Officers Never Type: Examining the Persistence of Paper in e-Governance

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ABSTRACT

The Global South has seen a proliferation of e-governance initiatives aimed at digitizing governmental service delivery. However, paper continues to remain the primary medium of bureaucracy. During ethnographic fieldwork at the CM Helpline, a state-wide e-governance initiative in central India, we observed that even tech-savvy bureaucrats who fully supported both the initiative and its paper-to-electronic transition ensured that paper continues to persist in abundance. Drawing upon scholarship from HCI, anthropology, and science & technology studies, we theorize this contradiction to uncover the circulations of power between people, paper, and electronic systems. We suggest that designers should recognize that new systems often disempower existing actors. The process of transition should integrate new systems into the existing ecosystem and plan for the graceful retirement of older technologies. In addition to machine errors, systems should be resilient to human errors. Finally, new systems should attend to sociocultural and historical specificities.

Author Keywords

Paper; persistence; e-governance; bureaucracy; power; structural violence; design

CCS Concepts

•**Human-centered computing** → **Empirical studies in HCI; Ethnographic studies;**

INTRODUCTION

Despite the proliferation of e-governance initiatives aimed at making governmental benefits and service delivery accessible, accountable, and fully digitized, paper continues to remain the primary medium of bureaucracy. As disciplines invested in technology interventions, the question of paper and its continued persistence across contexts has received significant attention in HCI and ICTD, finding that paper persists because it is cheap, predictable, familiar, and easily enables writing and annotation; and that it is neither possible nor desirable to fully eliminate paper, because paper simply is better at certain tasks than software or devices [55, 13]. ICTD research additionally finds that the physicality of paper documents provides them a perceived value and allows a semblance of control and ownership in resource-constrained contexts [20, 9, 13, 12, 20, 46, 47, 56].

Interventionist HCI for development (HCI4D) and ICTD scholarship deploys a narrowly conceptualized understanding of the end-user that typically excludes government officials. Officials and other actors internal to bureaucratic contexts are typically charged with implementing and working with new systems, such as when transitioning from paper-based systems to e-governance initiatives. By under-representing such stakeholders, HCI ignores the opportunity to inform large-scale and high-impact state-initiated development interventions. This work seeks to address this gap by examining the role of internal bureaucratic actors in the persistence of paper.

The focus of this article is the CM Helpline, a large e-governance initiative in central India that aims to make grievance resolution and information about state-provided benefits easy to access, accountable, and importantly, paperless. During ethnographic fieldwork at the CM Helpline, we observed that even tech-savvy bureaucrats who fully supported the helpline and its transition from paper to electronic systems often themselves ensured that paper continues to persist in abundance. Moreover, in the CM Helpline, there appears to exist infrastructural support, organizational backing, human intent, and human capacity; and so, this continued persistence of paper in the CM Helpline is not a simple case of amplification [60]. We draw upon scholarship in HCI, anthropology, and science & technology studies to consider three questions: 1) Why does paper persist within e-governance initiatives? 2) Why does this continued persistence of paper matter? 3) What can system designers do about it?

Answering these questions in the context of the CM Helpline, this paper makes the following contributions:

- We show how government officials respond to the introduction of new e-governance systems, thus highlighting a set of stakeholders that are under-represented in HCI yet crucial to large-scale and high-impact research.
- We extend HCI literature on the persistence of technology by showing that paper persists in bureaucratic settings due to colonial legacies and because new systems disempower officials: from decision makers who delegate work, to mere subjects to whom tasks are allocated by unknown others.

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- We highlight that the persistence of paper contributes to structural violence (arbitrary outcomes in service provision) against marginalized people.
- We suggest that systems should be designed to gracefully integrate into and retire out of existing ecosystems. Further, systems should be built to empower users while staying resilient to human errors. Finally, new systems should account for sociocultural and historical specificities.

We conclude by suggesting avenues for future work examining the impact of the transition to electronic systems in other bureaucratic contexts and on the feminized labor of typists, stenographers, and other bureaucratic assistants.

RELATED WORK

As disciplines invested in technology interventions, the question of paper and its continued persistence across contexts despite technological advances has received significant attention in HCI and CSCW literature. This work is part of a larger discourse on how older technologies and related practices can inform the design of new information systems [18, 52, 8]. Studies on the persistence of paper look at the use of paper as a socio-material activity [1, 14], arguing that the resilience and longevity of paper is a consequence of how it enmeshes with everyday work practices [24, 4]. In *The Myth of the Paperless Office*, Sellen and Harper argue that it is neither possible nor desirable to entirely eliminate paper in the workplace because there are certain tasks where paper simply is better as a tool than software or devices [55].

The social role of paper has been of particular interest in organizational literature, with studies discussing how social relationships and built and maintained through interactions with paper objects [45, 4]. Studying the persistence of paper in organizations, Bondarenko and Janssen [5] find that document management becomes an implicit process that directly relates to how tasks are managed. That is, paper artifacts can be thought of as an institutional resource that constitutes and mediates relationships in the organization, while themselves being shaped by the resulting social interactions [1, 30]. Paper documents also play a semiotic role: their visibility shapes institutional identities and reduces articulation work [6, 14]. Further, the material tangibility of paper in everyday practices, such as the act of handing off documents, makes hierarchies visible, and social organization more explicit [44]. Paper is a flexible resource both in terms of its ecological versatility as well as how it can be arranged physically [34]. Its ease of use and tailorability has driven its use as a collaborative tool in organizations [54]. An analysis of paper use in hospitals, for example, finds that paper continues to persist primarily due to familiarity, ergonomics, and institutional inertia [16].

From a design perspective, these studies suggest that instead of replacing paper, we need to think of ways in which digital and non-digital artefacts can be interwoven [54, 59, 10, 35]. As Sellen and Harper argue, the continued use of paper is often a result of digital systems inadequately supporting existing work practices, leading to actors using paper-based workarounds [54]. Finally, paper is cheap, predictable, familiar, and easily enables writing and annotation [13].

