



INTER-AMERICAN DEVELOPMENT BANK

**THE ROLE
OF INFORMATION AND
COMMUNICATION TECHNOLOGY
IN BUILDING TRUST
IN GOVERNANCE:**

**Towards Effectiveness
and Results**

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN BUILDING TRUST IN GOVERNANCE:

Toward Effectiveness and Results

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Chrisanti Avgerou is a Professor of the London School of Economics and Political Science (LSE). Claudio Ciborra, who sadly passed away while this research was being carried out, was also a Professor at LSE. He was the project director, designed the project and established its intellectual foundations. Antonio Cordella is an LSE Lecturer and was the project manager. Jannis Kallinikos is a Reader at LSE and Matthew Smith is a PhD candidate. The authors wish to acknowledge Danilo Piaggese, Robert A. Vitro, Andres Garrett, Maximilian Spiess and Enrica Murmura of the Information Technology for Development Division, Inter-American Development Department for their help in the design, organization and management of the project. In addition, they are grateful to Wagner Guerra of the IDB office in Brazil and Professor Nicolau Reinhard, University of São Paulo, for their assistance with the Brazil case study. They also wish to thank Francisco Lois of the IDB office in Chile and Juan Toro, Benjamin Shutz Garcia, Ricardo Lervan Campuzano, Jaime Gre Zegers, Mario Waissbluth Subelman, Francisca Artaza, Francisco Valdivia, Miguel Aguillara Oyane and Fernando Barraza Luengo for their assistance with the Chile case study. This study would not have been possible without the support of the Italian Ministry for Innovation and Technologies and the commitment of Minister Lucio Stanca, as well as Stefano Gatti and Alessandro Bellantoni.

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OPENING STATEMENT

The wave of technological progress we are experiencing has made available increasingly powerful communication and information tools that are capable of connecting public and private institutions. Information and communication technologies have become an extraordinary means to improve the quality of life, as well as the speed and the accountability of the services provided to citizens and the private sector.

In a world in which 50 percent of the population is virtually excluded from the benefits of information and communication technology, bridging the digital gap has become an imperative for the international community, particularly for the industrialized countries. Italy is pleased of this opportunity to contribute to closing the digital divide by providing support for this publication, which was made possible thanks to the close collaboration between the Inter-American Development Bank and the Italian Ministry of Foreign Affairs-Directorate General for Development Cooperation.

The study was prepared by a group of Italian academics at the London School of Economics. The objective of this study is to define the role of new communication technologies in shaping good governance and people-centered development in accordance with the principles contained in the United Nations Millennium Declaration.

Since the Conference on e-Government for Development, held in Palermo in April 2003, the Italian Government has been in the frontline in assisting several developing countries and countries in transition to improve the level of services provided by local public administrations.

I wish to express my gratitude to every one involved in the publication and, in particular, the Inter-American Development Bank, one of our successful partners in the Italian initiative on e-government for development.

The Honorable Gianfranco Fini
Ministry for Foreign Affairs of Italy

CONTENTS

Foreword	vii
Preface	ix
Executive Summary	xi
Introduction	1
PART I: Toward a Framework for ICT in Building Trust in Governance	5
Chapter 1: Trust, ICT and Government	7
Chapter 2: Trust Through Trustworthiness	13
Chapter 3: Toward a Methodological Framework	21
Chapter 4: Context for the Case Studies	29
PART II: Case Studies	45
Chapter 5: Brazil: Case Studies	47
Chapter 6: Chile: Case Studies	67
Chapter 7: Factors That Have an Impact on Trustworthiness	87
Afterword	95
References	97

FOREWORD

To a large extent, development is predicated upon the capacity of individuals and organizations to foster and manage change. Technological advances, and their impact on the production and dissemination of information impinge upon the magnitude and the mix of physical, intangible and human capital investment needed to carry out democratic processes that lead to efficient, equitable and sustainable economic growth. Information and communication technologies (ICT) play a major role in the emergence and implementation of governance systems that facilitate the participation of all stakeholders in the decision processes that drive the allocation of resources. These technologies are a potent instrument to promote a culture of trust and participation among different strands of society and to strengthen the “social contracts” that are essential foundations of equitable and sustainable development.

A society’s vision of itself and how it transforms itself are defined, in large measure, by its attitude toward information and knowledge. Under appropriate conditions, ICT can enhance trust and trustworthiness by expanding access to public information and, thereby, promoting greater openness, transparency and accountability. The challenge for policymakers and planners is to improve the effectiveness of support for managing change by knowing when and how to intervene in using these resources.

This report addresses this challenge by focusing on the contribution that ICT can make to enhance trust and trustworthiness in governance. It is an ambitious preliminary step in

reshaping a framework that societies use in deciding when and how to deploy these resources to create the enabling conditions for development. We believe that it can serve as a catalyst for helping the Bank and beneficiary countries look at development, in general, and the use of ICT in governance, in particular, through a different lens and help improve the effectiveness of our collective efforts in this area. By offering a different way to view support for the use of ICT in public administration, the concepts discussed herein promote a refinement in the formulation of the outcomes, outputs and indicators for measuring, monitoring and evaluating development effectiveness in this area.

The Inter-American Development Bank is determined to assist countries in their transition to increasingly knowledge-intensive economies. In that context, the promotion of physical and human infrastructure for ICT that sustains productivity growth and supports these countries’ political commitment to increased social participation in the promotion of equitable and sustainable development and more efficient public governance systems will continue to remain a high priority for the Bank.

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PREFACE

The extensive and diverse efforts to use information and communication technology to improve public administration and strengthen democracy being carried out by the countries of Latin America and the Caribbean are the primary catalyst for this book. The use of ICT can energize collaboration among public, private and civil society organizations to improve public services, increase transparency and accountability as well as ensure that everyone participates and benefits from the democratic process.

Although this document focuses primarily on the experiences of Brazil and Chile in using ICT to build citizen trust in governance, it is important to point out that throughout the region, in different ways, at different institutional levels and relying on different resources mix, other countries are also investing in ICT infrastructure and human capacity building to make democratic institutions more responsive to and effective for citizens. All too often, the efforts of these agents of change go unnoticed. One objective of this document is to document such efforts and highlight their importance for all citizens.

Along with country efforts to adjust to the new conditions of development, the Inter-American Development Bank continues to strengthen its commitment to remain relevant and effective in matching its resources and experience with the changing needs and conditions of the countries. This book emerges as part of an ongoing

Bank-wide effort in response to the expressed political will of the countries of the region.

The availability of additional resources has enabled the Bank and the countries of the region to build upon previous experiences as well as strengthen their partnership through an expanded vision of e-government. As the first donor to the ICT for Development Trust Fund, the Government of Italy, through a mechanism created by its Ministries of Foreign Affairs and Innovation and Technology, and the Information Technology for Development Division (SDS/ICT) of the Bank, has provided significant resources for carrying out innovative pilot projects, meetings and studies in the area of e-government.

Last but not least, I wish to acknowledge the efficient coordination role played by my colleague Robert Vitro from the ICT division of the Bank's Sustainable Development Department and the outstanding contribution of the research team from the London School of Economics and Political Science to the work presented in this report. Without their commitment and expertise the policy relevance of the project and the guidance it provides for future actions would not have been as valuable.

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EXECUTIVE SUMMARY

The point of departure for this report are two reports (Latinbarómetro, 2004; UNDP, 2004) that found that the people of Latin America were losing confidence in democratic institutions and their ability to secure economic stability and prosperity. This lack of trust in democratic institutions and the associated weaknesses of the socioeconomic infrastructure of Latin America constitute a key issue that has to be addressed in order to successfully rise to the challenge of the Millennium Development Goals approved by the United Nations General Assembly. The low trust in democratic institutions is the outcome of both structural elements and contingent sociocultural factors. The Latinobarómetro survey has identified two main problems underlying the relationship between citizens and the public administration: a deficit of equality in the treatment of citizens by the public agencies, and low transparency and accountability in the ways public agencies operate.

The aim of this study is to establish whether investments in information and communication technologies and ICT-based services can contribute to improving trust between citizens and democratic institutions, and if so, to explore the ex ante assessment of the potential impact of ICT initiatives by government organizations on improving trust. To achieve this objective, the study comprised a critical review of relevant academic literature on trust, ICT and development. On the basis of this review we constructed a loose framework of conceptual ideas and relationships. The framework was brought to

bear on the design, collection, and analysis of empirical data obtained through five case studies in two Latin American countries, Brazil and Chile. The framework itself was revised and substantially developed to accommodate the empirical findings.

The report discusses the relationship between trust, ICT and government and outlines the directions along which they bear upon one another. Crucial in this respect is the effort to clarify the admittedly vague concept of trust and spell out the specific ways in which it is associated with social, cultural and institutional processes. Trust is conceived as the outcome of experiences of interaction taking place within smaller or larger networks of personal, institutional and cultural relationships. Such experiences are, over larger time scales, consolidated in the norms and values shared within the community of the network. Thus, the study of the potential effect of ICT-based reforms on trust has to recognize these characteristics of trust and has to be assessed accordingly. These norms and values are, therefore, contextually and culturally embedded. To a considerable degree, they shape the development and deployment of ICT-based state reforms whose aim is to affect the relationship between citizens and the government.

Thus conceived, trust forms the background against which a further distinction is made between trust as an *interpersonal relationship* and trust as a *social or institutional phenomenon*. In this last respect trust captures citizens' expectations of fairness, impartiality and reli-

ability vis-à-vis the impersonal and less tangible mechanisms, structures or processes underlying the modern State, and society at large. The distinction is crucial for e-government initiatives, which are mostly entangled with trust as a social or institutional phenomenon. It is also useful to better understand how the Bank can intervene to support political and economic development in Latin America, specifically by strengthening the relationships of trust between citizens and government.

The analysis, furthermore, distinguishes among the following aspects of trust: trust in *technological artifacts or processes*, trust in a specific *ICT-mediated service*, and trust in *government at large*. Our investigation has focused on the second of these relationships to discuss the potential of e-government projects for building trust among citizens and the government. To this end, we focus on those characteristics, properties or conditions that make a service or an institution worthy of being trusted, which is here defined as *trustworthiness*, and assess the potential of ICT in enhancing these characteristics and properties.

It is of utmost importance to state that the distinction between trust and trustworthiness forms one of the cornerstones of this study. It represents a major finding that has emerged from an iterative dialogue between empirical observations and theoretical predictions. Trustworthiness is a precondition for trust. The rationale for distinguishing trustworthiness from trust rests on two assumptions. First, trustworthiness, as distinct from trust, can be traced back to a set of technological, organizational and institutional preconditions that, to some degree, can be shaped and manipulated via e-government initiatives in the short or medium term. Secondly, trustworthiness may lead to trust but may, as well, fail to do so. In other words, trustworthiness is a necessary but not sufficient con-

dition for trust. Both assumptions are crucial in indicating the space within which the Bank should develop initiatives aiming at improving the trustworthiness of ICT-based government services. The first scope of the intervention deals with the achievement of the necessary condition of trustworthiness in the ICT-mediated services via the definition of proper ICT policies. Secondly, the Bank has to cultivate the milieu within which these policies are deployed to support the process that may ultimately contribute to raising the trust between citizens and government.

Drawing on empirical data and observations, this report suggests that trustworthiness is the joint outcome of several categories of factors and conditions. These involve the prevailing *technological* and *organizational* factors underlying the delivery of a particular ICT-based service, as well as the wider *institutional* and *infrastructural* relations within which the development and delivery of that service takes place. The technological, organizational, institutional and infrastructural factors that shape trustworthiness can be changed with appropriate policy interventions (though the degree to which the desirable features of each category of factors can be controlled varies). The joint outcome of these four clusters of factors in determining trustworthiness must be distinguished from the attitudinal or perception-based quality of trust that is imprinted on citizens as the outcome of their experience of interacting with government services or institutions.

On the basis of these observations, the report suggests that the aim of the Bank's interventions should be to improve the level of trustworthiness as the necessary but not sufficient condition for trust.

According to our findings, the Bank should invest in ICT projects whose aim is improving trustworthiness. This should be tempered with

the understanding that trustworthy ICT-mediated services are a first fundamental step for the *potential* building of trust, which will depend on the overall experience of the citizens of a country and a number of other key institutional and cultural conditions formed over large time spans that are beyond the means of individual initiatives to determine. As a result, it seems clear that the Bank should develop or decide to support projects that, via the use of ICT, change a set of those characteristics, properties or conditions that make trusting a service or institution warranted. Having more trustworthy services or institutions is, in fact, an overall necessary precondition to enhance the socioeconomic infrastructure of Latin America and to successfully meet the challenge of the Millennium Development Goals (MDGs).

The potential of an ICT project to increase the trustworthiness of a government service can be assessed. Hence, the Bank can use trustworthiness as a term of reference when programs are developed, chosen and implemented. This report provides methodological guidelines for assessing e-government projects and their potential to improve trustworthiness.

An *ex ante* assessment instrument for professional practice has to accommodate the categories of antecedents that theoretical analysis and empirical studies suggest to be significant for the construction of trustworthy ICT-mediated services. The analysis distinguishes between two levels of such categories: (i) the background institutional and infrastructural conditions of the country that provide the parameters, as it were, determining the degree to which an ICT-mediated service will be successfully developed, sustained and utilized, and (ii) the foreground organizational and technology factors that need to be mobilized to that end. As already indicated, the former develop over large time spans and can thus be influenced through long-term

and large-scale policies and interventions that have, accordingly, to be negotiated by multiple institutional and economic stakeholders. The latter are more likely to be controllable by the organization that hosts the intended ICT-mediated service and can be factored in the action comprising a project sponsored by the Bank.

Thus, the suggested methodological instrument comprises a mix of qualitative and quantitative assessments. It identifies categories of conditions that need to be checked and categories of factors that could be shaped by appropriate initiatives to conform to the specifications of those features that are considered in each case to be requirements for trustworthiness. The exact list of conditions to be checked and factors to put in place can be only tentatively and minimally prespecified. The suggested methodology is an instrument intended to guide professional decision-making by addressing the fundamentally contingent nature of the processes of constructing technologies aiming at socially desirable effects.

This report recognizes the fundamental role played by ICT and related policies as instruments to improve the quality, equity and accountability of the action of the public administration. Moreover, it highlights the role of ICT as enabler for the improvement of the trustworthiness of public services, and hence, as fundamental instrument to achieve the necessary precondition for the development of policies that aim to improve trust between citizens and the government. It is recommended that the Bank first undertake ICT projects to improve the trustworthiness of public services as a means of promoting the achievement of larger and far-reaching socioeconomic innovations. The book provides the proper methodological instrument to assess *ex ante* the potential of these interventions. Moreover, it provides an overall frame of references to guide the Bank in

structuring ITC policies that whose aim is affecting trust-related interventions.

In supporting such projects, the Bank should be aware of those objectives that can be achieved in the short and medium term (i.e. building trustworthy ICT-based services) as opposed to longer-term and less predictable goals of fostering trust between citizens and government. Given the high degree of complexity of the factors and processes that lead to trust, this investigation opted for separating the issue of trust from that of building trustworthy services.

Such a separation, we submit, furnishes the methodological and conceptual tools for better guiding the intervention of the Bank and connecting it to changes of the social engineering type. As indicated, trustworthiness is a necessary but not a sufficient condition for trust. Building on the foundations of this report, it is now necessary to shift focus toward the study of more elusive and contextually embedded conditions and factors that contribute or impede the development of trust between citizens and the governmental institutions.

INTRODUCTION

A UNDP report titled “Democracy in Latin America: Towards a Citizen’s Democracy” (2004) indicates that Latin American democracies suffer a crisis of confidence. It found that many Latin Americans would sacrifice some political freedoms for economic prosperity. While some original numbers were overestimated,¹ a significant portion of the population lacks confidence in the effectiveness of democratic institutions to secure economic stability and prosperity. This is an acute concern in a region like Latin America that is in the process of consolidating transitional democracies. Prospects for a stable and robust democracy are greatly improved if democratic ideals, values, and practices are supported by leaders and citizens alike (Dahl, 1998). This has brought the issue of trust in democratic institutions to the fore in development thinking. It is this concern with trust, as a component of improving the functioning and effectiveness of democratic institutions in Latin America that motivates this study. Before we can understand the potential for ICT-mediated government administration and services to build trust between citizens it is necessary to understand better the connection between trust, democracy and development. This is best done in the context of recent development thought and experience.

Development theory has undergone many changes in the last half-century, mostly focusing on a single ‘key’ to development (World Bank, 2000). By the late 1980s and early 1990s free market global capitalism had become the de facto development policy for many develop-

ing countries. However, the failure of the market to deliver combined with theoretical advances and the experiences of the Newly Industrialized Countries (NICs) led to a rethinking of the relationship between the market and the State. Markets were no longer considered necessarily efficient and equitable and, therefore, were inappropriate as the sole driver for development. The focus turned to reinvigorating the State’s capabilities and to an appreciation of the complementarity between the market and the State (World Bank, 1997). Development thought concentrated on the institutions of good governance that were supposed to “preserve the advantages of global market competition, and to turn the forces of globalization to support human advance” (UNDP, 1999: 13).

The turn of the new century also brought about the establishment of the Millennium Development Goals. This agreement by the members of the United Nations General Assembly focused development policy on a broad range of topics, but most acutely on alleviating poverty. At the same time, increasing inequalities throughout the world brought attention to the fact that the political process was central to creating more equitable conditions to expand

¹Originally, the UNDP published the figure that 58.1% of people polled said they “agreed with having the president go beyond the law if they have to” while the correct figure is 42.82%. This number was not used, however, in the calculations of the Support for Democracy Index. The retraction can be found here: http://www.pnud.org/ec/democracia/Correction_notice.pdf

options for people and not just the market regulated by an effective, transparent governance (UNDP, 2002). In this context, it is argued that “democracy provides the right framework for creating opportunities for political and social participation, particularly for the most disadvantaged” (ibid: 11). Given this central importance of democracy in achieving more progressive economic and social policies, effective democratic institutions become an important driver for achieving development aims. It should be noted that there are strong ethical arguments for promoting democracy based on the equality of political rights as well as practical considerations such as that democracies are less likely to have famines (Dahl, 1998; Sen, 1999).

The acceptance of democratic institutions, however, does not ensure more socially and economically progressive policies. Within democratic institutions there are conflicting mechanisms that tend toward the entrenchment of established interests as well as the creation of progressive economic policies (Little, 2003). However, given that the poor are numerous in developing countries we should expect them, if enabled, to be able to garner electoral support. However, democracy is more than voting at the ballot box. Democratic institutions in Latin America often mask underlying highly authoritarian structures, processes and practices (Adams, 2003). While democracy may provide the right *framework* for political and social participation, this potential still must be realized. To take advantage of the mechanisms within democratic institutions that can lead to progressive economic policies, a few more pieces must fall into place. First, there must be an administratively competent party of the poor to promote progressive economic policies (ibid). Second, the poor must be able and willing to play a more effective role in politics. Achieving the second is even more difficult given the

need to strengthen the legitimacy of democratic institutions hold in Latin America. These difficulties are compounded by the historically centralized and infrastructurally weak Latin American State, which is characterized by low levels of transparency and accountability (Cen-teno, 2002; O'Donnell, 2003).

How is it possible to establish legitimacy and regain trust in democratic institutions? One route to legitimacy is through consistent and effective governance as realized by policies that balance the State and the market and result in increased prosperity for many. However, theoretically, the enactment of these policies requires inclusive and effective democratic institutions necessary to counter the entrenchment of established interests. In this way the deepening of democracy is part and parcel of development; it is both a means and an end.

What is the role of trust in democratic institutions in this process? There is an inherent tension between trust and democratic institutions (Warren, 1999). Democratic processes can institutionalize conflicts of interest over resources, and in such situations, trust is harder to build. However, trust is necessary for the very possibility of solving conflicts of interest discursively. Trust in the deliberative decision-making process replaces the need for coercion or force to execute policy decisions. Furthermore, a deliberative process can breed even more trust through conversation and awareness. The increase in trust can also improve the deliberative process itself (ibid). For example, trust can replace the need for control and monitoring mechanisms freeing up resources for more effective and targeted participation.

The development of trust between citizens and government is, of course, not an all or nothing proposition. It is not the case that there must be complete trust before it is possible to engender effective social and political

participation, nor must there necessarily be effective democratic institutions to enact progressive economic policies. Trust is not only built through perfectly effective governance. Trust between citizens and democratic institutions can be built day-by-day, year-by-year, through incremental improvements in the relationship between citizens and the democratic institutions of governance. It is with this in mind that we investigated the potential of ICT-mediated

governmental processes to build trust between the citizen and the democratic institutions of governance.

An ongoing concern by the Inter-American Development Bank for these development issues provides the context for this study. A desire to ensure an effective contribution by information and communication technology in this context is the reason that this study is being carried out at this time.

PART I

Toward a Framework for ICT in Building Trust in Governance

TRUST, ICT AND GOVERNMENT

A core premise of this research study is that ICT has the potential to contribute to good governance. If effectively deployed, ICT may become an important means of breaking the vicious circle identified in the preceding section and lead to the achievement of the Millennium Development Goals, in particular, the objective of alleviating poverty. Specifically, this study assumes that ICT has the potential to improve governance by strengthening the level of trustworthiness of government services and, as a consequence, citizens' trust to government.¹

This last set of assumptions are quite common in the post-2000 thinking and practice of development (Kirkman, Cornelius et al., 2002; World Bank, 2002; United Nations, 2003), but they are not without controversy (Avgerou, 2003; Wade, 2004) and there is little evidence that they can be translated into effective programs of action in developing countries. It is beyond the scope of this study to explore the controversies surrounding the theoretical validity or feasibility of realizing the chain of relationships that goes from ICT to trust of citizens in their governments to good governance to development. Instead, this study focuses on the possibility of putting the relationship between ICT and the trustworthiness of government action into operation. We have sought to achieve an understanding of this relationship and to produce an instrument (a model of the relationship and a corresponding evaluation methodology) to guide relevant decisions for investment in ICT and organizational interventions. Nevertheless, this study, and in

particular the empirical cases, produced observations and created insights on the more complex relationship that links ICT and government to development, and various comments to that effect are included in this report.

