

## Research Article

# Achieving ICT4D Project Success by Altering Context, Not Technology

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### **Abstract**

*When explaining the failure of information and communication technologies for development (ICT4D) projects, researchers often turn to differences between how designers perceive and users experience the context of technology use. According to these explanations, ICT4D projects fail because designers take an uninformed stance toward context. The ICT4D literature offers four approaches for how designers might better design technology for the context of use. In all four approaches, the target of action is typically the technology itself, not the context. Despite increasing use of these four approaches, projects still fail because of persistent differences between designers' perceptions and users' experience. These differences appear inevitable because ICT4D projects address problems nested in complex systems whose interaction is difficult for designers to understand and predict. Yet, some projects do succeed. We show that success occurred in a Brazilian banking project because users took context-oriented, not technology-oriented, actions to better fit the technology with the context. Based on our case study, we develop propositions that integrate and expand existing theories of ICT4D project success.*

## **1. Introduction**

When explaining the failure of information and communication technologies for development (ICT4D) projects, researchers often turn to differences between how designers perceive and users experience the context of technology use. According to these explanations, designers hold an incomplete or inaccurate understanding of context. As a result, the designed system is inappropriate for actual use, rendering failure of the ICT4D project likely. Designers' understanding is often incomplete because they tend to be geographically distant from the context of use. As Suchman (2002, p. 143) noted, "Technologies designed at a distance generally are characterized by a design/use gap that requires either substantial reworking of the technology or, if that is impossible and prospective users are powerful enough, its rejection." Warschauer and Ames (2010) provided a good example of this gap when they argued that technologies created by U.S. designers to be given to students in other countries failed in part because components were not durable enough for student use and were costly to replace in that context. The ICT4D literature suggests that differences between designers' perceptions and users' experience are commonplace and fatal to project success.

Ideas about how to achieve success in ICT4D projects often focus on better technology design. Thus, researchers argue for using human-computer interaction (HCI) techniques such as participatory design that involve users directly in studies that pay close attention to user activities in the local setting (Medhi, Menon,

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Cutrell, & Toyama, 2010; Parikh, Ghosh, & Chavan, 2003; Toyama, 2010). Some researchers look beyond the user in interaction with the technology to consider the broader social, organizational, political, economic, and cultural contexts of use (e.g., Mosse & Byrne, 2005; Puri, 2007; Silva & Hirschheim, 2007). With this broader understanding, designers can better tailor the technological system to its context. Other researchers have turned to cognitive processes to understand why users viewed a technology differently than did the designers (Islam & Grönlund, 2010; Meso, Musa, & Mbarika, 2005). Finally, a few researchers acknowledge that users might modify the technology to better fit the context in the course of use (e.g., Pozzebon & van Heck, 2006).

In this article, we explore an alternative to existing approaches by considering that users might modify not the technology, but the social, organizational, political, economic, cultural, or other context surrounding use. The idea that context is malleable is central to several existing theories applied to technology design and use. Perhaps most prominent among these theories is structuration theory, which considers users' mutual shaping of technology and context (structures) over time (e.g., Orlikowski, 1992). In contrast to structuration theory, we limit our focus to users' shaping of context, based on our study of a case in which technology was largely fixed.

By saying that technology was largely fixed, our intention is not to adopt a deterministic stance: Outcomes are never fixed or universal, and are subject to user agency through the shaping of contexts. Yet, treating technology itself as fixed, for all practical purposes, in this and some other ICT4D cases may make sense for at least three reasons. First, users in many ICT4D projects may lack the technical skills to meaningfully modify the technology in the ways that users in developed countries might (Heeks, 2002), but these users may have the acumen (political, social, or otherwise) to alter their local context. Second, context is a more likely modification target in ICT4D projects aimed at financial inclusion, such as the case we studied, because banking systems, for security reasons, are designed to deny end user modification (Hertzum, Jørgensen, & Nørgaard, 2004; Singh, Cabraal, Demosthenous, Astbrink, & Furlong, 2007). In such cases, if altering the context alone is viewed as a viable implementation solution, designers have less incentive to change the technology post-implementation. Finally, the potential frequency of cases in which technology is largely fixed, combined with their neglect in the literature, suggests that exploring such a case should allow us to build a more complete explanation of how differences between designers' perceptions and users' experiences are remedied and how projects might succeed.

Our contribution in this article is to show that differences between designers' perceptions and users' experience of context exist not simply because designers take an uninformed stance toward context, but because the problems that ICT4D projects address are nested in complex systems of overlapping contexts (e.g., social, governmental, and so forth) whose interaction is nearly impossible for designers to understand or predict. Although concerted efforts to improve technology design might reduce differences between designers' perceptions and users' experience, these differences, narrowed or not, will likely be inevitable. We further show that resolution of these differences is not the sole province of designers and systems implementers; users also play a role. Users are not passive recipients who sit haplessly in a sea of contextual intersections and whose only choices are to accept the design shortfalls or reject technologies. Rather, when the context is more fungible than the technology, users may alter the context of use and aid in successful implementation. By extending the research lens to users' context-oriented actions, we show that ICT4D project success does not rely on the perfect designs of omniscient designers. This finding is particularly important given that contexts are dynamic: Even attempts to design for a well-understood context may fall flat when conditions have changed upon implementation (Heeks, 2002). To set the stage for our inquiry, we briefly review research that identifies and often tries to narrow differences between designers' perceptions and users' experience.