Paper in Resource-Constrained Settings

HCI research in resource-constrained environments (the HCI4D and ICTD communities) has similarly focused on designing technology aimed at minimizing and not eliminating paper use because paper is cheap, predictable, familiar, and easy to annotate [9, 13, 12, 20, 46, 47, 56]. Additionally, in low-income and low-literacy populations, the physicality and materiality of paper provide documents a perceived value and allow people a semblance of control and ownership [20].

However, interventionist HCI4D and ICTD scholarship deploys a narrowly conceptualized understanding of the end-user that typically excludes government officials. Researchers have focused on two sets of stakeholders: end-user beneficiaries of interventions; and community-based or non-governmental development organizations who implement interventions. This focus is understandable and justified, because end-users stand to gain the most, and because organizations are most able and willing to partner with researchers.

Government officials and other actors internal to bureaucratic contexts implement and work with new systems of technological governance. By under-representing these stakeholders, HCI ignores the opportunity to inform large-scale and high-impact state initiatives. HCI scholarship that does study bureaucratic governance retains the near-exclusive focus on end-user beneficiaries and non-governmental actors when it comes to design implications and impact evaluation (examples include [61, 49, 43, 19, 57, 7]).

Government officials and bureaucratic contexts have received significant attention from anthropologists of the state (see e.g., [21, 26, 51]), but their work is primarily theoretical in nature and does not seek to inform intervention design. Studying the paper-to-electronic transition in the Indian public distribution system (PDS),[1] anthropologist Ursula Rao finds that ration shopkeepers "have been degraded from writing subjects to computer clerks" [51]. In the paper-based system, shopkeepers are subjects endowed with the authority to make decisions about and attest to the provision of ration, i.e., "writing subjects." But the new biometric PDS systems reduce shopkeepers to mere citizen-to-system interfaces who enter information into a system and have no say in decision making, i.e., "computer clerks." Rao argues that this disempowerment plays a big role in making ration shopkeepers ensure that paper continues to persist in abundance in the ostensibly paperless PDS system, and uses this scenario to illustrate "the manufacture of transparency at the end-user point of the chain" (pg. 130) with a specific investment in media studies and science & technology studies [51].

We draw upon Rao's work and extend it by surfacing implications for intervention design. We also take seriously Matthew Hull's recommendation to expand the focus of our analysis beyond people and systems, and include the technical infrastructure and processes intended to replace paper [26, 25, 27].

[1] The Indian Public Distribution System, based on the National Food Security bill, entitles citizens below the poverty line to subsidized food and other provisions. These supplies are distributed through ration shops. See [51] for more.

BACKGROUND AND CONTEXT

CM Helpline

The CM Helpline is an initiative of the government of Madhya Pradesh, a large state in central India, aimed at making grievance resolution and information about state-run benefits programs seeking easy to access, accountable, and importantly, *paperless*. Citizens can seek information and register complaints via a toll-free telephone line backed by a 300-person call center. Complainants can track the status of their grievance by calling the telephone line or using a web portal.

In registering a complaint, helpline staff enter it into a state-wide software system, and assign it to one of over 9000 government officials spread across 56 state departments for resolution. Officials receive a text message on their registered phone number when a complaint is assigned to them, and are responsible for addressing complaints and providing status updates via a special official-facing telephone line or web portal. Complaints that remain unresolved for over seven days are automatically escalated to an official one level higher in the same department and region. Once a complaint receives a resolution from the assigned official, a CM Helpline operator calls the complainant to ask whether they are satisfied with the resolution. In case of dissatisfaction, the complaint is re-opened and escalated to a higher level official; and so on, until the complainant is satisfied or a senior official exercises their discretionary power to force close the complaint. See [39] for a detailed description of the CM Helpline and its operation.

From 2015 to 2019, the CM Helpline received over 6,500,293 complaints, of which 6,110,275, i.e., 94% have been marked resolved [58], roughly 70% of which are reportedly resolved with complainant satisfaction and 20% through force closure [39]. The high success rate of the CM Helpline deserves acclaim because Madhya Pradesh has some of India's most underdeveloped districts, especially since helpline usage trends are fairly consistent across urban and rural areas [39].

Good Governance

The CM Helpline is perhaps the largest in a spate of e-governance initiatives started under the "good governance" banner in India. Based on a comparison of democracies in the Global South to liberal democratic governments in the Global North, the good governance agenda operates on two levels: 1) on the bureaucratic level, the agenda advocates managerial techniques to simplify and decentralize administrative procedures; and 2) on the political level, it advocates the inclusion of non-state actors such as NGOs and private companies for transparent and accountable governance [38]. International development agencies such as the United Nations Development Programme, the World Bank, and the International Monetary Fund have spearheaded this agenda as the solution to problems in the developing world since the 1990s, often making aid conditional upon its adoption [38].

The good governance agenda is techno-solutionist and universalist [38]. The techno-solutionism is evidenced in the fact that improving governance in the developing world is tackled through technological change and not social change. Madon finds that both policy circles and academic literature unquestioningly buy in to this techno-solutionism, measuring the impact of e-governance interventions "in terms of static outcome parameters focused on efficiency and cost-reduction rather than on improving living conditions of communities in the developing world" [38]. The good governance agenda is universalist because it fails to recognize the sociocultural and historical specificities. For example, it does not recognize that Global South economies might require solutions that differ from those in the Global North, such as "economic institutions that privilege investment rather than innovation" [38, 29]. Further, by doing away with local intermediaries, the agenda removes a key resource used by people in the Global South to access public service delivery and information [38].