ICT IN GOVERNMENT

Before embarking on the analysis of ICT and the trustworthiness of government services,

¹ The influential Global Information Report (Kirkman, Cornelius et al., 2002), better known as the "e-readiness study," suggested a link between ICT and development (with emphasis on poverty alleviation). The e-readiness study has sought to produce a technoeconomic measure that captures the extent to which a country has deployed ICT infrastructure (in particular the Internet) and reformed its institutions to support a free market economy. The role of government does not feature prominently in the e-readiness study. The composite e-readiness index includes an e-government indicator that refers only to the diffusion of ICT (government effectiveness in promoting the use of ICTs, availability of online services, extent of government websites, Internet-based interactions between businesses and the government). Issues regarding good governance are limited to the extent that the government sector facilitates the operation of the market, by measuring, for example, the extent of deregulation and liberalization (in particular in telecommunication) or government effectiveness in supporting business. In this context, the only case of trust considered is "trust in the public postal system," as a subindicator of the measure of the business and economic environment. As we explain in this report, limited attention to the relationship between ICT and trust is a general feature of analytical perspectives that take an economic focus on development, and this makes them inadequate for the purposes of this study

this report examines how ICT is understood to have an impact on government administration and the development role that government is expected to play in developing countries. A burgeoning literature on this topic, under the umbrella term of e-government, points to:

- benefits regarding the conduct of public administration agencies, such as efficiency and accountability,
- benefits regarding the services that government agencies deliver to citizens, such as information on services, effective fiscal and social policy implementation, and
- benefits regarding the capacity of the State to promote development, such as safe-guarding and strengthening democracy, programs to alleviate poverty, and the distribution of income.

However, a closer look at the literature and the experience of governments with ICT reveals a less positive, indeed in many respects disappointing, picture. A great deal of the literature is speculative, making predictions of far-reaching benefits on the basis of the physical capacity of technologies without considering implementation effort and hurdles (Ciborra and Navarra, 2003). There is a tendency to extrapolate important large-scale effects, such as citizen empowerment and poverty alleviation, from sporadic evidence of mostly pilot experiments. Yet, the introduction of ICT in most developing countries encounters the twin problems of scalability (going from isolated cases to widespread effective implementation) and sustainability (sustaining effective ICT-based information systems over time) (Madon, 1992).

Also, the literature on e-government tends to emphasize benefits from using the Internet to construct a friendly interface between citizens and government. In this way ICT appears to

provide quick and rather easy improvements in the services that governments provide to their citizens, assuming that a country achieves widespread Internet access. However, such applications are often limited to accessing information; they do not actually provide the services. The development of systems to support government services requires the transformation of legacy systems in public bureaucracies to modern information systems. This is a hugely more difficult task, both technologically and organizationally. It involves the development of sophisticated software technology, overcoming security challenges, and the organizational reform of the public sector.

Many countries already have a plethora of software applications available. Technologically, the challenge e-government poses to them is the modernization and integration of fragmented systems to form a technology infrastructure capable of supporting improvements in services that are noticeable to the citizens, such as reducing or eliminating the need to access multiple government agencies in order to complete a service (Ciborra and Navarra, 2003). Moreover, there is no quick fix or reliable method for achieving the organizational reform required to create the capacity of the administration to improve the provision of public services in the long term. While most countries have launched some form of new public management reform (Heeks, 1999), the extent to which they have been able to sustain this effort and the results they have achieved vary substantially (Polidano, 1999).

Based on these observations, our study sought to derive lessons from the experience of two countries that have undertaken long-term, sustained efforts at using information and communication technologies for public administration. We chose a mix of transaction systems for internal improvement of the administration and

services to citizens. Moreover, we looked at each of these cases not as isolated successful systems, but in relation to the broader rationale and effort of the administration to utilize ICT for better government.

THE ROLE OF ICT IN THE DEVELOPMENT OF TRUST

In the last twenty years there has been a great deal of interest in the notion of trust and there is now a large literature on its meaning and significance as it pertains to various situations, including interpersonal relations, the functioning of the market or society, globalization and e-commerce. As we explain in the following section, our interest is in trust between individuals and institutions. At this point we need to explore the nature of trust in a way that will allow us to establish how relations that involve trust are affected by information and communication technologies. To that end we start from Ganzaroli's analysis of ICT and trust (2002), which uses a categorization of three different views of rational human behavior identified by Granovetter (1992).

The first view of trust is associated with the view of rational behavior as self-interested individuals maximize of their own economic and social interests. Most economic theories are based on this assumption and, consequently, consider information and the capacity to process information as crucial to rational choice and effective economic behavior. However, they vary according to the assumptions they make regarding the availability and cost of information required for individuals to make decisions and take actions that maximize their self-interest, the capacity of individuals to take into account information, and opportunistic behavior that exploits temporary information and power

advantages. In this case, trust is implicated in the behavior of individuals as a function of mutual self-interest; it is based on the calculation of the risk involved in trusting a counterpart in an economic transaction. The most elaborate view of trust from this perspective is transaction cost economics (Williamson, 1975), which states that economic agents are astute calculators who are continuously looking for opportunities to profit, including by cheating their counterparts. Transacting parties cannot expect their counterparts to behave in a fair manner on their own accord; therefore, institutional mechanisms are needed to prevent and punish opportunistic behavior. The trustworthiness of these mechanisms is fundamental to overcoming the lack of trust that jeopardizes the functioning of the economic system. From this perspective, free market and economic behavior regulated by a central authority (within the boundaries of a hierarchical organization or government regulated state) are the opposite ends of a continuum between transparent information and trust/trustworthiness.

Consequently, ICT provides the required information and the calculation capacity to reduce uncertainty and the extent to which persons are exposed to the risk of opportunism. Thus, by either reducing the costs of accessing information or providing more transparent regulation, ICT reduces the need for lengthy processes of building trust. ICT can take the place of trust and reduce the costs of acquiring and processing information. Ultimately, when ICT is available, trust becomes unnecessary as a mechanism that compensates for lack of information and uncertainty about the behavior of others. This leads us to think about the causal relationship between ICT and development: the more diffused ICT is in a society the better the market functions to create wealth, thus diminishing the need for the central regu-

latory authority of government (Eggleston et al., 2002).

Granovetter calls this view of human behavior “under-socialized,” suggesting that it unduly overemphasizes self-interest and economic gain and ignores other values implicated in people’s interaction. In contrast to this view, he points out the “over-socialized” perspective that seeks to explain the behavior of individuals as driven by culturally determined norms and values. From this point of view, trust is a historically developed attitude for spontaneous cooperation (that is, cooperation that does not result from calculated self-interest or is coerced by the power of an authority) among members of a community, or between members of a community and its institutions (Fukuyama, 1995). Therefore, it is possible to distinguish between inherently low-trust and high-trust communities. The members of low-trust communities act selfishly to maximize self-interest, or the interest of a closed network of kinship, but this behavior does not extend to wider collective activities that would yield economic benefits and growth. For example, family businesses do not always make the transition to management-governed corporations. Members of high-trust communities are characterized by collective orientation with multiple intermediaries, associations and institutions between the family and the State.

If we look at trust as a historically-developed sociocultural condition, then ICT has little role to play in its development. For our purposes, it is the opposite direction of the relationship that is of interest; namely, societies that have historically developed mutual trust are able to use information and communication technologies to form dynamic and flexible networks of firms and exploit the new transaction possibilities such as e-commerce. While low-trust societies can use ICT to improve the internal efficiency of firms,

they lack the required trust to exploit the possibilities of ICT-mediated communications and transactions.

Granovetter (1992) identifies a third perspective of human behavior as embedded in networks of social relationships that overcome the extremes of the under-socialized perspective of individualistic selfishness and the over-socialized perspective of culturally programmed behavior. From the embedded perspective, individuals are understood to interact with one another, with institutions, and with artifacts as they participate in networks of social relationships. This forms a dynamic view of trust, which is very different from the rigid and restricting notion of trust as stemming from the norms of static and unitary communities or societies. Thus, while it is recognized that the behavior of individuals is subject to community norms and values, it also changes according to the experiences they undergo in their social networks. Trust is produced through their interactions in networks of personal, institutional and cultural relationships. It is consolidated in norms and values shared within the community of the network, but it may dissolve or fail to evolve, according to ongoing experience.

In other words, trust is built by means of positive interactions. ICT can influence the development of trust by providing a trustworthy means of formal communication or a trustworthy context for public services provision. However, ICT is not sufficient to develop or to sustain trust. The social dimension is crucial in maintaining trust among the members of networks of interaction. The development and sustenance of trust requires both formal and informal processes of negotiating joint expectations, commitments for future action, and the execution of those commitments. Thus, the impact of ICT on trust needs to be studied against such a context of ongoing social processes.

INSIGHTS FOR THE STUDY OF THE CONTRIBUTION OF ICT TO TRUST IN GOVERNMENT

The under-socialized perspective of human behavior has been influential in the ICT and the development literature, underpinning arguments for the adoption of ICT by means of economic analyses (Kirkman et al., 2002). However, while it recognizes the significance of ICT for improving the efficiency of government regulations, its overall limited view of government merely as a mechanism to support the efficient functioning of the market renders it inadequate for our study. The over-socialized perspective is also discernible in the ICT and development literature as it forms the basis of various analyses that attribute ineffective take up of ICT to preexisting cultural conditions. This view of trust as the result of long historical processes that form social culture, offers little insight on ICT interventions to improve citizens' trust in government, which is the question of interest to our study.

By examining this notion from the perspective of human behavior embedded in networks of social relationships, we can see how ICT can contribute to strengthening trust by supporting

the positive experiences of citizens in their interactions with government agencies. As the next section will explain, this study captures this role of ICT by means of the notion of "trustworthy ICT-mediated government services."

Moreover, the perspective of embedded human behavior suggests that citizens' experience of trustworthy ICT-mediated government services is not automatically translated into trust. This depends on the extent to which broader social conditions play an enabling role in realizing citizens' expectations of their government, the extent to which there is a commitment for future action, and the execution of those commitments. In view of this, this study refrains from trying to determine a general condition of trust in government from the effects of the use of ICT in the provision of a government service. We consider trust in government at large to emerge from the interaction of citizens with the network of government agencies as well as its effectiveness in fostering effective markets and fair social relationships. Thus, we recognize the need to consider the shaping of trustworthy ICT-mediated services and the extent to which trustworthy services contribute to an attitude of trust, against the background of national economic, political and cultural conditions.

TRUST THROUGH TRUSTWORTHINESS

DISTINCTIONS AND DEFINITIONS

From what has been expressed so far, it emerges that trust is a highly complex phenomenon that is involved in human, social and institutional processes at various levels and, crucially, in forms that are often elusive and hard to pin down. For the purpose of the present investigation, we have found both reasonable and useful to make a distinction between trust as an *interpersonal relationship* and trust as a wider *social or institutional phenomenon* (see e.g. Reed, 2001). E-government applications like the ones studied here are mostly entangled with trust as a social or institutional phenomenon.

Trust as an interpersonal relationship describes human interaction (interaction between two or more individuals) in terms of expectations involving fairness, commitment and reciprocity. By contrast, trust as a wider social or institutional phenomenon captures citizens' expectations of fairness, impartiality and reliability vis-à-vis the impersonal and less tangible mechanisms, structures or processes underlying the modern State and society at large. Mechanisms, structures and processes of this sort are embodied in or expressed by a large variety of institutions, organizations or services, and represent an essential part of the experience of contemporary people. Indeed, in the context of modern society, social interaction increasingly takes place within institutional settings, making trust in relation to the mechanisms or struc-

tures underlying institutional life an essential means for managing and coordinating institutional relationships.

It goes without saying that citizens' contact with institutions and organizations often (but not always) involves interactions with other persons (i.e. employees, managers, commissioners, etc.). However, such interactions are shaped by the formal prerequisites of the institutional or organization role enactment that forms one of the foundations of contemporary economy and polity (Fountain, 2001; Kallinikos, 2004; Luhmann, 1995). Role enactment is itself rooted within the wider social division of labor and the concomitant and limited jurisdictions that various firms and public agencies embody. Persons qua persons should thus be distinguished from persons qua roles, and this is the fundamental rationale for distinguishing between interpersonal and social/institutional trust.

Overall, we define trust as an attitude of reliance vis-à-vis persons or institutions that is predicated upon established norms or social rules of fairness, reliability, commitment or reciprocity. However, this study focuses mostly on the formation of trust in governance and institutional relationships. Thus, reciprocity (an essential characteristic of interpersonal trust) gives way to the characteristics of fairness, reliability and commitment to serve citizens that increasingly define trust in institutional settings. Against the backdrop of these observations, we have found it useful to further distinguish between the following manifestations of institutional trust: trust in technological artifacts or

processes, trust in specific ICT-mediated services, and trust in government at large.

- Trust in *technological artifacts or processes*, e.g. a user trusting an ATM for completing a banking transaction or a web-based application for carrying out a task online or obtaining a service via the Internet. The trust is on the mechanics of the process and the technological artifact, not the service as such.
- Trust in a specific *ICT-mediated service*, i.e. the degree to which an ICT-mediated service is perceived to be reliable and fair. In the context of the present investigation this involves trust with regard to particular government services, that is, an expectation that a particular service will be delivered under conditions that reflect competence, fairness, conformity to established norms or rules and respect to civic rights.
- Trust in *government at large*. It describes the degree of trust people have in the political system and the administrative ability and culture underlying it.

The focus of this investigation is the degree to which Brazilian or Chilean citizens trust the ICT-mediated services that were studied and the agencies involved in the organization and delivery of those services

However, the three aspects of trust are linked. Trust in technological artifacts or process has important implications for the ways a particular ICT-based government service is experienced, while the dominant beliefs and attitudes vis-à-vis the State and its administration inevitably color the expectations and the interaction of people with that service. Although this study focused on how trust is involved in the development and delivery of ICT-based services, we have also sought to capture how the three characteristics of trust create a web of re-

lationships that are essential for assessing the expectations people develop about the services studied. Indeed, the contribution of this study could be seen in its attempt to disentangle and reconstruct how technological, organizational/administrative and political/institutional properties coalesce to establish the preconditions of trust in the ICT-based services studied in Brazil and Chile.

This leads us to the crucial distinction between trust and *trustworthiness*. It is important to bear in mind that this distinction is one of the cornerstones of this study and represents a major finding of the empirical investigation. *Trustworthiness* refers to all those characteristics, properties or conditions that make a service or an institution worthy of being trusted. Trustworthiness may lead to trust but it may, under particular circumstances, fail to do so. Indeed, it is on this ground that we have sought to disentangle trust from trustworthiness and clearly distinguish between the two. Perhaps the distinction between potential trust (trustworthiness) and actual trust is akin. In this regard, potential trust refers to the promise an ICT-mediated service makes for being actually trusted. But how is such a promise actually constructed and sustained?

Drawing on the empirical data and observations, we suggest that trustworthiness is the joint outcome of several clusters of factors that involve the prevailing *technological* and *organizational* conditions underlying the delivery of a particular ICT-based service as well as the wider *institutional* relations within which the development and delivery of that service takes place. The technological, organizational and institutional factors that shape trustworthiness could be seen as having a quasi-objective status. Such a status must be distinguished from the attitudinal or perception-based quality of trust that is imprinted on citizens as the outcome of their

experience of interacting with government services or institutions. Trust is undeniably shaped by the trustworthiness of the services involved, but in addition, it is influenced by historical memories of citizen's relationships with their government, as well as by haphazard and emergent phenomena that take place when citizens interact with the agencies or services involved (Luhmann, 1995). On the basis of these observations we suggest that the technological, organizational and institutional relations that define the trustworthiness of a particular ICT-based service form the structural preconditions for trusting that service. It is this fundamental relation we would like to bring forth with the distinction between trust and trustworthiness.

FOREGROUND AND BACKGROUND FACTORS

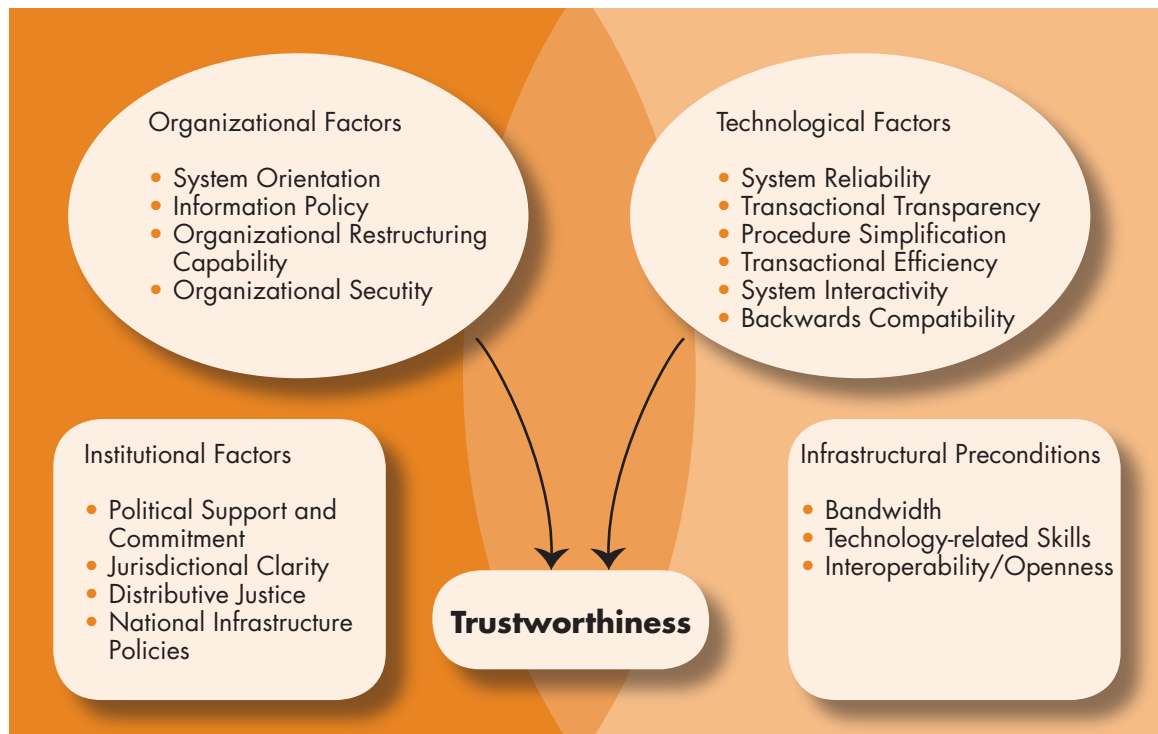
Relying on an analysis of the empirical data and drawing on a number of earlier studies on trust (e.g. Gambetta, 1998; Reed, 2001), we have chosen to describe the structural preconditions of trust (i.e. trustworthiness) of a particular ICT-based service as involving four categories of factors. This is justified by the fact that technology, as well as administrative processes of service provision, are constituted across two levels: the level of the particular ICT-based service and the wider infrastructural and institutional level of a particular sector or even the society at large.

Accordingly, the four blocks or clusters of factors defining trustworthiness involve wider *institutional/political* and *infrastructural* conditions as well as *organizational* and *technological* properties operating at the level of specific agencies or services. The trustworthy character of a particular ICT-based service, we claim, is shaped, in a rather straightforward and immediate fashion, by the organizational and technological charac-

teristics by which it is sustained. An ICT-based service is developed by deploying specific technologies, administrative procedures and human resources. People interact with particular agencies and obtain the services that they provide under specific organizational and technological conditions that have an important potential in shaping people's experience of these services.

These ICT-based government services always develop within a wider institutional/political and infrastructural context that forms, as it were, their background. Background conditions are vague and elusive, yet they set the overall premises within which a particular service develops and thus circumscribe the impact such a service may have, in terms of trust and trustworthiness, on the relationship between citizens and the government. The working of background and foreground conditions in producing trustworthiness is depicted in figure 1. Though schematic, and for that reason simplified, the picture conveys the major message of this investigation and expresses our attempt to unravel the complex factors and processes underlying the construction of trustworthy services that may lead ultimately to trust.

The distinction between background and foreground conditions is both analytically useful and empirically grounded on the analysis of the data and information collected from the case studies conducted. But there is a further rationale for making such a distinction that has important implications for policymakers and development planners at the IDB and in beneficiary countries at several levels. While foreground conditions can be said to be possible to control or shape in the medium or short term, background conditions usually involve outcomes that have been formed over longer time scales and therefore cannot be manipulated in any direct or straightforward way. Deliberate change of background conditions necessitates

FIGURE 1. INTERPLAY OF BACKGROUND AND FOREGROUND CONDITIONS

consistent policies and government initiatives and commitments over extended periods of time, while the outcomes that such a planned change seeks to accomplish unavoidably stumble upon haphazard or emergent conditions that produce unintended consequences (March and Olsen, 1989).

Institutional factors comprise the established administrative structure and culture of the state and form vertical and horizontal accountability, as well as the related issues of jurisdictional clarity, decentralization and responsibility. It comprises, too, issues of polity and the experience that people have had of the forms through which political or state power has been exercised. It should be stressed that political power in Latin America has, during certain periods in some countries, been exercised with authoritarian, despotic ways, while the typi-

cal Latin American State could be described as centralized but with weak infrastructure, lacking the potency of the administrative apparatuses of well developed and democratic states and being subject to low degrees of transparency and accountability (Centeno, 2002; O'Donnell, 2003). Both Brazil and Chile have had traumatic political experiences relatively recently, which to a considerable degree, have formed the attitudes of people about the State, and shaped the dominant perception of the services that it provides. The case studies further suggest that institutional factors also comprise the government initiatives and policies that have supported the development of particular ICT-based government services. Government support is crucial for a particular service to get developed and become embedded in the institutional life of a country. Nationwide policies to create the

conditions for the diffusion and social and economic embeddedness of these services also play an important role in this respect.

Finally, institutional factors involve the key issue of distributive fairness or equality. As indicated in the introduction, the question of poverty in Latin America is a major problem and cannot but have a decisive impact on the relevance that the development of ICT-based services may have for trust. Highly uneven income distribution leaves considerable segments of the population ignorant or indifferent about government services that seek to modernize State administration and the conditions underlying the provision of ICT-based government services. For large segments of the populations of Brazil and Chile the issues that concern us here (trust and trustworthiness in government) might be of less concern because issues of survival and subsistence tend to be uppermost on their minds.

However, it is important to consider that when government structures and processes are perceived as fair, lower-income people may have an added incentive to “play by the rules” and will be more likely to do so, instead of rationalizing questionable behavior because they perceive that the “system” is corrupt and works against them.

Technological infrastructure entails the comprehensiveness or pervasiveness of sector-specific or nationwide technical infrastructure that establish the conditions for development and the smooth functioning of particular services. Yet, technology cannot operate on its own. The successful use of technologies and technological artifacts is crucially dependent on the level and distribution of skills across large segments of the population and across institutional settings. An adequate level of human skills is necessary to support the development and successful operation of ICT-based services, and is also essential for the participation of

people in the relevant processes and use of the service. Technological infrastructure includes hard-wired technologies and the level and distribution of skills necessary to sustain their operation.

