Balancing Burden and Benefit: Non-Prescribed Use of Employer-Issued Mobile Devices

Ariel Schwartz[1],[2], Mohini Bhavsar[3], Edward Cutrell[2], Jonathan Donner[2], & Melissa Densmore[2]

[1]University of Texas at Austin	[2]Microsoft Research, India	[3]Dimagi, Inc., India
Main Rm. 101, Austin, TX	Vigyan #9, Lavelle Rd, Bangalore	D-1/28 Vasant Vihar, New Delhi
as192@cornell.edu	{mdens,jdonner,cutrell}@microsoft.com	mbhavsar@dimagi.com

ABSTRACT

Mobile devices are increasingly powerful and flexible tools for computing and communication. When ICTD workers are given a mobile phone "for work", what else do they do? And to what extent can or should an employer shape that use? This note presents research in progress, focused on rules that development projects impose to govern use of mobile devices. This work maps these rules against actual instrumental (work-related, non-prescribed) and non-instrumental (personal) device use, and enforcement of these rules, in eight projects using a popular mobile-based job aid, CommCare. We present early insights from qualitative analysis of two such deployments in India identifying a range of often conflicting policy choices that affect device use for project mission and/or professional and personal empowerment. We explore tradeoffs for morale, work quality, mission, and device integrity. We identify user remote availability, soft intimidation, and validation as mechanisms to shift authority and credibility of information sources. The implications of our findings are increasingly important as governments and NGOs arm frontline workers with mobile devices as tools to improve service delivery.

Categories and Subject Descriptors

H.1.2 **User/Machine Systems**–human factors, human information processing. K.4.2 Social Issues; K.4.3 Organizational Impacts.

General Terms

Management, Human Factors, Theory.

Keywords

Non-prescribed use, Health, Organizations, Mobile device, Social sector; Development; ICT4D; Negotiation; Enforcement; Power

1   INTRODUCTION

Mobile communications are rapidly being deployed to leverage technology for social service delivery. Many projects adopt mobile devices such as feature phones, PDAs, smart phones and tablets to reap the potential benefits of improved data accuracy, minimized data loss, reduced data collection costs, etc.

In this note we describe research in progress exploring how rules in the organizational setting influence use of a mobile device issued for community level or frontline social service work. In projects under study, the mobile device provided is most users' only device,

facilitating their first interactions with computing technology and the Internet. Allowing personal, or non-instrumental, uses, i.e., visiting Facebook, and work-related, or instrumental, but non-prescribed use, i.e., photographing clients' living conditions, can lead to compromised application, device breakage, or data loss. On the other hand, allowing these non-prescribed uses of the device—here, uses beyond a prescribed application—may motivate workers to maintain the device and learn advanced tasks.

This work asks three questions. First, what policies are being implemented that affect the use of work-issued devices? Second, what is the rationale behind these policies? Exploring these questions will reveal the competing priorities that underlie choice of restrictive or permissive rules. Third, what are the consequences of these policies? To answer this question, we compare how users were instructed to use their devices with how they actually use them, and effects, if any, on staff work, skills, or morale, device integrity, communication patterns, authority structures, and the ability to advance personal, professional, or project objectives.

2   BACKGROUND

This research explores the contested and negotiated boundaries of prescribed and proscribed use of mobile devices deployed for a social purpose. In cases under study, projects deployed mobile phones to frontline workers to use CommCare, a mobile-based application that improves interactions with clients; monitors client status and services received; monitors staff activity; and improves speed, accuracy, and complexity in evaluating outcomes. Dimagi, a social enterprise, designed CommCare to collect health data. CommCare features images and audio describing recommended behaviors that users navigate with a client during a home visit. Responses are recorded via data network connection to a remote server as input to population-level reports. In cases described here, CommCare-enabled devices were issued to Indian government health workers, Accredited Social Health Activists (ASHA), to increase government capacity to deliver health services. Other projects adopt the tool more for its monitoring and evaluation capabilities. While CommCare has typically been deployed on feature phones, one project in our study used smartphones and one, tablets. Thus, we use the general term device over phone.

Precautions help maintain devices' capacity to run applications like CommCare. It must be in working condition and the memory card uncompromised. For security, a project may proscribe certain uses. The surest proscription method is device selection, as possible uses are set by a device's capabilities. Limited capability devices that can run applications like CommCare are decreasingly available, so this solution is not always practical. Alternatives include technical modification and rules imposed by project management.