The CM Helpline exemplifies the good governance agenda. It is run as a public-private partnership, with day-to-day call center operations outsourced to a private IT firm. Further, it seeks to decentralize the work of grievance redress through a call-center that assigns complaints to individual officials in various departments. It does so using a technological solution: toll-free telephone lines, a state-wide electronic database of complaints with inbuilt status tracking mechanisms. Finally, it retains a managerial focus on "efficiency and cost reduction" [38] in measuring outcomes rather than benefits to society [39], similar to what Irani calls the "calculative work of decentralized governance" [29].

Bureaucratic Governance in India

Since colonial times, paper has been the primary medium of governance, and writing the main task of bureaucratic officials in South Asia [26, 21]. Anthropologist Matthew Hull writes that the reliance on paper and writing as tools of management arose in the practices of the British East India Company circa 1600. The Company employed commercial agents who often ran their own business in addition to working for the Company: paper-based artefacts such as receipts and notes helped demarcate Company business from unrelated work and could be sent back to England for verification. The Company thus very intentionally constructed a "social organization constituted by the movement of paper" [26] to rule from afar. As the governance of India changed hands from the Company to the British government, these legacies were carried forward into colonial India [26]. Anthropologists find that it is hard to overstate the continuities between colonial era practices and present-day governance: for example, triplicate forms (creating three copies per form) still used across India are a legacy from twelfth century Britain [21, 26].

Anthropologist Akhil Gupta cautions us against seeing writing as separate from the real work of governance: "as long as writing is seen as important only, or mainly, for the functions it performs, as that which accompanies or follows real actions and real decisions, and not as an action in itself, it is hard to understand the proliferation of documents. One has to shift attention away from writing's instrumental function in helping run the government to its constitutive role as that which defines what the state is and what it does" [21]. That is, instead of merely recording what happened, *writing constitutes the state and "is the main activity that takes place in bureaucratic work"* [21].

Gupta writes further that the file is "the critical unit that organizes bureaucratic life" [21]. In grievance redress, for instance, each complaint is associated with a file. The file contains printed copies of the original complaint, a report of the action taken, records of investigations conducted, their results, and any decisions taken. The official to whom a complaint is assigned begins by assembling such a file (or procuring it, in case of an old complaint). Working on a complaint consists of adding to this file by generating more written documents. One such addition could be an official letter for instance: in this case, the official dictates the letter to a typist. The typist types up a draft for review by the official. The official reviews and finalizes this draft, and then has it sent to the concerned party and includes a copy in the complaint's file. Indian bureaucrats are appointed to posts for fixed terms and routinely transferred to different places and posts. In this system of routine transfers, therefore, the file is vital to carrying forward work that another official may have begun [21].

We take seriously Matthew Hull and Akhil Gupta's suggestions, maintaining a focus on the centrality of writing and the colonial legacies of paper documents in our analysis.

METHOD

This paper is grounded in ethnographic fieldwork conducted at the CM Helpline in January 2015, consisting of 50 hours of direct observation, 14 semi-structured interviews (6 helpline staff, 8 government officials) and several informal conversations with helpline staff and officials recruited through insider referral and snowball sampling.

Interviews were conducted in Hindi, the primary language spoken in Madhya Pradesh. However, the difference in dialects between the interviewer and the participants made the outsider status of the interviewer very apparent. As we describe in more detail in the findings, access was a significant challenge and was shaped by their perceptions of the first author. Ethnographic access is an ongoing process [22], and here it was continuously shaped by various constructs including caste, class, and how the interviewer personally positioned themselves. Through the dynamics of access, we were also able to gauge the role of power and trust in everyday organizational life, along with how it shaped social relations.

Most interview participants, as employees of the government and/or the private firm that runs the helpline's call-center, were not comfortable being audio recorded or photographed. Instead, we took quick jottings and detailed notes during interviews depending on participant comfort. We converted jottings and notes into longer-form transcripts immediately after the interview, doing our best to reflect participants' words and voices. We shadowed CM Helpline staff during 40 phone calls from both the citizen-facing and official-facing lines. We wrote field notes after every session of data collection.

Our original intent was to understand the inner workings of a large state-run grievance redress helpline. The continued and abundant presence of paper alongside the CM Helpline's enthusiastic push towards digitized and paperless governance, however, haunted our data collection in many ways and inspired this article. Interviews and field notes were analyzed using inductive coding, followed by data sessions involving both authors. We wrote analytic memos during data analysis. We triangulated findings by comparing observations from different field sites (e.g., the helpline call center vs. officials' workplaces), and by presenting early findings to other researchers engaged in ethnographic research on e-governance initiatives in other parts of India, to examine the validity and applicability of our findings to their field experiences.

We present findings in the form of *ethnographic vignettes* that describe representative fieldwork scenes from the first author's perspective [40, 17]. Vignettes are commonly used to present ethnographic data because they preserve both the context and the chronology of events surrounding participants' quotes, thus painting a "holistic cultural portrait of the social group that incorporates both the views of the actors in the group and the researcher's interpretation" [11]. An analytical summary follows each vignette. We present lightly edited quotes for readability and use pseudonyms for anonymity.

Reflexivity, access, and ethics

The first author conducted data collection and analysis while the second author contributed to argumentation and writing. The first author is an upper-caste, middle-class, assigned-female Indian graduate student who has previously studied citizen journalism in central India. The first author presented female during fieldwork, but now identifies as nonbinary and uses they/them pronouns. The second author is a middle-caste, middle-class, male Indian early-career academic with over 6 years of ICTD and HCI research experience in India. Our bureaucrat participants were middle- and upper-caste (prior research has found this historically true of Indian bureaucracy in general [29]) and male. Helpline staff were lower-to-middle caste and relatively gender-balanced; however as is common in such settings, more women worked the day shifts and more men the night shifts.

Both authors are native speakers of Hindi. However, the first author's Hindi, inflected by an upbringing in west India, differed in accent and vocabulary from the Hindi spoken by helpline staff and bureaucrats who were largely from north and central India, marking them an outsider.