Obviously good, or at least adequate, infrastructure conditions are essential to the development of ICT-based reforms to modernize the State and provide effective services. Our study suggests that the adequacy of technological infrastructure for the development of sophisticated ICT-based services is often positively related to the diffusion of broadband Internet across institutional settings and geographic regions. The quantity and quality of data that support sophisticated ICT-based services (e.g. procurement platforms) is such that limited-bandwidth technologies often become a restricting factor. This having been said, it is important to stress the crucial role played by the less conspicuous, “soft” factors associated with the level and distribution of skills, knowledge and competencies essential to effectively develop, use and sustain contemporary ICT. Hard-wired technologies are a necessary but never a sufficient condition for the development of sophisticated ICT-based services.

Institutional conditions and infrastructure at the level of the state or region are the background that either makes possible or hinders the emergence, diffusion and success of particular ICT-based government services. Such services, however, are straightforwardly shaped by what we see here as foreground factors, that is, the technological characteristics, systems and applications that support a technology mediated service, as well as the organizational setting within which the service is developed and delivered. Foreground factors have an immediate impact on citizens’ experience of government services. Technological factors at this level involve all those technical conditions that help develop a

reliable, efficient, transparent and user-friendly ICT-based service. Security, procedural simplicity, transactional efficiency and transparency are some key characteristics that shape the trustworthiness of an ICT-based service.

In addition, the successful use of available technologies and the development of particular applications to sustain the provision of ICT-based services are dependent on the organizational structure and culture within which they develop. Trustworthy ICT-based government services demand a genuine ethos for serving the citizen (service orientation) that is part and parcel of the well-developed democratic state. Little wonder that such a service orientation may be inhibited by the cumbersome procedures and introverted culture of many public agencies. The orientation to serve citizens fairly, effectively and simply is not just an attitude. It presupposes a deep and consistent organizational reform that leads to the establishment of a new organizational practice. This, in turn, often necessitates adequate organizational leadership and thorough organizational restructuring, and the capacity to imagine and implement structural solutions that are concordant with such a service orientation and enable the successful deployment of technological capacities. In the context of contemporary administration, neither of these comes about without a well-thought out, well-formulated, and consistent policy for the organization of ICT and information. Finally, ICT-based services are shaped by the behavior and skills of incumbents within the relevant organization. As a result, an appropriate human resources policy is essential to sustain trustworthiness (Fountain, 2001).

The technological and organizational characteristics that sustain ICT-based government services interact with institutional factors and infrastructure to create the structural preconditions of trust we subsume under the label

of trustworthiness. It is, however, important to point out that the relative significance of these four cluster of factors may well vary across contexts and services. Some ICT-based services may be more dependent, say, on bandwidth than others. The depth and exchange of information between agencies and economic actors varies substantially between different services, making the importance of what we refer to here as “infrastructure conditions” contingent upon the particular context and service-specific characteristics. The same holds true for each one of the four fundamental clusters of factors identified in this investigation.

The interdependent character of the two categories of background conditions and the two categories of foreground factors that determine the trustworthiness of ICT-based service needs a final commentary. As a rule, western democratic societies with well-developed economies enjoy the underlying structural conditions that make the interactions of these four clusters of factors less dramatic or important. Summarized with terms like structural differentiation or loose coupling, such conditions provide a basic means through which advanced societies deal with complexity. Adverse conditions in one field or domain do not determine options or courses of action in other fields or domains. To put it differently, the separate domains that each cluster of factors refers to constitute a relatively separate context whose effects on the others may be buffered or channeled across very distinctive paths. Though such an idea defies a widespread but naïve belief that equates complexity with the density of interactions, it is indeed a key characteristic of complex societies capable of steadily reforming and adjusting themselves (Gellner, 1995). Indeed, this is an idea that was first developed by Weber (1978) and further elaborated by major thinkers such as Gellner (1981, 1995), Luhmann (1995), Walzer (1983) and others. It

currently forms one of the foundations of complex, democratic societies.

By contrast, in less developed societies, differentiation is not as deep and factors in one domain may cause significant problems in domains that seem distant and unrelated, thus making often sector-specific reform a much more insidious enterprise. These observations underlie

the construction of our model. The fact that we insist on the interdependent status of these wider institutional conditions and infrastructure with technological and organizational characteristics that operate at the level of particular governmental services or agencies attest to our awareness of the different state and institutional organization of developing countries.

TOWARD A METHODOLOGICAL FRAMEWORK

The objective of this report is to propose a methodology that can be deployed to assess the potential impact of different e-government projects on the trustworthiness of the resulting services. The methodology will furnish the criteria or indicators on the basis of which the IDB would be able to choose to finance those projects that have the greatest potential to create trust between citizens and the government. The model presented in chapter 1 forms the basis of the proposed methodology.

Before presenting the methodology, it is important to emphasize several points. First, an e-government initiative is more than just the development of an ICT application. As a rule, an e-government initiative comprises a cluster of technological and institutional interventions whose goal is the development of an ICT-based government service. While the objective of an e-government intervention may be to develop a trustworthy ICT-mediated service, whether or not trustworthiness leads to improved conditions of trust depends on circumstances that are beyond the control of the managers and sponsors of a particular e-government initiative.

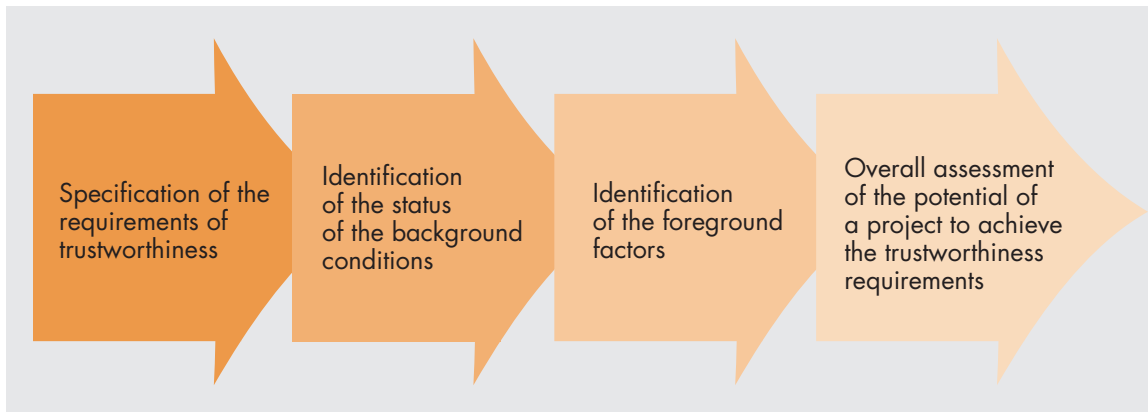
Second, our model and the methodology derived from it suggest the categories of conditions and factors one should check in order to decide whether an ICT project is likely to improve the trustworthiness of an existing government service, or whether to introduce a new trustworthy service. Some features of e-government services, existing conditions, and factors in each category are of general relevance and validity. For example, we can be quite certain that

security of transactions is a general requirement for an ICT-mediated service to be trustworthy. Therefore, it is important to ascertain the infrastructural, institutional, technological, and organizational factors that will enable (or prohibit) the setting up of an adequately secure system. Each project will also have particular requirements for trustworthiness, which also need to enter the picture. Also, the relevant weight of the identified factors may well vary across nations and in different situations. Analysts using the methodology will need to exercise judgment in order to choose the specific indicators that are relevant to a particular project and existing national conditions. There is no universal and context-free way to assess the relative significance of institutional/political, infrastructural, organizational and technological factors unless one accepts steamroller quantitative methodologies like those captured by the network readiness index (Kirkman et al., 2002). For example, the relative significance of the four categories of conditions and factors vary according to context and the characteristics of the ICT-based service. Online tax administration may, for instance, posit similar challenges across nations, but such similarities fade away in the cases of widely different services (for example, electronic voting versus public e-procurement platforms and the different requirements for trustworthiness the latter imply). To make the issue even less tractable, we suggest that even ostensibly similar services (e.g. online tax administration) differ depending on national histories and sensibilities.

Lastly, the methodology we suggest is largely qualitative. In essence, we propose a feasibility study methodology that first specifies the general requirements of trustworthiness of the ICT-based services under evaluation. The methodology then investigates and identifies the conditions and factors that are implicated in achieving the required trustworthiness of a specific ICT-mediated government service. It subsequently assesses them with appropriate techniques or measures. The starting point in this second step (that follows the specification of the requirements of trustworthiness of the services under consideration) is the examination of the four categories of conditions and factors we identified in our model. The purpose is to establish how they may be relevant in the context of particular services or projects. Overall, we recommend sensitivity in the use of quantitative scores. They should be used for those factors that have tangible measurable dimensions (for example, existing bandwidth infrastructure) or allocated budget. But, conflating all conditions and factors in quantitative scores poses the risk of missing qualitative potential or obstacles that may make the difference between cases likely to succeed from those likely to fail.

The proposed methodology then comprises four major steps.

1. **Specification of the requirements of trustworthiness** to determine which features are needed to make the ICT-mediated service trustworthy (for example: simplicity of use, security of transactions, transparency, etc.). This step results in the specification of the features that an ICT-mediated service project should have if it is going to be considered trustworthy. It is, therefore, the anchoring point for the trustworthiness feasibility study.
2. **Identification of the status of the background conditions** to establish whether national (or regional) institutional and technological conditions are conducive to providing the required trustworthy service (e.g. whether there is adequate political commitment to improve government services, or whether there is adequate telecommunications infrastructure in the country to sustain an Internet-based service).
3. **Identification of the foreground factors** to establish whether the agency in charge of the ICT-mediated service is capable of sustaining the organizational changes and technological development that will satisfy the trustworthiness requirements identified in step 1. The result of this step is a list of organizational and technological factors, an assessment of their adequacy, and estimates of effort required to improve them if they are found inadequate. For example, if an agency's bureaucracy is so cumbersome that it stifles its ability to adequately provide a service, the analyst will need to estimate the cost and likelihood of success of an intervention to redesign organizational processes and working conditions. If the organization does not have adequate ICT capabilities in house, the analyst will need to assess the option of outsourcing and the effort required to develop capabilities for managing outsourced projects and relationships with software development vendors.
4. **Overall assessment of the potential of a project to achieve the trustworthiness requirements.** This involves a judgment of the relative significance of the conditions and factors identified in steps 2 and 3 in order to support a decision about the soundness of the project investment with respect to intended effects of trustworthiness.

FIGURE 2. STEPS IN THE METHODOLOGY

The section that follows details the trustworthiness features, background conditions and foreground factors that emerged from the case studies and which, we believe, are likely to influence the trustworthiness of an e-government intervention. Part II discusses the specific cases of Brazil and Chile.

REQUIRED FEATURES OF TRUSTWORTHINESS

The case studies show that different services have different trustworthiness requirements. This is apparent in the case of Brazil where we looked at the trustworthiness of the electronic voting system, of online tax administration (ReceitaNet), and of the Integrated System of Finance Administration of the Federal Government (SIAFI) and the Financial Administration System for States and Municipalities (SIAFEM).

The trustworthiness of the electronic voting system comprises:

- simplicity of voting machine interface,
- security of the act of voting and vote counts as well as efficiency (the speed with which

people are able to cast their votes and the votes are counted),

- functionality (e.g. report producing mechanisms),
- openness to participation and/or inspection by political parties, and
- manageability of the election process (the extent to which judges feel that they are in control).

The characteristics of ReceitaNet that make it more trustworthy than the manual tax filing process it replaced are listed below:

- It is considerably less laborious than the manual tax filing process.
- It provides an option to declare detailed expenses and make more complex tax calculations.
- The system provides fast refunds in cases of overpayment resulting from the ‘pay-as-you-earn’ method of tax collection.
- It represents a low security risk because taxpayers do not connect online to the Finance Ministry’s database.
- It has useful additional functionality, such as issuing “no-debt certificates.”

The SIAFI and SIAFEM systems have the following trustworthiness qualities:

- standardized, efficient, and effective accounting infrastructure that meets the professional needs of public sector accountants;
- transparency, which enables accountability in budget allocation and public sector spending; and
- restrictions on the autonomy of indirect administration (a negative factor, according to the management of the indirect administration organizations who see it as an unnecessary central control).

A similar account can be made of the trustworthiness requirements of the services provided by Chile's tax administration service (Servicio de Impuestos Internos, SII) and ChileCompra. It is possible to identify a number of common features across both case studies that can form the core of discernible general requirements of trustworthiness. These core requirements include procedural simplicity, transactional transparency, transactional efficiency and technological security.

- *Procedural simplicity* refers to the steps and procedures that underpin administrative functions and the way they interface with citizens. This is fundamental in determining the costs or immediacy of access to the services provided by public agencies.
- *Transactional transparency*: administrative actions require the exchange of information and data between offices, and between public agencies and citizens. The clarity of the information and how the information is evaluated are fundamental elements to assess transparency.
- *Transactional efficiency*: a successful relationship between public agencies and citizens also requires efficiency. The time that it takes

for the agencies to provide satisfactory answers to citizens' queries and requests, and the efficiency of the process of exchanging and managing information are also important to the success of public agencies.

- *Technological security*: public agencies are the biggest users and exchangers of information. To protect this information it is necessary to implement both technological solutions (encryptions) and organizational procedures designed to prevent improper use and access to information.

BACKGROUND CONDITIONS

Institutional Conditions

Political Support and Commitment

The political debate and agenda are fundamental to assess the role or function of a proposed e-government initiative. Political support and commitment are expressed in the public debate and in the government plan for the use of resources. Higher levels of commitment and public awareness are indicators of the trustworthiness of the service/project under consideration.

To assess political support and commitment we evaluate government budgets and the actual role of e-government in the public and political debate (analysis of media publications and of parliamentary debates).

National Information Policies

There needs to be a vision regarding the role of ICT in the State and government and the active promotion of the development of ICT infrastructure and services, as well as the effective use of ICT in all industries and social services, and the establishment of the required legal framework.

To assess national information policies we must look at documents that present the gov-

ernment's vision of the role of ICT in the State and government, the degree of implementation of that vision, and the legal reforms concerning identification and authentication procedures and other related legal aspects for electronic take-off.

Jurisdictional Clarity

A clear jurisdictional mandate provides the uncontested institutional space in which a particular agency develops its actions and initiatives. It also helps make public agencies accountable to other (government and nongovernment) institutions and to the general public.

To assess the extent of jurisdictional clarity it is necessary to examine the existence of overlapping responsibilities of public agencies because overlapping responsibilities are negatively related to trustworthy ICT-based government services. The assessment of jurisdictional clarity should also involve an examination of the laws and regulations that govern the organization of public agencies. The laws and regulations furnish one important criterion for assessing how the jurisdictional issue has been taken into consideration.

Distributive Justice

The equal distribution of resources and opportunities in the society makes it easier to target solutions to the problems of e-literacy, digital exclusion and division. There already exist fairly well-established ways of measuring distributive justice.

The Status of Existing Infrastructure

Bandwidth

Many e-government services are designed to rely on data communication over the Internet. This means that the reliability of network capacity is fundamental for a trustworthy service.

It is important to assess bandwidth (measured in MBits) in relation to the projects and their future needs. As the Brazilian electronic voting system and ReceitaNet demonstrate, not all ICT-mediated services necessitate broadband Internet connectivity, or at least, not as a universal service.

Technology-related Skills

The level of skills available at the national and sector-specific level to support the development and utilization of particular ICT-based services includes both professional technology capabilities and general user capabilities. The former refers to the ICT skills of the government sector as a whole, the capacity of the national ICT industry, and access to international services. The latter refers to the professional skills as well as e-literacy of the general population.

The availability and dispersal of technology-related skills can be measured by the diffusion of digital devices, the general and e-literacy, education level and the like.

Interoperability and Openness

Interoperability among systems is fundamental because sophisticated e-government initiatives tend to rely upon a complex network of technological systems. A preexisting open infrastructure facilitates the success of an ICT-based service and thus increases its trustworthiness. Existing limitations can be overcome with gateways or ad hoc development.

Interoperability captures a technical aspect of infrastructure. It can be assessed by looking at the technical components of the systems and the necessary adaptations. We identify a three-stage scale onto which one can position the openness/closure of national or sector specific infrastructures: open infrastructure with no need for adaptation; semi-open infrastructure that can be rendered compatible through the development

of gateways; and closure and lock-in with no immediate possibility for an interoperable infrastructure.

FOREGROUND FACTORS

Organizational Factors

Service Orientation

The attitude of the public agencies toward the provision of services is distinct from the efficient execution of internal routines. Service orientation is the organizational practice and policy for providing, as smoothly as possible, all the necessary information and services that can be useful to citizens in their encounters with the public agencies.

This indicator can be assessed by looking at the policy and mission statement of the agency providing the service. It can also be assessed by measuring the existence of help desks, reception hours or other such services that facilitate the interaction of citizens with particular agencies. Human resource policies are also crucial; the existence of service-related personnel incentives and rewards or lack thereof is another way of assessing the service orientation of public agencies. Finally, function-based versus business area-based administrative structures are another indicator of the internal versus external orientation of agencies. As a rule, business area-based structures are positively related to service orientation.

Information Policy

Information policy refers to the integrated agency-based approach to deploy contemporary ICT to improve internal administration and existing services, and for providing new services. It also refers to the consistency of agency policies for exploiting ICT. Accordingly, it should

be assessed by the existence (or not) of agency information policy and information strategy documents as well as agency-wide organizational discourse on relevant matters.

Organizational Restructuring Capability

This refers to the capacity of public agencies to restructure in order to respond to citizens' demands and needs. It reflects the ability of the service-providing agency to reorganize and re-define the organizational structure to respond to new operational challenges. It should be measured by the number of major administrative reforms during a decade. As a rule, administrative inertia is inimical to developing trustworthy services.

Organizational Security

Security in the use and management of data requires proper organizational procedures and safeguards. Public agencies should have practices, rules and regulations that prevent improper use of data and information. The assessment of this factor relies in an evaluation of the procedures, rules, and regulations that determine the way data and information are used and managed in the agency.

Technological Factors

In-house Systems Development Expertise

This refers to the technical capabilities of the government agency responsible for developing and delivering ICT-mediated services to see the technology project through and support its operation and maintenance. Invariably, the expertise required for e-government applications involves software, data management, communications and security techniques. In-house systems development expertise can be assessed by investigating the skills available in the IT unit of the organization, or the IT government center

that will undertake the development of the system. Such skills include systems development methodologies, encryption techniques, and open source competencies.

ICT Management Capabilities

This refers to the technical capabilities of the organization to manage sophisticated IT projects. It involves technical skills for planning, budgeting, monitoring quality, and implementing the deployment of a technical system in the multiple locations of its operation. ICT management capabilities can be checked by examining the existence of project management methods and techniques, training facilities and maintenance arrangements.

Outsourcing Capabilities

Invariably, large ICT projects involve outsourcing. A typical project will use the services of multiple software and hardware vendors and management consultants. It is well known in the information science (IS) literature that outsourcing is not a substitute for management competencies that are lacking. On the contrary, it requires ability to draft meaningful contracts and collaborate as user participant in the technical work of the project. This poses demands for expertise in the IS function of the organization to negotiate contracts on services and actively participate in monitoring project progress. An assessment of this factor comprises the investigation of the legal and technical capabilities of the organization in order to handle outsourcing relationships effectively.

CONTEXT FOR THE CASE STUDIES

The study involved an empirical component to explore the validity of initial theoretical ideas about the nature of trust and the conditions under which trustworthy ICT-mediated services are constructed. The case studies were carried out in Brazil and Chile, two countries that, despite the progress made, face considerable development challenges and where a significant portion of the population lives in poverty. Brazil has many ICT applications to support public administration, as well as a highly competent local ICT services industry. Chile has good socioeconomic indicators and a high level of citizen trust in government. In addition, some of the e-government services provided in Chile, including an electronic platform for collecting taxes, are considered exemplary.

Given the limited scope and explorative nature of this empirical research, we chose to study a small number of successful cases in each country. In addition, the study sought to outline the current situation in each country by exploring the institutional characteristics that have a significant impact in the emergence and sustainability of the systems studied. This refers, in particular, to the current political situation, the government's overall ICT capabilities, and each country's information policies.

The studies were conducted in four stages: a search for suitable case studies, a first visit to Chile, a visit to Brazil, and second visit to Chile.

The Search for Suitable Cases. We undertook a consultation process to identify ICT-mediated services that had already been in place for some

time and were widely considered to have had an impact within the public administration and on the public at large. The first services identified were Chile's electronic tax system and electronic procurement system. Next, we looked for comparable cases in Brazil. We included Brazil's federal electronic income tax system in the study, but not its electronic procurement system because it is still under development. Brazil's electronic voting system provided a unique opportunity to study a system with a wide impact on the citizenry.

First Visit to Chile. During this visit to Chile we conducted interviews and collected documentation on the online tax administration system (SII) and the public procurement system (ChileCompra). We interviewed critical actors in both agencies as well as outside these agencies, and gathered a variety of paper and electronic documents relating to the services provided by the two agencies. In addition, we visited the Santiago Chamber of Commerce (and other such organizations) and interviewed key staff. We conducted a number of interviews across a variety of public agencies and other organizations in order to understand and collect material concerning national information policies, the processes that led to the formation of the major policy document (*Agenda Digital*) and other initiatives to raise the country's e-literacy level. To this end, we visited a number of infocenters located in the outskirts of Santiago and in Temuco, and interviewed the people running those centers. It was on the basis of this first round of

empirical data collection that we distinguished the notion of trust from that of trustworthiness and developed a first version of the model.

Visit to Brazil. The empirical study conducted in Brazil sought to check the validity of the model and to gain new insights from the electronic voting system and the income tax system (ReceitaNet). We observed the electronic voting system in use during the second round of the 2004 mayoral elections in the city of São Paulo. In addition, we interviewed a range of stakeholders of the electronic voting system and ReceitaNet, including the government officials responsible for the systems, the government ICT services company that developed ReceitaNet, the Federal Ministry of Planning that has overall responsibility for e-government policy and implementation, NGOs, academics, journalists, and a small number of citizens. During this effort, many interviewees directed our attention to the federal and states' budgeting systems (Integrated Financial, Budgetary and Asset System, SIAFI, and the Financial Administration System for States and Municipalities, SIAFEM), as ICT applications that have had a significant impact on transparency and accountability. As a result, we decided to expand the study and collected data on these two systems as well. To that end, we interviewed the chief accountant of the state of São Paulo, officials in the Ministry of Finance and technical staff in the software services center of the federal government.

Second Visit to Chile. The second visit to Chile involved cross-checking information, verifying data and gathering additional data about the process and the agencies studied. During this trip, particular attention was paid to the way that electronic invoicing was being developed and its significance to the success of ChileCompra. In addition, we focused on the administration of

value-added tax returns as distinct from income tax returns. We also interviewed several managers in the municipalities of Valparaíso and Viña del Mar about the degree to which they are able to use ChileCompra and the implications of the deployment of the platform for municipal procurement operations. We organized a roundtable meeting with political scientists from Valparaíso universities, municipal managers and other interested parties to discuss the likely impact of electronic tax returns and ChileCompra on the perception that Chileans have about these services.