After data collection, we will interpret the range of formal and informal rules that affect frontline workers' use of a technology, the perceived tradeoffs of those rules, and their consequent uses and meanings, using three theoretical lenses, first viewing the

organization as a mediator that supports and limits technology use. Second, devices blur boundaries between professional and personal life, and we will examine how this affects both arenas. Last, we will probe tensions between a project's objectives and how users appropriate devices beyond its scope.

An organization is a social system characterized by rules, programs, structures, and members grouped into units. This system directs, constrains, and often supersedes individual preference and behavior. For project-based deployments, we view the project as an organization; in the two cases described here, each project structure pulls from among staff in three NGO partners and the government.

The relationship between technology and user in an organizational setting differs from that in a consumer setting where one's use of a given device is largely voluntary. In the latter case, individuals select devices (based on price, preferences, peer behavior, etc.), and use may have implications for users, their peers, and manufacturers, but in aggregate, development impacts on society are unclear and unplanned. In contrast, ICTD projects deploy a technology for direct or indirect but systematic impact on some social objective. Project management demand uses that users may not otherwise undertake, altering behavior in important ways that can, for example, change communication patterns among stakeholders.

The dynamics of information and communications technology use in resource-rich office settings are well-described, for example in empirical and theoretical work by Orlikowski [8]. However, non-prescribed use in the work setting has not been systematically studied in ICTD settings or in work narrowly relating to CommCare or similar applications [1], though some work highlights its importance. A project to increase medical communications among remote doctors in Ghana observed many new, purely social, conversations, despite the medicalized design of the deployed interface. Authors found unexpectedly fluid "barriers between profession and person" [6, p. 8]. Studies have also described non-prescribed instrumental uses, where a device's predicted utility differed from its actual utility, as in the BulkSMS deployment described in Densmore [3], and a CommCare project in which users purposed phones' recording capabilities to cajole reluctant service providers into treating patients [7]. These studies motivate us to explore tensions between how users are instructed to use a device and how they appropriate it, and how conflicting realms of power and control over user and device affect empowerment and mission.

3 RESEARCH DESIGN AND DATA

We report on two deployments in India, the first of eight completed case studies. Data for these cases were collected over two weeks June-July, 2013. Collection activities, summarized in Table 1, featured reading, semi-structured interview, and observation.

Both cases deployed CommCare in India to Accredited Social Health Activists. ASHAs are frontline health workers, government-incentivized volunteers meant to cover a population of 1000 in rural areas. ASHAs must be female, married, and literate but often lack sufficient training to conduct counseling for which they are responsible. Project staff also use CommCare devices to troubleshoot technical problems and facilitate ASHAs' use. Project staff have no formal authority over ASHAs, who are supervised by government salaried Auxiliary Nurse Midwives (ANM).

Both projects were led by an international NGO collaborating with CommCare's developer, Dimagi. USAID funded Dimagi's on-site presence to ensure that CommCare was well-adapted, that project staff learned usage, troubleshooting, generating and using reports from data collected, and how to train ASHAs on CommCare. The

Dimagi staff remained through training, and ASHAs directly reported problems to her in the pilot stage. Both deployments were implemented by a local NGO with expertise in the region and in health intervention. The state and local government was an informal but active planning and implementation partner. For all stakeholders except Dimagi, this was the first mobile health project.

Table 1. Completed Data Collection Activities

	Case 1-Uttar Pradesh	Case 2-Rajasthan
Documents Reviewed	User contract; Job description; Project report; Annual report; Implementation Plan; Sample Active Data Management (ADM) report; Technical	
Total # interviewed	24	13
ASHAs	5 /255	4 /4
CC Use Facilitators	10 /10	2 /3 former
Technical Personnel	2 /3	2 /2
M & E Personnel	2 /2	n/a
Program Managers	4 /5	4 /5
Government Partner	0	1 /2
Technology Partner	1 /1	1
Patient Observations	2 home visits	1 home, 1 anganwadi center visit

Case 1: 255 ASHAs, Uttar Pradesh. This May 2011 CommCare phone deployment in rural Kaushambi District to 10 ASHAs scaled to 111 in Aug 2012 and to 255 in Mar 2013, covering two full administrative blocks. One co-author interviewed 24 project affiliates including five ASHAs, 18 on- and off-site staff, and one Dimagi staff. The project is ongoing, funded by the project lead.