We received initial permission to conduct fieldwork by cold-calling high-level bureaucrat Officer5; however, we never met this bureaucrat in person and he was not a key informant. Curious about the access given to a young unmarried female-presenting outsider (we were the first researchers to visit the helpline), helpline staff initially assumed a familial connection with Officer5. The first author explicitly told interviewees that they were employed by an independent research organization and bore no connections to officials. Three interviews conducted during this initial confusion were discarded. We reflect on this confusion and include an ethnographic vignette (Vignette 3) to make explicit our research process and the patriarchal and hierarchical nature of Indian bureaucracy.

Once participants realized that the first author was not related to superiors, they spoke more freely. For example, helpline staff explained the situated meaning of the polysemous term '*nirakaran*': at the helpline, this refers to the resolution of

a complaint, not its cancellation or refutation. Participants consented before each interview; interviews were conducted in private; and participants were offered every opportunity to decline or suggest changes: e.g., most opted out of audio recording during interviews, preferring written notes.

Our familiarity with Madhya Pradesh as a field site and e-governance as an area of study is supplemented by the first author's year-long engagement as software developer, researcher, and participant-observer with CGNet Swara, a citizen journalism platform in central India, including close interactions with its leadership and staff, who regularly deal with government officials [42].

THE ABUNDANCE OF PAPER IN E-GOVERNANCE

The CM Helpline is promoted as a model e-governance initiative highlighting the promise of electronic systems in helping governance become paperless [58]. During fieldwork, however, we observed that *paper was present in abundance and was often the primary medium used in grievance resolution*.

This abundance of paper manifested in several ways: first, officials conducted the actual work of grievance redress on printed copies of complaints and used the CM Helpline's web portal only to update complaint status. Second, even supportive officials felt overburdened, powerless, and mistrusted by the CM Helpline and favored the traditional, interpersonal, paper-based system. Finally, after the researcher's outsider status became known to officials, we were denied access to the field site and required to submit a printed letter in place of our earlier email and telephone correspondence.

This was not an exception. The officials who contributed to the abundance of paper were not disillusioned low-rung officials, but mid-to-senior bureaucrats who championed not only the CM Helpline and its paper-to-electronic transition, but also the chief minister and the political party who spearheaded the helpline. We present representative ethnographic vignettes from our fieldwork to illustrate this phenomenon. All vignettes are written from the first author's perspective

Vignette 1: Paper as relational and evidence of work

This vignette demonstrates that government officials use paper to relate legacy systems with the CM helpline, to maintain existing routines, and as physical evidence of their work.

Vignette

Staff1, assigned to introduce me to CM Helpline officials, took me to Officer3, who the nodal officer for the education department and head of the information technology department for a major university. As nodal officer, Officer3 was responsible for tracking, resolving, and reporting on all complaints assigned to officials within the education department.

Staff1 was particularly enthusiastic about Officer3 because he was an intelligent and invested bureaucrat who regularly advised the CM Helpline software team on the design and architecture of its web portal and backend. Discussing his views on the CM Helpline, Officer3 said:

> *"I think the CM Helpline has a great thought behind it. The system itself is great. We check [the web portal] daily. Our Level 1 official is actually an administrative person, who looks at the complaint, prints it out, and sends it to the right section, for example, exam section, scholarship section, and so on, for processing."*

The mention of printouts caught my attention, so I asked Officer3 to explain what happened next. He continued:

> *"We have manual registers that we use to maintain complaints. The Vice Chancellor's office has always had a filing system, so the Level 1 official writes the number of the complaint from the filing system onto the CM Helpline printout and then circulates it."*

When I asked him how officials from the various sections update complaint status in the CM Helpline system once a resolution (or otherwise) has been made, Officer3 said:

> *"Oh no, officers never type... their typists or stenographers type."*

That is, once complaints are resolved, the printouts are handed to typists employed by the education department, who update the CM Helpline web portal. Intrigued, I asked Officer3 what happened to the printouts after that. Gesturing to piles and piles of bundled papers stacked on top of cupboards behind him, Officer3 said:

> *"Yes we maintain all our complaints, look that's the stack of past complaints."*

But why were these physical copies necessary, particularly for complaints that had already been resolved, I asked. Officer3 continued:

> *"The [CM helpline] system or the internet goes down sometimes. Also, this is a physical office, so in case a complainant visits in person and asks for proof, or if the [CM Helpline] system is retired in future..."*

Officer3 did not complete the sentence. My interlocutor Staff1 chose Officer3 in particular because to him, Officer3 was the epitome of the ideal government official: someone who loved the CM Helpline, who was very knowledgeable, who had significant experience in both online and offline grievance redress, and had helped design the software system for the CM Helpline. Officer3 was a champion and believer of the system and part of its design and implementation.

Analytical Summary

This vignette shows that even an official who played a role in the design and implementation of the CM Helpline used printed paper copies of complaints within his own department. This was due to several reasons: first, paper helps relate the legacy filing system used by the education department with the newer state-wide CM Helpline. Second, paper helps maintain the existing work routines and hierarchies within the department: typing is done by stenographers and typists, officials continue to engage in the discretionary and decision-making work of grievance redress. Third, the physicality of the bureaucrat's own office combined with unreliable technological infrastructure means that physical evidence of work is a necessary accompaniment to the online CM Helpline.

Vignette 2: Poor verification and accountability online
This vignette shows that the CM Helpline's implementation made officials feel overburdened, powerless, and that the new system had little faith in them.