The descriptions of the case studies include full details regarding the empirical data, background conditions and foreground factors (derived by following the trust-through-trustworthiness model), and comments about their impact on trust. While we sought to follow a common template for this part of the report, differences in the particular cases investigated make significant differences inevitable.

THE CONTEXT IN BRAZIL

The National Context

Although Brazil has a considerable production capacity, it is also faced with a huge development challenge. The per capita income of the top 20 percent of the population (about 34 million people) is US\$15,000, similar to that of many European countries. But the per capita income of the bottom 40 percent of the population averages only US\$1,000. In 2002, 25.4 percent of the population lived on less than US\$2 a day. The richest 10 percent of the population consumed 46.7 percent of the national income, while the lowest 10 percent consumed only 1.0 percent of national income. According to the

World Bank (2002), the country's Gini index is 59.1. At the time of the study, Brazil was struggling with rising unemployment and a sluggish growth, which have both affected the country for more than a decade.

Brazil was under military rule from 1964 to 1985. The restoration of the multiparty democratic process started slowly in 1979 and the transition to popularly elected government was completed in 1989. During the 1990s, a succession of governments implemented neo-liberal economic policies. The left-wing government that took office in 2002 took a pragmatic stance and avoided taking radical steps to reverse the policies of the 1990s. At the time that this study was conducted (2004), among the most pressing political issues in Brazil were land reform in the north, corruption in the judiciary, and drug-related crime in poor urban communities.

In 2002 telephone connectivity reached 18.17 lines per 100 inhabitants. This is quite low by international standards, placing Brazil in 48th place in a teledensity ranking (Kirkman, et al., 2002). Similarly, despite competition among Internet service providers that keeps prices relatively low and provides a wide variety of services, access to the Internet is limited to relatively wealthy persons living in affluent urban areas. It is estimated that 10 percent of the population uses the Internet.

Brazil has a big "digital divide" problem that can be traced, in part, to its skewed income distribution. Only a relatively small middle-income population can afford to use information technology and are highly motivated to do so. Numerous "digital inclusion" initiatives to address the needs of the rest of the population have been put forth at all levels of government as well as by NGOs. They include a federal program to bring the Internet to schools, the creation of community telecenters, and the

implementation of computer training for youth living in poor communities.

ICT in Brazil

Brazil is one of very few developing countries in which government efforts to foster the production and use of information technology started in the 1970s. Early IT policy was associated with the country's vision for national autonomy and sufficiency in industrial production (Tigre, 2003). However, in the late 1980s many industries complained that they lacked the advanced IT products that they needed to remain competitive in the global market. Under a regime of import restrictions, Brazil developed not only substantial indigenous hardware and software products, but also the skills best tuned to local needs. Brazil remains one of the few developing countries with extensive technology capabilities in hardware and software manufacturing.

Information and communication technologies have long been a part of Brazil's industrialization and economic development policies, and are viewed as an engine of progress. The public sector generally considers it an aspect of reforms aimed at modernization. ICT professionals who work in government centers such as SERPRO (a federal IT company) have developed several generations of all major federal IT systems. They have an intimate knowledge of government processes and act as strategic partners in ICT-driven process reforms. They also serve as advisors for ICT innovation, such as the development of trusted third-party services (digital certificates) and interoperability standards (e-ping) for government ICT applications.

The interviews conducted for this report yielded evidence of a particularly positive attitude toward ICT and an expectation that the federal government would use it to improve internal administrative efficiency and facilitate

interactions among government agencies. It was often suggested that this positive attitude stems from successful ICT innovations carried out by Brazilian groups since the 1980s. Despite hyperinflation, Brazil's banking industry enjoyed an impressive period of growth during the 1980s. While banks could protect their customers from losses of purchasing power, they had to be very efficient in processing accounts, because the value of money changed significantly from day to day. This implied the need for very efficient information systems. Because, at the time, the industry enjoyed relatively healthy profits, it was in a position to invest in ICT and innovate. Economic stabilization brought with it new profit-making opportunities as well as increased competition, prompting banks to intensify their innovation efforts and further develop IT-based services (La Rovere, 1996).

The use of information technology in banking was significant not only because it familiarized people with IT-mediated transactions (ATMs, for example), but also because it established a set of expectations regarding government services. Bank branches in Brazil have been providing some government services since the 1960s by serving as a convenient place for people to receive their social security benefits or pay their taxes. The development of IT-mediated services by banks set standards that citizens came to take for granted and expect from their contacts with government offices as well. In short, a generally positive attitude toward IT-based services together with the traditionally low level of trust in government officials made people prefer e-government when dealing with state agencies.

Federal Electronic Income Tax Service in Brazil

The income tax process in Brazil is managed by the Federal Revenue and Customs Secretariat

(SRF) of the Ministry of Finance. This agency is also responsible for all electronic services dealing with the income tax process. The SRF has 566 offices throughout Brazil, a country with 90 million individuals registered as *potential* taxpayers and 14 million registered legal entities. SRF services are supported by a set of Internet services provided through the Internet portal of the secretariat, ReceitaNet.

In 1996, SRF launched an Internet service to provide information to taxpayers. The electronic tax form submission service was initiated in 1997. By 1998 SRF began providing electronic access to tax regulations and related legal legislation, and offering interactive facilities (automatic answers provided by the system) for queries and information about tax refunds. In 1999, specific legislation was enacted to include the functionality of the e-Receita program in the nation's formal tax rules. Legislation was enacted in 2002 to regulate the issuing and use of digital certificates by individuals and legal entities, which are required for more sophisticated financial transactions, such as the transfer of funds.

About 25 million individuals (those earning more than 20,000 Brazilian Reais in 2003) are required to file income taxes. However, less than 15 million people actually pay additional taxes because they are withheld from their salaries. Tax forms are submitted electronically via the Internet. The ReceitaNet tax form submission system comprises application programs that need to be downloaded from the SRF server to the user's computer before the forms can be filled out and submitted. Individual taxpayers have two types of income tax forms to fill: a simple and a detailed version. The simple version is a consolidated statement of income and expenses, whereas the detailed form includes breakdowns of income and expenses into various categories in multiple levels of detail.

The system supports taxpayers by including pull-down menus with available options for filling particular data fields; guidance about the order in which the different parts of the form should be completed depending on previous data fields entered; descriptions of data required in each field (summary of relevant laws); and checks on invalid field parameters. It also presents relevant pieces of tax legislation and regulations pertaining to each of the data fields, as well as automatic calculations to determine the best way to declare income (detailed or consolidated) to minimize additional taxes (or maximize the refund). For added information on income tax laws and regulation, the ReceitaNet site provides full electronic documentation of all active pieces of legislation, regarding all types of economic activity, classified by government issuing agency, organized hierarchically from broad to more specific types of taxes, and supported by sophisticated search engines.

The user fills in the forms in full and the system checks for invalid parameters that will prevent the form from being transmitted, and inconsistencies that may result in erroneous tax calculations (these are issued as advice messages to revise the form but do not prevent its transmission). Once a tax form is filled out, users may create a copy of it in the local computer or in portable data storage media for their own records. At no point during the interaction with the system do users access data on the SRF data servers and the transmission of the form does not require the use of a password.

The Trustworthiness of ReceitaNet

ReceitaNet is a robust, user-friendly system that has simplified the income tax filing process and speeded up tax refunds. Users state that the electronic tax filing process is less complex and faster than using paper forms.

The electronic system also provides filing support, such as doing the calculations, checking the information, explanations of the data required in particular fields, and advice on ways to legally minimize payments, which taxpayers consider useful and valuable. In addition, the system offers online information on applicable legislation, rules and regulations. This service is particularly important because tax legislation is complicated in Brazil and few taxpayers can afford the services of tax accountants. The simple version of the tax declaration is considered easy to use (even for those with limited skills) and does not require declaring relatively small earnings and expenses. Use of the electronic system has significantly reduced the length of time required to process tax refunds, providing another incentive for its use. The system also processes other requests and issues various certificates required for many types of financial transactions.

ReceitaNet poses no serious security threats to the integrity of the tax data or to its misuse because the forms are completed off line. Additional functionality for direct tax payment from taxpayers' bank accounts is carefully handled by the ICT center of the Ministry of Finance, which is currently working on required certification processes.

The Organizational Context

ReceitaNet is being shaped within an organizational environment that is making efforts to cultivate a service orientation. This is important because tax authorities are not generally perceived as citizen friendly. Indeed, Brazil's Ministry of Finance has been trying to change its image by means of national information and education campaigns. Citizenship education starts at the primary school level with a component on the country's fiscal system that familiarizes chil-

dren with the institutional jargon, tax forms, and ReceitaNet.

This activity is part of a broad effort to present a federal government that cares for its citizens. The Ministry of Planning, which is coordinating the development of e-government infrastructure, is keen to encourage applications that support citizens' rights, as well as their obligations, and has worked out a systems analysis methodology to that end. It is in this more general context of striving to create a perception of a government that has citizens' interests at heart that the developers of ReceitaNet have been asked to add useful functionality, such as the issuing of certificates, and speeding up the tax refund process.

Electronic Voting

Brazil is a presidential and federative republic with considerable decentralized federalism. It is made up of twenty-six states and a federal district (Brasília). The government includes a directly elected president with a national constituency and a congress. The legislature is made up of a 513-member Chamber of Deputies and an 81-member Senate. Congresspersons serve for a basic four-year term, while senators serve for eight years. The states have unicameral legislatures that are elected simultaneously with Congress. The municipalities have city councils that serve for four-year terms; municipal elections take place two years after state and national elections.

The computerization of the electoral system started in 1986 with the development of the National Registry of Voters. The development of this central database system improved the reliability of the registration process by preventing voters from registering in more than one local registry. It also increased the efficiency of the registration process and developed a comput-

erized network to connect *The Tribunal Superior Eleitoral* with the 27 Regional Electoral Courts and the 2,900 precincts. The development of this network was the first step toward the more ambitious objective of establishing an automated vote counting process.

Electronic count was introduced in 1994. A year later, a task force put forth a proposal for the development of a computerized ballot box. The proposal was sent to all institutions, political parties and ministries in the country. Experts from the federal ministries were invited to participate in establishing the system's technical requirements and specifications. The electronic voting machine was first tested in the municipal elections of October 1996. The test included cities with more than 200,000 voters and all state capitals, involving 33 percent of the voters. A second test was performed during the 1998 general election, and included cities with more than 40,000 voters, covering 67 percent of all voters. The system was first tested in the entire country during the 2000 municipal elections.

The voting procedure is quite straightforward. A voting machine consists of two terminals installed in each polling station. The first, a numerical keyboard with a two-line liquid crystal screen, is used by the representative of the voting board to type a voter's identification number. If the voter is registered in the precinct, his or her name is displayed on the screen and identification accomplished. The second terminal is used by voters, and it also includes a keyboard and a liquid crystal display. First, voters type their candidate's identification number. The screen shows the candidate's name, initials of the party or coalition he/she belongs to and his/her photo. After verifying that all data are correct, voters press "enter" to confirm their choice. The keyboard contains two additional keys. The first is the correction key that allows

voters to restart the process. The second one allows a voter to cast a blank ballot.

The Trustworthiness of Electronic Voting

The trustworthiness of the electronic voting service is embedded in institutionalized procedures as well as the technical features of the software and systems. This combination of procedures and technical features provides security to the system and software before and during the election.

Software development stops 180 days before the elections. The source code is made available to the technical experts of political parties so that they can ensure that it complies with approved legislation and test the reliability and trustworthiness of the entire system. Sixty days before the elections the software is sealed during a public ceremony. Representatives from political parties and civil society are invited to participate in order to digitally sign the compiled copy of the software code. During this ceremony a sequence of important events take place. The first is the generation of hash-function tables to prevent the software's source code from being modified and verified afterwards. The second step is the digital signing of the compiled version of the software source code to ensure the integrity of the software uploaded into e-voting machines. In the third step, software applications, which are already digitally signed and encrypted, are distributed to the regional electoral court (*Tribunal Electoral Regional*, TRE), which is the authority managing the electoral process.

E-voting machines are put in place on the day before elections. However, a percentage of these machines, depending on the number of voters in the state, are taken back to the TRE to check their reliability. At 7.30 a.m., on the day of the election, the president of the precinct, in the presence of representatives of the Voting

Board and the political parties, turns e-voting machines on and runs a calibration check. Detailed information on the votes is printed and signed by the president of the precinct and representatives of political parties on the day after the election. The data can then be independently verified by several groups, including the electoral committee and political parties.

The system itself is protected by a security infrastructure that prevents data from being intentionally or unintentionally modified and/or deleted. The security of the system comprises two separate programs loaded on all voting machines. The system auditing program records all transactions performed on the particular machine, including initialization and the casting of every vote, as well as machine downtimes due to power failures, printouts requested, and other such information. All transactions are time stamped. Transaction records from a sample of machines are examined following the conclusion of the voting process. The system security program prevents any tampering with the actual machine, such as, for example, the removal of the diskette on which votes are stored. Any such action will result in the machine shutting down.

The Organizational Context

Brazil's electoral system is ruled by the judicial system, which consists of a number of specialized courts. As previously discussed, the management of the elections process is delegated to the regional electoral courts. Each court has three judges, who are also members of the State Court of Justice. Each state is divided into electoral zones. There are 2,900 electoral zones in the country, of which 2,000 are principal electoral zones where a judge is entrusted to ensure that elections are conducted in a proper manner. The remaining 900 are secondary electoral zones, which are assigned to a principal zone.

Electoral zones are mainly defined according to logistical requirements and do not reflect the administrative organization of the territory.

The *Tribunal Superior Eleitoral* (TSE) is responsible for electoral affairs, has jurisdiction over all aspects of elections, and regulates the functioning of political parties. It was created in 1932 to combat electoral fraud and mismanagement. It is made up of seven members, each of whom has a two-year mandate. Three of the tribunal's members are appointed by and are members of the Federal Supreme Court. Two are appointed by and are members of the Superior Court of Justice (*Superior Tribunal de Justiça*). The remaining two members belong to bar associations and are appointed by the President with Senate approval from a six-name list proposed by the Federal Supreme Court.

The functions of the TSE are to revise and propose electoral legislation, supervise party conventions and internal elections, grant or cancel registration of political parties, register candidates and certify those who are elected, regulate and supervise party access to free television and radio time during elections, and register voters. Electoral law in Brazil is revised every two years, when new elections take place. In December of the year before an election, the TSE submits a draft resolution to Parliament to update the electoral law. The resolution describes the necessary amendments to enact a new version of the voting system. Design of the automated voting system was highly influential in the redesign of the election process and its organizational setting.

THE CONTEXT IN CHILE

Historical Context

Chile is considered by many as a model that exemplifies a path to democracy and prosperity

for Latin America and the Caribbean. By some measures, such as transparency and effectiveness of the government, Chile appears to be one of the best democracies in Latin America (Hagopian, 2003). Between 1988 and 1998, per capita income in Chile more than doubled, poverty fell, and there was a doubling of social spending, particularly on education, health and housing (UNDP, 1998). Economic gains are often attributed to the neoliberal policies imposed during the Pinochet regime. Despite the notable pace of economic growth, Chile still suffers from income inequality and a large part of its population lack basic necessities. In 2002, 18.4 percent of the population lived with less than US\$2 a day, and the richest 10 percent consumed 46.9 percent of the national income, while the lowest 10 percent consumed only 1.4 percent. The Gini index for Chile in 2002 was 57.5 (World Bank, 2002). This makes it difficult to integrate large segments of the population into the economic and political life.

During the first decade of democracy after the military government, Chile experienced levels of mistrust in interpersonal relationships as well as between citizens and the health, social security and education, and labor systems (UNDP, 1998). One expression of this situation was the dramatic decline in electoral participation in a country where political participation had been the norm (Olavarria, 2003). The UNDP Human Development Report on Chile concluded that one of the reasons for this outcome was low citizen security and unequal income distribution. Searching for the balance between centralized and decentralized political structure has been a characteristic of the transition. In addition, a neoliberal ethos has coincided with a peaceful transition to democracy in Chile. Similarly, political parties have had to rebuild their relationships with constituent groups. Despite the weakening of democratic

institutions that had taken place, Chile shows a trend toward improvement (Hagopian, 2003).

The Status of ICT in Chile

Central to this wider agenda are the highly coordinated statewide political efforts to apply information and communication technology to help achieve socioeconomic goals. The push was initiated in 1998 when then-President Frei formed a presidential commission to design a national plan for the country to benefit from the information society. Public and private collaboration rapidly developed, which led to significant improvements in Chile's information infrastructure. By 2003 Chile was ranked 28th in the world in e-readiness (Economics Intelligence Unit, 2003) and 22nd in e-government readiness (United Nations, 2003). The pro-ICT orientation and momentum continued during the administration of President Lagos. The Digital Action Group was formed in 2003, presided over by the National Coordinator for Information and Communication Technologies and consisting of over 160 managers from the public and private sector, including members of the chamber of commerce, IT providers, and representatives from the academic world. The result of their year-long collaboration was the Digital Agenda.

The Digital Agenda is a holistic strategy and plan of action that explicitly incorporates the principles established by the World Summit on the Information Society to harness the potential of ICT to achieve the Millennium Development Goals. This translates into policy concerns for creating equal opportunities; increasing individual freedoms; improving the quality of life as well as the efficiency and transparency of the public sector; and enriching the cultural identity of the nation and of indigenous peoples. The 2004–2006 plan of action includes

expanding access; an e-literacy campaign; increasing the scope of e-government services; improving business connectivity and expanding e-commerce potential; promoting the local ICT industry; and modernizing the judicial system regulating the information society and digital economy.

Chile's Electronic Income Tax System

Tax administration in Chile involves three state agencies: the *Servicio de Impuestos Internos* (SII), the Treasury, and Customs. The SII is responsible for collecting taxes and managing all related processes. The agency is in charge of tax compliance procedures, audits and enforcement, as well as interpreting tax laws and handling tax disputes.

Tax administration in Chile entails two massive, legally embedded processes. One is the income tax return collected monthly (income from wages and salaries) or annually (interest income and profits), but calculated on an annual basis. The other is the value-added tax, which is calculated and collected monthly. Since the mid-1990s, the SII has gradually phased out its paper-based processes in favor of online income tax filing and administration. By the end of 2004 online procedures covered almost all steps associated with filing tax returns and related financial transactions. This includes gathering third-party information about taxpayers (such as salaries, interest paid, etc.), compiling and completing provisional tax returns, and displaying tax forms online. It also provides links to major banks operating in Chile so that taxpayers can choose to pay any taxes due directly from their accounts.

Most Chilean taxpayers went online in a rather smooth and largely efficient fashion. In 1998, online filing of income tax returns was

virtually nonexistent. In 1999, only 5.2 percent (89,365 out of 1,711,782) of all income tax returns were filed electronically. Just a few years later, in 2004, online income tax return filings rose to 83 percent, while traditional paper-based tax return filing fell to 17 percent. The SII's objective is to virtually eliminate paper-based filing in 2005.

The same progress is taking place with the value-added tax return. An average of approximately 900,000 value-added tax returns are currently filed monthly. In June 2004, 36 percent of all value-added tax returns were filed via the Internet. The number of value-added tax returns filed over the Internet has more than tripled during the past two years. Value-added taxes filed electronically now account for 77 percent of all electronic tax filings.

The transition to electronic filing consisted of three stages of development: informational, interactive and transactional. The informational step entailed the placement of a significant amount of tax-related information online, including guidelines and filing procedures, taxpayer instructions, and tax principles and policies. The next (interactive) step built upon the functionalities already in place to allow taxpayers to interact with the SII online. Once implemented this stage allowed taxpayers to make more specific queries and pursue selective inquiries either through online contact with SII personnel (e-mail) or through links to different levels of information that entailed the use of decision trees and knowledge-based systems. The transactional stage marked a breakthrough in the use of the Internet for tax administration. It allowed the entire sequence of steps underlying the filing of income tax returns and payment of taxes to be carried out online. As this stage reached maturity, SII continued to improve its administrative processes and introduce new services. For instance, it achieved a smoother

relationship with the Treasury and developed more elaborate cross-checking procedures using a variety of information sources to improve efficiency and offer new services to taxpayers.

Trustworthiness of the Electronic System

Efficiency, procedural simplicity, and transparency combine to make online filing of income tax returns in Chile smooth and reliable. Taxpayers log in with a secure unique identification number to find pre-filled tax forms, which greatly simplify the filing process.¹ The use of the electronic system has reduced the time needed to process tax forms.

The simple procedure of online filing and payment of taxes in Chile masks an impressive underlying technical complexity and interoperability. The ability to gather and accurately fill in tax forms with taxpayer information already available in government databases was brought about by a serendipitous event. The system's modular technical architecture benefited from the wide diffusion of client-server technologies. In addition, before the advent of the Internet, SII had made the decision to base the development of its technological infrastructure on the TCP/IP protocol.² The advent of the Internet found the agency ready to benefit from it. The transition to Internet further helped the simplification and streamlining of the administrative procedures. Front-end transactions made necessary a potent technical and administrative data processing machinery and contributed to an efficient and straightforward relationship with taxpayers.

¹ Taxpayers must confirm the accuracy of the data already entered into the system.

² The decision was based on the agency's wider policy of reducing excessive reliance on just one IT supplier.

The Organizational Context

The transition to online filing of income tax returns was fast but did not happen overnight. The transition process, which dates back to 1990 and the restoration of Chilean democracy, is still under development. The modernization of SII and strengthening of its operations played a key role in permitting it to raise the government revenues required to finance social policies to rectify some of the social inequalities that were heightened during the military regime.

Several goals were met during this transition process. The first was the introduction of ICT into the agency to reduce the costs typically associated with visits or phone calls to local offices. The second objective was to give a different character to the agency and to establish a new relationship with taxpayers, one marked by mutual trust and high standards of service. Transparency, objectivity, impartiality, and good service shaped the new image of the SII.

Additionally, there was a third and wider goal closely associated with the institutional and political processes that culminated in the Digital Agenda. The development and dissemination of information on the online tax system were seen as important vehicles for creating awareness of the potential of ICT and the Internet among citizens, economic agents, and other public agencies. While the role of the SII has been decisive in driving the relevant processes, the transition to online tax collection had effects that extended beyond the administrative and technological retooling of the agency and entailed a set of highly complex and interwoven social and economic processes. Online tax collection presupposes high levels of e-literacy and ICT diffusion in society, compatible technical standards and communication protocols, and a complex web of interoperable ICT-based systems/applications allowing for information

exchange and cross-checks as well as carrying out transactions between a significant number of actors and organizations.