## 2. Narrowing the Differences Between Designer's Perceptions and Users' Experience

When the United Nations set its Millennium Development Goals in 2000, many international development agencies responded by devoting resources to the deployment of technologies in developing countries, spawning the ICT4D movement. Wilson (2002, p. 12), who analyzed 101 documents from seven international

development agencies (World Bank, UNESCO, UNDP, IDRC, ITU, GKPF, USAID), found that each agency considered ICTs a “magic development solution” to the problem of poverty. When these ICT4D projects began to fail, researchers sought to understand why.

Often, researchers found their answer in the differences between designers’ perceptions of what the technology ought to have done (and how users ought to have employed it) and what users needed the technology to do (and how they expected to use it). For example, Cervantes, Warschauer, Nardi, and Sambasivan (2011) found that in a school laptop program in Mexico, success did not rely on the factors that program designers had considered. The authors concluded that implementing school laptop use in developing countries “is far more complex than what technology designers assume” (p. 945). In short, designers’ perceptions differed so significantly from the actual context of use that project success lay in peril. Heeks (2002, p. 104) termed this difference between designers’ perception and users’ experience the “design-actuality gap” (later, the “design-reality gap,” see Heeks, 2003, p. 3).

In the following sections we consider four existing approaches to narrowing the gap between designers’ perceptions and users’ experience: the cognitive approach, the local setting approach, the contextualist approach, and the user agency approach. We do not mean to suggest that the four approaches are mutually exclusive; indeed, several studies incorporate two or more approaches. We point out that the approaches represent distinct ideas about why differences in perceptions and experience exist and how to remedy them.

We investigate in this article a variant of the user agency approach in which the object of users’ agency is not the technology, but the context of use. Although we consider all approaches to be complementary, we argue that, due to the impossibility of fully understanding users’ practices, needs, skills, and context of use, a user agency approach with a focus on context-oriented actions seems applicable in understanding success and failure across a wide array of ICT4D projects.

### **2.1 Cognitive Approach**

The cognitive approach views users as applying a rational decision process when assessing whether to use a technology in an ICT4D project. These studies implicitly hold that systems designers’ inability to convey to users the technology’s affordances will impede use by creating the perception of differences between designers’ perceptions and users’ experience. Davis’ (1989) technology adoption model (TAM) provides the theoretical grounding for much of this work. Specifically, researchers in this realm argue that the TAM constructs of perceived ease of use and perceived usefulness will be predictive of use in ICT4D projects. Although Meso et al. (2005) found little support for the TAM constructs of perceived ease of use and perceived usefulness in explaining intentions to use in studies carried out in Nigeria and Kenya, they did find strong support for perceived reliability of the technology, lending credence to their cognitive approach. Among ICT4D studies, TAM constructs appear primarily when assessing intentions of technology use.

### **2.2 Local Setting Approach**

The local setting approach directs attention to users and their use practices in their immediate setting. At the most basic level, the local setting approach construes *setting* narrowly as user plus technology and aims to employ HCI best practices to design a suitable user interface. As Toyama (2010) noted, HCI principles are applicable to one of the biggest challenges in ICT4D research—designing, building, and evaluating effective interfaces. Parikh et al. (2003), for example, employed a mix of HCI best practices, including iterative paper prototypes, prototype evaluation, association tests, and collaborative design, to develop an interface for community-based financial institutions in rural India.

The ICT4D literature also reflects a prominent debate in the HCI field in which some scholars have argued for less attention to the user-technology relationship, such as the user interface, and more consideration paid to the role of the larger setting. Scholars have contended that, with a broader conception of *setting*, designers could craft system modifications at the point of implementation to promote fit between the technology and the context. To this end, Patra, Pal, Nedeveschi, Plauche, and Pawar (2007) conceptualized the setting in terms of the usage models in India. Similarly, Medhi et al. (2010) employed ethnographic techniques to understand setting, finding that employing human intermediaries was instrumental in the success of a computer-based

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system in a Bangalore slum. Human intermediaries also figured prominently in Gandhi, Veeraraghavan, Toyama, and Ramprasad's (2007) study. In each of these studies, expanding the boundary of the local setting beyond the user interface, then tailoring the system to that expanded setting aided project success.

The local setting approach also includes expanded ideas of *local* to account for national culture. Pitula, Dysart-Gale, and Radhakrishnan (2010), for example, argued that designers in developed countries, which often display an analytic culture, rely on theory to build low-context technologies. The authors argued that developing countries, by contrast, often display experiential cultures that favor a design process that considers local practices.