Case 2: 70 ASHAs, Rajasthan. This May 2011 CommCare phone deployment in rural/urban Kishangarh District to 10 ASHAs scaled to a full 70 ASHA block in Jan 2012. Project funds ended in Jan 2013, and ownership of each device transferred to ASHA. Since then, one panchayat has been funding CommCare use for its four ASHAs. Thirteen project affiliates were interviewed, including the ASHAs who still use CommCare, the official who supervises them, eight former project staff, and a Dimagi staff member.

4 PROJECT FEATURES THAT ACT AS RULES AFFECTING USE

Here we present early results on the range of decisions that can constrain or promote use, and the perceived tradeoffs that guided debate about these choices. This early analysis was conducted by inductively grouping utterances into themes as data were collected [3], probing later interviewees for comment on the most salient, and searching for relevant literature, to be discussed in future writing, on what emerged. Project staff often teach users to make calls, save contacts, and use SMS regardless of whether these activities fall within explicit project objectives. We demonstrate below that for researcher, project staff, and user, conflicting policies, actions, and priorities make lines between prescribed, non-prescribed, and proscribed uses often quite fuzzy.

Device ownership. Projects can own devices or assign ownership to users. This may be finalized during deployment, or a project may schedule transfer of ownership, i.e., at project end, and may leave that decision conditional on, for example, program adherence. One priority in making this choice is control over the device and its maintenance. In Case 1, which maintained project ownership, staff expressed concern to promote ASHAs' sense of ownership, despite not being actual owner, by emphasizing the project's importance and ASHA role in achieving its mission, and maintaining a relaxed stance to non-prescribed and explicitly proscribed device uses.

Device possession. A user may be fully responsible for securing a

device issued her. Projects may alternatively share responsibility by, for instance, locking them at project headquarters overnight. This reduces the likelihood of damage or loss during non-work hours, and may strengthen users' sense of the project's importance and/or importance of protecting device and application. For users who do not typically visit the office twice a day, it may reduce their ability to manage a full workload. It may also engender resentment by enabling close contact with a device that could provide enjoyment or other benefit but does not. Users in Case 1 and 2 were responsible for their feature phones at all times. Some other deployments in India and Africa require users to leave devices, typically smartphones and tablets, in the office overnight.

SIM ownership, topping up. Ownership of SIM cards has security implications and influences the top-up procedure; decisions on topping up data versus talk time influence instrumental and non-instrumental use. SIM ownership is a liability if a SIM is abused, a major security concern in India and increasingly in Africa as states require users to register their SIM. One benefit to project SIM ownership is that topping up prepaid airtime can be done en masse. If security overrides convenience concerns, careful selection of a carrier can minimize difficulties topping up devices individually. India Airtel's website, for instance, currently allows anyone to remotely charge any device. CommCare requires data transfer, not talk time, though some carriers require a nominal talk balance to send data. Some projects give users a flat amount for her to allocate to data and talk; others top up only data. This decision affects the consistency with which devices are topped up and thus how regularly CommCare data are sent. Further, if users are encouraged to call clients or peers or to keep a minimum balance, but projects do not fund these objectives, frontline workers will bear the burden.

Memory card lock, hiding folders, AppLock. Downloading external media on CommCare devices often results in virus infection or accidentally erasing CommCare media. Users in both cases expressed clear interest in activities that could compromise CommCare, i.e., downloading music or video. To minimize disruption, Case 1 project staff added a password to protect memory cards; another solution is to hide CommCare media folders. For Android devices, the AppLock application only reveals functions that a device manager chooses. These solutions technically proscribe uses viewed as hazardous to the application's function. To the extent that users want to do their jobs well, these measures are appreciated by even those they restrict. But they also restrict personal uses of these devices. Balancing benefits that accrue to project, device, and ASHA, with potential disappointment in being excluded from certain activities, can be a challenge. Password-protecting devices and applications can be confusing for users [5] but better protects patient data.

Contingency for damage, loss. Advance agreement via contract in Case 1 and 2 assigned ASHAs financial responsibility to repair or replace devices. Some staff expressed that ASHA should bear some cost to encourage a sense of ownership and duty. On the other hand, the burden can be severe for ASHAs, who get no salary. Projects address this variously. Case 1 and 2 enforced modified versions of the contract, incurring all or part of the cost. One ASHA paid her balance according to a schedule agreed at the time of the incident. Project staff expressed little concern about the expense to replace a feature phone, but worried about a smartphone or tablet. Staff and ASHAs reported that losing or severely damaging their device would constitute a serious breach of professional responsibility.

