E-Government Intermediaries and the Challenges of Access and Trust

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In this article, we present the results of a study examining challenges related to access and trust for nutrition assistance outreach workers and suggest design implications for these challenges. Outreach workers are e-government intermediaries who assist clients with accessing and using e-government online applications, systems, and services. E-government intermediaries are not typical end users; they use e-government systems on behalf of clients, and as such their challenges differ from those of primary users. We detail social and technical aspects of these challenges to develop a nuanced understanding of access and trust in the ecosystems surrounding e-government systems. First, we describe how the practical accomplishment of access involves multiple stakeholders, actors, and practices. Second, we highlight how trust emerges through the e-government intermediaries' work to project themselves as professional and competent through their technical practice. Last, we propose design implications sensitive to both the social and technical aspects of these challenges.

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1. INTRODUCTION AND FRAMING

Government services, including those aimed at reducing the negative impacts of poverty, are increasingly offered online [U.S. Department of Agriculture 2012]. Scholars and government representatives alike herald these e-government systems as creating unprecedented, transformative access to and use of government services (e.g., U.S. House of Representatives [USHR 2010]; King and Cotterill [2007]). Much of the literature on e-government suggests that these systems will transform the relationship between governments and citizens, taking advantage of new forms of interaction provided by the Internet to foster increased citizen participation (e.g., King and Cotterill

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[2007]; Torres et al. [2005]; Bannister [2010]). However, empirical verification of these assumptions has been limited. Our previous research indicates that the transformation of government services is a complex endeavor that does not happen without substantial invisible work by intermediaries, the individuals who assist others in gaining access to and use of these services [Dombrowski et al. 2012]. Intermediaries are crucial players in the e-government ecosystem, with a key role of bridging the gap between citizens and e-government services. Intermediaries facilitate access to e-government systems by advocating for government programs and services, providing technical assistance, helping clients understand the different avenues of available assistance, and offering long-term support. It is in part through the (often invisible) work of intermediaries that citizens are able to maintain productive relationships with government services over time. Nevertheless, intermediaries face many challenges in their daily practices of using e-government systems on behalf of others. In this article, we provide insight into these challenges and describe how intermediaries attempt to overcome these challenges in their daily work practices. We then highlight new opportunities for the design of technology that validate and foreground the important work being done by these previously unacknowledged "users" of e-government systems.

We present the results of a qualitative study of the challenges faced by one group of e-government intermediaries: outreach workers for a government nutrition assistance program. Our research focuses on *nongovernment* outreach workers supporting a particular government nutrition assistance program: CalFresh. These outreach workers are employed by community-based nonprofit organizations and assist applicants in accessing and navigating an e-government online application for federal nutrition assistance. We describe the social and technical aspects of the challenges that these outreach workers face as they facilitate access to and help applicants use this e-government service. Our findings suggest that the most critical of these challenges are neither the technical skills required to interact with the system nor problems with traditional conceptions of "access" to technology but, rather, challenges related to how access is negotiated as well as how trust is fostered and maintained.

Prior research investigating barriers to the adoption of e-government systems has notably focused on two populations: the end users (e.g., Nam and Sayogo [2011]) and the governmental agencies that administer services (e.g., O'Neill [2009]). In contrast, we focus on intermediaries as a critical but generally overlooked category, broadening our understanding of how online services are appropriated. We find that although some challenges faced by intermediaries are similar to those faced by end users, many are, in fact, unique to this population. These new types of challenges derive from the e-government intermediaries working with multiple stakeholders as part of local communities. The community-based nature of e-government intermediaries' work underscores the social and organizational aspects of working with e-government systems. E-government intermediaries are often the only viable source of e-government access, use, and support for those they serve. Thus, understanding the challenges specific to e-government intermediaries is essential for design that supports the breadth of ways in which access to a governmental service is achieved.

This article is structured as follows. We begin with a brief discussion of e-government systems, focusing on end-user challenges and the adoption barriers that plague these systems. Here we foreshadow the relationship between the challenges that end users face and those experienced by intermediaries. We then provide context for our research, including a description of CalFresh (the governmental program studied) and its online application system (Benefits CalWin). Our empirical findings, drawn from qualitative fieldwork with outreach workers, highlight two key challenges faced by e-government intermediaries: (1) how access to the online application is negotiated and (2) how

trust is created and maintained across multiple stakeholders. We conclude with a discussion of opportunities and implications for the design of e-government information systems.

2. RELATED WORK

E-government is the study of technology used to support internal government operations in order to engage citizens and enhance access to government services [Schneider and Bowen 2010; Dawes 2002]. Scholarship in this domain has traditionally assumed that e-government systems can and do benefit citizens by enabling radically new relationships between citizens and the state [Torres et al. 2005; Heintze and Bretschneider 2000; Blackstone et al. 2005]. In practice, however, this may not be the case [Bannister 2010; Kraemer and King 2006; Moon and Norris 2005]. Rather, most current e-government systems simply automate existing services—for example, a telephone-based customer service component supplements pre-existing face-to-face interactions, or an online application process replicates in-person car registration applications. Changing the nature of the relationship between citizens and the state requires a substantial economic and organizational investment that is rarely feasible. Thus, the underlying goal of current ventures is often simply to create more efficient and cost-effective systems for service providers [Danziger and Kraemer 1985; National Association of State Chief Information Officers 2010; Mossberger 2009].

Aside from transforming relationships, both scholars and practitioners expect e-government systems to create additional avenues of access for citizens to interact with their governments [Pieterson and Dijk 2007; Moon 2002]. For example, in a congressional testimony, the director of the Department of Transitional Assistance for San Bernardino County Human Services emphasized how its online application system "increase[s] public awareness and program access" [USHR 2010]. Although it may be logical to assume that additional avenues of access will help increase the use and acceptance of programs and e-government services, these additional avenues of access will not create new access points for all populations equally. In recognition of this discrepancy, the e-government literature calls for greater attention to the impact of e-government systems for people who are eligible but for whatever reason are not taking advantage of governmental programs [Library of Congress 2002; Helbig et al. 2009; Jaeger and Bertot 2010; Norris 2001; Sipior et al. 2010; Hall and Owens 2011]. These researchers assert that e-government systems are responsible for serving all citizens, even those who are "excluded from . . . innovation"; they advocate for the implementation of policies that "encourage inclusion" [Bélanger and Carter 2009]. Supporting the work of e-government intermediaries is one such way to encourage social and digital inclusion.

2.1. Challenges Associated with E-Government Adoption

E-government systems targeting individuals from low-income households are not always used to their full potential, and many barriers exist for those most in need of services. In what follows, we explain the four areas commonly identified as barriers to the access and use of e-government systems: awareness, usefulness, trust, and the digital divide. Within each section, we foreshadow how these end-user challenges relate to e-government intermediaries. While the existing literature on obstacles to e-government adoption primarily focuses on end-user challenges, our work finds that an intermediary may experience these barriers differently in important ways. Given the vital role these individuals play in enabling access to and use of e-government systems, understanding these differences can inform how systems may be designed to better support their access and use by low-income populations.

2.1.1. Awareness. Awareness refers to how familiar or conscious an individual is of a particular service or e-government initiative, including how familiar one is with the benefits that a particular service might provide. Awareness has been identified as a challenge for e-government adoption [Awoleye et al. 2008], because it is a necessary precursor to the use of such systems. Citizens' awareness of e-government systems and services is notoriously low [Lee et al. 2005; Choudrie and Dwivedi 2005; Al-Jaghoub et al. 2010; Al-Sobhi et al. 2010; Al-Sobhi et al. 2011].

Although gaps in awareness are daunting, research has shown that e-government intermediaries can be pivotal in successfully increasing the awareness of e-government services [Dombrowski et al. 2012; Chaudhri and Dash 2007]. E-government intermediaries use on-the-ground tactics to increase awareness by traveling out into the community (e.g., churches or soup kitchens) and providing programmatic information to individuals who may benefit from these services.