Vignette
Sipping tea in an air-conditioned Bhopal office, Officer4, branch manager at a state-owned bank, was fairly eager to talk to me. He kept repeating that the CM Helpline is well-intentioned but plagued by insufficient verification of complaints and a lack of accountability for the complainant. Officer4 explained:

> *"I think the CM Helpline has a great thought behind it, but there is absolutely no verification done before complaints are registered. Maybe 25% of the cases are genuine. In one case, a person complained saying they didn't know whether their account had been opened under the correct scheme. So, they filed a complaint instead of checking with the bank. It seems someone asked them whether their account is under the Jan Dhan scheme and they didn't know, so they complained. If you open an account under a certain scheme, it will be opened under that scheme! You can't file a complaint because you don't know. The CM Helpline is good but this kind of misutilization shouldn't happen. Many times people make a mistake while filling a form or filing an application but complain against us!"*

Officer4 was not entirely correct: callers to the CM Helpline register grievances in conversation with helpline staff, and helpline staff receive special training to get to the heart of the matter within the first minute or two of the call. This includes helping callers articulate what the complaint really is about, getting the necessary bits of information, and so on.

Nevertheless, Officer4's objection is valid: helpline staff's interactive articulation work is insufficient because helpline staff have neither the access nor the authority to verify whether, say, a bank account was opened under the right scheme. Similarly, helpline staff cannot decide whether a given problem arose due to a form-filling mistake by the complainant or due to negligence on part of the official.

To make things worse for officials, grievances are considered resolved only with the consent of the complainant: "the complaint remains open until the complainant says they are satisfied." Echoing Officer4, another officer Officer3 from the education department said:

> *"For example, a student complains that he is not being allowed to appear for an exam. We often find that the student didn't fill the exam form before the deadline, so our resolution informs them of that and says they can try next time. But the student refuses to say they are satisfied with the resolution and the complaint hangs around, unresolved. [...] Students should try applying to us first before registering a grievance with the helpline. For example, if your mark sheet is wrong or missing, come talk to us, submit the necessary forms and try at least, before calling [the helpline]."*

The paper-based system that was in place prior to the introduction of the CM Helpline was designed to handle this issue: the complainant would have visited the department in person and filled up a paper-based grievance form. This ensured that the official – who has both the access and authority to decide whether a complaint is valid and contains the necessary information – would be central decision maker.

In reducing the interpersonal nature of grievance redress, officials think that the CM Helpline allows complaints that are not really grievances or complaints that would be resolved faster had the complainant contacted the official directly. However, officials are expected to resolve all grievances, including faulty ones, to the satisfaction of the complainant. Thus the introduction of the CM Helpline has led to officials feeling overburdened and unheard. Officer3 describes:

> *"The complaints are often an unnecessary burden on us, mainly because of the lack of verification. So officials are now accountable for everything but there is absolutely no citizen accountability. Sometimes the complaints don't have the required information. For a mark sheet application, for example, we need to know at least the course, the semester, the year of study, etc. Complaint attributes are so specific and vary so much across departments, that there are often missing fields. There are more than 300,000 students under our department. Imagine if all of them start filing complaints! The helpline is free and phoning in is easy. There's absolutely no accountability on behalf of the citizen. If the complaint is faulty, it could be a waste of our time and effort. The CM should listen to the officers' part of the story as well."*

Finally, the faceless nature of the interaction enabled by the CM Helpline means that officials must seek help from intermediaries who are often unavailable in case of difficulties. Officer3 laments: *"if we have any difficulties, they've given us a phone number to call, but no one is available to talk. Whom do we talk to at the CM Helpline?"*

Analytical Summary
Insufficient verification of complaints, limited accountability for complainants, and the faceless nature of the CM Helpline led to officials feeling overburdened and powerless. Further, officials felt that the new system and its designers did not have faith in them. A paper-based system, while inefficient in parts, encouraged face-to-face interactions and helped build an offline "common information space" [53] between officials and complainants that assisted the interpretive work required to redress grievances. Thus, officers were both the human mediators and decision makers in this process.

The introduction of the new CM Helpline disrupted existing processes, limiting officials' role in decision making and in mitigating potential complexities. CM helpline operators are limited in their ability to verify complaints to the level desired by officials: operators do not have physical access to complainants to verify documents, and operators do not have the state authority to verify whether the complainant actually filled out a necessary form. Therefore, officials must conduct an additional layer of verification even after complaints have

been verified by helpline operators. Further, instead of only reporting to superiors, officials must interface with (and report to) helpline operators who are unknown, lower-ranked, less-educated, and unseen by the officials. Finally, with the CM Helpline, officials must participate in a "customer service" model of governance, where the citizen's satisfaction is the goal (as opposed to the earlier focus on due diligence).

Vignette 3: Mundane and symbolic uses of paper

This vignette describes the mundane, everyday uses of paper in everyday bureaucratic practice and how it is imbued with symbolic meaning: it is the preferred medium for official work and it can be used as a delaying tactic for outsiders.

Vignette

I was three days into fieldwork. I had been treated with the utmost respect: I was granted access to internal CM Helpline demos and presentations, and even biweekly presentations of summary statistics that helpline officials make to the chief minister. I had been given an in-depth tour of the call center facility. I was allowed to conduct long interviews (without permission to record, as is usual in bureaucratic settings) with the bureaucrat heading the CM helpline, the leadership of the private business process outsourcing (BPO) firm in charge of day-to-day call center operations, and even the chief of the executive state department in charge of the CM Helpline.

As a junior researcher with no personal helpline contacts, I was puzzled by this extreme deference and unrestricted access. I thanked my lucky stars and assumed it was because I was working for a well-known research organization at the time. And then, during a casual conversation, a helpline staff member asked me how I was related to Officer5, the head of Madhya Pradesh's information technology department.

Surprised, I said I was not related to Officer5 at all. After not receiving replies to emails for over a month, I had essentially spent two weeks calling his office for the chance to talk to him. Officer5's secretary eventually grew fed up of me and had him return my call at 7pm one Friday evening, during which he agreed to let me visit the CM Helpline. To this day, I have no idea why they imagined I was related to him.