Informal or Implicit Rules. Uses may be pre- or proscribed, intentionally or not, via words, attitude, and action. Implicit rules may relate to existing norms; i.e., if it is already taboo to take calls during client visits, then this proscribed use may not be addressed in training on a new device. Informal rules may be explicit, or stated; staff asked one user who repeatedly erased CommCare media as her children downloaded new games to limit her gaming. Informal rules may also be explicit and apply to an entire group, such as instructing users to maintain a minimum talk time balance. A contract or altered job description can formally reflect new expectations, but the latter may only be practical when users are project staff. Case 1 and 2 users were government staff with non-negotiable job descriptions; a contract was signed instead.

Strict or weak monitoring and enforcement of compliance further constitute policies that support or constrain device use—rules only proscribe use to the extent that they are followed. For example, contracts signed in Case 1 state that users may not allow family to use CommCare devices. Despite this, ASHAs consistently admitted that family use them. Though all were trained on contract details, they did not mention the rule. When asked why, program staff expressed the seriousness with which frontline workers view the responsibility of possessing a device, and the consequences if it were damaged. Because of this, staff did not see fit to closely monitor use, and in fact often demonstrated new uses on their own volition and in response to requests. Monitoring and enforcement may be deemed critical in other projects despite resource demands including funds and diversion of staff attention from other work.

Both cases reported here appeared permissive; non-prescribed use of devices' capabilities was effectively unrestricted. But when CommCare required reinstallation, all staff reported that all ASHAs expressed concern, often panic, with urgent requests to reinstall. All project staff reported few consequences: no cost, no annoyance, no penalty. But if CommCare is disabled, the ASHA cannot work.

Threat to reputation or finances may therefore be effective passive modes of enforcement that constrain use in unobserved ways. First, ASHAs' performance is announced monthly at government meetings. ASHAs publicly defend peers if they think unavoidable conditions, i.e., a family death, prevented her from working. Second, ASHAs reported that the financial burden of replacement would be heavy. In neither case did projects advertise that, despite the contract, ASHAs in relevant instances had not been made to pay in full. Third, program staff reported their and ASHAs' sense of responsibility to protect devices, and not be seen as shirkers.

Soft encouragement of non-prescribed uses. Before deployment in both cases, general knowledge of devices' affordances or how to use them was minimal. During training, staff demonstrated calling, SMS, contact lists, etc. Even in Case 1, where non-CommCare use was clearly outside objectives, staff trained and encouraged ASHA to use these functions. ASHAs gradually asked staff about other uses, including how to photo, share a song, or surf. As noted, activities were not truly off-limits unless technically proscribed. Frontline workers and project staff seemed to have agreed implicitly or explicitly on the import of protecting the devices and on activities that would truly endanger them. Staff and ASHAs also recognized the importance of a) advancing the spirit of the project mission beyond explicit objectives, b) uplifting ASHAs' status in eyes of clients, clients' families, and supervisors, and c) improving ASHAs' lives through a sense of, and actual, independence.

5   EARLY INSIGHTS

This section addresses our third research question, which asks what these rules mean for projects and frontline workers. This relates with actual use, which demonstrates the extent to which policies influence behavior with respect to devices.

ASHAs reported that CommCare informs client counseling sessions, tracks clients over time, and helps ASHAs deliver appropriate services based on clients' status. These gains in productivity also have appeal outside the workplace. For instance, one mother-in-law excitedly reported that before, her ASHA daughter-in-law spent evenings writing notes on client visits. Now, she had time to cook. This anecdote implies that the line between personal and professional life has always been fuzzy. Before, work responsibilities infringed on personal time; a new professional tool created it, not necessarily blurring the bound between professional and personal life but changing where the balance resides.

Non-prescribed use to advance project mission. Non-prescribed use can also advance project objectives. In Cases 1 and 2, phone and SMS allowed quicker and better communication among ASHA, client, and ANM. ASHAs reported photographing healthy, hospital-delivered babies to show the benefit of following their good advice. Non-prescribed use may further advance the mission by improving frontline workers' status in the community, via three mechanisms—increasing ASHA availability to clients; signaling ASHA as professional and her message credible; and acting as an imagined authority or representative of remote authority. First, a device's call and SMS features increase ASHA availability. Phone-enabled ASHAs were easily contacted by clients in need. Second, the device acted as a validation signal to client, client's family, and ASHA herself, as she possessed a device, participated visibly in a government initiative, and showed better understanding of her counseling topics. ASHAs thus had confidence to include family in counseling when prior, they typically counseled clients privately.