In sum, far from being accidental, the successful transition to Internet-based tax management reflects a consistent long-term policy epitomized by the agency's effort to achieve better results through the modernization of its operations and, crucially, through a change in its relationship with taxpayers. It also reflects the outcome of a wider national government agenda to promote the use of ICT in the Chilean economy and society in which the role of SII figures prominently.

ChileCompra

ChileCompra is the government's successful response to the problems of public corruption, and the associated lack of efficiency in public procurement activities that have been a problem in Chile since the mid-1990s. ChileCompra also represents one of the major investments in the digitalization of the Chilean State, since the modernization program of the public administration (CIMGP) identified government acquisition practices as problematic areas that needed to be reformed.

The ChileCompra project led to the development of the massive and pervasive system of public procurement under the *Dirección de Compras y Contratación Pública* (DCCP), now known as ChileCompra. The DCCP is the central procurement office that mediates the procurement activities of individual government offices. This centralized function is organized around electronic catalogues. Every catalogue groups specific goods or services in an organized form. The DCCP created the catalogues after choosing appropriate providers. The process of selecting providers results in an agreement (*convenio marco*) by which providers supply goods at given

prices and quality specifications during a given period of time to any public administration procurement body that may need them.

Another function of ChileCompra is that of maintaining an open marketplace for all government procurement offices in the country. Procurement officers publish a request for the provision of goods and services. The request contains very clear specifications and procedures to be followed in the evaluation of offers submitted by providers. The request is entered into the system following specific procedures: the procurement office of a specific unit is the only authority that can access the system and publish requests for products or services. The period of time during which tenders are published, made available and can be submitted is established by law.³ Once the tender is closed, the committee in charge of the evaluation process ranks offers and assigns the contract to the one that better meets the explicit requirements of the tender. This procedure makes transparency possible in the procurement activities of the public sector.

Large municipalities as well as national and government procurement agencies are now using ChileCompra for their procurement needs, while smaller municipalities and some local administrative agencies are in the process of adopting it. By the end of 2004 all central public agencies as well as 123 municipalities were successfully using the ChileCompra system. The remaining 251 municipalities are in the process of becoming full users of the system. It is expected that, by the end of 2005, all public offices in the country will be using the system. By the end of 2004, ChileCompra had handled supply tenders worth US\$1.5 billion compared to US\$945 million in 2003. It also listed 84,000

suppliers and managed tenders on behalf of 655 entities.

Trustworthiness of ChileCompra

The project relies on a proprietary platform that is very open in terms of usability and accessibility. The system collects tenders and offers as Microsoft Word and Adobe PDF documents. To access the system, users are required to log onto the ChileCompra website with a username and password. This makes the system extremely easy to use and does not assume the existence of any kind of ad hoc technology or standard. The reliability of the technological platform is enforced by the simple structural functionalities embedded in the system. This reflects a radical simplification of the traditional process of public procurement for the public administration and suppliers. Rules and regulation are uniform to increase the transparency of the evaluation, monitoring, and accountability of the public procurement. The functions of the system also reduce the complexity and costs of procurement for the public sector and, specifically, for the smallest offices. A system that regulates and organizes procurement along given procedures makes it easier for a procurement office to regulate, monitor and oversee local procurement procedures, eliminating issues related to local discretion in procurement activities. The uniformity, clarity and accountability of every procurement activity, both at the local and central level, increase the trustworthiness of the overall system.

From a technological point of view, the system does not require backwards compatibilities, as no other procurement systems were used before. However, it requires a transitory organizational and procedural phase to make the new platform the only means for all procurement activities. Both the law and regulation of elec-

³ Spanning from 3 days for small tenders to over 25 days for larger ones.

tronic procurement consider these needs and provide the appropriate solutions.

Last but not least, it should be noted that ChileCompra has a high potential for use with small and medium enterprises.

The Organizational Context

The success of ChileCompra in fostering the trustworthiness of the Chilean public procurement systems is the result of the combination of a number of elements that can be clustered into two main categories: structural/context dependent and project related. The modernization of the national procurement system has been at the center of the political debate since the mid-1990s. Moreover, both the president and the government publicly committed to the project. Given these elements we can conclude that the project received high levels of political support and widespread commitment at the political and administrative levels. From the administrative point of view, the clear definition of roles, actors and offices involved in the management, control and support activities of public procurement has significantly improved the transparency of the processes through which public procurement is managed and monitored in Chile.

The first step in the development of the system can be traced to the government of Frei Ruiz-Tagle, who, in 1998, designed a policy for the reform of the system of purchases and hirings in the public sector, that recognized that public purchases were a key activity for the proper administration of the State. Before and during the development of the reform, various studies had concluded that the public purchasing system worked reasonably well compared to other countries in the region. Nevertheless, in October 2002, irregular practices and evidence of corruption highlighted another reality, which, interestingly, had already been glimpsed in the

report of the Commission on Public Ethics (1994), which noted that transparency and accountability in the management of public purchases were the two main issues to be resolved through the development and implementation of an electronic procurement platform. The change in public procurement procedures followed a gradual process of modernization to respond to the needs for reorganization.

ChileCompra was deployed in different phases. Its first version was a system to provide better information about public procurement activities, and was designed to provide information about normative and operational requirements to potential providers. The system was also conceived as a useful application to improve transparency in the management of public procurement, through, for example, the publication of results of public tenders and public purchases. As a result of a change in leadership, the objectives of the project were redefined during the second phase, and a long-term action plan was proposed, along with the inclusion of all public procurement phases and actions in the platform. These goals were summed up in a strategy aimed at successfully consolidating the transparency of public procurement, increasing the efficiency of the procedure and reducing the costs of the process and of the goods purchased. At the same time, the development of this platform included the potential challenge of facilitating and increasing Internet access for private companies in order to develop new skills and opportunities for Chilean companies in the international business environment.

The digitalization of the purchasing cycle also played an important role in the dissemination of e-business activities in Chile, helping to increase competitiveness and encourage innovation. It also helped promote the entry of small and medium enterprises into the world of information technology.

The success of ChileCompra can be explained not only by the introduction of digitally mediated transactions into the procurement systems, but also by other activities and initiatives that are taking place within the framework of actions to modernize the functions of the government. ChileCompra was not conceived as an isolated project. It supports, and at the same time is supported by, other projects aimed at changing and improving the relationships between citizens, economic agents and the State with the use of ICT.

Limitations and Further Research

The instrument for ex ante evaluation of the potential trustworthiness of a proposed ICT-mediated service requires further testing and fine-tuning. To that end, further empirical research is required to examine the validity of the trust-through-trustworthiness model by looking at cases that failed to lead to trustworthy systems, other countries, services of a more direct development relevance for the poor, and research to refine the methodology.

Cases That Failed to Lead to Trustworthy Systems. Studies of cases that did not result in the creation of trustworthy systems are necessary because they provide information about the conditions and factors that are likely to constrain and perhaps abort initiatives for building trustworthy ICT-mediated services. It is important to understand unfavorable background conditions to provide governments with appropriate advice regarding the long-term efforts that they need to sustain if they are to benefit from the potential of new ICTs. It is equally important to understand what interventions are necessary at the organizational level in order to achieve greater control over the factors that contribute to trustworthiness.

Other Countries. Generalizations cannot be made from studies in only two countries. Our analytical approach relies minimally on broad generalization, guiding each case's feasibility assessment in terms of its own circumstances. Nevertheless, the relevance and robustness of the guidance that our proposed methodology is capable of providing relies heavily on our understanding of the two Latin American countries. Studies of other countries may reveal significant additional trustworthiness requirements as well as conditions and factors implicated in their achievement.

Services of a More Direct Development Relevance for the Poor. Our choice of successful e-government services restricted our study to systems relevant primarily to middle-income citizens. The most pressing problem, which requires urgent attention, is the provision of services to the most needy groups. We can assume that the requirements, conditions and factors are substantially different in services oriented toward closing the inequality gap in a developing country. Efforts for winning trust in government (and in democracy more generally) among persons living in *favelas* or remote low-income rural regions are likely to be quite different from those aiming to satisfy the needs of the relatively affluent, educated people who are active in the formal employment sector. It is impossible to overemphasize the importance and urgency of such research. However, it is important to keep in mind, as stated in chapter 2, that when government structures and processes are perceived as fair, people with low income may have an added incentive to "play by the rules" and will be more likely to do so, instead of rationalizing questionable behavior because they perceive that the "system" is corrupt and works against them.

Research to Refine the Operationalization of the Proposed Feasibility Methodology. The proposed methodology can be supported by appropriate techniques and measures for professional

practice. We need to develop practical models and methods for the assessment of the qualitative conditions and techniques for the measurement of the quantitative factors.

PART II

Case Studies

BRAZIL: CASE STUDIES

THE NATIONAL CONTEXT

Despite Brazil's considerable production capacity,¹ it has significant development hurdles to overcome, including a highly unequal income distribution. The average per capita income of the top 20 percent of the population (about 34 million people) is US\$15,000, on a par with that of many European countries such as Belgium. However, the average per capita income of the bottom 40 percent of the population is only US\$1,000, similar to that of India (Tigre, 2003).

In stark contrast to the 50-year period of high industrial development that Brazil enjoyed in the middle of the twentieth century, during the past decade it has struggled with rising unemployment and sluggish economic growth. Brazil's relative prosperity ended with the 1982 debt crisis, which marked the beginning of a period of profound macroeconomic instability. A long lasting policy of import substitution was abandoned in the 1990s and the government launched a strategy of competitive integration that included trade liberalization, and tight fiscal, monetary and exchange rate policies (policies in tune with the so-called "Washington consensus").

The transition to this new economic paradigm entailed a costly process of prolonged economic instability. Until 1994 the Brazilian economy experienced severe hyperinflation. In 1993, the general price index rose above 2,400 percent and GDP remained below the level reached in 1980. Investment as a percent

BOX 1. KEY DEVELOPMENT INDICATORS FOR BRAZIL

- Population: 183 million (19.2 percent live in rural areas).
- Per capita gross national income (purchasing power parity US\$ in 2000): US\$7,320
- Population living on less than US\$1 a day: 9 percent
- Population living on less than US\$2 a day: 25.4 percent
- Percentage share of income or consumption of the lowest 10 percent of the population (in 1997): 1 percent
- Percentage share of income or consumption of the highest 10 percent of the population (in 1997): 46.7 percent
- Adult illiteracy rate (share of the population 15 and older, in 1999): 15 percent
- Life expectancy at birth: 67 years

Sources: UNDP, 2001; World Bank, 2002.

of GDP fell from 22.8 percent in 1980 to 14.5 percent in 1992. A turning point was the imple-

¹ Brazil's gross domestic product is nearly half that of France, although its population is 3 times larger than that of France. Similarly, Brazil's GDP is larger than India's, while its population is only one sixth that of that country. Agricultural value added in Brazil is 9 percent of GDP, compared to 3 percent in France and 27 percent in India. Similarly, industrial value added in Brazil is 32 percent of GDP, compared to 23 percent in France and 27 percent in India. Finally, the value added of Brazil's services sector totals 59 percent, compared to 74 percent in France and 46 percent in India.

mentation of *Plano Real* in 1994, which encompassed a series of fiscal and monetary reforms that led to the establishment of a new currency, the Real, which was tied to the US dollar. Economic stabilization was followed by a period of economic recovery. The economy grew at 5.7 percent in 1994, 4.2 percent in 1995, and 2.9 percent in 1996 (Teixeira and Ferraz, 2004). In 2004, the economy was estimated to have grown at an average annual rate of 4.6 percent. Investment as a percent of GDP, which hovered around 19.5 percent during the second half of the 1990s, fell to 18 percent in 2003.

Brazil had a turbulent political history in the twentieth century, including a period of military rule between 1964 and 1985. Although Congress was active during the years of military rule, its power was greatly curtailed. The country enjoyed a period of relative economic prosperity between 1969 and 1974, when the economy entered a long period of stagflation. The restoration of multiparty democracy began in 1979 and the transition to popularly elected government was completed in 1989 with the election of President Fernando Collor de Mello.

During the 1990s, a succession of governments² implemented neoliberal policies. A left wing government took office in 2002, led by President Luis Inacio “Lula” da Silva, a former metalworker and union leader. There was a

great deal of alarm among international institutions and local industrialist circles that his government would reverse the liberalization of the economy and default on the country’s debt. However, the new government took a pragmatic stance and avoided radical steps. Two years later it seems that da Silva continues to enjoy public support, but his government still faces challenges.

INFORMATION TECHNOLOGY IN BRAZIL

IT Policy

Brazil is one of very few developing countries in which government efforts to foster the production and use of information technology predate the “information society” policies of the 1990s. Early IT policy was associated with national autonomy and sufficiency in industrial production. The protective IT policy implemented during the 1970s and 1980s remains controversial (Tigre, 2003; de Meiroz Dias and Reinhard, 2004). In the late 1980s, many user industries complained that they were deprived of the advanced IT products required to remain competitive in the global market. However, import restrictions allowed Brazil to develop a substantial national hardware and software industry as well as the skills to meet the needs of the nation’s private and public sectors. Although liberalization dealt a setback to the domestic IT industry, Brazil continues to be one of the few developing countries with extensive technology capabilities in hardware and software manufacturing.³

Nevertheless, domestic demand outstrips production. In 2000, the Brazilian IT market accounted for 2.38 percent of GDP, which was the highest in Latin America. Indicators of the demand for IT professionals reflect those of the

² The nineties were marked by the policies of Fernando Henrique Cardoso. He first served as finance minister and masterminded the *Plano Real*, and then served as a president for two terms, from 1994 until 1998.

³ Most of this production supplies the internal market. Discussions are currently underway about the possibility of emulating India’s successful export-oriented software industry. One disadvantage for Brazil is language because Brazilians are not always fluent in English, which is the lingua franca in the software business and the advantage that Indians have.

demand for IT equipment. In 2000, 405 undergraduate courses in IT-related subjects were being offered in Brazil and 3,000 students were pursuing postgraduate degrees in computer science. Tigre (2003) estimated that in 2004 there would be 403,000 job vacancies in the area of networks alone, but only 155,000 people qualified to meet this demand.

The demand and supply situation is more complex in telecommunications, an industry that was liberalized in 1998.⁴ Private investments led to an increase in telecommunication services and a substantial improvement in quality. In 2002, telephone connectivity reached 18.17 lines per 100 inhabitants. This is quite low compared to international standards, with Brazil ranking 48th in teledensity (Kirkman et al., 2002). Similarly, despite competition among Internet service providers that keeps prices relatively low and generates a wide range of services to satisfy local needs, Internet access is concentrated on the relatively wealthy who live in affluent urban areas. It is estimated that 10 percent of the population uses the Internet.

The federal government promotes Internet use by financing ICT for social purposes, such as linking libraries to the Internet, and by providing online access to public services. A great deal of effort was put into e-government applications and highly successful initiatives were reported, such as income tax declarations and government procurement over the Internet, that reach a large number of individuals and businesses. States and municipalities pursue similar policies.

With its skewed income distribution, Brazil faces a big “digital divide” problem. A relatively small middle class can afford to use IT and is highly motivated to do so. Numerous initiatives have been put forth by all levels of government as well as by NGOs to close this divide. The proposals include a federal program to bring

Internet to schools, build community telecenters, and provide computer training for youth in poor communities.⁵

A Long History of Developing IT Applications in the Public Sector⁶

The computerization of the public sector in Brazil can be traced to the first uses of electro-mechanical machines to process payroll and accounting data in 1953–54. By the mid-1960s several federal and state government departments had established their own “mechanized

⁴ Until then, the state-owned telecommunications holding company, Telebrás, had been unable to keep up with increasing demand and build an adequate telephone system, despite being highly profitable. In 1996, Telebrás was the 22nd most profitable service firm in the world with annual growth in earnings of 25 percent (Mcknight and Botelho, 1997). But, during the previous decade, the government had given priority to other sectors, and telecommunications was in dire need of investment. The investments that Telebrás could make for the expansion and modernization of the telephone network was insufficient. In the mid-1990s, the average telephone density rate was less than 10 lines per 100 inhabitants. The quality of lines was very poor, with about 35 percent of uncompleted calls in Rio de Janeiro and São Paulo.

⁵ In our empirical research we came across several such initiatives. In São Paulo, for example, we visited one of the telecenters set up by the state government (Poupatempo). In Rio de Janeiro we interviewed personnel of the NGO RITS, which assists in setting up information centers to meet needs in poor areas. In São Paulo one of our interviewees, academic/journalist Gilson Swartz was busy promoting Internet capabilities in poor areas in the Northeast. In a seminar discussion, MBA students at the Business School of the University of São Paulo told us that the gap in Internet use is also a barrier to overcoming the gap between the rich and the poor, but they were optimistic that the problem was being addressed by such initiatives.

⁶ This section draws from *The Evolution of Information Technology in the Public Sector in Brazil*, by I. de Meiros Dias and N. Reinhard (University of São Paulo, Business School, 2004).

sections,” which lacked the technical expertise to develop their own applications and relied on the services of technology suppliers, such as IBM, NCR and Burroughs.

In the next 15 years (until the end of the 1970s) the task of processing government data was concentrated in a few public data processing companies. As a result, the federal government set up SERPRO. The states and large municipalities followed the same centralized model to develop computerized operations for large data processing tasks such as payroll, taxes collection, accounting, social security payments, and civil servants entrance exams. These government data processing centers were not required to comply with restrictive civil service recruitment procedures and salaries. They were able to attract highly trained professional staff, many of whom were subsequently transferred to strategic positions in other parts of the government. Such professionals acted as “agents of change,” and computerization projects introduced changes in bureaucratic public sector processes.

Another government organization that played an important role in public sector use of IT was the Committee for Coordination of the Activities of Electronic Processing (CAPRE). It was created in 1972 within the Presidential Planning Bureau to provide overall guidance on the use of computers in federal public administration, and later assumed an overall IT policy-making role. In 1979, CAPRE was succeeded by the Special IT Bureau (SEI), which were directly linked to the National Security Council and further tightened control over the computerization of the public sector. CAPRE, and subsequently SEI, was responsible for exercising restrictions over computer imports. Such restrictions limited the scope of design options, often necessitating modifications to the specification of computer applications to fit available

hardware. The positive side of this situation was that it encouraged local software engineers to innovate and find appropriate solutions.

The financial crisis of the 1980s hindered the computerization programs being implemented by centralized data processing centers. Without adequate investment in the fast advancing new technologies and required skills, the technical and management capabilities of the centers were eroded. They were unable to develop a strategic vision of IT, limiting their activities to operating their legacy systems and developing new applications that, technically speaking, were not very demanding. Gradually, government departments switched away from the services of the centralized state-owned data processing companies and subcontracted the development of innovative applications to the private sector.

However, toward the end of the 1980s, the government data processing centers pioneered the development of integrated intergovernmental systems, such as the Integrated System for Financial Administration (SIAFI) developed by SERPRO. These large-scale systems became possible with the construction of nationwide data communication networks by the state-owned telecommunications company Embratel.

During the 1990s a number of factors gave new impetus to the computerization of the public sector and the reinvention of government IT centers, including the redistribution of government functions between federal, state and municipal levels, public administration reform, and downsizing through privatization of support functions. Also, changes in the technology itself and trends in information science management fueled a strategic perception of IT and led to a change in the role of the centralized data processing centers from data processing to coordination and technical support for users who had growing autonomy. The trend of outsourcing increased and the state IT companies had no

choice but to become competitive to retain a substantial level of operations.

Finally, since the mid-1990s, the notion of e-government has been spearheaded in three ways: by the increasing spread of the Internet, the spread in the use of personal computers, and the privatization of the telecommunications industry. The government sees information technology as a means of providing efficient public services, transparency and quality.

The Current State of E-government

The federal government currently operates 11 e-government systems (see box 2). Some of these systems are particularly advanced and successful. ReceitaNet was accepted by the public very quickly (95 percent of all income tax declarations are currently filed using the system) and is highly valued for simplifying the income tax filing process and for its reliability. SIAFI has won recognition from the International Monetary Fund and the World Bank as a tool to control public expenditures and ensure transparency, and has been recommended for implementation in other countries. SISCOMEX is remarkable for the extent to which it has successfully integrated the activities of various government agencies as well as for the impact it has had on the efficiency of foreign trade activities and on reducing fraud in foreign exchange and the flow of goods.

At the federal level, main activities to advance e-government include the identification of areas that need e-government solutions, the establishment of interoperability standards, digital certification, commitment to free software and digital inclusion.

Identification of areas that need e-government initiatives (solutions, information services, etc.).

The Ministry of Planning, Budget and Manage-

BOX 2. EXISTING E-GOVERNMENT SYSTEMS IN BRAZIL

- SIAFI: the federal government's integrated finance administration system
- COMPRASNET: the purchases portal of the federal government, which provides information regarding government procurement and allows for electronic purchasing processes
- ReceitaNet: electronic income tax filing system
- SISCOMEX: integrated external trade system that brings together customs, and the trade and exchange functions of the Bureau of Federal Income, the Bureau of External Trade, and the Central Bank
- SIORG: government organizational chart with 53,000 entries—government units
- SIGPLAN
- SIDOR: budget preparation system
- SIASG: centralized system for all government procurement functions with 198,000 registered suppliers, 2,500 buying agencies and 1.7 million transactions in 2003
- SIEST
- SIAPE: integrated human resources management system for federal government civil servants
- RENAVAL: the national motor vehicles registry

ment is developing a bottom up participative diagnostic methodology to identify areas in need of e-government initiatives. Central to the methodology is a “life events” model that is based on the cycle of events that require business firms and individuals to interact with the government. These include, for example, birth, starting employment, marriage and family, retirement, death and so on. The idea is to identify gaps in existing services and produce a list of additional e-government initiatives. The methodology has a service orientation, giving priority to systems

to support the administration of citizens' rights rather than the efficiency pressures of government administration. It is felt that, so far, governments have used ICT primarily to enforce compliance with people's obligations as citizens and the current state of e-government reflects this mentality.

Interoperability standards to allow the exchange of information between systems and the possibility of substituting e-government components and products with others that have similar specifications without compromising the functionalities of the component systems. The Ministry of Planning, Budget, and Management (which has undertaken responsibility for this issue) and SERPRO have chosen to implement the e-Ping architecture, an adaptation of the UK's e-Gif architecture.

Digital certification. Issuing digital certificates is considered a crucial step for upgrading the integration of interorganizational transactions. This will allow for secure transactions and will permit extending the functionality of existing systems. For example, digital identity certificates will allow for the direct payment of taxes (or tax refunds) directly through banks. There are several certifying authorities in Brazil and SERPRO is acting as the registry authority (in addition to being a certifying authority itself).