### 2.3 Contextualist Approach

Contextualists develop a repertoire of concepts, models, and theories to explain the interplay of extra-technological contextual factors that prompt differences between designers' perceptions and users' experience. Using actor-network analysis in an early application of this approach, Walsham and Sahay (1999) found that, although system designers incorporated HCI practices of participatory design and improved user training, the system failed because designers did not align relevant groups through educational processes and administrative structures. Complementing applications of actor-network analysis are perspectives informed by social construction of technology (SCOT) theory, which holds that technologies have different meanings in different contexts and among different social groups. Alternative interpretations of the same technology by different stakeholder groups could lead to differences between designers' perceptions and users' experience, depending on which stakeholder groups designers had in mind. Krishna and Walsham's (2005) finding that involving multiple stakeholder groups increased the likelihood of successful implementation lends credence to the SCOT idea of a broad and diverse social context. Mosse and Byrne (2005), who similarly paid attention to the broader social context of use, found that a project faltered because the technology did not reflect communicative norms and emergent collective identities among villagers. Through such studies, contextualists have built up a set of case-specific factors for designers to consider.

With this empirical base, contextualists turned to organizational concepts, models, and theories to build universal, not case-specific, explanations of ICT4D project failure. Drawing on the concepts of boundary objects and participation, Puri (2007) identified four knowledge domains—technology, application, community, and implementation—across which designers must create alliances to ensure project success. Similarly, Madon, Reinhard, Roode, and Walsham (2009) argued that project success depended on concepts of social and political legitimacy and the inclusion of financial incentives and other development opportunities for relevant groups. Silva and Hirschheim (2007, p. 331) introduced a punctuated equilibrium model in a study of a strategic IS implementation in Guatemala, finding a fatal mismatch between the IS and the organization's distribution of power, core beliefs, and other structural factors. Using stakeholder theory, Bailur (2006) found that inclusion of stakeholders was important in Indian ICT4D projects. Hayes and Rajão (2011) used institutional theory to reveal the historical roots of competing institutional logics among groups in a project in the Amazon. With these efforts, contextualists hoped to derive universal lessons for overcoming differences in designers' perceptions and users' experience.

### 2.4 User Agency Approach

ICT4D scholars acting in the user agency approach recognize that social, political, and organizational climates shape how designers develop technologies and users employ technologies, and suggest that users might make local adaptations to technologies to better fit the particulars of their context. Pozzebon and van Heck (2006) provided evidence that users made local adaptations to technology and noted the importance of users' aptitude for improvisation. Avgerou and Walsham (2000) recognized that such adaptations might be instrumental in ICT4D project success. Ali and Bailur (2007) similarly argued that users' *bricolage* (tinkering using the resources at hand; in the ICT context, see Ciborra, 1998) may be the key to project success over time.

A few examples exist in the literature in which user adaptations were not technologically oriented, but strategically oriented. In a case study of a Nigerian reengineering project, Bada (2002) noted that senior managers opted to selectively implement the project. Similarly, Rangaswamy (2006) documented how an ICT4D project in rural India was repurposed to provide other services that local people wanted. In both examples, users

Table 1. Summary of Existing Approaches to Narrowing Differences.

Approach	Envisions the Actor as the . . .		Actor Modifies the . . .	
	Designer/Implementer	User	Technology	Context
Cognitive	✓		✓	
Local Setting	✓		✓	
Contextualist	✓		✓	
User Agency		✓	✓	

adapted an ICT4D project to meet their business aims. Less common still in the literature are examples of local adaptations of work practices that users undertake on their own, without official sanction from and absent the knowledge of system designers, implementers, and project officials. We see an example of such adaptations in Bada's (2002) Nigerian case study in which the project's new business rules were flouted to better match local customs.

Table 1 summarizes the four existing approaches to narrowing differences between designers' perceptions and users' experience. As the table indicates, all but one approach envisions designers and implementers, not users, as the actors, and all four approaches focus on changes to technology, not context. Yet, because users in ICT4D projects are likely to lack the technical skills to modify technology, it seems probable that these users would turn to adaptations to their context of use. The literature, however, reveals little about these kinds of context-oriented user actions, including how users enact them and what the ramifications of such adaptations may be. To investigate context-oriented, as opposed to technology-oriented, actions that users might take to better fit technology and context, we conducted a qualitative research case study of a financial inclusion project featuring correspondent banking.

### 3. Methods

#### 3.1. The Correspondent Banking Project in Brazil

In 2001 the Brazilian government implemented family welfare programs that distributed monthly checks for education and other family needs to the nation's poor. Because banks were scarce in rural areas, Brazil's Central Bank adopted a regulation that allowed nonfinancial establishments such as grocery stores, post offices, and lottery shops to cash the benefit checks as well as to handle bill payments, such as utilities, and bank deposits and withdrawals (Alves & Soares, 2006). These establishments, known as "correspondents," expanded the reach of the banking system.