2.1.2. Usefulness. Usefulness denotes the extent to which potential users believe that there would be a personal benefit from using an e-government system [Nam and Sayogo 2011]. To be adopted and used, individuals need to believe that e-government systems would provide some value [Dimitrova and Chen 2006; Hung et al. 2006; Colesca and Dobrica 2008; Phang et al. 2005; Carter and Weerakkody 2008]. The more value a person believes the service will provide, the more likely he or she is to use the system [Carter and Bélanger 2005; Mills et al. 2010].

Despite the benefits provided by most social services, these government programs are often thought to be harmful and/or risky by potential clients. These perceived risks stem from myths regarding how participation might negatively impact clients, such as the belief that accepting nutrition assistance would negatively impact their immigration status or the belief that they will have to repay the benefits at a later time [Dombrowski et al. 2012]. Additionally, researchers who study the nonuse of social service programs cite the impact on moral and social capital [Sherman 2009], self-judgment [Ellwood 1989], and judgment of others who receive services [Ellwood 1989; Sherman 2009] as reasons for nonparticipation. Before any other action can be taken, e-government intermediaries must contend with these myths and perceived risks. Beyond communicating information about the potential benefits, e-government intermediaries advocate for why those potential benefits outweigh any perceived risks.

2.1.3. Trust. Within the e-government literature, trust is said to exist when a person is confident in the "reliability and integrity" of another party [Bélanger et al. 2002] (see also Morgan and Hunt [1994]). The use of e-government systems often involves multiple parties, and trust must be negotiated with the government [Job 2005], the program being serviced online [Dombrowski et al. 2012], and the technology being used to access the service [Carter and Bélanger 2005]. If trust is lacking with any party, citizens are unlikely to engage with these systems. Common trust-related concerns include a diminished sense of privacy [General Accounting Office (GAO) and McClure 2001; Bélanger et al. 2002]; the potential for the misuse of personal data [GAO and McClure 2001]; and the reluctance to disclose personal, intimate information [Carter and Weerakkody 2008].

Previous research on e-government intermediaries indicates that client trust in the e-government intermediary organization significantly impacts e-government adoption [Al-Sobhi et al. 2011]. The social skills and program expertise of intermediaries helps clients build trust in the government program and e-government online application [Dombrowski et al. 2012].

2.1.4. Digital Divide. The digital divide typically refers to the disparity between individuals who engage with digital technology and those who do not [Norris 2001; Bruno et al.

2011; Nam and Sayogo 2011]. Fundamental to the digital divide is the capacity (or lack thereof) to *access* technology, whether information and communication technologies (e.g., Riggins and Dewan [2005]) or their underlying infrastructure (e.g., the Internet; see Bélanger and Carter [2009]). Indeed, low-resource settings, in which people might benefit the most from the use of government information and services, are the least likely to have access to the Internet [Bélanger and Carter 2006]. However, the digital divide literature is not solely focused on the lack of access. Scholars are also concerned with understanding the necessary skills that individuals need to make use of technologies effectively (e.g., Mossenburg et al. [2003]; Bélanger and Carter [2006]). Two skills essential for successful interaction with e-government systems are the ability to operate hardware and software and the ability to recognize what kinds of information can solve a problem [Mossenburg et al. 2003].

An underlying assumption of a great deal of research is that issues associated with the digital divide can be reduced to simple economic terms, and they can therefore be resolved by providing individuals with technological resources. However, our findings contribute to a line of research that counters this assumption and emphasizes the more systemic problems that pervade the digital divide (e.g., navigating government jargon and bureaucratic culture in order to achieve ideal outcomes). When individuals from low-resource settings do have access to the Internet, they tend to use it differently than their higher socioeconomic counterparts [Zillien and Hargittai 2009], and they are disproportionally less likely to use it to access e-government systems [Thomas and Streib 2003; Hall and Owens 2011]. Intermediaries help bridge the digital divide by providing not only the necessary technical support and resources to help their clients engage with e-government systems but also by providing other vital nontechnical assistance, such as helping them interpret what information the online forms are asking for and connecting them with other local service organizations that might fill the gap in need between when they apply for social services and when the services are approved.

Our research builds upon the current understanding of challenges associated with e-government use by focusing on the intermediaries who, through active engagement with potential users, help render e-government systems viable options to individuals in low socioeconomic communities who are eligible for governmental support. By directing our attention to these users of e-government systems—rather than the clients of the social service programs—our research provides three contributions. First, our examination of the challenges unique to individuals acting in the capacity of e-government intermediaries provides a more holistic understanding of how these systems actually work. Understanding how intermediaries enable access to e-government systems on behalf of others reveals a series of tensions in the design and use of such systems. Second, we demonstrate how e-government intermediaries create social and institutional resources (e.g., bridging the gap between people and resources and fostering trust in the service system) that are necessary for overcoming challenges of access and use. The field of e-government has noted that an understanding of the complex social and institutional contexts of how government services are delivered is a significant research gap within this literature [Yildiz 2007]. Our work speaks to this gap, framed within the specific context of HCI concerns. Third, we suggest design guidelines to alleviate some of the challenges faced by intermediaries.

3. RESEARCH SETTING AND CONTEXT

The research reported here stems from an in-depth, empirical examination of the activities of nonprofit outreach workers. These workers strive to enable increased access to and use of a government social service program within low-income communities. Best known across the United States as the Supplemental Nutrition Assistance Program (SNAP), this program is also colloquially referred to as food stamps. In California,

the program has been rebranded as CalFresh. This federal program provides food and nutrition assistance for low-income households. In 2010, a household of four was eligible if their monthly gross income did not exceed $2,389.[1,2]

Within the United States, California has the lowest rate of participation of eligible individuals in SNAP (44% compared to the U.S. national average of 66%) [Cunnyngham et al. 2010; Nord et al. 2008]. Marketed as part of efforts to increase participation in services and reduce food insecurity more generally, California has recently supplemented its traditional paper application process with an online application, Benefits CalWin. Additional efforts to identify potentially eligible individuals and families, encourage them to apply for CalFresh, and support them through the application process could also improve participation rates. However, there is no budget for such time-intensive work to be handled by the social services departments. Instead, nonprofit organizations invested in issues of local food access, food justice, and nutrition (such as community food banks) have stepped in to help. More than 3,000 community-based, nonprofit organizations employ outreach workers to conduct outreach work in 51 out of 58 counties across California [California Department of Public Health 2013].

To assist their clients, outreach workers travel to a variety of locations within the local community to advertise CalFresh, provide assistance with the CalFresh application process, and address clients' fears and misconceptions regarding the program. With the deployment of the Benefits CalWin e-government system, outreach workers began assisting clients with the online application as well. To prepare for these new responsibilities, outreach workers requested and received additional training from social services and collected equipment—both already on hand (e.g., laptops, desktop computers, scanners, cameras) and new tools (e.g., wireless and cellular connectivity cards for laptops)—that could be helpful in online application assistance.

Outreach workers offer multiple types of online application assistance and support. They assist individuals in filling out applications, interpreting responses from social services, submitting additional requested information, and reapplying if denied. In this article, we focus primarily on the work performed by outreach workers during the initial process of completing the CalFresh application. During the application process, outreach workers provide application assistance both in person and over the phone. In person, one-on-one application assistance is provided for clients who have limited technical skills. Over-the-phone assistance serves clients who have access to computers and the technical skills to navigate the online application with some (limited) independence.