As soon as helpline officials realized that I was no personal relation of their boss's boss, my field access dropped from firehose to zero. I was asked to provide an official letter from my employer requesting access to the helpline facility and promising fair use of any data I collected. I was not allowed to enter the helpline facility for the next two days as my bosses in a different Indian city scrambled to put together the letter.

We emailed the letter to Officer1 one day after I was asked for it. I asked my interlocutor Staff1 when I would be given access again, eager to resume fieldwork. He smiled and said:

> *"Sir [Officer1] is going out of town via train on some official work. You'll have to wait for him to come back."*

But he can check his email on his smartphone, surely, and give you permission via email, I asked.

> *"Sir [Officer1] does not check his own email."*

What does he do then, I asked.

> *"His secretary prints out emails and hands them to him."*

I was taken aback. Officer1 was the bureaucratic and administrative head of the CM Helpline, an initiative considered the ideal prototype of paperless e-governance. There was a computer at his desk, he was reasonably tech-savvy, and I knew from interviews and observation that he was fully supportive and indeed proud of the helpline being fully electronic.

But Officer1 himself worked only on paper. I was puzzled. I wrote a memo, filed it away in my head, and carried on with fieldwork. Later I realized that Officer1 himself had not used paper when cutting off my access to the field, but had required a hard copy letter from my employer as a delaying tactic and as safeguard against misuse of the data we collected.

Analytical Summary

This vignette illustrates that even tech-savvy officials prefer working on paper in everyday bureaucratic practice, including official correspondence over email. The semiotics (or meaning) of paper, however, vary by context and use. Here officials project their lack of trust of outsiders to the paper, selectively deploying it as a symbolic hurdle. We thus see how they imbue meaning to a paper document that is independent of its form and materiality, using it as an exclusionary tool that impedes and delays access to the bureaucratic sites.

DISCUSSION

The HCI4D and ICTD communities have frequently found that technological interventions fail to deliver because technology is but an amplifier [60]. That is, when systems are not well-received, the reason is either that the infrastructure or organizational backing necessary for success is not in place; or that there is a lack of human intent or capacity, i.e., those implementing the system aren't fully trained or invested in it or are in some way resistant to change. But in the continued persistence of paper in the CM Helpline, the reasoning is not so straightforward: it has good technical and organizational support along with committed government officials. Indeed, this continued dependence on paper in e-governance is not specific to the CM Helpline: anthropologist Matthew Hull reports a similar story from the 181 Police Helpline in Punjab. In fact, due perhaps to the seriousness of complaints involving the police, the police helpline additionally mandates that officers submit a hard copy report for each complaint that they resolve, documenting the exact actions taken [28, 48].

This section makes three arguments: 1) CM Helpline officials use paper due to affordances that are well-known to the HCI community: cross-referencing between multiple systems, control, visibility, and permanence. 2) Officials feel overburdened and disempowered in the new system, and in response, continue to work on paper within their own departments. 3) This is a problem because the persistence of paper facilitates arbitrariness in bureaucratic decision-making that negatively impacts marginalized people.

Sometimes, paper just is better

Our paper confirms that there are certain tasks where paper is simply better as a tool. Paper is cheap, predictable and easy

to use, making it especially suited for low-constrained environments [13, 55, 46]. Further, paper documents are familiar and allow "natural inscriptions" [20], i.e., they can easily be annotated or marked up. In the CM Helpline, this enables easy cross-referencing between internal or legacy systems and external or new software systems. Paper copies allowed the education department, for example, to cross-reference between the Vice Chancellor's existing filing system and the newer CM Helpline system, without disrupting longstanding and habitual workflows that depend on the legacy filing system.

The visibility and control afforded by paper gain special importance in the CM Helpline, because it provides the illusion of guarding against the tinkering of electronic records by potentially disgruntled or corrupt colleagues and complainants. Paper documents have perceived value and permanence that electronic data do not have [20, 51]: for CM Helpline bureaucrats, situated in a system of changing political climates and chief ministers, the materiality of paper guarantees long-term persistence in case the CM Helpline is retired in future.

While prior work on the persistence of paper has focused on low-income low-literate end-users and employees of development organizations, we confirm that this holds true even for middle-income and highly-educated officials in bureaucratic contexts. Importantly, these affordances are not unique to paper, and we recommend that researchers explore other materials that are similarly cheap, predictable, and easy to use (see, e.g., Ghosh et al.'s paper-technology spectrum [20]).

Paper persists in response to a loss of power

The previously-discussed affordances of paper are necessary but not sufficient to explain its continued persistence in the context of the CM Helpline. We draw upon anthropologist Ursula Rao's theorization to argue that the move from paper to electronic systems entails a loss in power for bureaucrats, and that this disempowerment helps ensure that paper remains abundant, often thanks to the very people charged with implementing the paper-to-electronic transition [51, 50].

Rao finds that in the pilot implementation of paperless PDS systems in Delhi, ration shopkeepers "have been degraded from *writing subjects,*" endowed with the authority to make decisions about and attest to the provision of ration, to mere *"computer clerks"* who enter information into a system and have no say in decision making [51].

The CM Helpline reduces officials from *decision-making subjects* who delegate work, to mere *typing subjects* to whom tasks are allocated by unknown others, in two ways. First, government departments in India have historically employed and continue to employ full-time typists and stenographers. Hence, officials typically receive printed material to work on from administrative staff, delegate work to junior officials, and dictate instructions to typists. Instead, the CM Helpline requires officials to access the helpline portal using their own computers and to type up complaint resolutions themselves.

Second, government officials traditionally received complaints directly from citizens or had complaints assigned to them by superior officials. In the CM Helpline, call-center operators choose the department and district code in the process of registering complaints, thereby deciding which official each complaint gets routed to. The CM Helpline portal does not display which call-center operator (out of 300 total operators) registered a particular complaint. Officials thus receive complaints from remote and unknown operators. Thus, the CM Helpline disempowers officials by expecting them to carry out tasks traditionally reserved for lower ranks and by having them receive work orders from unknown third parties.