To enable grocery store owners, postal clerks, lottery shop operators, and other small business owners to perform these simple banking transactions, system designers created a rudimentary, easy-to-install technical system featuring a point-of-service (POS) machine or a personal computer as a terminal, with limited accessories such as barcode scanners and keypads. The terminals connected to bank servers directly via Internet, General Packet Radio Service, or satellite. Clients either entered passcodes into key entry machines or swiped bank cards in a reader to establish their identity. The correspondent, using a computer interface or a POS machine, accessed the client's account, made the desired transaction, and provided the client with a receipt.

As a top-down project conceived originally to attend to a cash transfer government policy and to expand the country's network of payment collection, the correspondent model was designed from a perspective of only one view of the involved actors: the banks'. Banks implemented the system in little more than one year via tens of thousands of correspondent outlets throughout Brazil, largely in places with weak economic and technical infrastructure. Local shop owners received little training to accomplish the banks' goal of serving millions of financially and technically illiterate clients. Eventually, many banks started to work with third parties, called network integrators, who installed the equipment for correspondents and, in some cases, hired and trained correspondents (Jayo, Diniz, Zambaldi, & Christopoulos, 2012).

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The correspondent model is “based on agreements involving a diversity of social groups, some identified with local interests—such as local government, small retailers and clients—and others with non-local interests—such as national government, big banks, technology providers and network integrators” (Diniz, Birochi, & Pozzebon, 2011, p. 485). Project success was evidenced, as Diniz et al. (2011, p. 492) noted, by “a clear perception of the positive impact on the local economy by all actors” involved, based on statistics of financial inclusion and local economic growth as well as small retailers’ reports of increasing foot traffic and revenues for transactions. The project’s success was further reflected in the increasing number of correspondent outlets, growing from 20,000 to 150,000 in a decade, totaling more than six times the number of regular bank branches and serving more than 40 million Brazilians who otherwise had no access to banking services (Banco Central, 2011).

The correspondent banking system is an instrumental case for ICT4D research because it provides insights that will help us integrate and expand theory (Stake, 1995). Specifically, because this case involves a government program designed to address a social problem via financial institutions operating with ICTs, it reflects the interplay of multiple systems, replete with the complexity that such interplay entails and the differences between designers’ perceptions and users’ experience that are likely to ensue. In operation for a decade, the project affords us the opportunity to investigate actions users have taken and it also provides an opportunity to examine the consequences of user actions for project success.

### 3.2. Research Design

To understand the interplay of the social, financial, technical, and governmental systems in the correspondent banking system, we interviewed 51 individuals across a variety of system roles. We interviewed 21 correspondents (owners or clerks in lottery shops, grocery stores, drugstores, Internet shops, and post offices), 15 *bancarios* (bank employees), 12 bank managers (branch managers, midlevel managers, and senior-level managers), two network integrators (third parties who handled equipment installation, training, and support), and one of the main system designers (a bank director at the time of design). Interviewing people across this breadth of roles permitted us to understand the system from multiple perspectives and to ascertain designers’ perceptions and users’ experience.

To ensure that our findings were not particular to any given bank, we spread our interviews across three banks (two public and one private) that together accounted for more than 70% of the correspondents offering transactional services (Central Bank, at [www.bcb.gov.br/?CORPAIS](http://www.bcb.gov.br/?CORPAIS)). We also chose two geographical locations in Brazil—the states of Pernambuco and São Paulo—so that we might investigate use in rural as well as urban settings on the grounds that correspondents in urban settings may have had greater access to technical support and, hence, less need for workarounds than their counterparts in more remote regions. In São Paulo, we interviewed bank executives, network integrators, bank managers, *bancarios*, and correspondents in *favelas* (slums). In Pernambuco, we interviewed bank managers, *bancarios*, and correspondents in a city of 35,000 inhabitants 400 kilometers from the state capital. We also interviewed correspondents in five nearby towns ranging from 5,000 to 10,000 inhabitants, in some cases accessible only by dirt road, where correspondents provided the only financial services.

### 3.3. Data Collection

We conducted semistructured interviews. Interviews ranged in length from 20 minutes to two hours, with a median of one hour. We audio recorded and transcribed interviews, took pictures of the location, and video recorded some of the interviews. In addition to interviews, we wrote detailed field notes to capture details of the physical environment, clientele, and the like. We conducted almost all the interviews in Portuguese. Purposely, none of our questions specifically asked about the narrowing of differences between designers’ perceptions and users’ experience: We expected that if differences and their resolution were important in the correspondent banking project, they would arise naturally in discussion of everyday activities. Sample questions from the correspondent protocol reflect this focus on everyday work:

1. How did you learn how to be a correspondent?
2. Can you tell me what kinds of tasks you did yesterday?

3. Could you show me the different technologies and tools that you use in your job as a correspondent?
4. What kinds of problems do you routinely face as a correspondent?