Outreach workers seek out clients presumed to have urgent needs for nutrition assistance by going to the places that such individuals are likely to frequent, such as community centers and food pantries. The online application makes it possible for them to attend to the needs of those clients quickly. Outreach workers provide clients with immediate assistance and direct attention through one-on-one application sessions. Typically, a client schedules a session with an outreach worker. The outreach worker then prepares the client for the session by advising the client of the information and documentation necessary to complete the application process. During the one-on-one application sessions, the outreach worker physically meets the client at a predetermined location, such as a coffee shop, library, or free health clinic. The outreach worker then interviews the client to gather the information required for the application and collects the client's documentation, either by scanning, taking a photograph, or a making a photocopy. After the one-on-one meeting (and typically once back at the office), the outreach worker submits the application for the client via the online application

[1]http://www.ladpss.org/dpss/calfresh/eligibility.cfm.
[2]http://www.sfhsa.org/157.htm.

portal, Benefits CalWin. One-on-one application sessions may also occur without an appointment if, for example, a client spontaneously runs into an outreach worker at the common sites they both visit (e.g., food pantry). From the initial outreach encounter to the one-on-one application session, an outreach worker will typically interact with a client three to four times.

Many low-income individuals have access to the Internet [Zickuhr and Smith 2012],[3] and outreach workers often provide nontechnical assistance to their clients with high technical skill levels (i.e., access to the Internet and basic familiarity with Web-based portals). In these instances, clients may have met previously with the outreach worker and been informed of the outreach worker's willingness to provide real-time assistance over the phone while they complete the online application process. When the client calls the outreach worker, the outreach worker verbally guides the client through the application process, and the client does the work of entering his or her own information and documentation into the online application. This may require some technical prompting, such as explaining how scanning and uploading works. In these situations, clients may also require institutional support and information that goes beyond technical assistance, such as explaining the regulations guiding application processing, decoding the online application's program-specific language, or outlining the various ways of completing the application (e.g., expedited or regular applications; in-person applications or online applications). In general, outreach workers help their clients navigate the complex online application and provide translation assistance (from official parlance to standard English and/or Spanish).

In both contexts—over-the-phone assistance and one-on-one application sessions—outreach workers clarify definitions and terms, answer questions, and situate the application in the broader context of the service system of CalFresh. In addition to Benefits CalWin, outreach workers use other technologies, such as wirelessly enabled laptops, scanners, cameras, personal mobile phones, and photocopiers, to collect and capture information and documentation and to schedule and coordinate with the clients and other outreach workers.

4. METHODS

In this research, we used multiple qualitative methods—including direct observation, participant observation, shadowing, and formal and informal interviewing—to understand the work practices and technology use of outreach workers in one county in California. Over 7 months, we conducted interviews and observations in all three of the outreach organizations within that county that employ outreach workers who assist with Benefits CalWin (two food banks and one religiously affiliated organization). We observed nine outreach workers at 15 field sites, taking detailed field notes during approximately 49 hours of observations. Observations focused on how outreach workers interact with their clients and social services employees with respect to the e-government system. We observed a variety of forms of outreach work, including application workshops, client appointments, community outreach efforts, and organizational and interorganizational meetings. This allowed us to see firsthand the conditions under which outreach workers experienced and dealt with emergent and recurring problems. We also conducted six post-observation interviews to ask questions clarifying our observations.

In addition to observations and post-observation interviews, we conducted 20 formal interviews with individuals working in outreach organizations, including all 10 outreach workers in this county, 3 outreach work supervisors, and 7 other workers within

[3]In 2012, 62% of Americans in households with yearly income less than $30,000 have Internet access [Zickuhr and Smith 2012].

the outreach organizations (e.g., staff in charge of social media, IT support, and other assistive programs). Interviews focused on current work practices, collaborations, technology use, interactions with clients, and experiences with the online application tool. All interviews were audio recorded and transcribed.

Throughout data collection and analysis, the research team met regularly to discuss trends in the observation and interview data. Dominant topics included the work practices of the outreach workers, breakdowns that occurred, and how the outreach workers responded to those breakdowns. We conducted a grounded theory–based iterative and inductive analysis of our field notes and interview transcripts using coding, memoing, and affinity diagramming [Charmaz 2006]. During the first round of open coding, codes focused on themes of information, social interactions (i.e., other outreach workers, nonprofit workers, clients, government employees), work practices, and challenges. Based on the first round of coding, a second round of coding and analysis was conducted to examine further the challenges that outreach workers face during the course of their work. During our second round of coding, we aggregated themes related to challenges as experienced by the outreach workers. Our analysis detailed the emergent barriers around technology use and the associated practices that outreach workers used to negotiate these barriers. Finally, we explored how various artifacts played different roles in the outreach workers' practices and in their relationships with other organizations. This analysis focused on how outreach workers used different tools, created resources, and responded to these challenges.

We also engaged in a variety of design activities to elaborate opportunities for design, given the work practices and challenges of outreach workers, including iterative sketching and affinity diagramming.

5. THE CHALLENGES OF INTERMEDIARIES IN THE USE OF SERVICE TECHNOLOGIES

To make the online application a viable option for the populations they serve, outreach workers must overcome challenges in two key areas: access and trust. In these data, *access* is not just a technical issue tied up in the logistics of using a computer and getting online. Rather, it is a social and organizational accomplishment that requires outreach workers to engage in diverse practices aimed at creating and ensuring access. Likewise, *trust* is not just about traditionally considered issues of privacy, control of data, and potential for surveillance. Here, trust includes perceptions of competency and professionalism. In what follows, we highlight the social and technical aspects of the challenges that outreach workers face as they create access and negotiate trust on behalf of their clients. How outreach workers respond to and overcome these social and technical challenges demonstrates the very social and organizational nature of their work. These findings indicate the need for additional design considerations in the development of e-government systems intended to serve low-income communities.

5.1. Access: Challenges and Responses

In this section, we describe specific challenges that outreach workers face in facilitating access to resources and infrastructure to complete online applications for nutrition assistance, and we discuss how they respond to these challenges by negotiating access so that their clients benefit from the online application. To understand these challenges, it is useful to distinguish between physical access and access negotiation. *Physical access* exists when a person has the technical resources and the consistent infrastructure necessary to interact with an e-government system. Physical access does not mean that all interactions with the online application are brought to a successful completion (i.e., an application is submitted), only that it is technically possible to do so. *Access negotiation* encompasses the social and organizational practices involved in successfully accessing and using e-government systems and services.

Access is negotiated through a variety of strategies, including the following:

—Separating information and data collection from the submission of the online application;
—Repurposing personal technologies for work-related activities; and
—Resourcing infrastructure and technical resources through social and organizational relations.

Together, these practices enable outreach workers to help clients benefit from the online application. These findings suggest that access is not simply a technical challenge, but a social and organizational one as well.

5.1.1. Sociotechnical Challenges of Access. Initially, participants described being excited about the new ways in which they might be able to help clients using Benefits CalWin: "The way I see [the online application] impact[ing] our work . . . is that we can go anywhere and do the process with someone online" (Paul,[4] Outreach Manager). This vision, however, did not align with the realities of trying to make these e-government service technologies work "on the go." Barriers included an absence of consistent Internet infrastructure and a lack of complementary technical resources, such as scanners. To compensate for the scarcity of these other technical resources, outreach workers have had to find ways to creatively adapt the resources on hand.

We observed outreach workers assisting clients with online applications in a variety of locations, ranging from free health clinics to coffee shops. Outreach workers continually found themselves in situations in which cellular-enabled laptops were unreliable. This unreliability stemmed from the lack of a consistent cellular connection—sometimes the adaptor appeared not to work, and sometimes a colleague had taken the adaptor for his or her own use. These outreach workers strived to appear professional; when the technology does not work, it becomes difficult for them to present a professional appearance to their clients. Further, language barriers made it difficult for outreach workers to explain and help clients understand technical problems.