Rao's shopkeepers responded to their disempowerment in ways similar to the CM Helpline bureaucrats: shopkeepers resort to paper and writing to maintain their own records of ration transactions independent of the electronic system, in a paper register that remains with the shop and in printed paper booklets that citizens retain. Writing was a way for shopkeepers to retain a sense of power and control. Paper-based records also created a local memory that shopkeepers used as proof of work done [51]. Similarly, as seen in vignettes 1 and 2, CM Helpline officials used paper records to guard against temporary lapses in technical infrastructure, to retain their position in the officer-typist hierarchy, and to serve as evidence of work done.

Why does this happen? Why do CM Helpline bureaucrats and ration shopkeepers alike respond to the paper-to-electronic transition by continuing to work on paper? In both cases, this refusal is not because internal actors lack faith in the new system, but in fact, because the new system does not (and by implication, those commissioning or designing it do not) empower or have faith in the internal actors. That is, new systems not only disturb existing routines and enforce new ones, but also call into question "the facticity or truth value of shared knowledge systems" [51].

The CM Helpline, for example, expects government officials to resolve every incoming complaint within seven days without first verifying whether the complaint is valid or whether it is simple enough to be resolved within that time period, meaning that officials now have to do additional work within an already-restricted time frame (see [39] for a detailed discussion on the restrictions imposed by such a time frame). That is, the CM Helpline heeds neither the officials' integrity nor their expertise in grievance redress.

When faced with these new electronic systems, and in the absence of predictability and familiarity [36], internal actors are asked to take "active leaps of faith" within the socio-political contexts they function in [41, 33]. In both the CM Helpline and Rao's PDS case study, electronic systems are intended to enhance traceability and accountability, and reduce corruption; with the ultimate goal of reducing the structural arbitrariness of the modern bureaucratic state and ensuring that citizens receive the benefits they are due.

But in their rush to fix problems, new technological systems (and by implication, their designers) both disempower and refuse to have faith in the internal actors that are tasked with carrying out the paper-to-electronic transition. Ignored, disempowered, and mistrusted, these internal actors, viz. government officials and shopkeepers, respond by holding on to

the cheap, predictable, physical, familiar, and performative medium of paper, ensuring that it persists in abundance.

Paper often contributes to structural violence

In the CM Helpline, paper persists in part due to its affordances; and in response to a perceived disempowerment of government officials. This section critically analyzes these affordances, arguing that paper became the primary medium of Indian bureaucracy only under colonial rule and that paper might contribute to structural violence.

The comforting familiarity of paper in bureaucratic contexts makes us forget its historical contingency: Indian bureaucracy would not necessarily have evolved to rely on paper if India's colonial masters had not chosen to put in place and leave behind a "government of paper" [26]. Paper feels natural, familiar, and appropriate in modern-day Indian bureaucratic contexts primarily because it was enforced as a technology of governance under British rule. Using paper for detailed record-keeping created bureaucratic trails that could be gathered together, tallied, and sent back to England for verification and oversight, helping rule India from afar [26, 51].

This colonial-era routinization of paper-based bureaucratic practices resulted in paper serving as the ideal medium to enact the "structural violence" of the modern bureaucratic state [21]. In naming it structural *violence*, neither Akhil Gupta nor we intend to demonize individual bureaucrats; indeed, the officials we met during fieldwork were often sincere, hard-working, and invested in their work. By "structural violence," Gupta refers to the "repeatedly and systematically [...] arbitrary outcomes in [the] provision of care" [21] in modern bureaucracies. That is, the modern bureaucratic state positions itself as a rational decision-making entity, but fails to deliver on its promises to the needy with an unpredictable regularity, and ensures that officials are underpaid, overburdened, and blamed for the corruption of the whole system.

The physicality of paper means that it very literally *circulates*, reflecting the reality of work being done, and in some cases, sustaining the illusion thereof [32]. That is, paper does not need network analyses – neither from information theory nor actor-network theory – to convince onlookers – superior officers, coworkers, and citizens alike – that work is being done, that the bureaucracy is doing its due diligence. Paper is right there, visibly inscribed upon and performatively circulating, for anyone who cares to look. Moreover, paper is both a technology of representation and the result of that representation [31, 37]. Therefore through its very existence, paper proves that work is being done. It is this dual role that allows paper to be co-opted into the arbitrary structural violence of bureaucratic decision-making against those least able to counter it.

Thus emerges a cyclical power dynamic in the bureaucratic transition from paper to electronic systems: 1) paper has several affordances that potentially made it a good choice of medium for governance in colonial times; 2) however, paper contributes to structural violence against the disenfranchized; 3) hence, those in power put their faith in new electronic systems to alleviate the structural violence. But in the process, they snatch paper and power away from internal actors charged with caring for and working with the new systems; and 4) this makes internal actors hold on ever harder to paper.

To summarize, it is primarily physicality and historical contingency that make paper seem uniquely suited to bureaucratic contexts. In fact, the persistence of paper sustains arbitrary and unjust outcomes in governmental service delivery. Electronic systems such as the CM Helpline have the potential to visualize this arbitrariness [51, 61]. Hence, we turn to implications for the design of better e-governance systems.

IMPLICATIONS FOR HCI

The physicality and familiarity of paper are affordances for end-users, but they also allow paper to serve as the ideal medium to enact the structural violence of the modern bureaucratic state. Further, electronic systems intended to alleviate this violence ignore, disempower, and have little faith in the internal actors, e.g., government officials, who work with and are therefore crucial to the success of these paperless systems. Treated unjustly, these internal actors respond by holding on to paper, ensuring that paper (and by implication, structural violence) persists in abundance.