### **3.4. Data Analysis**

Our analysis is based on our translated and transcribed interviews and field notes as we searched for emergent themes, to assess their resonance across different banks, geographic locations, and bank roles. One theme that struck us as a “core category” (Corbin & Strauss, 2008, p. 104) was the apparent mismatch between how the system designer, bank managers, *bancarios*, and network integrators perceived the correspondent banking system versus how the correspondents experienced it. To confirm this sense, we generated codes from the literature, building from Heeks’ (2002) idea of a design-reality gap and contextualists’ ideas of multiple systems, domains, or contexts at play (e.g., Mosse & Byrne, 2005; Puri, 2007; Silva & Hirschheim, 2007), as well as ideas of user agency from prior research (e.g., Pozzebon & van Heck, 2006). Using the resulting codes, we employed a constant comparison method (Corbin & Strauss, 2008) to probe our data for designers’ perceptions and users’ experience of reality across four systems central to the correspondent banking system (social, financial, government, technical), refining our codes as we went along to better fit our data. We also coded for actions that correspondents took to narrow the differences between designers’ perceptions and users’ experience. Our approach enabled us to understand why differences arose and how and why users took action.

## **4. Findings**

Our interviews revealed that project designers and implementers envisioned a simple, affordable technical solution to implement a straightforward social policy: By government decree, poor families all over Brazil were to receive their government benefits checks locally. But the government bank responsible for distributing these checks determined that opening branches in Brazil’s more remote areas would be too costly. The bank also ruled out ATMs as a solution because ATMs would require servicing (e.g., cash management), which remoteness also rendered costly and impractical. Instead of new branches or ATMs, the bank implemented the correspondent banking system, which eventually spread to other public and private banks. Although the technical solution that stood at the heart of the correspondent banking system did prove simple—often arriving in a plug-and-play kit—the social problem required more than what a simple transactional exchange would allow. To accommodate the rural public’s limited technical and financial literacy, correspondents narrowed differences between designers’ perceptions and their own experience not by altering the technology, but by expanding their role with clients and developing system workarounds. Tellingly, system designers and implementers did not notice, and hence did not appreciate or openly support, these context-oriented actions that correspondents took.

### **4.1. A Simple Solution**

A key designer of the project was Henrique Costabile, at the time a director with the government bank. Costabile viewed the problem of distributing government benefit checks in terms of the logistics of cash flow:

There was a law saying that [the bank] should pay everybody in the country that has this profile [to receive government benefits]. So that was the problem: How can we pay benefit in the middle of the Amazon, if there is no branch there?

Then we came up with the correspondent banking solution.

The solution was simple. Because most towns had—at bare minimum—a drugstore, bakery, or grocery store, banks could enlist the store’s infrastructure for bank transactions. In the case of a beneficiary in the middle of the Amazon, Costabile explained,

When he passes the card [at the bakery], what happens is we debit the funds for that benefit, and we credit the account of the bakery, and the bakery gives the money, physically, back to him. That is the transaction.

All parties involved in the project confirmed the simplicity of the financial and technical systems that governed the correspondents’ activities. Bank managers noted that the technology’s interface made accessing accounts

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easy. Moreover, because correspondents handled simple transactions with limited equipment, their training was intentionally slim, as this exchange illustrates:

Interviewer: So, the training on the equipment, how long is it? One day, two days, a week?

Network Integrator: About two hours, max. . . . I send a kit to the site. . . . As soon as the kit gets there, I take the initiative to call the [correspondent] to ask, "Is the kit there with you? Do you have time available to turn it on, for us to test?"

Interviewer: Oh, because it is the person himself who installs?

Network Integrator: Yes, it is just to plug the cord in the wall.

### 4.2. Differences Between Perceptions and Experience Prompt Problems

Although designers thought they had a simple technical solution to implement a social, government policy and address a financial problem, reality was more complex. At least three factors contributed to differences between designers' perceptions and users' experience in the correspondent system.

The first factor was that, although system designers, implementers, and *bancarios* themselves saw strict and clear differences between correspondents and *bancarios*, correspondents and their clients viewed correspondents as *bancarios*. As a result, the project prompted client expectations with respect to the governmental and financial systems that correspondents could not meet. These quotes from *bancarios* illustrate the stark distinctions that they saw:

I have to develop the commercial relationship; the guy from McDonald's doesn't have to do this. . . . When it comes to the bank and correspondents, they are not like us, they are just minimum McDonald's, minimum is what you expect, when it comes to McDonald's.

A banking correspondent is the one who receives the water, electricity bills. Great, because I have this idea of business, what I don't want is a branch full of people to pay a phone bill.