The lack of consistent, reliable Internet connectivity renders an online application inoperable as a mobile application, because outreach workers cannot complete all of the necessary steps for an application out in the field:

> Sometimes [the computers] lose connections. The CalWin application asks you if you want to create an account for [a] client, [and] I always do that because [Benefits CalWin] ask[s] you if you want to continue or [you] will automatically close the application. That means you lose everything and have to start again. (Gabriel, Outreach Worker)

Gabriel articulates the frustration of working with an online application that does not behave consistently in an expected manner. These moments when technology acts unexpectedly or simply does not work can be particularly troublesome for outreach workers as they engage in the complicated task of using multiple tools and technologies together to support the online application process. For an outreach worker, dealing with unpredictable or malfunctioning technology is compounded by the social setting in which they are simultaneously managing the client's experience of the service while repurposing tools to achieve the appearance of a seamless working system on behalf of a client.

Outreach workers attempt to ease clients into the social service program by managing the experience of the service by "mak[ing] the whole process easier for the client" (Maria, Outreach Worker). "The whole process" necessarily includes the online application, which can be rife with technical breakdowns. When these breakdowns occur,

[4]All participant names are pseudonyms.

outreach workers attempt to explain what happened to clients, even though they often do not understand the origins of the breakdown themselves. Furthermore, outreach workers are engaging with clients from multiple backgrounds. Only 3 out of 10 outreach workers observed spoke Spanish natively; none spoke Vietnamese or Korean, two other popular languages in the geographic area. Outreach workers explained how using the online application requires specialized technical language to articulate the problem, which they often could not achieve in the client's language:

> My Spanish skills aren't that strong so I couldn't really explain to them [the clients] especially because like technology terms . . . they never really taught you that in school so I couldn't explain to them what was happening . . . and I didn't want to seem unprofessional. (Isabel, Outreach Worker)

Mobile technologies can be expensive to own and operate. Thus, due to budgetary constraints, outreach workers may not have all of the technical equipment necessary to engage with the online applications anytime and anywhere, either because mobile technologies are shared or not available. One informant reported challenges with sharing and coordinating technological resources involving miscommunications regarding availability and the use of equipment (e.g., wirelessly enabled laptops). For example, during observations of an attempted online application session, an outreach worker conveyed that she did not have the wirelessly enabled laptop with her because there was a miscommunication regarding who had scheduled online application appointments with clients, and another outreach worker had taken the laptop. Not having the laptop available, but still wanting to help the client apply for the program, she developed alternative methods that do not require a wirelessly enabled laptop (described in the next section) to help the client.

5.1.2. Sociotechnical Practices of Negotiating Access. To overcome issues with physical access (the lack of technical resources or lack of consistent infrastructure), outreach workers engage in three sociotechnical practices to negotiate and create access for their clients: separating information and data collection from the submission of the online application, repurposing personal technologies for work-related activities, and gathering infrastructure and technical resources through social and organizational relations. In this section, we describe each sociotechnical practice to show how these activities relate to negotiating and creating access for clients.

The first practice undertaken by outreach workers is separating the collection of information and documentation from the submission of the online application. As outreach workers became accustomed to working with limited resources, they modified their in-person application practices to limit the use of laptops for collecting client information and documentation. Instead, they began to complete forms on paper and collect documentation in alternate ways (e.g., the cameras on personal mobile phones or the photocopier at an outreach location). Outreach workers would then return to the office to "process" stacks of applications by entering client information online, uploading client documentation, and submitting applications on their client's behalf:

> We don't have the equipment for two laptops. At the office, Isabel and I can separate the [previously collected] applications [and documentation] and we will be done with [submitting the] six applications. (Maria, Outreach Worker)

Outreach workers separated their processes both physically and temporally. Although this separation enabled outreach workers to offer application assistance and create access in locations without adequate infrastructure, it also came with additional overhead, as so much of the actual application process was happening on their own, back at the office.

This kind of separation also required the use of additional equipment, often purchased by the outreach workers themselves (e.g., personal mobile phones):

> I performed an impromptu, "on the spot" application because . . . I didn't have the scanner and laptop with me, so I took pictures [of the client's documents] with my phone instead. (Isabel, Outreach Worker)

Neither the outreach workers nor their employers originally envisioned that assisting clients with the online system would require the use of workers' personal devices. The security and privacy concerns that emerge from the integration of personal devices into outreach work, as well as issues related to fair compensation of the workers for the use of personal resources, are relatively underexplored concerns within these organizations. From the outreach workers' perspectives, the emphasis seems to be on getting their work done at whatever cost in whatever creative ways they can devise.

Likewise, to make use of other community-based organizations' spaces and technological resources, outreach workers must foster an ongoing relationship with the employees of other community-based organizations. Outreach workers frequently work to build and maintain social capital [Putnam and Feldstein 2003] that affords them access to resources, such as a photocopier. Therefore, part of the outreach worker's "technical" practice is the creation and strengthening of social bonds with colleagues at other community-based organizations.

The work of these e-government intermediaries is a practical accomplishment of creating access. Here, achieving access requires the creative assemblage and use of tools and resources—both human and technical.

5.2. Trust: Challenges and Responses

For the outreach workers in our study, earning the trust of clients is a necessary precursor to assisting them with the application process. In what follows, we describe the specific challenges that outreach workers face in establishing trust. First, we outline the social aspects of trust, namely the ways in which outreach workers explicitly present themselves as professional, competent, and worthy of client trust. Second, we discuss how these practices break down when the technology does not work as expected—all of which can be highly detrimental for outreach workers. Finally, we show how outreach workers are careful in their selection and use of technologies to help develop and maintain trust between themselves and their clients. These findings suggest that technologies that are thought to interfere with client–outreach worker trust will not be used in these outreach field sites.

5.2.1. Sociotechnical Challenges of Trust. The process of convincing a client to apply for services inherently requires that clients have some measure of trust in the outreach workers. Thus, outreach workers engage in a variety of practices to present themselves as knowledgeable professionals who warrant such trust. In particular, they demonstrate program knowledge, relate the program's eligibility requirements to the client's personal situation, and articulate how the program may impact the client:

> Just so you know, people take advantage of the Spanish [speaking] people, especially those who do not know how to read or write or know the laws. It can be hard to go and talk to them. You have to build trust with many people. Five years ago we used to only help only ten people a month, now we are doing 90 people because of all of this hard work. Those 90 people go and tell another 90 other people. I say to them, the only way you can pay me back is helping another person to get the same thing as you. What I did for you, I can do for them. (Raphael, Outreach Worker)

Building trust is a long-term activity that extends beyond interactions with any one encounter or any one individual. Clients often refer friends, family members, and neighbors to outreach workers. As a result, outreach workers orient their work toward

establishing trust with individuals in order to generate broader impact within their local community.

In the process of building trust, the outreach workers' primary concerns center around whether or not they appear professional enough to be perceived as trustworthy. A professional appearance entails not just their physical appearance (e.g., age or maturity) but also their cultural sensitivity (e.g., do they speak Spanish?), their domain expertise (e.g., knowledge about the government food assistance program), and their technical ability (e.g., can they "work" the online system?). All but one of the outreach workers expressed concerns about how trustworthy they appeared to clients because of their age, race, gender, and/or CalFresh expertise:

> When you are young, it is hard to get that credibility from people. [Clients always ask] "how do [you] know it's not going to mess up my immigration status? You look like you are inside of high school!" . . . You know when you think of young girl doing work its more for a "tanning salon." It is not for a serious government program . . . I'm always trying to put myself in my client's shoes, like [they perceive me as] "This girl is not a native Spanish speaker, she's not Latina, she's telling me its not going to affect my immigration status, and she's really young looking. Really, how much can she know?" . . . [Clients] disregard you unless you let them know you are serious. (Maria, Outreach Worker)

> When I do one on one [applications] I get asked a lot of questions, "what about this or that?" I have limits in what I know. Like I go, "[W]ell I don't know to be honest. Just leave those questions blank and have the interviewer go over with you on the application and then you can ask that question." I feel like people trust us, and if I say, "I don't know," I don't like it. I want to be more professional and responsible with the responses that I provide to my clients . . . I was talking to a lady [and . . .] she was asking me questions and then I tried to come up with the logical answer, but she didn't take my word. She said, "You guys don't know what you are talking about." That really hurt me but . . . she's right in the sense that we need to be more knowledgeable or prepared for that type of question. (Ines, Outreach Worker)

To mitigate these concerns about domain knowledge, outreach workers often try to cover potential gaps in their knowledge through finding people with more expertise, such as social service workers or seasoned outreach workers.