Finally, devices were used as a tool for soft intimidation of client and her family. The device itself was often viewed by clients as an authority, its messages respected as information from radio or television [2]. ASHAs reported that clients' families may shush each other—'The phone hears everything!' Instead of discouraging these views, ASHAs used these misconceptions non-maliciously to encourage clients' behavior change. ASHAs sometimes ask clients to speak directly into the device, though the application lacks voice recognition capability, and ASHAs must type responses manually. As ASHAs guide clients through questions, they encourage honest responses because authorities in Delhi or America will check. These gains in credibility and authority may be novelty effects, but have not yet diminished for even the earliest adopters in our study.

It is also debatable whether these examples constitute non-prescribed or prescribed use—if ASHA pretends, or client construes, that CommCare has an affordance it lacks, is the manipulation of understanding prescribed? This complexity highlights the importance of the interaction between the prescribed application and a user's appropriation of it and the device it is on.

Non-prescribed use in frontline workers' lives. Most ASHAs reported that the project device was their first personal phone and described various ways it improved their lives. Responses often featured gaining independence from husband: calling her mother without asking permission and ordering groceries when he is away. The devices changed how ASHAs' families perceive them—children and husbands reported that the device signals that mother/wife does important work and that she has been trained. They are also an entertainment source; ASHAs reportd playing games during downtime or when their mood is poor and sharing them with family, and often photograph their children [see also 2].

Our work makes explicit how policies, including informal ones stem from attitude and enforcement, can promote empowerment and encourage active and thoughtful participation in a project's mission, developing frontline workers' agency and credibility to faithfully implement a project.

Considerations for scale-up. With mass deployment, can non-prescribed use be so flexibly allowed, and contracts as flexibly enforced? Project oversight may shift to government, and replacing smartphones and tablets will be costly. Will security or funding concerns overwhelm priorities to empower frontline workers or instill a sense of ownership over devices? Further, as clients get used to devices as information sources, they may learn that its message is as fallible as the human who entered it. Early status boosts may be fleeting, and may not be achieved by later adopters.

6 ONGOING WORK

Additional data will cover eight CommCare deployments in India and across Africa. Future writing will detail the ongoing negotiation between rule making and rule breaking, exploring how members in a project unit advance objectives in ways not encoded in plans and make the most of their devices despite the rules. We will explore how mobile ICTs support or undermine hierarchies of authority and trusted information, building on existing ICTD work that introduces power dynamics and negotiation around IT in resource constrained organizational settings [8]. Finally, we will make recommendations for future deployments and scale-up.

7 ACKNOWLEDGMENTS

8 REFERENCES

[1] Chatfield, A., Javetski, G., and Lesh, N. CommCare Evidence Base. 2013. Dimagi. June 2013.

[2] Chittamuru, D. and Bhavsar, M. (2012). CommCare: Evaluation of a Mobile Application for Maternal Health in Rural India. IAMCR Durban: Communication Policy and Technology.

[3] Davis, G.B., et al. 1992. "Diagnosis of an Information System Failure: A Framework for an Interpretive Process." Information & Management. 23: 293-318.

[4] Densmore, M. 2012. Experiences with Bulk SMS for Health Financing in Uganda. CHI 2012 Extended Abstracts. ACM.

[5] Haberer, J.E., Kiwanuka, J., Nansera, D., Wilson, I.B., and Bangsberg, D. R. 2010. Challenges in using mobile phones for collection of antiretroviral therapy adherence data in a resource-limited setting. AIDS Behav. 14, 6 (Dec. 2010), 1294–1301.

[6] Luk, R., Zaharia, M., Ho, M., Levine, B., and Aoki, P. M. (2009, April). ICTD for healthcare in Ghana: two parallel case studies. In Proc ICTD 2009, 118-128. IEEE.

[7] Medhi, I., Jain, M. Tewari, A., Bhavsar, M., Matheke-Fischer, M. Cutrell, E. 2012. In Proc. NordiCHI 2012. ACM.

[8] Orlikowski, W. 2007. Sociomaterial Practices: Exploring Technology at Work. Organization Studies. 28, 9. (1435-1448).

[9] Sambasivan, N. and Cutrell, E. 2012. Understanding Negotiation in Airtime Sharing in Low-income Microenterprises. In Proc. CHI 2012, 791-800. ACM