Correspondents, by contrast, minimized their task differences with bankers, as when a drugstore correspondent noted over a dozen services that he could offer clients, pointing out only a few that he could not perform that *bancarios* could. Because clients also held a broad perception of correspondents' capabilities and because correspondents served as the connection to government and financial systems for these low-income people, clients were frustrated when correspondents could not meet all their financial service demands in the manner of a *bancario*. The problem was that, although the tasks may have been similar, the capabilities of a branch differed from those of a retail establishment operating as a correspondent, as the drugstore correspondent explained:

Interviewer: When the client says this bank is not good, do they mean that they view you as a bank or are they talking about [the bank] as a big institution?

Correspondent: Us.

Interviewer: So, they [refer to] the correspondent as a bank?

Correspondent: Yes. . . . Right, just to clarify with an example: The other day a guy walks in trying to cash R\$15,000, and I had to explain that the limit here is R\$1,000 and we are not the bank. That is because they think we are the bank. . . . That shows that a lot of people don't understand how the correspondent works even though it has been around for a long while now. Maybe there isn't enough information out there, just because you can do that in a branch doesn't mean you can do it here.

In fact, clients routinely expected correspondents to act in ways that *exceeded* what *bancarios* could do. They expected correspondents to resolve government problems such as stopped benefits, reduced benefits, and notices to turn off utilities. The correspondents could not meet these heightened expectations because their simple interfaces offered no links to government agency databases with client information, a fact that clients



with limited technical and financial literacy struggled to accept. This exchange with a shop owner and her clerk illustrates how clients expected correspondents to solve problems with government agencies:

Interviewer: What is your role in the community?

SHOP CLERK: Like doctors!

SHOP OWNER: Sometimes, a client comes here for help with things that we don't even work with, but we help them, make phone calls, and try to solve their problem.

SHOP CLERK: We're the medicine for everything.

SHOP OWNER: [It] is because we have a lot of patience. . . . Because we deal directly with the client, and sometimes the payment had been suspended, and they think is our fault.

SHOP CLERK: Some clients think that we are stealing from them, they try to hit us when we try to explain.

A second factor arose in conjunction with the interaction of the technical and social systems. Although the equipment was simple to operate, it was sometimes unreliable. Connections to the bank's servers routinely went down. One correspondent confessed

The most difficult part is when the client gets here upset, aggravated, or furious with some personal problem and wanting something that at that moment we can't offer. For example, sometimes, a client wants to pay its bill or cash some money and the system is down, and I can't help. It's a technical issue with the bank.

In addition, the technology required client documents to be uncomplicated. A small variation in the document, such as a crease in a bill stub, could render the system unable to process the transaction. The poor people who were the correspondents' clientele were often unable to maintain their documents in conditions sufficiently pristine for the technical system.

A third factor contributing to differences in designers' perceptions and users' experience arose from the financial system in the form of restrictions set in place by the banks to limit their liability with respect to cash and to provide security for correspondents, whose businesses, unlike the bank branches, had no security guards. These restrictions included caps on how much money a client could withdraw and how much total cash a correspondent could receive. Correspondents told us of having to suspend services because they had reached their cash limit. To reopen, they would need to go to the bank to make a deposit, a trip that they could not always make easily during their store hours, as this grocery store correspondent explained:

For example, the flow amount is R\$5,000.00. If I have R\$5,100.00, I have to deposit and go to [local small city where the bank branch is located], which is not close. Because of the distance, I have to pay someone to go there. Or I have to close the store or leave my son here, which I'm afraid of; people know there is money here.

Thus, although system designers had provided a simple technical solution for serving poor and remote communities with essential banking services for the distribution of government benefits, there were complicated social, governmental, and financial factors associated with the correspondent banking system. To remedy the differences between designers' perceptions and users' experience prompted by these factors, the correspondents took action. They expanded their role beyond what designers and implementers had prescribed it to be and developed system workarounds.

#### **4.3. Workarounds and Role Expansion as User Context-Oriented Actions**

When confronted with problems arising from differences in perceptions and experience, correspondents engaged in small, improvisational acts to modify the two systems malleable to them: the social and the financial systems. Correspondents could not modify the technical system because it was closed to user programming; even if it had been open, correspondents' limited technical skills (e.g., no programming ability) would have prevented most of them from effecting change. Correspondents could not modify the governmental system because government was large, bureaucratic, and distant from them.

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Correspondents modified the social system by expanding their role. System designers and implementers envisioned correspondents as mere transaction processors: A swipe of a card, a few keystrokes, the entry of an amount or two, and the printing of a receipt constituted, in the designers' and implementers' minds, the full extent of the correspondents' duties. Correspondents quickly realized, however, that the problems that arose required more from them than their prescribed set of tasks incorporated. To resolve these problems, correspondents found they needed to talk personally with clients, take time to explain issues (often multiple times), get to know clients' families and situations, direct clients to appropriate services to resolve issues, and help clients with personal problems unrelated to government benefits or bill payments.

Thus, to handle clients who routinely had problems with their benefits or bills, and who often lacked the technical and financial acumen to appreciate the complexity of their problems, the correspondents needed to be more than the mere transaction processors the system designers had in mind. Instead, one-on-one and often confidentially, correspondents helped people solve their personal problems, as these correspondents explained,

We're the "human ATM." [The bank's] ATMs are there, but they don't talk to the client, and here we do, we give them security and support.