The need to appear professional is a core component of trust for intermediaries and technology breakdowns can also negatively impact an intermediary's ability to appear competent and, by extension, create and maintain trust. Applying for Benefits CalWin requires the exchange of sensitive personal information between the outreach worker and client. This information ranges from understanding clients' living arrangements to intimate details about how clients share and prepare food in their homes. In addition, outreach workers deal with highly confidential information such as social security numbers, financial information (e.g., banking account information, rent and housing information, bills), and the legal residency status of individuals living in clients' homes. If clients interpret technological breakdowns as worker incompetence, the rapport between outreach worker and client can be damaged:

> When you submit the online application, its kind of more of your responsibility in a way and sometimes you question "did I mess up?" . . . We are responsible for helping [the clients] get their benefits. (Isabel, Outreach Worker)

> I don't know how you could avoid a problem like that . . . It's just . . . I don't like making the client feel uncomfortable. Because if I'm [a client] applying for [government assistance] . . . and you know my boyfriend's not documented and I'm applying for a government program, I don't want my information being put into the computer [by an outreach worker who] doesn't know what she's doing. I don't want [my] credibility hurt by it. (Isabel, Outreach Worker)

The outreach workers' awareness of the highly sensitive nature of this information compels them to take their role as informational stewards seriously. Whereas outreach workers are concerned about the security of clients' data, they are not always certain

about how to protect those data. For example, one outreach worker relayed her concern about a client's data after dealing with an online application that was continually and unpredictably restarting the application process, causing the outreach worker to re-enter all of the client's data and information:

> I didn't want to seem unprofessional, but [Benefits CalWin was] really messing up. I just put all of [the client's] personal information in the computer and I don't know where it's going and it's freaking me out. I'm hoping it's fine. I don't know what's going on with it at all . . . not really. (Isabel, Outreach Worker)

As information stewards, outreach workers have two strategies to help them appear professional. First, they try to keep their clients' information secure. Second, they communicate with clients about how they keep their sensitive information secure. However, these two strategies are difficult to employ when technology does not work as anticipated. When breakdowns occur, outreach workers have limited technical expertise to draw from to troubleshoot breakdowns. Additionally, they have difficulty explaining these breakdowns to clients, particularly to clients whose native language is not the same as their own.

Outreach workers also described how, once trust was established, clients would mistakenly assume that they were official governmental employees. The online application process often happens without a client ever seeing an official government employee. Because the clients never come into direct face-to-face contact with a government employee, the outreach workers become the only human faces that clients can associate with the social service program: "They don't always understand the difference [between me and the government]. They think I'm a social worker, and I'm not!" (Maria, Outreach Worker).

This is a problematic misperception, because outreach workers do not have the same privileges and responsibilities as government employees but can be tainted by the government's actions. A clients' impressions of one institution, whether community-based nonprofit organization or social services, may impact the other.

5.2.2. Sociotechnical Practice of Negotiating Trust. To establish and maintain trust with their clients, outreach workers present themselves as having expert knowledge about the government nutrition assistance program, including knowledge about the online application. When technology associated with the online application breaks down, it reflects poorly upon outreach workers and can damage the trust that they have established with clients. Technologies perceived as being less reliable (and thus potentially endanger that client–worker trust) are phased out by outreach workers and replaced with less temperamental technologies and practices.

In what follows, we highlight how outreach workers deal with technology when it does not work as anticipated. To mitigate the consequences of nonworking technology, during our observations, outreach workers changed how they processed the online applications and selected particular tools that help promote them as professionals.

First, "nonworking" technology refers to the different ways in which the cellular-enabled laptops were unable to consistently connect or remain connected to the Internet, which are all barriers to completing applications (e.g., unable to upload client documentation or submit the online application). The unexpected nature of these issues often increased their severity, since outreach workers were put into the awkward position of trying to explain why the online application could not be submitted. These infrastructural problems stem from multiple, simultaneously occurring issues: (1) first, these outreach workers attempted to use cellular technologies in places with weak or no connectivity; (2) second, these community locations the they visited lacked available WiFi; (3) and finally, there simply was not enough hardware to simultaneously

Fig. 1. Outreach workers commonly use laptops and desktop scanners to collect client documentation for the application process, even when working at off-site locations. Please note that the scanner is a traditional desktop scanner, not a mobile scanner.

run multiple sessions, which becomes problematic when outreach workers failed to communicate who planned online application sessions.

These one-on-one application meetings have a very immediate practical objective of filling out the client's application but also a longer-term goal of setting up the client for continued success by fostering their ongoing relationship. Thus, outreach workers changed the nature of these meetings in the face of limited hardware infrastructure. They adopted new processes that allowed them to separate the information and documentation collection phase with the submission phase. The outreach workers stopped submitting applications with their cellular- and wireless-enabled laptops and began scanning and collecting documentation with their clients, waiting to submit the applications until they were at their desks in the office. In this way, they could focus on preparing clients for future interactions with the social service agency—an activity that does not require computational technologies.

These new practices allowed outreach workers to sidestep problems with nonworking technology and nonexistent infrastructure, but not all tools are equal. Outreach workers' concern about the relationship between the appearance of their technological competency and client trust drove decisions regarding which technologies were considered "appropriate" for client information collection:

> The scanner looks more legit. That's my reason. If someone saw me taking pictures with a camera, they'd ask, "[W]hat are you doing?" With a scanner it looks more professional, more office like . . . I don't want to have to explain, "[O]h I can still send [your documents in] with my phone." And I don't want people's information on my mobile phone. It's just easier for me to do it on the scanner. (Maria, Outreach Worker)

These outreach workers prefer to use desktop scanners in their work. As shown in Figure 1, these scanners are large and cumbersome, not made for portable use but for desktop use. Even so, they persisted in using them at these mobile one-on-one application sessions because they perceived them as being "more legit." The selection of technologies was a key part of their face-to-face work with clients. Outreach workers described feeling more "office-like" and professional when they were using "serious" technologies. Outreach workers have to convince clients and potential clients of the benefits of the government program when encouraging clients to apply. Being seen as a professional with more legitimate technologies helps them advocate for and act as a spokesperson of the government program because they have established and maintained client trust.

6. IMPLICATIONS FOR DESIGN

This article describes the challenges that outreach workers face when helping clients access and use an e-government system for food assistance. Our research has demonstrated that the role of e-government intermediaries is vital to the populations they serve and for the success of the online program. Therefore, one way in which e-government initiatives could further their goal of increasing access would be through investing in better ways to support e-government intermediaries within their respective communities. Designing technologies and systems targeted toward improving the capacity of intermediaries will improve the reach of these technologies, government programs, and other outreach efforts throughout local communities.

Yet, the ultimate goal of the outreach workers—assisting members of their local community with gaining access to fresh food and nutritional resources—is one shared by many in the community. Therefore, we take the perspective of the entire food and hunger ecosystem in our design implications. We ask how design might better serve intermediaries as well as clients, social services, and other nonprofit workers and volunteers, with the goal of using such designs to improve the vitality of the entire system. In what follows, we suggest both technical and organizational modifications to address the challenges identified in this research.

6.1. Design for Access Negotiation by Intermediaries

Core strengths of intermediaries lie in their ability to build relationships that enable the creation and maintenance of access on behalf of clients. This work is made possible, in part, through their technical practices of navigating a complex array of tools, systems, and functioning state on behalf of others. The design of e-government systems should consider how to amplify these social and technical aspects of the efforts of these e-government intermediaries.