Commitment to free software. The term "free software," is misleading. This basically refers to promoting the use of open-source software in government.

Digital inclusion projects. The government realizes that its e-government infrastructure will remain of limited value unless low-income communities gain access to Internet facilities and the skills to use them. A major effort is being

made to provide Internet resources to schools. However, at present only 4,000 of the country's 180,000 schools are connected. Federal government efforts to promote digital inclusion are complemented by those of the states and municipalities, NGOs and major private companies, such as Petrobras.

Attitudes Toward IT

E-government initiatives have been well accepted by the general public (or, at least, by middle-income persons, who have been affected the most by e-government applications). In general, the people we interviewed were very positive about using information technology when dealing with the government. It was often suggested that this positive attitude stems from the success of IT innovations in the banking system that have taken place since the 1980s. Those innovations have improved customer service, familiarized the public with the use of IT equipment such as ATM machines, and created expectations for similar quality of service in the government sector.

The banking industry enjoyed impressive growth during the period of hyperinflation and banks were able to protect customers from the loss of purchasing power. However, this meant that their accounts processing capacity had to be very efficient because the value of money changed significantly every day. Because of their healthy profits, banks were in a position to invest and innovate.⁷ When the stabiliza-

⁷ In the 1980s banks had an average return on sales (net profit/revenue) of 16.09 percent, substantially higher than the average of 10.12 percent for nonfinancial firms at that time. They could, therefore, afford to invest in IT: first automating payment systems, interbank transactions, and back office tasks, and later introducing an extensive range of ATM services. Banks developed substantial capabilities in software and some entered hardware pro-

tion plan went into effect and inflation-related demand disappeared, banks continued to find new profit making opportunities in high interest rates.

As competition increased, banks intensified their innovation efforts and developed IT-based services in order to keep their customers (La Rovere 1996). Since the 1960s, bank branches had been delivering government services such as paying social security benefits and collecting taxes. Thus, government service applications were linked with the banking systems from an early stage, and later provided valuable links for government-to-banks interorganizational infrastructure. The banking industry's continuing development of IT-mediated services set high standards that people came to take for granted and to expect, as well, from their direct contact with government offices.

However, the public's positive attitude toward IT in banks seems to downplay the high risk of fraud, which is estimated to have increased 40 times. This may be due to banks' policy to compensate customers and recover their losses through downsizing and insurance. In the government sector, the positive attitude toward IT-based services may be reinforced by the traditionally low trust that some people may still have toward government officials.⁸

Finally, there seems to be relatively little concern about the two main threats of the wide diffusion of ICT in modern society; namely, privacy and surveillance.

duction too. In 1994, Itaútec, the computer company of Itaú Bank was the leading vendor of personal computers in Brazil.

⁸ This impression stems from an interview with the Brazilian Ministry of Planning.

⁹ This conclusion emerges from the rich material we collected during our field study and interviews with representatives of the government and the civil society.

Conclusion

Brazil made an early start in the use and production of information technology, and was able to pursue sustained computerization efforts despite frequent economic crises and political instability. The history of IT use in government reflects international trends in technology, know-how and information science management. Government computerization (and more recently e-government) efforts tapped into and contributed to the development of local IT expertise. Today, the Brazilian government has in place layers of IT infrastructure in most of its agencies, electronic transactions with businesses and banks, and an increasing range of Internet transactions with citizens. It is faced with the demanding issues of safeguarding secure operations, and the interoperability of diverse systems that advanced e-government entails.

Brazilian society has welcomed e-government initiatives.⁹ However, it should be kept in mind that it is mainly the middle class that demands them and benefits from them. IT affects the middle class minority and the low-income majority differently, contributing to increasing rather than decreasing the gap between them. IT has become a visible aspect of the lives of those integrated into the local and global economy: they use it in their jobs as well as in their every day dealings with the government, banks and shops, and are developing the sophisticated technical and social skills of participants in the information society. But some people in low-income groups, who lack jobs where they could use computers, do not have bank accounts (let alone credit cards) and do not pay income taxes, still lack an understanding of what IT might potentially contribute to their lives. Fortunately, the government recognizes this challenge and is implementing programs to address it.

CASE STUDY: THE ELECTRONIC VOTING SYSTEM

Brazil is a presidential and federative republic with considerable decentralized federalism. It is composed of twenty-six states and the Federal District (Brasília). The government system comprises a directly elected president with a national constituency and a Congress. The legislature is composed of the 513-member Chamber of Deputies and the 81-member Senate. Congress has a basic four-year term, but senators serve for eight years. The states have unicameral legislatures elected simultaneously with Congress. The municipalities have city councils with four-year terms; municipal elections take place two years after state and national elections.

Brazil's electoral system is ruled by the judicial system, which is made up of federal, state and municipal courts. The two most important institutions are the Federal Supreme Court (STF) and the Superior Court of Justice (STJ). The Supreme Court, which was created in 1890, is made up of 11 members appointed by the president with Senate approval. It has jurisdiction over conflicts between the executive and legislative branches of the government, disputes among states, and disputes between the federal government and the states. In addition, it rules on disputes involving foreign governments and extradition. The STF issues decisions regarding the constitutionality of laws, acts, and procedures put forth by the executive and legislative branches, and warrants of injunction. It proposes lists of potential candidates (usually three) for certain judicial branch nominations, and conducts trials of the president, cabinet ministers, and congressional and judiciary members.

The Superior Court of Justice, which was created in 1946, is made up of 33 members. It reviews decisions of the regional federal courts (TRFs) and tries governors and federal judges.

The president, with Senate approval, appoints the members of the Superior Court of Justice. One-third is picked from the ranks of TRF judges; one-third from the ranks of State Supreme Court judges; and one-third from the ranks of state and federal public prosecutors.

The judicial system includes a number of special courts that have jurisdiction over particular specific areas. The *Tribunal Superior Eleitoral* (TSE) is responsible for electoral issues. This court was created in 1932 to put an end to electoral fraud and manipulation. It is made up of seven members, each of whom has a two-year mandate. Three of the tribunal's members are appointed by Federal Supreme Court and are members of it, while two are appointed by and belong to the Superior Court of Justice.¹⁰ The remaining two member of the tribunal belong to the bar associations and are appointed by the president with Senate approval from a six-name list proposed by the STF. The TSE elects its president and vice president from among the members of the STF.

The elections tribunal has jurisdiction over all aspects of elections and regulates the functioning of political parties. Its power includes revising and proposing electoral law, supervising party conventions and internal elections; granting or canceling registration of parties; registering candidates and certifying those who are elected; regulating and supervising party access to free television and radio time during an election; and registering voters. The electoral law in Brazil is revised every two years, in accord with the election cycle. It is the TSE's responsibility to draft a law resolution to submit to the legislative power for approval. Over the years, the TSE has developed a reputation for trustworthiness, competence and autonomy in the management

¹⁰ In both cases they are chosen by secret ballot.

of the electoral process. As a result, the draft resolution is rarely debated by the legislative power. These two factors, TSE's reputation, on the one hand, and the legislation's flexibility, on the other, have greatly contributed to the success of the e-voting system.

The TSE is only responsible for ruling on issues pertaining to the electoral system. The management of the elections process is delegated to the Regional Electoral Courts (TRE – *Tribunal Electoral Regional*). Each court is made up of three judges who are also members of to the State Court of Justice. States are divided into electoral zones (EZ), of which there are currently 2,900. Two thousand of those are principal electoral zones where a judge is entrusted to ensure that elections are carried out regularly. The remaining 900 are secondary electoral zones, each of which belongs to a principal zone. The jurisdictional organization of the territory does not reflect the administrative one since electoral zones are mainly defined according to logistical requirements.

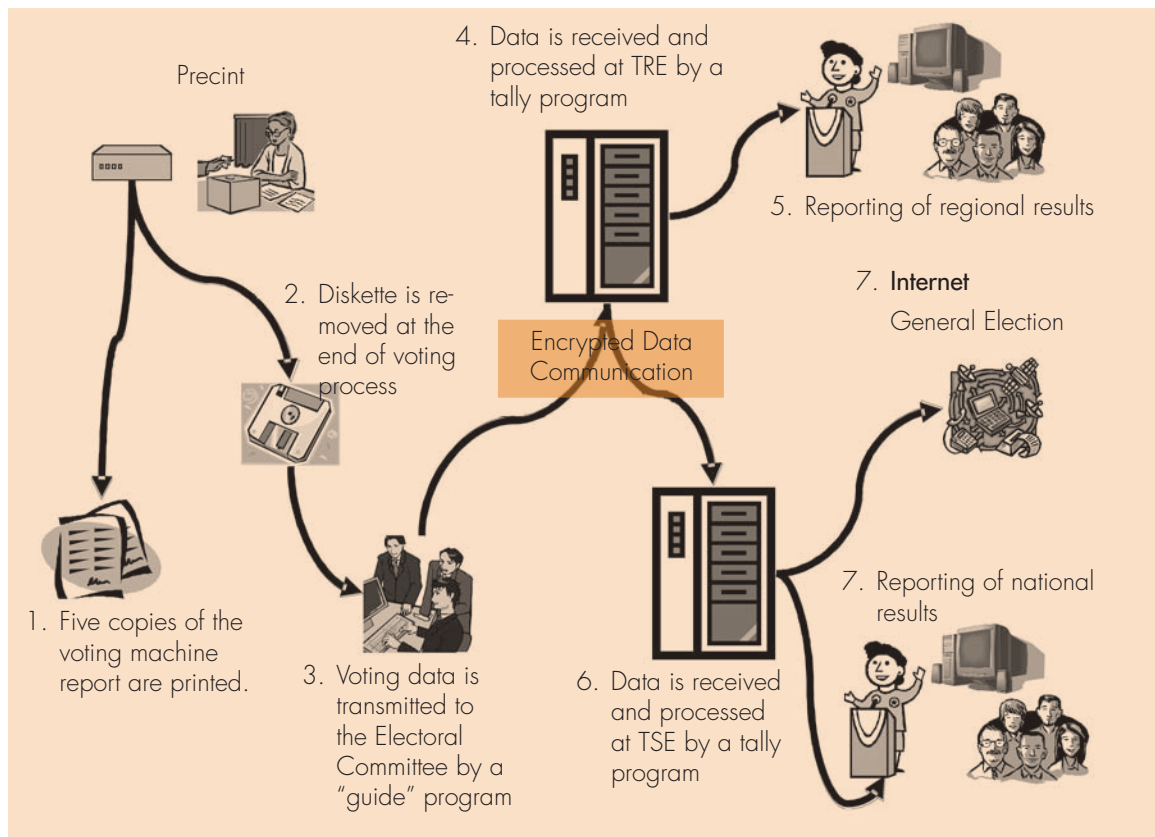
A Brief History of the E-voting System

The computerization of the electoral system started in 1986 with the development of a central database of registered voters (the National Registry of Voters). The development of this system achieved three major objectives. First, it improved the reliability of the registration process by preventing voters from registering in more than one locality. Second, it increased the efficiency of the registration process. Third, it developed a computerized network to connect TSE with the 27 Regional Electoral Courts and the 2,900 precincts. The development of this network was the first step in the much more ambitious objective of the TSE of automating the vote counting process.

Electronic vote counting was introduced in 1994. The system worked as follows: votes are counted manually at the precinct level and the results are formally reported to the local Electoral Committee, which enters the data into an electronic database. The data is then transferred, via encrypted transmission, to the counting server, which is hosted in the premises of the TSE. As expected, the introduction of electronic vote counting increased the efficiency of the electoral process and is considered a decisive step toward increasing the accuracy of the counting process and reducing fraud.

Initial success convinced TSE that further technological improvements were possible. At the beginning of 1995, TSE formed a task force to focus on two major tasks: stopping fraud and simplifying the voting system. The existence of voting fraud (the practice of buying votes) was common knowledge. However, there were no adequate means to prosecute corruption. Simplifying the voting system was considered important to improve participation and inclusion. The existing voting system required people to read the name of candidates from a list and to write down the candidate's name on the ballot. This requirement placed voting beyond the reach of persons who could not read and write. In Brazil, this meant that close to 30 percent of the population, who are illiterate, were, as a result, unable to participate in the political process.

To address these problems, the task force proposed the development of a computerized ballot box. The proposal was discussed at all institutional levels, as well as political parties and ministries. Technical experts from the ministries were invited to participate in the next step of the project; namely, defining the system's technical requirements and specifications. This invitation was accepted by five ministries: Science and Technology; Communication; Air Force;

FIGURE 1. E-VOTING IN BRAZIL

Marine; and Infantry.¹¹ A group of fourteen technical specialists was formed in September 1995 and the first version of the electronic voting machine was released in May 1996. The machine was tested for the first time in the municipal elections of October 1996. The test included all cities with more than 200,000 voters and all state capitals, and involved 33 percent of all voters. The general elections of 1998 created an opportunity for a second test of the system, which included all cities with more than 40,000 voters, reaching 67 percent of voters. The system was used nationwide in the municipal elections of 2000.

¹¹ The last three ministries have been merged into one: the Ministry of Defense.

Functional Description of the E-voting System

The voting machine is made up of two terminals installed in each polling station. The first is the voting board representative's terminal. This is a numerical keyboard with a two-line liquid crystal screen. It is used by the board representative to type in a voter's identification number. If the person is registered in the precinct, his or her name will be displayed on the screen and identification accomplished. The board representative checks the status of the voting machine on the screen and, if available, presses "enter" to make the machine ready.

When the voter enters the voting booth, he or she will find the voting machine ready to

register his/her vote. The voting terminal is also made up of a keyboard and a liquid crystal display. The voter then types in his/her candidate's identification number. The screen will show the candidate's name, the initials of the party or coalition to which the candidate belongs, and his/her photo. If the information is correct, the voter presses "enter" to cast his/her vote. The keyboard contains two additional keys. The first is a correction key that allows voters to restart the process. The second key allows voters to cast a blank ballot.

At 5 p.m. on Election Day the precinct president closes the voting machine and prints five original copies of the precinct's report, which contains the precinct's identification code, the voting machine's identification code, the number of people who voted, and the total number of votes received by each candidate. The precinct president and the representatives and inspectors of the political parties sign each of the copies, which are sent to the precinct register and the Electoral Committee. One copy is delivered to the political parties committee. If necessary five additional copies can be printed out and distributed to the district attorney of the political parties, to representatives of the press and to the Public Prosecution Office. The copy that is delivered to the political parties committee is extremely important, because it allows parties to check whether the data have been changed during transmission. The TRE and TSE send an electronic receipt to the political parties upon receipt of the data.

The voting machine program saves the data on a diskette in an encrypted format to prevent any changes to the data. The diskette is then delivered to the local Electoral Committee where data are decrypted and uploaded using a "guide program." From this point forward, the process varies depending on the type of election. In the case of municipal elections the votes are

tallied at the precinct of the municipality and then transferred to the local TRE and to TSE. In the case of general elections, the votes are tallied at the precinct that corresponds to the municipality and transmitted to the local TRE and to TSE. Tallies of votes in presidential elections are done and announced by the Superior Electoral Tribunal.

The technical trustworthiness of the system is ensured by a security infrastructure that prevents data from being intentionally or unintentionally modified and/or deleted. The security of the system comprises two separate programs that are loaded into all voting machines. The *system audit program* records all transactions performed on the particular machine including the initialization and casting of each vote, as well as machine downtimes due to power failures, print-out requests, and so on. All transactions are time stamped and records from a sample of machines are examined following the conclusion of the voting process. The *system security program* prevents any tampering with the actual machine, such as, for example, the removal of the diskette on which the votes are stored. Any such action results in a complete shutdown of the machine.

Preparing for the Elections

Preparation for elections begins in December of the pre-election year when TSE submits a draft resolution to Parliament updating the electoral law. While this is not a technical document or description of the e-voting system, it does present any changes needed in order to input the law into a new version of the system. The reorganization of the electoral process is mainly technology driven and not vice versa. The resolution proposed has to be approved by Parliament in March, at which point TSE has one month to review the system according to the

requirements specified in the approved resolution. This implies that there should not be major differences between the proposed and the approved resolution.

Software development stops 180 days before the elections at which time the source code is made available to the technical experts of the political parties who review it to ensure that the system complies with approved legislation and to assess the reliability and trustworthiness of the entire system.¹² The software is sealed during a public ceremony that takes place 60 days before the elections. Representatives of political parties and civil society are invited to participate and to digitally sign the compiled copy of the software code. In the last elections, held on October 31, 2004, the software applications were signed by the representatives of two political parties (the two largest one), as well as representatives of the bar association and the federal prosecutor. Several major events take place during the ceremony. The first is the generation of hash-function tables, which number ten, one for each system's macro component, and are generated to prevent the software source code from being modified and verified at a later time. The second is the digital signature of the compiled version of the software source code. After this point, members of the political parties are able to ascertain the integrity of the software uploaded to any e-voting machine using their digital signature. The third event is that the software applications, digitally signed and encrypted, are distributed to the TREs.

A few days before the elections each TRE loads all e-voting machines with candidate

(name, number, party or coalition abbreviation and photo) and voter databases in the precinct and software applications. Representatives of the political parties are required to attend this uploading process. The validation of the loading process is made on a sample of three percent of the overall population of e-voting machines randomly selected by the representatives of the political parties.

The e-voting machines are put into place on the day before the elections. A percentage of the machines (depending on the number of voters in the state) is taken back to TRE to check their reliability. This is tested by a simulation of a voting session that consists of an electronic and a traditional ballot box. People cast their votes in both boxes. The session is taped to make sure voters have cast ballots for the same candidate in both formats. The votes in the two boxes are compared. If there are no inconsistencies, each machine is returned to the precinct before 7.30 a.m. on Election Day.

At 7.30 in the morning, the precinct president turns on the e-voting machine in the presence of representatives from the Voting Board and the political parties. The machine automatically prints out a report (called a *zerisma*) that certifies that the ballot box is empty, ensuring that no candidate has preassigned votes. The *zerisma* is signed by the identification officer and party representatives and included with the precinct's documents.

CASE STUDY: ELECTRONIC FILING SYSTEM FOR FEDERAL INCOME TAXES (RECEITANET)

Brazil's federal income tax process is managed by the Federal Revenue and Customs Secretariat (SRF) of the Ministry of Finance, which is

¹² It should be noted that there is some concern about the political parties' ability to effectively assess the system's functionality in such a short period of time as well as about the lack of access to the source code of the e-voting machine's operating system, which is copyrighted.

also responsible for the electronic income tax filing system.

SRF maintains 566 offices throughout Brazil, a country with 90 million registered *potential* individual taxpayers and 14 million registered legal entities. SRF provides various services through its Internet portal, ReceitaNet. Some of the services available through the Federal Revenue and Customs Secretariat (such as registering a company) can only be accessed electronically.

SRF's Internet portal was launched in 1996 with a site that provided taxpayer information. Electronic income tax filing was introduced in 1997. By 1998, the site also included access to tax regulations and related legislation, as well as an interactive query system that also provided information on tax refunds. Specific legislation was enacted in 1999 to introduce e-Receita program functionality into the formal rules of the tax process. Additional specific legislation was enacted in 2002 to regulate the issuing and use of digital certificates, which are required to access more sophisticated services, in particular, financial transactions (account debits, fund transfers).

Ninety-five percent of individual and corporate income tax forms are submitted electronically. While about 25 million individuals are required to file an income tax form based on their income (more than 20,000 Reals in 2003), less than 15 million taxpayers must pay additional taxes beyond those withheld from salaries.

The main online services provided by ReceitaNet include the following:

- Information on income tax regulations and legislation
- The tax form submission applications (more below)
- Query facilities on income tax refund status and on personal data records

- Application for requesting and obtaining a certificate of no debt (CND) from SRF
- Fiscal audits and fiscal status management
- Enrollment and record alteration in the national directory of legal entities
- Fiscal debt recovery program
- Internal and foreign trade tax information

Electronic Income Tax Filing

Tax forms are submitted electronically via the Internet. The ReceitaNet tax form filing system is made up of application programs that need to be downloaded from the SRF server onto the user's computer before forms can be completed and submitted. These programs are also available in telecenters or Internet cafe computers.

The application program modules include:

- An income tax statement generator
- Income tax form validation and transmission functionality
- Support tools for generating tax statements (a very sophisticated help facility that guides the user on the data needed to fill in each of the tax form fields)
- Checks that are performed on the form to ensure that it is properly filled in, on the transmission session, and on the taxpayer's database records

For individual taxpayers there are two types of income tax declaration forms: the simple and the detailed version. In the simple version the user declares income and expenses in a consolidated fashion, whereas in the detailed form income and expenses are broken down into various detailed categories.

Users can access various types of support to fill out their income tax form, including pull-down menus with options for each data field; guidance as to which parts of the form to fill

FIGURE 2. A SIMPLIFIED TAX FORM

IRPF 2004 - Declaração Simplificada On Line

Identificação

CPF do Contribuinte: [] Data de Nascimento: [] / [] / [] Título de Eleitor: []

Ocupação Principal: Natureza [Selecione a Natureza da Ocupação] Código: []

CPF do Cônjuge: [] UF de entrega: [selecionar] Correo Eletrônico: []

Valor Total do Patrimônio

em 31/12/2003 (até R\$20.000,00): [] em 31/12/2002: []

Rendimentos e Imposto Pago

Rendimentos Tributáveis: [] Imposto a Restituir: []

Desconto Simplificado: [] Banco: []

Imposto Devido: [] Agência: [] DV: []

Imposto na Fonte: [] Nº da Conta para Depósito: []

Carnê Leão/Mensalão: [] Rendimentos Isentos e Não Tributáveis: []

Saldo a Pagar: [] Rendimentos Tributação Exclusiva/Definitiva: []

Declaração de Bens (situação em 31/12/2003)

Proprietário de carro, moto, trator, barco a motor ou outro veículo ☐ Sim ☒ Não

Proprietário de casa, apartamento, loja, terreno ou outro imóvel ☐ Sim ☒ Não

Titular de conta bancária, de poupança ou outro investimento ☐ Sim ☒ Não

Informações Adicionais

Atualizar Endereço? ☐ Sim ☒ Não Declaração em Conjunto? ☐ Sim ☒ Não

Enviar **Limpar** **Ajuda**

in next depending on data fields already filled in; descriptions of data required in each field (summary of the relevant laws); checks on invalid field parameters; relevant tax legislation and regulations for each data field; and automatic calculations to ascertain which version of the form (detailed or consolidated) will result in a lower tax payment (or a higher refund). To further assist taxpayers, the ReceitaNet site provides full electronic documentation of all legislation, regarding all types of economic activity, classified by issuing government agency, organized hierarchically from broad down to more specific types of taxes, and supported by sophisticated search facilities.