There are people that come here so often that I know their names, date of birth. Sometimes an elderly person forgets to bring a picture ID and that is a requirement from the bank and when they get here, they want to talk to me, because they know I remember.

When correspondents equated themselves to "human ATMs," they reflected how they expanded their role to narrow the difference between designers' perceptions and their own and their clients' experience. For example, clients expected the correspondents to resolve for them problems that they had with the bank, government, or utility. Correspondents tried to determine where clients should go to resolve these problems because they empathized with their clients, a sentiment that was much less prominent among the *bancarios* whom we interviewed. In this manner, correspondents' roles expanded as they guided clients through the government system. A drugstore correspondent described how he helped uninformed or misled clients:

I explain what was done wrong and show how to do it right. There are people that don't know the difference between R\$5 and R\$50. You can charge them R\$50 instead of R\$5 and they will thank you for doing so.

Correspondents modified the financial system via system workarounds. In a transaction, the first contact that users had with the financial system was in entering their account identification passcodes. This first step proved problematic because using the 10-number keypads for entering passcodes overwhelmed many clients. Intending that the pads should face the clients, designers had placed a hole in the kiosk's plastic window to allow a cord to connect the keypad on the customer counter to the correspondent's computer behind the window. In the designers' vision, clients would enter their passcodes while standing at the counter across from the correspondent. Yet in our visits to grocery stores and other shops, we found that the keypad was most often positioned directly beside and facing the correspondent. Clients never stood at the customer counter; instead, they advanced to the correspondent and stood near him as he operated the keypad and the computer. As we witnessed many times, clients handed over to correspondents a small slip of paper on which they had written their passcode. Clients trusted correspondents to enter their passcode for them and to treat it in confidence. In short, clients did not wish to interact with the technical system, not even to punch in a short numeric code. A post office correspondent explained, "On a regular basis is like this, an elderly comes and gives us their card and password. They trust us, and they don't check the money, and we need to do this for them."

In addition to developing workarounds for entering account identification information, correspondents developed workarounds to the cash restraints enacted by banks. For example, correspondents "borrowed" money from their business whenever the cash in the correspondent revenue was too low to process a client transaction. If the correspondent did not do so, then the client would be unable to receive the benefit payments and would have to wait until the correspondent was able to go to the bank. As a grocery store correspondent explained, "[I] took money from the market to take care of the customer, because if every now and then, someone comes and [the correspondent account] is out of money, what will happen?"

#### 4.4. Differences Narrowed and None the Wiser

Despite differences between designers' perceptions and users' experience, the correspondent banking system worked. It worked because users acted. Their acts, however, were aimed not at the technology, as prior scholars have documented in ICT4D projects, but at the social and financial systems that contributed to the context of use. Specifically, correspondents modified the social system by expanding their role and modified the financial system by developing system workarounds. Correspondents undertook these context-oriented acts to help their clients navigate the web of social, governmental, financial, and technical systems that comprised the correspondent banking system.

Because correspondents fixed the problems occasioned by differences in designers' perceptions and their own experience, people higher up in the stakeholder chain were unaware these differences existed. Network integrators whom we interviewed, for example, had not visited correspondents' shops. These integrators were astounded to learn from us that clients shunned the simple keypad interface, entrusting their passcodes to correspondents. Similarly, most *bancarios* did not visit correspondent sites and thus had no insight into the daily practices of the correspondent banking system. As a result, they were largely unaware of the problems that correspondents faced and the solutions they devised. Yet, had correspondents not taken these context-oriented actions, the correspondent banking system might well have failed.

## 5. Discussion

Our study of correspondent banking positions us to develop propositions with respect to project success in the face of differences between designers' perceptions and users' experience. Our objective in doing so is to explain not why ICT4D projects fail (there is plenty of evidence to suggest that one main cause of failure is the existence of such differences), but why projects with such differences sometimes succeed, as did the one we studied. We put forward seven propositions that, taken as a set, integrate and expand existing theories of ICT4D project success.

1. *Designers can narrow differences between their perceptions and users' experience by employing a local setting approach that focuses on users and technology, by adopting the contextualists' broader view of the use environment, and by gaining insight into users' cognitive perceptions of the system.* As we discussed in the beginning of this article, the local setting, contextualist, and cognitive approaches each offer ways to successfully narrow differences.
2. *Despite these efforts, differences between designers' perceptions and users' experience, albeit narrowed, will remain.*  
The contextualists have made clear the many factors that play a role in the context of use in ICT4D projects. No designer, no matter how cognizant of the complexity that the interplay of these many factors engenders and no matter how much attention he or she pays to the user, can fully account for this complexity, then create a technical system perfectly tailored for use. Thus, differences are a natural artifact of design. Thoughtful design, however, may narrow these differences sufficiently for system use.
3. *If differences are small enough, users can narrow them via local adaptations.*  
This proposition, first posed by Pozzebon and van Heck (2006), implies that large differences between designers' perceptions and users' experience exceed users' potential for narrowing them, thereby leading to project failure. Differences must be sufficiently small that users, with the skills and resources available to them, have a chance to narrow them. Only then might projects succeed.
4. *In narrowing differences, users can modify the technology, the context, or both.*  
Our study makes clear that users altered the social and financial context, not the technology. Although Heeks (2002, p. 108) pointed out that users might make adaptations to context (what he termed "actuality improvisation") or technology ("design improvisation"), prior research on local adaptations has primarily investigated users' adaptations to technology. Conceivably, users may change both the technology and the context.