Related research has explored the challenges of access in a variety of less than ideal circumstances, which is useful when approaching design for e-government intermediaries. For example, research examining how people navigate breakdowns during periods of sustained disruptions (e.g., Semann and Mark [2011]; Mark et al. [2009]) has recommended designing for flexibility and improvisation within sociotechnical arrangements as well as creating multiple, redundant systems so that less technically savvy individuals are not left behind. Similarly, other research focuses on individuals working under resource constraints, where frequent patterns of use suggest that people also share or mediate technology use for others (e.g., Parikh and Ghosh [2006]; Sambasivan et al. [2010]; Sukumaran et al. [2009]; Oreglia et al. [2011]; Toyama [2010]; Bailur [2010]). Such work frequently recommends designing for "equitable engagement" [Sambasivan et al. 2010] across multiple users, meaning that technology should involve clients when possible and seek to increase comprehension and legibility by all parties when possible.

Much of this research has explored how people work under constraints, create new resources through human and technical assemblages, and navigate breakdowns to achieve their goals. Such literature helps us frame our own thinking about designing in similar contexts. In particular, we are attuned to the relationship between people and their social and technical resources. Although there are many ways that design facilitates the process of negotiating access, we build upon these lessons from related research to highlight three technical and organizational considerations, including (1) designing for existing infrastructures, (2) designing for intermediaries, and (3) supporting secondary outreach efforts.

6.1.1. Design for Existing Infrastructures. Outreach workers used a wide variety of workarounds to get their tasks accomplished despite malfunctioning or ill-fitting

technology. E-government services need to be designed in light of these kinds of low-resource settings with temperamental and inconsistent infrastructure. We propose two types of strategies for designing for existing infrastructure (or the lack thereof).

First, e-government services should work without constant connectivity. Systems designed to locally store application materials and upload application data and documentation when connectivity exists will greatly increase the viability of e-government services. Designing to stave off unstable Internet connectivity increases the technological resiliency and adaptability of these systems. This is a common design strategy within systems designed for ICT4D contexts (e.g., Tucker and Blake [2008]) that would greatly increase the usability, the scope of places where online applications would be possible, and the number of individuals who would be able to access these systems.

Second, greater care should be given to designing e-government systems in light of the breadth of technologies used by all potential stakeholders in the design process. For example, low-socioeconomic families often own mobile phones [Brenner 2012][5] but are less likely to access the Internet through a desktop or laptop computer [Zickuhr and Smith 2012].[6] Thus, designers should take advantage of all technologies in use by stakeholders, including client mobile phones and the phones and laptops belonging to the intermediaries. Designing for mobile technologies with multiple stakeholders in mind (i.e., intermediaries, clients, and even other nonprofit workers and volunteers), however, poses significant challenges. In particular, the power relationships that might already exist among intermediaries, clients, and other invested parties (e.g., social service workers) can be reified by who is actually accessing the site through which devices, who owns the devices storing the personal data, and so on. Thus, designers must consider issues of equity, control, visibility, and legibility within systems from the perspective of different stakeholders. In general, e-government systems intended to serve low-resource populations would do well to move away from the desktop platform to embracing mobile technologies because, increasingly, this is the most common Internet access point for lower-income populations.

6.1.2. Design for Intermediaries. Although much HCI research has been carried out to explore how to design for information and technology mediators, this research is usually done within developing contexts and usually involves the mediation of technology use (e.g., Parikh and Ghosh [2006]; Sambasivan et al. [2010]; Sukumaran et al. [2009]; Oreglia et al. [2011]; Toyama [2010]; Bailur [2010]). Research exploring how to design for people who mediate not only technology use but also services and process has been less well examined [Dombrowkski et al. 2012]. Integrating intermediaries into the design of the service, in addition to the technological infrastructure, requires sensitivity to issues of cross-organizational boundary work.

Services should be redesigned to take into account the complex sociotechnical relationships that support effective outcomes for clients though mediated interactions with government programs and their technologies. For example, current online application tools could be redesigned to support more explicitly the intermediaries who could assist with multiple client cases while still granting access to individual clients. With such a redesign, intermediaries could better assist with clients' cases and could be better situated to communicate with social service representatives on behalf of their clients. Additionally, this recommendation has the potential to foreground the intermediaries' position with both social service representatives and their clients, decrease misunderstandings about intermediaries being social service workers, create

[5]According to Brenner [2012], 80% of adults living in households with income of less than $30,000 per year own mobile phones, and 55% of mobile phone owners use their phones to access the Internet.

[6]Only 62% of adults living in households with income of less than $30,000 per year have desktop-based Internet access [Zickuhr and Smith 2012].

more accountability for clients, and provide transparency for social services about who is assisting applicants.

We do caution, however, that intermediaries often work best at the boundaries between official organizations. Thus, although greater transparency may provide clients with additional avenues for accountability, it may also hinder these outreach workers' ability to work in the margins. Future research is essential to understand the tradeoffs implicated in this design trajectory and to understand some of the nuanced and unanticipated implications that this class of designs might bring to light.

6.1.3. Design for Secondary Outreach Efforts. Outreach workers often connect with new clients through word-of-mouth recommendations from other members of the local community, such as existing clients or other nonprofit workers. Community advocates for outreach workers, in particular, raise awareness of governmental assistance programs and the outreach workers who advocate for them.

Although designers could imagine many different technical proposals attempting to transform these secondary outreach efforts into a technical system, doing so does not come without costs (e.g., excluding individuals who may not choose to use certain technologies or who have insufficient skills to use certain technologies; difficulties of building trust in additional online systems). We recommend that future work explores how this service and outreach information does and does not propagate through the community. Additionally, we suggest reframing these pre-existing social relationships as resources for organizational improvements to this system. This focus allows us to envision practices that foster inclusiveness by galvanizing more actors into the outreach process.

To engender a warm handoff between intermediaries and potential new clients, we recommend giving clients and other nonprofit workers both technical and nontechnical resources to help them bring more people into the process. These resources could include items such as informational brochures or business cards with QR codes that link to information easily accessed on mobile devices. Additionally, using custom links, QR codes, and other technological tools to support the paper-based informational artifacts could facilitate documentation of the outreach efforts and their outcomes. This kind of reporting is critical for funding in the nonprofit space.

6.2. Design for Fostering Trust in e-Government Intermediaries

Beyond simply designing e-government systems to appear trustworthy, systems and support structures—including nontechnological structures—must be designed to foster trust in the intermediaries who help clients use them. In particular, the link between the professionalism and knowledge of the intermediary and client trust cannot be underestimated. One of the ways in which outreach workers present themselves as competent professional intermediaries is through their knowledge of the system—both the online technological one and the human bureaucratic one. Thus, there is an additional opportunity for innovative design to support the continuing education of these workers, including keeping them informed about the government program, as well as the online systems that provide access to it, and helping them curate best practices.

Understanding the intricacies of the administration, regulation, and governance of complex government programs is a challenging but essential part of acting as an e-government intermediary. Outreach workers currently build expertise by gathering information from individuals who are distributed across the social service organization and other community organizations. Therefore, design should foster information exchange among a variety of key parties to keep intermediaries informed and up to date. This type of information support and guidance could be fostered in several

ways, including through online or hybrid (online–offline) communities. Online communities accessible by various stakeholders in the social support ecology could provide venues for intermediaries to pose questions to social service workers and other intermediaries and could function as information repositories for best practices and sources of expertise for newcomers to the community. This kind of system would serve as a first step toward a lasting social infrastructure, built on a fairly robust and common technological infrastructure. However, this model requires appropriate incentive structures for participation. Much of this kind of information is currently disseminated among intermediaries and governmental employees in face-to-face encounters. The existing practices of helping other nonprofit workers and organizations currently in place indicate that the cultural practices and intrinsic motivation of nonprofit workers may already provide some of these incentives. However, if not stored and shared, this ephemeral information is lost or stands to benefit a few select individuals only.