Once taxpayers complete the tax forms, the system performs two types of checks: one looks for invalid parameters that will prevent the form from being transmitted, and another looks for inconsistencies that may result in erroneous tax

calculations (and outputs messages that suggest revisions, but does not preventing the transmission from occurring). Once a tax form is completed, users may create a copy of it in the local computer or in portable data storage media for their own records. The actual transmission of the form does not require the use of a password. *At no point during the interaction with the system do the users access data on the SRF data servers.*

Perceptions Regarding the ReceitaNet Electronic Service

The trustworthiness of the ReceitaNet system derives from its user friendliness¹³ and confidence in the accuracy, timeliness and completeness of the information provided. The electronic

¹³ The ease with which the forms can be completed and the additional services provided by the SRF site.

tax filing system, in particular, is valued for simplifying the income tax declaration process.¹⁴ The paper-based forms for declaring income were complex and completing them required considerably more time than the electronic forms. The support provided to complete the forms (mathematical calculations, checks, information on data required for particular fields, advice on how to declare in order to minimize taxes) is very well accepted by taxpayer. More significantly, the adoption of the electronic system has reduced the time required to process tax refunds. Finally, the ability to request no debt certificates (a document required for many types of financial transactions) electronically has eliminated a transaction burden for both sides.

CASE STUDY: SIAFI AND SIAFEM

SIAFI

The Integrated Financial, Budgetary and Asset System (SIAFI) is almost twenty years old. It is an internationally acclaimed information system that serves to control and administer federal expenses, as well as integrate the financial activities of the federal public administration. Currently, this includes some 317 governmental agencies,¹⁵ totaling more than 5000 administrative units (World Bank, 2004) of the federal government from the legislative, executive and judiciary branches, as well as all agencies and public enterprises that are included in the social security budget.¹⁶

¹⁴ We elicited the opinions of four citizens regarding the electronic tax system. They all stressed the ease with which electronic forms can be completed.

¹⁵ As of 2001.

¹⁶ *SERPRO: Solutions in Information Technology and Communications*, information pamphlet.

The information system itself is a large legacy system physically based in Brasilia and accessed and used by federal agencies, including those that are located outside of Brazil. The introduction of such a national scale information system was made possible in part by the services provided by the then state-owned national telecommunications company, Embratel (Dias and Reinhard, 2004). Currently, all agencies are linked through the SERPRO telecommunications network as well as by other external networks that guarantee access to the system by the 13,800 active managing units.

SIAFI was created as a response to a series of administrative problems in the federal government including:

- poor and inadequate work methods, including manual accounting,
- poor information access at all levels of public administration,
- delayed processing time that rendered information irrelevant for management purposes,
- inconsistent data collection compromising decision making,
- underqualified public accountants, and
- a proliferation of bank accounts within the federal government.

These problems made it difficult to adequately manage public resources and prepare the federal budget. SIAFI was created to modernize and rationalize federal finances. To this end, the National Treasury Secretariat in the Ministry of Finance, in collaboration with SERPRO (a large public sector software development firm) defined and developed SIAFI in less than one year (it was originally conceived in 1986 and implemented and launched by January 1987).

The SIAFI project enjoyed strong political backing. Two other significant events that

occurred in 1988 appear to be integral to the implementation of SIAFI. By 1988, the federal government's three separate budgets were merged into a single Treasury account. This process centralized financial control and significantly streamlined payment and collection operations (World Bank, 2004). The second event was the implementation of the Document of Electronic Collection of Federal Revenues, which records payments made to every unit of the federal government.

Implementation of SIAFI resulted in a re-engineering of federal accounting processes and led to three major changes in financial accounting activities: the standardization and rationalization of accounting and budgetary procedures, improved transparency in public disbursements, and improvements in the relevance and timeliness of the information available for budgetary decision making.

Standardization and Rationalization

By integrating all federal financial activities, SIAFI standardized financial, budgetary and accounting practices across the government. This has meant the integration of three public sector administrative bodies: the executive, all direct administration, and all the judiciary and legislative branches. Also included now are some decentralized administrative bodies, public enterprises and mixed enterprises that are included in the federal fiscal budget. All of these administrative bodies enter their financial, budgetary, and asset management transactions into the system.

This standardization imposes a rationalization of these activities. Before the implementation of SIAFI, there were various accounting practices that were often performed manually. Because all accounting procedures must now be entered into the system, SIAFI is able to enforce the digitization and standardization of accounting practices. As a result standardiza-

tion has taken place without making it overly restrictive.¹⁷

For example, before SIAFI every public sector unit received a lump sum funding for a year. It was not necessary to have a budget plan and thus it was possible to spend the entire budget in the first quarter. Then supplemental budgets of up to 200 percent of the original lump sum could be requested and Congress could approve or deny the request. In principle, Congress was the controlling authority, but in practice they did not engage in much oversight.

The new system makes it impossible to receive additional funding without submitting a budget. Furthermore, in order to make a request for supplemental funding of up to 10 percent, administrative units must ask for a decree from the Ministry of Planning (which will be analyzed by the Budget Office before being granted). If the request is between 10 and 25 percent, the requesting unit must go to Congress for a supplemental appropriation. This structure enforces more judicious budgetary practices and a more rigorous control over the disbursement of funds. This rationalization was even more important given the recent financial history of Brazil that included several years of high inflation that effectively rendered the budgets a fiction.

It should be noted that these changes are considered more than just managerial or technical fixes. Arguably, it also involves a philosophical change within the public sector bureaucracy toward a focus on standardized and integrated work from budgetary planning through to financial action (Parente, 2001).

Transparency and Accountability

The integration and standardization of accounting practices also facilitated improvements in

¹⁷ SIAFI website.

transparency and accountability. There are two major elements that have led to increased transparency and accountability. First, the integration of three separate federal budgets (fiscal, credit operations, and special) into a single one meant that the Treasury became the controlling authority over the federal budget, with the power to allocate funds according to the budget of each organization and making funding available on a program basis. This was a profound change from the prior system of three separate federal budgets, two of which had no oversight and lacked transparency. For example, the credit operations budget did not have to identify where its funding came from and was totally divorced from the fiscal budget. The collapsing of these budgets into one under the purview of the Treasury means that there is “total transparency with regard to the origin and destination of resources used by the administration” (SERPRO).

This improved transparency also means that it is possible to hold individual public sector managers accountable for poor budgetary decisions or practices. This has been particularly salient since the enactment of the Law of Fiscal Responsibility and Financial Crimes (1999–2001). This legislation and SIAFI ensure decentralized responsibility for fiscal management. A 2000 presidential order established the “Transparent Brazil” program, which gave a great deal of importance to systems of management control such as SIAFI. The program “encourages society to take part in the entire control process, so that the entire society can learn if its particular local governments are receiving certain credits, if they are in charge of certain responsibilities” (Parente, 2001: p.223).

Information Source

One of the initial goals of the system was user friendliness. To that end, the intention was to create a system that could also be used as a

managerial tool through the provision of timely, necessary and reliable information to facilitate budgetary decisions.

The system includes data storage for all the financial information and processes. A side benefit is that SIAFI has turned into a “powerful instrument for administrative transparency and for combating corruption” (ibid: p.220). As a result, both the Congress and the press use it as a source of information for evaluating and monitoring the use of public resources. “The political opposition is the most active user and is most convinced that the information made available through SIAFI comes from a sure source. The press uses SIAFI more and more as time goes on as an information source and passes its findings on to society” (ibid). Thus, SIAFI has played a significant role in making information widely available to the public. It is also considered a reliable source of information for academic research regarding activities of the Brazilian government.

Technically, the information produced by the system is accessible to all citizens without the need for identification. SERPRO has attempted to facilitate access through a simple interface and previously prepared consultations for specific information generated by the system.

SIAFEM

SIAFEM is a network-based distributed accounting system used by all public administration organizations of the state of São Paulo, and includes state government administration departments and so-called “indirect administration,” that is, public sector organizations such as universities, utilities and so forth. Until 1996, the state of São Paulo had a centralized computer system that served the accounting departments of 13 organizations in the report.

One copy is displayed to make public the results of the election in the particular precinct of São Paulo and 11 organizations in the rest of the state. The Finance Secretariat of the state's Central Accounting Department was responsible for operating the system and employed a large number of accountants to check the data collected. It was a slow system, taking up to two months to collect financial data, transfer it to the Central Accounting Department, correct any errors, input the data into the system, process it and produce reports.

Like SIAFI, SIAFEM was also developed by SERPRO. In effect, it is a version of SIAFI adapted for the use of municipalities and state governments. SIAFEM replaced the old system in São Paulo in January 1987 after an implementation stage that lasted only 40 days. The new accounting system was part of a broader administrative and financial reform pursued by governor Mario Covas in 1996. SIAFEM formed the basis for the reengineered process of financial control performed by the state's General Accounting Department with 12,300 users over the Intragov state network that connects public and semi-public organizations. The Finance Department was reengineered and a new State Control Division was created. This division was staffed with the accountants who were previously employed checking data under the old centralized system.

The government of São Paulo purchased SIAFEM from SERPRO and continued to rely on them until 1999 for system maintenance and adaptations to the changing requirements of the state government. SERPRO discontinued its SIAFEM software service at that time due to technical staff shortages and PRODESPI (a São Paulo software company) took over the system's maintenance. Today, São Paulo's SIAFEM system is different from the versions used in other states, producing more detailed analyses and

reports than it was originally designed to do. New system amendments and enhancements are currently under way to further decentralize budget accounting and asset management as part of the state's new public management initiatives.¹⁸

SIAFEM as a Mechanism for Preventing Overspending

SIAFEM is an accounting system made up of two main subsystems: one for the budget and the other for cash flow control. The budget making process of the state is based on a forecast of income for the next 4 years, which is made using historical data. Upon taking office, every governor makes a 4-year plan in the form of government programs, which are divided into specific actions, and are associated with deliverables, costs and performance indicators. The plan, approved by the government, acquires the status of a law.

The annual budget is worked out by the Secretary of Planning on the basis of the 4-year plan, the proposals of the finance secretaries, the state's budgeting regulations and federal legislation regarding legitimate state expenditures.¹⁹ The budget allocates funding and sets spending

¹⁸ In Brazil there are significant differences of attitude and practice among federal and state governments regarding public management reforms. At present, the federal government is not keen to pursue new public management. The reforms of the 1990s were reevaluated and were judged disappointing in terms of the savings and service quality achieved (interview: Rodrigo Ortiz Assumpção, 3/11/04). In contrast, there continues to be strong interest in new public management in the state government of São Paulo, with extensive training on management techniques (interview with staff of Fundap, 9/11/04).

¹⁹ State income is raised mainly from sales taxes. In addition, poorer states receive funding from the federal government. States contribute 25 percent of their sales tax revenues and 50 percent of car taxes to their municipalities.

limits on several financial categories, such as financial investment and interest repayment.

The main users of SIAFEM are the finance secretaries of 35 public organizations (direct and indirect, as well as the executive, legislative and judiciary branches of the state government), which make initial budget proposals and subsequently have to comply with actual budget allocations and restrictions. All secretariats have the same structure; they are divided into budget units, each of which has a management and executive unit. Each finance secretary prepares a budget proposal on the basis of the requests of their units and sends them to the Secretary of Planning. When the annual state government budget is worked out, the Secretary of Planning sends the budgets to the secretaries of finance in much higher levels of detail than the SIAFEM functionality can provide for and blocks part of the budget for contingencies.

SIAFEM is used in day-to-day accounting and keeps track of income and expenses, that is, the overall financial status of the 35 state organizations as well as their compliance with their allocated budgets. There are monthly limits for spending with a 17 percent margin. Parliamentary approval (i.e. change in the law) is needed for requests above the 17 percent limit. Also, SIAFEM makes it possible for the Secretary of Planning to review the actual income of the organizations and compare it with income forecasts used in the budgeting process. If it is less than expected, spending requests can also be revised (this has only happened once in 22 years).

SIAFEM produces technical financial information in increasing detail. However, it is not a particularly friendly system. Its masses of 'raw' formal/technical financial data are meaningful to the trained accountants of the 35 public organizations and serve their financial management purposes. To increase the utility of the

data generated by the SIAFEM system through its day-to-day use in the administration, another application, SIGEO, has been developed to produce reports on demand. SIGEO, however, can be used for a fee.

SIAFEM Users Outside the Government

In addition to the 35 organizations that use SIAFEM for their financial management purposes, the system is also accessible to a number of outsider users, including the public accounts auditors working in the state parliaments, members of Parliament, the federal government, university researchers, NGOs and the press. Indeed any citizen can have access to the system through the service of operators/facilitators on terminals at the state information telecenters.

The Impact of SIAFEM on Trust

No doubts were voiced about the trustworthiness of SIAFEM. On the contrary, the system is seen as an effective technical component in a successfully redesigned structure and process of the accounting function of the state government. We found no signs that there was resistance to change when SIAFEM and the decentralized financial control processes it was designed to support were introduced, despite the fact that it abolished the role of accountants whose job was to check financial data collected by public organization for data entry in the old centralized system. This job loss was offset by upgrading those staffers to the role of auditors in the State Control Division.

The chief accountant of the state sees SIAFEM as the basis for public management. He emphasized two aspects of the system. First, the level of detail it provides makes better financial control possible. Second, the real time input of financial data forces the public manager to report "everything correctly according to the rules of good accounting."

However, organizations such as universities see SIAFEM as an unwelcome mechanism exercising stricter state control. For these types of organization, SIAFEM signifies a loss of autonomy.

Several interviewees suggested that SIAFEM (and SIAFI) play an important role in improving trust in government more generally, by providing tools for transparency and accountability. The system is seen as significant for monitoring the way government funding is allocated to different public purposes, the way public funding is distributed to various contractors, and the way the public budget is spent throughout the year. Thus, SIAFEM is used by the auditors of the state parliament to monitor state accounts in real time. Moreover, Iara Pietricovsky (INESC)

has suggested that transparency is improved by making SIAFI (and SIAFEM) accessible to the public. It is important for keeping government administration accountable and ultimately, empowering the civil service to make parliamentary democracy respond to the needs of the less privileged.

Nevertheless, the use of SIAFEM outside the administration is currently limited. According to the chief accountant, the public in general is not interested in technical matters such as budget allocation. And the system is not designed to be user friendly for persons who are not technical expert on state finances. The services of the report-producing application (SIGEO) are too expensive to facilitate their widespread use.

CHILE: CASE STUDIES

OVERVIEW

The Institutional Context

Chile is considered a model for Latin America's path to democracy and prosperity. Between 1988 and 1998, Chile more than doubled its per capita income, poverty fell (and continues to do so), and social spending, particularly in education, health and housing, doubled (UNDP, 1998). These gains are often attributed to neoliberal economic policies followed during the Pinochet regime. Despite these improvements, extreme income inequality remains a problem in Chile (World Bank, 2001).

Similarly, mistrust continues to be a problem, both in interpersonal relationships and those between citizens and government systems such as health, social security, education and labor (UNDP, 1998). A result of this malaise was a dramatic decline in electoral participation during the first decade of democratic governance. This was a marked contrast with the relatively high levels of political participation that were the norm in Chile before the dictatorship (Olavarría, 2003). There are several hypotheses to explain this problem, each of which highlights a different mechanism at play in Chile. The 1998 UNDP *Human Development Report* concludes that it is the result of lack of personal safety and the unequal income distribution. Others argue that it can be explained by the continuation of neoliberal policies, which may have paid inadequate attention to the need to ensure that the

benefits of economic growth are fairly distributed among the population. Finally, this malaise may also be attributable to citizen's perception of what to expect politically (Olavarría, 2003).

ICT Policy in Chile

It was from this contradictory context of economic, social and political transition, deeply entrenched political and business interests, and increasing voter disenchantment that Chile's ICT policies emerged. In mid-1998, a presidential commission on new information and communication technologies was created and undertook a six-month investigation of the opportunities and challenges for the diffusion of ICT, which culminated in the publication of a report on the findings. The report focused on the social, cultural and economic impact of the technological revolution in Chile. The commission also presented a short-term plan of action whose goal was to ensure the development of an information infrastructure in 1999–2000.

As a direct result of these initiatives, there were significant social, political, and infrastructure changes, which moved Chile forward on the road to building an Information Society. A United Nations study (2003) that evaluated national e-readiness placed Chile in the top 25 countries in the world and in the top ranking among Latin American countries.¹ Despite

¹ Connectivity statistics as of October 2003 explain Chile's relatively high ranking: 8,000 schools have PCs and 4700 of them are connected to the Internet (20 per

these improvements there were still several deficits in a number of areas such as, for example, a gap in digital access that extends to government agencies, an absence of widespread and high quality training, a lack of interoperability among services, and an incomplete and not entirely coherent legal framework.²

The Digital Agenda

President Lagos, who was elected in December 1999, has continued the government's emphasis on information and communication technologies. The Digital Action Group (GAD, in its Spanish acronym) was formed in 2003 to, once again, take stock of the situation and plan for the future. The GAD is presided over by the national coordinator for information and communication technologies and is made up of representatives of government institutions, the business community, academia and others. Their yearlong efforts gave rise to the Digital Agenda, an extensive public-private collaborative agreement on a countrywide digital strategy to create Chile's Information Society.

Perhaps the most salient aspect of this agenda is its commitment to the social development of Chile. Infrastructure is no longer thought of as solely the realm of engineers, and e-governance is not simply a technical issue. Information and communication technology is not viewed as an end in itself, but instead as a tool to further other aims, such as the modernization of the State, increasing business productivity, improving the efficiency of social policies and diminishing regional developmental inequalities.

The Digital Agenda explicitly incorporates the principles established by the World Summit on the Information Society³ that is dedicated to the harnessing of the potential of ICT to achieve the Millennium Development Goals.⁴ For Chile,

this translates into creating equal opportunities, increasing individual freedoms, improving the quality of life and the efficiency and transparency of the public sector, enriching the cultural identity of the nation and indigenous peoples and other such socioeconomic development objectives.

To accomplish this, the Agenda adopts a holistic two-pronged strategy. On the macro level, it requires growth in GDP, increased equality, and an extension of democracy and freedom of expression. On a micro scale it requires the regulation of the telecommunications industry, more modern business technologies, the modernization of the public sector, and training.

The Digital Agenda does not include much in the political realm with regards to promoting or strengthening democracy in Chile. There is little rhetoric specifically relating to the ability of ICT to promote democratic participation and no actionable items directly concerning the promotion of democratic participation and the participation of civil society. The greater concern for now is ensuring equality of access and building capacity rather than promoting participation per se (for example, extending democra-

cent have broadband access); 85 percent of teachers are trained and 80 percent have PCs in their homes; there are 1,300 infocenters in 317 communities, 368 public libraries with Internet access and 500 of the online schools provide community access. In addition, the cost of access to the Internet was reduced by moving away from variable charges. Also, several pieces of legislation facilitate electronic business and other transactions: Protection of Private Life Law of 1999, Electronic Signature Law of 2003. Finally, there are 239 web portals run by public ministries and government services providers, with more than 170 online transactions and services (Source: Agenda Digital: Se Acerca el Futuro, Feb. 2004).

² Source: Agenda Digital: Se Acerca el Futuro, Feb. 2004

³ See http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1161|1160

⁴ See <http://www.un.org/millenniumgoals/>

cy with respect to access rather than promoting participation).

The Future (Plan of Action 2004–2006)

The Digital Agenda proposes that by the year 2010 (Chile's bicentennial) Chile will be a digitally developed country and a full-fledged member of the Information and Knowledge Society. To achieve this goal, the 2004–2006 Action Plan lists seven major priorities and 34 initiatives. The plan has six major parts: access, e-literacy, e-government, digital business development, facilitate the take-off of the ICT industry, and modernize the judiciary to serve the needs of the Information Society and the Digital Economy.

Expanding Access. To develop a solid and secure broadband infrastructure available throughout the country and accessible to all Chileans will require the consolidation and coordination of the public and private network of infocenters so that thousands of Chileans can access the Internet.⁵ Ensuring access implies extending broadband to the country's 1300 infocenters and developing a sustainable management system for them. The goal is to connect 900,000 homes to the Internet. Also central is equipping micro and small business with government sponsored online tools to enhance productivity, increase online transactions and consultations, uncover new business opportunities, build capacity and obtain technical support⁶ from the community infocenters⁷ (*Programa Nacional de Infocentros Comunitarios*).⁸ The future of these access points is uncertain. As of now, several projects have funding for only the next few years. There is a movement to discover ways to create financially sustainable access points to ensure equal access for all.

E-Literacy Campaign. This refers to establishing an active e-literate population that is qualified in the use ICT and the Internet. The goal is to train at least a million people in the use of computers and the Internet. Special focus will be given to training to access various e-government services that are currently available (including taxes online and ChileCompra). The national campaign for e-literacy (*Campaña Nacional de Alfabetización Digital*), which was created in 2002–2003, is part of the Ministry of Education's National Center for Education and Technology. While the e-literacy campaign appears to be successful (as of early 2004, 250,000 people had received basic e-literacy computer training), there are two concerns. First, the system of data collection needs to be strengthened. Thus, it is best to consider the number of people trained as a rough estimate. Second, the computer literacy courses are of limited applicability; however, their content will be expanded and other courses will be offered, including training on accessing government services online.

⁵ There are a variety of types of access points (a map of their locations can be found at <http://www.infocentros.cl/>), each with different sources of funding, and motivation. The publicly-sponsored programs include: ENLACES (computers in schools), Biblioredes (computers in libraries), and access points sponsored by various government organizations including SUBTEL (Subsecretaría de Telecomunicaciones, 300-600 telecenters), SERCOTEC (RedSERCOTEC with around 60 telecenters), INJUV (120 telecenters). There are also several privately-funded access points, including El Encuentro, cybercafes and other access places sponsored by NGOs.

⁶ Examples include www.Sitioempresa.cl, www.RedSercotec.cl, and www.zonaempresas.cl

⁷ See: <http://www.infocentros.cl/index.php?seccion=inter-net&subseccion=quienes>

⁸ The *Programa Nacional de Infocentros Comunitarios* was established in 2001 by presidential decree (http://www.infocentros.gob.cl/AUSI/respaldo/Descargables/Instructivo_Presidencial.pdf). Its goal is to strengthen and facilitate access to ICT for small and micro businesses.

E-Government. This refers to efforts to enable the Congress, the judiciary, and regional and municipal governments to deliver services and contribute to the digital development of the country. The goal is to increase the number of government services offered electronically and to extend the use of ICT to all the government agencies. A key feature is the development of an electronic service platform that will make interoperability between public services possible. The idea is that all public institutions will have access to the information held by the large state services in their databases.

Digital Business Development. The goal is to increase Internet connectivity for businesses and intensify the advanced use of the Internet for business purposes, including highly developed e-commerce. This should ultimately increase productivity and competitiveness.