What, then, are we to do? The challenge is particularly difficult in development and resource-constrained contexts, complicated as they are by colonial pasts, postcolonial presents, poor infrastructure, and social support; where the difference between receiving ration versus not can be one of surviving another day versus starving. As critical scholars, we believe that to a certain extent, every way we respond to the *what to do* question is doomed from the start. But the answer is not inaction, because HCI as a community is non-innocent and implicated in this question [23]: our designs, implementations, evaluations, policies, practices, and theories all center around interventions. We provide three suggestions for responsible system design in bureaucratic contexts.

Design for graceful integration and retirement

Designers should aim to make the transition between e-governance systems easy for both internal actors and end-users, and recognize that new systems will co-exist with the existing ecosystem long past the planned transition period.

The CM Helpline is not designed to integrate gracefully and co-exist alongside older systems: every registered complaint is assigned an identifier that only makes sense to the helpline's software system and has no significance outside it. As we saw in Vignette 1, the education department has always used an internal filing system with its own set of unique identifiers, and officials have developed a well-oiled workflow around it. With the introduction of the CM Helpline, officials have to additionally maintain a manual register that cross-references between the old filing system and the newer CM Helpline system. Despite this extra work, we heard no mention of transitioning away from the obsolescent filing system, perhaps because too much depends on it. That is, the older filing system was not designed to be retired gracefully.

The CM Helpline could be redesigned for graceful integration by providing customizable form fields in the helpline's data model that allow cross-referencing with legacy filing systems.

Further, the CM Helpline should allow data to be stored and accessed locally by individual departments, so that past records remain available even when the internet goes down. The legacy filing system could then be gracefully retired by digitizing older records into the CM Helpline system.

Design for generosity

In making the transition from a paper-based system to a new electronic system aimed at replacing or minimizing paper, internal actors responsible for implementing and working with for the new system are asked to abandon well-rehearsed routines and longstanding systems, and transfer their faith to a new and unfamiliar system, establishing new routines or integrate new systems into existing routines. System designers should recognize that such work is demanded of all actors in the ecosystem, including government officials and citizens.

In light of this recognition, we as designers need to be as generous with people as we are with our machines. We know and accept that machines usually work but occasionally fail, and so we build fault tolerance into our systems instead of blaming the individual machine that fails because there are so many machines that a few failures do not matter in the larger scheme of things, even the odd machine that takes an entire sub-network down with it. Computer networks, for instance, are explicitly designed to expect, tolerate, and keep working despite a certain percentage of mistakes using strategies such as network redundancy and message encryption.

Similarly, we should build e-governance systems that can tolerate mishaps. Officials and ordinary citizens are both human beings: fallible in addition to often being overworked and underpaid. As a result, they sometimes fail: they forget, cheat, or steal; especially when the stakes are high, and there is a lot of external pressure. The CM Helpline could incorporate this generosity by improving the verification of complaints and providing officials a flexible time window corresponding to the severity of the issue for complaint resolution. The helpline could periodically share complaint resolution data with disinterested third-party auditors. This would discourage misbehavior and identify officials who delay resolution.

Attend to sociocultural and historical specificities

Technological solutions have often "aspired to universality" [15], built on assumptions that are generalized and global, rather than focusing on the local details that shape technology adoption and use. In this article, we show that the persistence of older technologies, such as paper, is often a consequence of deeply sociocultural and historical practices. For example, paper has been the primary medium of governance in South Asia since colonial times: writing is the main task of bureaucratic officials, typically by annotating existing paper documents and dictating new documents to typists. Data entry is handled by typists and other lower-level functionaries. These documents are maintained in department-specific paper-based archival filing systems [26, 21, 51].

New e-governance systems such as the CM Helpline do not account for these specificities and are therefore unable to handle issues that older paper-based systems had often created workflows to handle. These workflows, often implicit in nature, were socio-technical solutions that had evolved over time and were shaped by local resources and constraints. The CM for example Helpline expects officials to abandon longstanding paper-based workflows and data entry labor practices in favor of an electronic, mostly paperless, remote, and centralized database system maintained by unknown helpline staff. With the result that officers continue to work on paper with legacy filing systems and typists, instead of interfacing directly with the CM Helpline. This results in less than ideal outcomes in new systems: the CM Helpline works best, for instance, for "day-to-day short-term complaints involving straightforward resolution," and not so well for longer-term, harder-to-resolve complaints that affect the most marginalized [39]. Where officials and citizen intermediaries had, over time, created paper-based routines to handle these marginal cases, the CM helpline falls short [39].

Pressured for time and biased by universalizing models of design, designers often ignore socio-cultural and historical specificities. In doing so, we ignore, for example, the colonial legacies of power and governance, the flexible practices of everyday work, and changing labor relations. We echo feminist and humanistic HCI research [2, 3, 62] to stress on the need to include local specificities consciously in our research questions, recruitment and sampling strategies, pilot studies, field trials, impact evaluations, and policy guidelines. Further, designers need to look beyond timeless ahistorical design paradigms; instead, studying how technology adoption and use is enmeshed in ongoing and historical power relationships, and in the case of the Global South, shaped considerably by colonial legacies.

CONCLUSION AND FUTURE WORK

This paper has sought to explain the continued persistence of paper in present-day electronic governance systems. We conducted ethnographic fieldwork at the CM Helpline, a large e-governance initiative in central India, finding that the affordances of paper are necessary but not sufficient to explain this phenomenon. Instead or rather in addition, we find that government officials hold on to paper in response to a perceived loss in power in this transition from paper-based to electronic systems. In doing so, we also bring to fore the experiences of a relatively important, but understudied population - the bureaucratic actors tasked with implementing and working with new technological systems in low resource contexts.

One question for future work is to examine whether this explanation for the persistence of paper also applies to contexts other than the CM Helpline. Another important question is whether the transition to electronic systems impacts the work roles and job security of typists and stenographers, whose labor has historically been feminized and considered not as important as that of the traditionally male bureaucrat.

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