Beyond these kinds of informal approaches, formally integrating intermediaries into the service process could enhance their standing in the eyes of the community. If outreach workers were legitimized by social services as client advocates, they would likely have more frequent, sanctioned interactions with social service workers and would be better able to ask questions about edge cases, clarify information that is misunderstood within their community, and follow up on behalf of clients. An approach that enables outreach workers to fill in their knowledge gaps in such a targeted and "as needed" manner is only possible by integrating intermediaries into the service process. This design strategy builds on the existing relationships between the social service workers and the outreach workers to create more legitimate spaces for productive information exchange.

Our design recommendations seek to support the e-government intermediaries within their local communities; in summary, we highlight the following areas for future design consideration of such systems:

(1) Important infrastructure limitations should be assumed within e-government services; therefore, building technologies that work without constant connectivity will increase the robustness and utility of these services.
(2) The design of e-government services for lower-income populations should support mobile technologies, as it would increase who and where people are able to access these services.
(3) These e-government intermediaries provide vital support roles for their local communities and should be integrated into the design of e-government services.
(4) Integrating these intermediaries into the process may create unintended consequences that impact their role between individuals and organizations and affect their ability to work with their clients; thus, we caution that care should be taken to not hinder their work when designing new technologies and systems.
(5) Given the social nature of information and assistance, we recommend that future research explores how information does and does not propagate within these communities and also explores how new technical and nontechnical resources can engender warm handoffs between intermediaries and new clients.
(6) Last, design should seek to support the continuing education of these intermediaries through systems that share best practices and keep these workers informed on the changes to the programs with which they work.

7. CONCLUSION

E-government intermediaries face multiple challenges while enabling access to and using online applications for government programs. By overcoming challenges of access

and trust, intermediaries create opportunities for low-resource communities and clients to have successful engagements with government programs.

In this article, we have detailed the social and technical aspects of e-government intermediaries' challenges. Our research adds nuance to the understanding of access and trust in the ecosystems surrounding e-government systems. We have described how the practical accomplishment of access involves multiple stakeholders, actors, and practices. The work of negotiating access draws attention to the various aspects of intermediaries' work that are community based and social in nature, yet are also key to successful technical practices. Service technology designers would do well to design beyond individual stakeholders and into the broader communities that provide sociotechnical support for clients. Our research also emphasizes the extent to which establishing trust is both a social and technical endeavor. We highlight how trust is not solely about client privacy or control of their personal data. Trust emerges through the work of the intermediaries to project themselves as professional and competent through technical practices. These practices become visible and problematic when technology breaks down and affects clients' trust in the outreach workers. These findings suggest the need to design better ways of managing breakdowns in complex service technologies. Based on our analysis of the challenges facing e-government intermediaries, we propose designing implications for the technical and social aspects for the challenges of access and trust as considerations for future HCI design research in this context.

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REFERENCES

S. Al-Jaghoub, H. Al-Yaseen, and M. Al-Hourani. 2010. Evaluation of awareness and acceptability of using e-government services in developing countries: The case of Jordan. *Electronic Journal Information Systems Evaluation* 13, 1, 1–8.

F. Al-Sobhi, V. Weerakkody, and M. Albusaidy. 2010. The roles of intermediaries in the diffusion and adoption of e-government services. In *Proceedings of the 16th Americas Conference on Information Systems*. Paper 385.

F. Al-Sobhi, V. Weerakkody, and R. El-Haddadeh. 2011. The relative importance of intermediaries in egovernment adoption: A study of Saudi Arabia. In *Proceedings of the 10th IFIP WG 8.5 International Conference on Electronic Government*. 62–74.

M. Awoleye, A. Oluwaranti, W. Siyanbola, and R. Adagunodo. 2008. Assessment of e-governance resource use in south-western Nigeria. In *Proceedings of the 2nd International Conference on Theory and Practice of Electronic Governance*. 154–159.

S. Bailur. 2010. The liminal role of the information intermediary in community multimedia centres. In *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development (ICTD'10)*. ACM, New York, NY, Article 5.

F. Bannister. 2010. Deep e-government: Beneath the carapace. In Hans J. Scholl (Ed.), *E-Government: Information, Technology, and Transformation.* M. E. Sharpe, Armonk, NY, 33–51.

F. Bélanger and L. Carter. 2006. The effects of the digital divide on e-government: An empirical investigation. In *Proceedings of the Hawaii International Conference on System Sciences*. 81–88.

F. Bélanger and L. Carter. 2009. The impact of the digital divide on e-government use. *Communications of the ACM* 52, 4, 132–135.

F. Bélanger, J. Hiller, and W. Smith. 2002. Trustworthiness in electronic commerce: The role of privacy, security, and site attributes. *Journal of Strategic Information Systems* 11, 1, 245–270.

E. Blackstone, M. Boganno, and S. Hakim. 2005. *Innovations in E-Government: The Thoughts of Governors and Mayors*. Rowman and Littlefield, Lanham, MD.

J. Brenner. 2012. Pew Internet: Mobile. Retrieved January 10, 2014, from http://pewinternet.org/Commentary/2012/February/Pew-Internet-Mobile.aspx.

G. Bruno, E. Esposito, A. Genovese, and K. L. Gwebu. 2011. A critical analysis of current indexes for digital divide measurement. *Information Society* 27, 1, 16–28.

California Department of Public Health. 2013. CalFresh Outreach. Retrieved September 1, 2013, from http://www.cdph.ca.gov/programs/cpns/pages/foodstampoutreach.aspx.

L. Carter and F. Bélanger. 2005. The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal* 5, 1, 5–25.

L. Carter and V. Weerakkody. 2008. E-government adoption: A cultural comparison. *Information Systems Frontiers* 10, 4, 473–482.

K. Charmaz. 2006. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. Sage, Thousands Oaks, CA.

N. Chaudhri and S. S. Dash. 2007. Community information centers: E-governance at subdistrict level: A case study. In *Proceedings of the 1st International Conference on Theory and Practice of Electronic Governance*. 366–369.

J. Choudrie and Y. K. Dwivedi. 2005. A survey of citizens' awareness and adoption of e-government initiatives, the 'Government Gateway': A United Kingdom perspective. In *Proceedings of the* e*Government Workshop (*e*GOV'05)*.

S. Colesca and L. Dobrica. 2008. Adoption and use of e-government services: The case of Romania. *Journal of Control and Computers* 6, 1, 2004–2017.

K. Cunnyngham, L. Castner, and A. Schirm. 2010. Empirical Bayes Shrinkage Estimates of State Supplemental Nutrition Assistance Program Participation Rates in 2005–2007 for All Eligible People and the Working Poor. Retrieved January 10, 2013, from http://www.fns.usda.gov/sites/default/files/Techpartrate2005-2007.pdf.

J. N. Danziger and K. L. Kraemer. 1985. Computerized databased systems and productivity among professional workers: The case of detectives. *Public Administration Review* 45, 1, 196–209.

S. S. Dawes. 2002. *The Future of e-Government*. Center for Technology in Government, State University of New York, Albany, NY.

D. V. Dimitrova and Y. C. Chen. 2006. Profiling the adopters of e-government information and services: The influence of psychological characteristics, civic mindedness, and information channels. *Social Science Computer Review* 24, 2, 172–188.

L. Dombrowski, A. Voida, G. R. Hayes, and M. Mazmanian. 2012. The labor practices of service mediation: A study of the work practices of food assistance outreach. In *Proceedings of the 2012 ACM Annual Conference on Human Factors in Computing Systems*. 1977–1986.

D. Ellwood. 1989. *Poor Support: Poverty in the American Family.* Basic Books, New York, NY.

General Accounting Office and D. McClure. 2001. Electronic Government: Challenges Must Be Addressed with Effective Leadership and Management. Retrieved January 10, 2013, from http://www.gao.gov/assets/90/81725.pdf.

