statistics; state level coordinator, HMIS; functional lead, HMIS project. District-level interviews (two districts): chief medical officer, chief health officer Visited a number of departments in a district hospital and had informal conversations with doctors, nurses, and clerical staff about their use of the HMIS. Demonstrations of the system in use were also provided. Attended high-level workshop hosted by the State Institute for Health and Family Welfare. Workshop reviewed progress on HMIS and broader health reform in the state.

Table A1. Fieldwork Timeline

2010		
9 May	EuroCity	Follow-up Skype interview with NRHM personnel in State A
18 May		Update Skype interview, president, IS-NGO
18 July		Update Skype interview, president, IS-NGO
17 – 18 November		Update interview (in person), President, IS-NGO
2012 (fieldwork suspended)		
31 August		Update Skype interview with president, IS-NGO
2013 (fieldwork suspended)		
21 June		Update Skype interview with president, IS-NGO
2014		
27 June	UK	Update interview (in person), President, IS-NGO
29 September – 4 October	Southern India	Paper presentation at international seminar on building communities of practice to strengthen capacities around public health information system. Presentation at this seminar resulted in an invitation to carry out fieldwork in State C.
14 November	State C	Skype interview with NHM personnel
<i>Indian field trip 6</i> 1 – 11 December	State C	See Table 2 for details
* National Health Systems Resource Center		

Table A2. Data Collection in State C

Pseudonym	Position	Date (d/m/y)	Location	Duration
Dr. Reena & Dr. Ameet	Consultant, NHM; deputy director, NHM	18.11.14	Skype call	40 minutes
Dr. Ravi	Subordinate director, NHM, state government	2.12.14	NHM office, state capital	20 minutes
Dr. Ameet	Deputy director, NHM	3.12.14	NHM office, state capital	20 minutes
Dr. Reena	Consultant, NHM	2.12.14	NHM office, state capital and lunch at local hotel	2 hours
Prof. Arora	Public health academic and partner to NHM	2.12.14	Institute of Medical Education and Research, state capital	1.5 hours
Dr. Sahil	Academic, health economics (leading the concurrent evaluation of NHM)	2.12.14	Institute of Medical Education and Research, state capital	45 minutes
Dr. Nadeen	Junior consultant, anaemia tracking module (ATM), maternal and infant death reporting system (MIDRS), and supportive supervision	1.12.14 2.12.14	NHM office, state capital	1 hour
Mr. Vihaan	Mission director, NHM	3.12.14	NHM office, state capital	30 minutes
	Social, behavioral change, & communication (SBCC) team	3.12.14	NHM office, state capital	45 minutes
Dr. Nadia	Partner, IP global	3.12.14	NHM office, state capital	45 minutes
Dr. Kiaan	Technical officer, NHM	2.12.14	NHM office, state capital	45 minutes
Dr. Shaan	Officer, maternal and child tracking system (MCTS)	2.12.14	NHM office, state capital	20 minutes
Mr. Hansh	HMIS program officer	4.12.14	NHM office, state capital	45 minutes
Ms. Umali	District monitoring and evaluation officer (DMEO), District Y	4.12.14	NHM office, state capital and lunch at local hotel	30 minutes
Dr. Bakur	Civil surgeon/chief medical officer (CMO), District Y	4.12.14	District Y offices, state capital	45 minutes
Mr. Rahul	RDQA consultant (ABT Associates) health finance and government (HFG) project—funded by USAID	4.12.14	NHM office, state capital	80 minutes
Dr. Ameet	Deputy director, NRM	4.12.14	NHM office, state capital	1 hour
Ms. Samah	Consultant, HFG project	4.12.14	NHM office, state capital	20 minutes
Dr. Rohan	HMIS documentation specialist	4.12.14	NHM office, state capital	15 minutes
Mr. Hansh	HMIS program officer and team	5.12.14	NHM office, state capital	50 minutes
Dr. Sanjay	Commissioner of the food and drug administration and mission director at the NHM	5.12.14	NHM office, state capital	45 minutes
Dr. Devansh	State consultant HMIS	8.12.14	Five-hour drive to District X	4.5 hours
Dr. Dhe	Chief civil surgeon, District X	8.12.14	District offices, District X	2.5 hours
Dr. Talun	District immunization officer, District X	8.12.14	District offices, District X	2.5 hours
Mr. Nabil	District program manager, District X	8.12.14	District offices, District X	2.5 hours

Table A2. Data Collection in State C

Mr. Pranay	District monitoring and evaluation, District X	8.12.14	District offices, District X	2.5 hours
Dr. Balbo	Chief civil surgeon, CHC, District X	8.12.14	CHC in District X	30 minutes
Mr. Nabil	District program manager, District X	9.12.14	Two-hour drive to District Z	1.5 hours
Dr. Samar	Deputy civil surgeon, District Z	9.12.14	Workshop on data usage, District Z	1 hour
Dr. Bhupa	Chief civil surgeon, District Z	9.12.14	Workshop on data usage, District Z	1 hour

Table A3. Glossary of Acronyms Used

CHC	Community health center
DMO*	District medical officer
MO	Medical officer
DPM	District program manager
FOSS	Free and open source software
GOI	Government of India
HMIS	Health management information system
IMR	Infant mortality rate
MMR	Maternal mortality rate
NHM	National health mission
NRHM	National rural health mission
NUHM	National urban health mission
PHC	Primary health center
RAPID	Regular appraisal of program implementation in district
SC	Subcentre
SS	Supportive supervision
WHO	World Health Organization
*Also referred to as Chief Civil Surgeon	

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