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5. *Users can only modify those aspects of the context that are malleable.*

Our analysis of the correspondent banking project revealed that all four of its associated systems—social, governmental, financial, technical—contributed to differences between designers' perceptions and users' experience. Notably, only the financial and the social systems were malleable enough for correspondents' actions to narrow those differences. The government and technical systems, by contrast, lay beyond the correspondents' grasp and, thus, were never a target for correspondents' actions.

The government system of welfare benefits that created the motivation for the correspondent system was beyond the correspondents' grasp because it operated at the federal level in a centralized, bureaucratic manner. Correspondents neither had access to government records and databases nor authorization to act on behalf of government agencies. Thus, for example, when a client's benefit changed or his payment was blocked for some reason, there was little a correspondent could do except tell the client to report the problem to the relevant government agency. Designers did not incorporate fully this domain of knowledge into the correspondent banking system and, as a result, correspondents had no ability to modify the government system.

The technical system was similarly rigid: It was designed to handle only simple transactions and allowed little modification beyond physical placement of the kiosk and the keypad. Correspondents did not know how to write computer code to modify the technical system and they lacked the technical expertise to otherwise bypass the highly structured menu interface. For this reason, correspondents could not carry out improvisational acts to alter the technical system.

What were amenable to correspondent modification were the social and financial systems. Correspondents, therefore, modified these systems to make the banking project work. Specifically, they expanded their role in the social system and developed system workarounds in the financial system.

6. *Users require skills to modify context.*

Correspondents lacked the necessary skills to modify the technical system. Nor did they have the political clout or proximity to modify the government system. What correspondents did have was business acumen garnered over years of providing service or running a small retail establishment. This acumen gave them the creativity, patience, resolve, and other traits required to modify context.

The correspondents' clients—the poor who came to pay bills, make small cash transactions, or receive their government benefits checks—had even fewer technical and political skills than did the correspondents. They could not, for example, manage the numeric keypad interface for entering their passcode and they grew quickly frustrated and confused when problems arose with their bills or payments. Moreover, they lacked the correspondents' acumen for finding system workarounds. In all likelihood, had the correspondents not stepped in on behalf of the users, the correspondent banking project would have failed.

7. *Intermediaries may act in place of the users to make modifications on their behalf.*

We suspect that if researchers had examined the plans for the correspondent banking project prior to its implementation, they would have identified the clients as the users of a system that, through correspondents' entries into a simple technical interface, would yield the desired benefits. The researchers may not have recognized the potential for the correspondent to usurp the client as the primary user of the system. Early attention to design may have focused too much on the skills and abilities of the clients, overlooking the skills and abilities of the correspondents who would come to operate as "human ATMs." The correspondents' actions suggest that the span of use in ICT4D projects may be greater than in projects where users have considerable skills and abilities. Consequently, intermediaries may come to act on behalf of the intended users. Although prior ICT4D research has considered the role of intermediaries, most studies to date have conceptualized intermediaries as people who train users on the system, not people who may make local adaptations to the system or the surrounding context (e.g., Medhi et al., 2010). Future research might consider how to best map

out the potential users in an ICT4D project, their relationship to one another, and their understanding and skills with respect to the context of use.

## 6. Conclusion

In this case study of the correspondent banking project, we identified the local adaptations that users made to ensure project success. Users in this study directed their adaptations to the context of use (specifically, to the systems associated with use) rather than to the technology itself. They modified only those systems that were malleable to their attempts and for which they had the skills that modification required. The users who took these actions were not the primary beneficiaries of the banking project (those who received benefit payments, paid bills, or carried out small cash transactions), but the correspondents who served as intermediaries to the banking system. Through their actions, correspondents narrowed the differences in designers' perceptions and users' experience to ensure project success. Based on our case study, we developed propositions that integrate and expand existing theories of ICT4D project success.

The tale of correspondents reveals how local adaptations may be broader in scope than the literature has thus far considered. Some authors assert that local adaptations—be they adaptations to the technology or to the context—are key to ICT4D project sustainability because, given that contexts are dynamic, only users' *bricolage* can ensure continued project success over time (Ali & Bailur, 2007; Heeks, 2002). Our study shows how the *bricoleurs* of interests may not be the intended primary users, but intermediaries. ■

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