T. Hall and J. Owens. 2011. The digital divide and e-government services. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance (ICEGOV'11)*. 37–44.

T. Heintze and S. Bretschneider. 2000. IT and restructuring in public organizations. Does adoption of it affect organizational structures, communications and decision making? *Journal of Public Administration Research and Theory* 10, 4, 801–830.

N. Helbig, J. R. Gil-García, and E. Ferro. 2009. Understanding the complexity of electronic government: Implications from the digital divide literature. *Government Information Quarterly* 26, 89–97.

S. Y. Hung, C. Chang, and T. Yu. 2006. Determinants of user acceptance of the e-government services: The case of online tax filing and payment system. *Government Information Quarterly* 23, 97–122.

P. T. Jaeger and J. C. Bertot. 2010. Transparency and technological change: Ensuring equal and sustained public access to government information. *Government Information Quarterly* 27, 371–376.

J. Job. 2005. How is trust in government created? It begins at home, but ends in the parliament. *Australian Review of Public Affairs* 6, 1, 1–23.

S. King, and S. Cotterill. 2007. Transformational government? The role of information technology in delivering citizen-centric local public services. *Local Government Studies* 33, 3, 333–354.

K. Kraemer and J. King. 2006. Information technology and administrative reform: Will e-government be different? *International Journal of Electronic Government Research* 2, 1, 1–20.

S. M. Lee, X. Tan, and S. Trimi. 2005. Current practices of leading e-government countries. *Communications of the ACM* 48, 10, 99–104.

Library of Congress. 2002. E-Government Act of 2002. Retrieved January 10, 2013, from http://thomas.loc.gov/cgi-bin/query/z?c107:H.R.02458.ENR:

G. Mark, B. Al-Ani, and B. Semann. 2009. Resilience through technology adoption: Merging the old and the new in Iraq. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 368–698.

A. Mills, L. Carter, and F. Bélanger. 2010. Conceptualizing public service value in e-government services. In *Proceedings of the Americas Conference on Information Systems*. Paper 346.

M. J. Moon. 2002. The evolution of e-government among municipalities: Rhetoric or reality? *Public Administration Review* 62, 4, 424–433.

M. J. Moon and D. Norris. 2005. Does managerial orientation matter? The adoption of reinventing government and e-government at the municipal level. *Information Systems Journal* 15, 1, 43–60.

R. M. Morgan and S. D. Hunt. 1994. The commitment-trust theory of relationship marketing. *Journal of Marketing* 58, 3, 20–38.

K. Mossberger. 2009. Towards digital citizenship: Addressing inequality in the information age. In A. Chadwick and P. N. Howard (Eds.), *Routledge Handbook of Internet Politics*. Taylor and Francis, New York, NY, 173–185.

K. Mossenburg, C. Tolbert, and M. Stansbury. 2003. *Virtual Inequality: Beyond the Digital Divide*. George Washington University Press, Washington, DC.

T. Nam and D. S. Sayogo. 2011. Who uses e-government? Examining the digital divide in e-government use. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance (ICEGOV'11)*. 27–36.

National Association of State Chief Information Officers. 2010. 2010 Recognition Awards for Outstanding Achievement in the Field of Information Technology. Retrieved January 10, 2013, from http://www.nascio.org/awards/2010awards/.

M. Nord, M. Andrews, and S. Carlson. 2008. Household Food Security in the United States, 2008. U.S. Department of Agriculture, Economic Research Service. Retrieved January 10, 2013, from http://ageconsearch.umn.edu/bitstream/55953/2/ERR83%20full%20doc.pdf.

P. Norris. 2001. *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*. Cambridge University Press, New York, NY.

R. O'Neill. 2009. The transformative impact of e-government on public governance in New Zealand. *Public Management Review* 11, 6, 751–770.

E. Oreglia, Y. Liu, and W. Zhao. 2011. Designing for emerging rural users: Experiences from China. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'11)*. 1433–1436.

T. Parikh and K. Ghosh. 2006. Understanding and designing for intermediated information tasks in India. *IEEE Pervasive Computing* 5, 2, 32–39.

C. W. Phang, Y. Li, J. Sutanto, and A. Kankanhalli. 2005. Senior citizens' adoption of e-government: In quest of the antecedents of perceived usefulness. In *Proceedings of the 28th Hawaii International Conference on Systems Sciences*. 130–138.

W. Pieterson and J. N. Dijk. 2007. Channel choice determinants: An exploration of the factors that determine the choice of a service channel in citizen initiated contacts. In *Proceedings of the 8th Annual International Conference on Digital Government Research: Bridging Disciplines and Domains*. 173–182.

R. D. Putnam and L. M. Feldstein. 2003. *Better together. Restoring the American Community*. Simon and Schuster, New York, NY.

F. J. Riggins and S. Dewan. 2005. The digital divide: Current and future research directions. *Journal of the Association for Information Systems* 6, 12, 298–337.

N. Sambasivan, E. Cutrell, K. Toyama, and B. Nardi. 2010. Intermediated technology use in developing communities. In *Proceedings of the 2010 CHI (CHI'10)*. ACM, New York, NY, 2583–2592.

B. Schneider and B. Bowen. 2010. Winning the service game: Revisiting the rules by which people co-create value. In P. Maglio, C. Kieliszewski, and J. C. Spohrer (Eds.), *The Handbook of Service Science*. Springer, New York, NY, 31–60.

B. Semann and G. Mark. 2011. Technology-mediated social arrangements to resolve breakdowns in infrastructure during ongoing disruption. *ACM Transactions on Human-Computer Interaction* 18, 4, Article 21.

J. Sherman. 2009. *Those Who Work, Those Who Don't: Poverty, Morality, and Family in Rural America*. University of Minnesota Press, Minneapolis, MN.

J. Sipior, C. Ward, T. Burke, and R. Connolly. 2010. An empirical evaluation of e-government inclusion among the digitally disadvantaged in the United States. *Information Resources Management Journal* 23, 4, 21–39.

A. Sukumaran, S. Ramlal, E. Ophir, V. Kumar, G. Mishra, V. Evers, V. Balaji, and C. Nass. 2009. Intermediated technology interaction in rural contexts. In *Proceedings of CHI'09 Extended Abstracts on Human Factors in Computing Systems (CHI EA'09)*. ACM, New York, NY, 3817–3822.

J. C. Thomas and G. Streib. 2003. The new face of government: Citizen-initiated contacts in the era of e-government. *Journal of Public Administration Research and Theory* 13, 1, 83–102.

L. Torres, N. Pino, and S. Royo. 2005. E-government and the transformation of public administration in EU countries. *Online Information Review* 29, 5, 531–553.

K. Toyama. 2010. Human–computer interaction and global development. *Foundations and Trends in Human-Computer Interaction* 4, 1, 1–79.

W. Tucker and E. Blake. 2008. The role of outcome mapping in developing a rural telemedicine system. In *Proceedings of IST-Africa*.

U.S. Department of Agriculture. 2012. Supplemental Nutrition Assistance Program (SNAP). Retrieved November 24, 2012, from http://www.fns.usda.gov/snap/applicant_recipients/apply.htm.

U.S. House of Representatives. 2010. Testimony to the USHR Subcommittee on Department Operations, Oversight, Nutrition, and Forestry. Retrieved January 25, 2010, from http://democrats.agriculture.house.gov/testimony/111/h012510/Swanson.pdf.

M. Yildiz. 2007. E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly* 24, 3, 646–665.

K. Zickuhr and A. Smith. 2012. Digital Differences. Retrieved March 10, 2014, from http://www.pewinternet.org/Reports/2012/Digital-differences.aspx.

N. Zillien and E. Hargittai. 2009. Digital distinction: Status-specific types of Internet usage. *Social Science Quarterly* 90, 2, 274–291.

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