Facilitate the Take-off of the ICT Industry. The goal is to reach a critical mass of ICT-enabled businesses able to compete internationally. The focus will be to promote the development of software and content, Internet services and offshore services. This also includes a quality certification program (between 50 and 60 companies have already been certified).

Modernize the Judicial System for the Information Society and the Digital Economy. This refers to developing a judicial system to facilitate the development of the Information Society, ensuring freedom of expression, democracy, transparency, access to knowledge and culture, as well as providing copyright protection, and protection for businesses, workers and consumers. Electronic document, signature, information crimes, and privacy protection legislation have already been enacted. However, it is crucial to take the steps necessary to remove existing constraints

on the judiciary, provide adequate support and promote the development of e-commerce, e-government and the use of ICT. It is also important to take steps to increase users' confidence in the operation of the e-platforms (for example, enacting legislation regarding consumer rights in e-commerce). Remaining concerns include the lack of computer literacy among staff of the judicial system and the administration.

The Context for SII and ChileCompra

The transformation in the administration of taxes through the use of information and communication technologies and construction of the public procurement platform (ChileCompra) are important initiatives in a highly collaborative, holistic, nationwide agenda for enhancing socioeconomic development in Chile by means of the judicious use and application of ICT. The Internet-based administration of taxes should benefit Chilean society by facilitating tax filings for all taxpayers (individuals and businesses), as well as by increasing government revenues.⁹ ChileCompra is an attempt to rationalize the government procurement process and increase its transparency. This has the potential to both decrease corruption and increase the efficiency and effectiveness of government operations, thereby, improving their ability to promote socioeconomic development. ChileCompra can also improve competitiveness and promote small business access to the large public sector market. These two projects are considered key to the diffusion of ICT in the Chilean economy and society. The examination of the projects that follows will assess the impact of the ICT-based

⁹ Improved revenues are crucial to maintaining fiscal balance, promoting socioeconomic development and permitting the government to finance other spending needs.

state reform on the trustworthiness of the tax authority and ChileCompra.

ICT-BASED ADMINISTRATION OF TAXES IN CHILE¹⁰

Key Aspects of Chile's Tax System

Tax administration in Chile involves three state agencies: the *Servicio de Impuestos Internos* (SII), the Treasury (*Tesorería General de la República*) and Customs (*Servicio Nacional de Aduanas*). The SII collects taxes and manages all the processes involved therein. The agency is in charge of tax compliance procedures, audits and enforcement. It also has jurisdiction over the interpretation of tax laws and is the first judicial stage in tax disputes.¹¹

Information and communication technologies and the Internet have been introduced into Chile's tax administration system with remarkable speed. The scope of ICTs and the Internet in this area is also impressive. In the course of few years, a significant majority of Chilean taxpayers went online in a smooth and efficient fashion. As late as 1998, online income tax filing was virtually nonexistent or marginal; in 1999 only 89,365 out of 1,711,782 income tax returns were filed electronically. By 2004 online filing had risen to 1,663,720 (83 percent), while traditional paper-based filing fell to only 341,388 (17 percent). Value-added tax filing has not gone online as quickly, but it is moving rapidly in the same direction.

Far from being accidental, the successful transition to Internet-based tax administration reflects a consistent long-term policy to achieve better results by modernizing SII operations and, crucially, by changing the agency's relationship to taxpayers. It also reflects a wider national agenda to promote the use of ICT in the Chilean

economy and society and the prominent role that the SII plays in that process.¹² SII hopes to virtually eliminate paper-based income tax filing in 2005 and move rapidly to bring ICTs and the Internet to bear equally strongly on monitoring and collecting value-added taxes.

Recent changes have provided an opportunity for the government and SII to reconfigure the social role of the agency and reposition its national significance. The use of information and communication technologies to expand the range of services offered to taxpayers is one of the agency's major objectives. While the ultimate aim also includes increasing tax revenues, it is achieved in ways that change significantly the forms through which it is accomplished, reconfiguring the relationship of the agency to the taxpayers by stressing its service orientation and making it easier for taxpayers to fulfill their obligations. Furthermore, the expansion or introduction of new services, such as electronic invoicing (*factura electrónica*) is tied to other major social goals such as enhancing overall economic development and more equitable income distribution.

Tax administration in Chile, as perhaps in most countries, includes the tax on income and the tax on value added. Income taxes are collected monthly (withholding on salaries) or annually (interest income and profits) but calculated on an annual basis. The value-added tax is calculated and collected monthly. As shown in table 1, in 1999 income and value-added taxes accounted for 71 percent of total taxes (income taxes represented 22.6 percent and value-added taxes,

¹⁰ Most of the data presented here are based on personal interviews. When documents are used they are usually referenced.

¹¹ *General Aspects of the Chilean Tax Systems: Concepts and Guidelines for Foreign Investors*, Internal Revenue Service, 2004.

¹² See www.agendadigital.cl

TABLE 1. TAX STRUCTURE AND REVENUES IN 1999 AND 2003

	Amount US\$ Mill		% Total Net Central Govt	
	1999	2003	1999	2003
Income Tax	2,579	3,223	22.6	27.5
VAT	5,526	5,872	48.4	50.0
Special Sales Taxes on Certain Goods		199		1.7
Specific Taxes	1,607	1,422	14.1	12.1
Other	1,216	1,025	10.6	10.6
Taxes on Legal Acts	482		4.2	
Total Tax Revenue	11,411	11,741	100.0	100.0

Sources: SII, 2004 and 2001.

48.4 percent) and yielded US\$11.411 million in government revenues (SII, 2001). By 2003, these two taxes had increased to US\$11.741 million, with income taxes accounting for 51.7 percent of total taxes and value-added taxes representing 27.5 percent. Government revenues from income and value-added taxes represented 16.3 percent of the GDP in 2003 compared to 16.9 percent in 1999, indicating a shift and perhaps a simplification of the country's tax structure.

Procedures for Filing Income and Value-Added Taxes

The successful and relatively rapid transition to online income tax return filing can be explained by the fact that income tax administration is straightforward. However, value-added tax returns are inherently more complex, at least in some respects. Collecting value-added taxes entails the recording and pecuniary control of ideally every single market transaction.¹³ The traditional paper-based system entails issuing numbered invoices that are stamped every time they are transferred to economic agents. This

system requires persons to visit local tax offices once a month and submit their tax returns on specific dates. Tax officials record the numbers of stamped invoices that have been used and cross-check them against other information. Tax payments are calculated accordingly depending on the monetary value of the transactions. New blocks of stamped and numbered invoices are provided once the old ones are used up.

ICTs and the Internet are bringing about significant changes in the administration of the value-added tax. The number of value-added tax returns processed monthly is fairly stable at approximately 900,000 per month on average. In June 2004, 36 percent of all value-added tax returns were filed via the Internet. This implies a tripling of the number of returns filed electronically compared to 2002. Electronically filed returns jumped from 175,000 to 300,000 between June 2002 and November 2003. The

¹³ Value-added taxes are calculated as a percent of the added value of market transactions, that is, the sale of products or services minus the cost of the inputs used to produce the goods or services sold.

share of value-added taxes filed electronically reached 77 percent in June 2004.

The SII has attempted to use ICT and the Internet as a means of overcoming some of the limitations inherent in the old paper-based system of value-added tax administration, specifically, the problem of tax evasion (which is higher in the value-added tax than in the income tax, but is declining) (SII, 2001). To this end, the SII introduced two types of electronic invoices, one for the sale of goods (*factura electrónica*) and another to be used as a receipt for services rendered (*boleta de honorarios electrónica*).¹⁴ Instead of issuing and stamping numbered paper invoices, the SII now issues batches of numbered *electronic* invoices that taxpayers can obtain from the SII website. Eventually, every market transaction will involve the issuing of an electronic invoice that will be transmitted automatically to the buyer and the SII at the moment that the transactions take place. Consignment notes for dispatched goods could then be checked against the SII's information through bar coding technologies.

Electronic invoicing has faced a number of difficult technical (standards, interoperability of systems, security) as well as administrative and institutional problems, which have delayed its development. For instance, micro, small and even medium-sized businesses find it difficult to adopt the new system because they lack the financial, technical and human resources. Moreover, a study undertaken by the Santiago Chamber of Commerce in 2003 reported that a substantial number of companies (30.5 percent) indicated among their reasons for not adopting e-invoicing their belief that it would increase the power of the SII over them.¹⁵

Despite the fact that the electronic invoice was introduced in March 2003 with great fanfare, it has not taken off so far, despite notable progress. Only 6 percent of the companies sur-

veyed by the Santiago Chamber of Commerce stated that they use the electronic invoice. The Chamber of Commerce report anticipated that 22 percent of the companies would be using electronic invoicing by 2004. This compares to 35 percent in the United States. Actual data for 2004 shows outcomes well below expectations. Only 1,650,000 electronic invoices out of a total of 33 million monthly invoices (5 percent) were issued electronically. Nevertheless, this is a significant improvement from just eighteen months earlier when only 400,000 invoices were issued electronically.

Electronic invoicing requires major social and economic changes that are still taking place in Chile. Nevertheless, it is safe to say that it has successfully weathered its introductory stages and is now well on its way to nationwide diffusion. The introduction of electronic invoicing in larger companies is well underway, and it is expected that it will spread to smaller companies and the economy as a whole. As mentioned, smaller businesses have found it relatively more difficult to move to electronic invoicing. Currently, the nation's 1000 largest companies account for 47 percent of all electronic invoices issued, while the smallest 196,000 companies represent only 8.6 percent of the invoices issued.¹⁶ One hundred and six large companies are already using electronic invoicing, while another 146 are in the process of certification. E-factoring and third party providers of e-invoicing services are currently being consid-

¹⁴ The latter is used for calculating the income (and the income tax) of professionals rather than for value-added tax purposes.

¹⁵ The most significant obstacle to the adoption of electronic invoicing was the lack of resources (78.3 percent), followed by the lack of an appropriate administrative culture (49.3 percent). See SII, 2003.

¹⁶ See reference in footnote 4. The extent to which this reveals a pattern of tax evasion by smaller companies is difficult to tell.

ered as solutions to help small companies that lack the necessary ICT infrastructure, financial resources and skills to adopt the e-invoicing. The successful establishment of ChileCompra (an Internet-based platform for public procurement) is acting as a springboard for the further diffusion of electronic invoicing. More than 300 major public organizations can currently accept and demand electronic invoices for the goods they procure.

Online procedures currently in place cover almost the entire gamut of steps associated with filing of income tax returns as well as the financial transactions necessary to complete the process. The sequence of the steps involved in the annual income tax operation is as follows:

- From January to March of every year the SII gathers third-party information about taxpayers' salaries, interest income, dividends, tax withholdings, etc.
- Based on this information, a provisional tax return is completed and placed on the agency's portal (www.sii.cl) by the end of March or beginning of April.
- Individual tax returns can be accessed via the SII's portal through an authentication procedure. Taxpayers carefully review their individual tax returns and check whether the information is correct.
- If they agree with the information in the tax return, they indicate their consent by actually submitting the tax return by April 30th, at the latest.
- The next step involves making the necessary arrangements for paying any taxes due. The SII portal provides links to all the major banks operating in Chile. Taxpayers can select their bank and arrange to have their tax payments transferred directly from their bank accounts. Payment confirmation takes place between the bank and SII. When a taxpayer is

owed a refund, the SII informs the Treasury, which deposits the refund into the taxpayer's bank account (refunds take approximately two months to process).

In 2004, about half of the all (online and paper) tax returns were prepared automatically, and another 20 percent was partially filled in. Taxpayers have several options in the case of automatically completed tax returns. They can indicate their consent or approval of the information, correct any errors, or provide additional information and documentation. Taxpayers also have the option of filling out their own online tax returns if they deem it necessary. In addition, there are a number of online procedures for appealing the SII's decisions. However, the SII is tasked with interpreting tax legislation and is the first judicial stage of any tax dispute. The Institute's administrative and judicial powers are a highly sensitive issue that ultimately affects its trustworthiness.

The transition to online tax administration in Chile is remarkable for a developing or an industrialized country. While the role of SII has been decisive in driving this transition, the overall outcome extends beyond the administrative and technological restructuring of the agency to highly complex and interwoven social and economic processes. It presupposes high levels of e-literacy and ICT diffusion in society, compatible technical standards and communication protocols, and a complex web of interoperable ICT-based systems and applications allowing for information exchange, cross-checks and the accomplishment of transactions between a significant number of actors and organizations.

The Pattern of Development

Even though the transition to online filing of income tax returns has been rapid, it did not

happen overnight. The transition process has spanned more than a decade, going back to 1990, when, after the restoration of democracy, the government realized the importance of the SII for raising government revenues to support a new social policy that aimed to rectify the social inequalities that had been accentuated during the military regime. The modernization of the SII and strengthening of its operations (which had been undermined by declining staff, few resources and low morale during the dictatorship) were critical steps to reaching this goal (SII, 2001). Changing the relationship to the taxpayer and basing it on *voluntary self-compliance* was a key factor, which was made possible by an effective and smooth system of transactions. The SII's *service orientation* is instrumental for promoting compliance, combating tax evasion and ultimately raising tax revenues.

The next section details the SII's administrative reform, which entailed an organizational restructuring, a new administrative culture and appropriate human resources. All this demands substantial efforts and consistent leadership over the years. Before embarking on these issues, it is necessary to have a picture of the growing involvement of ICTs and the Internet in the administration of taxes and the management of the procedures and transactions.

The SII decided to introduce some ICT aspects into the process of filing tax returns during the second half of the 1990s, soon after use of the Internet became widespread. The Internet provided an opportunity to radically restructure the SII and the entire public sector. However, given the low level of ICT penetration in Chile's economy and society, the SII opted for a careful stepwise introduction of new technologies. Accordingly, the first step was informational in nature and entailed the placement of a significant amount of tax related information online. The information concerned included guidelines

and procedures for filing tax returns, taxpayer instructions, and tax principles and policies. This first phase served three major goals. The first was to introduce information and communication technologies into the agency and reduce the costs to taxpayers that are typically associated with visiting or telephoning local tax offices. The second goal was to develop a new public image for the agency as well as a new relationship to taxpayers marked by *mutual trust and high standards of service*. But there was a third and wider goal as well, which was to create awareness among citizens, economic agents and other public agencies of the opportunities that ICTs and the Internet provided. In this respect, the SII acted as a major vehicle for the diffusion of ICTs in Chile.

The response went beyond all expectations. The SII website was accessed by far more people than the SII leadership imagined when the plan was devised. The success of the first stage thus created the incentives for moving forward and expanding Internet use. Therefore, the next step was to build on the functionalities already in place in order to allow taxpayers to interact with the SII online. This allowed taxpayers to raise more specific questions and pursue inquiries either through online contact with SII personnel (e-mail) or through links to additional information accessed through the use of decision trees and knowledge-based systems. The response to this initiative was equally positive.

The expansion and successful development of the interactive phase set the stage for the transition to the critical stage of online tax filing. This third phase marked a breakthrough in the use of the Internet involvement for tax administration. It allowed the entire sequence of steps underlying the filing of an income tax return and payment of taxes to be carried out online. The comprehensive way through which the entire processes moved online was a signifi-

cant shift. The rapid annual expansion of online income tax return filing and payment soon made another goal more realistic; that is, the complete elimination of the old paper based process and a complete transition to online income tax filing. With 83 percent of tax returns filed online in 2004, this goal is on the verge of being accomplished. As this phase reached maturity, the SII conceived of a fourth phase, that of expansion. The expansion phase entails perfecting the process and correcting any problems or errors remaining in the system, as well as providing new services. For instance, this could involve making interactions with the Treasury smoother. It also entailed the development of more elaborate cross-checking procedures and filing of a variety of information sources in order to improve efficiency and offering new services to the taxpayers.

As already indicated, the relatively smooth transition to online income tax return filing and payment laid the groundwork for electronic filing of value-added taxes by means of electronic invoicing. Whereas income tax return filing could take place through indirect access to computers (taxpayers could access SII at infocenters, or by relying on accountants, relatives or friends), electronic invoicing requires the use of information and communication technologies in the everyday operations of firms and organizations. In some cases, such as the issuing of electronic receipts (*boleta de honorarios electrónica*) by professionals, the process can be relatively straightforward. In other cases, however, e-invoicing may become a complex venture because it presupposes advanced systems of computer-based accounting. Because of the administrative and accounting complexity of the throughput process, the invoice represents the last step of a powerful administrative and accounting system. These factors add to the social and technical complexity of electronic invoicing because

it reaches down to the everyday operations of firms and organizations.

There also are institutional issues that concern the overall balance of power between the SII and economic agents. While the SII presents the development of electronic invoicing in terms of facilitating a modern relationship between buyers and sellers, there is undeniably an issue of control involved. As the study carried out by the Santiago Chamber of Commerce indicated, 30.5 percent of companies feel that the introduction of e-invoicing will increase the power that the SII has over them, while 37.3 percent even raise issues of privacy. It is difficult to tell if this is a legitimate concern or if it conceals practices of tax evasion.

Administrative and Organizational Requirements of Change

Technological, administrative and institutional changes of the scale required by the transition to the Internet-based administration of taxes in Chile are seldom as straightforward as the above description may suggest. The transition to online tax administration would seem to be the end outcome of the confluence of several processes taking place at different levels. Some of these processes are of wider social and institutional concern (and were briefly described in the overview of Chilean ICT policies). This section points out a few crucial administrative and organizational conditions that were prerequisites to the successful restructuring of SII and the transition to online tax administration.

As already mentioned, establishing a strong service orientation was a major part of the SII's strategy. This was considered a precondition for the smooth interaction with taxpayers and for accomplishing the ultimate goal, which was to increase tax revenues. However, there were several obstacles in the way. Some obstacles

were structural and demanded the thorough restructuring of the organization, while others were cultural or attitudinal. A long established tradition of following rules and standard operating procedures makes public agencies especially susceptible to a ritualized complexity that inhibits a service orientation. Changing that introvert and ritualized culture was a major challenge for the SII. The agency also had to change the public's impression of the agency as the arm of an authoritarian and repressive State, and convince citizens that it was now an institution committed to serve them, genuinely concerned for the welfare of all Chileans.

Service orientation was part of the agency's strategic outlook even before the advent of the Internet and the transition to online services. During the nineties, this strategy was reflected through the restructuring of the organization. The identification of nine business areas provided the tools for defining tasks and processes that would facilitate the service orientation of the agency. A considerable simplification of processes took place whose ultimate purpose was making the relationship to the taxpayer as immediate and smooth as possible. This business type of organization also helped to change the internal decision-making process for the allocation of resources, making it less haphazard and subjective. An example is provided by the problem of bottlenecks in tax administration that naturally result from the periodic peaks in filing tax returns. Under the old structure, resources were committed to urgent tasks. But urgency is not always a good criterion for allocating resources. Though urgent, specific tasks may still be insignificant or less significant when placed within a broader picture. The transition to a businesslike organizational structure helped to solve some of the bottleneck problems by translating urgency into priorities.

The internal reorganization and redefinition of administrative processes along the lines described partly preceded the advent of the Internet and, to a considerable degree, reflected the then dominant managerial fashions of lean organization and reengineering in the early nineties. However, several serendipitous events combined to strengthen the direction that the SII was taking. A modular technical architecture made possible by the wide diffusion of client-server technologies that matched well with the businesslike organizational processes. At the time, and also before the advent of the Internet, the SII had made a major decision to base the development of its technological infrastructure on the TCP/IP protocol. The decision was based on the agency's wider policy to reduce its excessive reliance on just one IT supplier. Thus, the advent of the Internet found the agency ready to jump on the bandwagon. The transition to the Internet further helped to simplify and streamline administrative procedures. Front-end transactions made necessary a potent technical and administrative data processing machinery and contributed to an efficient and straightforward relationship to taxpayers. In order to reduce complexity, the SII outsourced the development of new applications while maintaining operational control and coordination of the technological infrastructure. Specifications were produced by SII, but software development was subcontracted.

These changes necessitated a new organizational mindscape and the ability to construct a new public image for the organization. One way of reaching these goals was to help taxpayers to switch to the Internet as easily as possible. For that reason, the SII undertook the work of filling out tax returns, thus offering taxpayers as painless an interaction with its portal as possible. Another important gesture of goodwill on the part of SII was making available online all

the rules and conventions used by SII employees and managers in making for the final calculation of taxes due.¹⁷ The online publication of the “rules of the game” signified a breakthrough and a new ethos on the relationship between the SII and the public. Transparency, objectivity, impartiality joined service orientation to enhance the image of the agency (as well as the government, given that tax authorities are often identified with it).

These changes made a new human resource policy necessary in order to equip the SII staff with the skills necessary to successfully operate in the new environment. Education and skill development programs were developed. It was also necessary to cultivate an appropriate climate to overcome psychological fear of change and encourage the behavior consistent with the goals envisioned. The transition to Internet-based tax collection was threatening to many employees, especially the older ones. Measures were therefore taken prevent resistance to the organizational changes. Salaries were increased significantly, especially those of lower level staff. Another important incentive was the development of career paths and clear job descriptions. Between 1990 and 2004 the number of SII employees rose from 2,000 to 3,500 (SII, 2001).

Assessing the Trustworthiness of SII

The changing relationship of the SII (as well as the State) to citizens (and taxpayers) was a basic premise upon which the technical, administrative, and institutional developments described so far were predicated. The rapid and rather smooth transition to online tax administration suggest that these developments were unambiguously positive. The positive outcomes go beyond the confines of tax issues and relate to the modernization of the State as well as a considerable number of other economic institu-

tions that make possible the online production of information, and the gathering and cross-checking of a variety of information sources.

The SII’s service orientation, its ambitious information policy and the organizational restructuring, as well as technological factors, played a key role in constructing the trustworthy image of the agency. The system’s efficiency, reliability, simplicity and transparency make filing income tax returns online a smooth and reliable process. The expansion of the ICT infrastructure and the improved clarity regarding the rules of the game (independent judicial adjudication of tax disputes) will contribute to the transition to online value-added tax return filing and, most crucially, to the trustworthiness of the SII. These last developments are intimately connected to the jurisdictional clarity of SII and the institutional modes through which the agency can be held accountable.

The government’s long-term commitment to efficiency and accountability was crucial for the restructuring of the SII and the transition to Internet-based administration of taxes. Also important was the government’s commitment to making the use of computers widespread and raising the level of e-literacy of the population and the e-capacity of economic agents. The culmination of these policies in the Digital Agenda reveals both a consistent concern on the part of the government and other policymakers and a wide consensus across the public/private sector. The establishment of this consensus simultaneously presupposes and enhances trust.

To gather the information required to complete tax returns for taxpayers and establish an

¹⁷ It should be noted that these rules and conventions concerned tacit, experience-based practices and not formal rules and legal precepts, even though the SII interpretation and application of the latter also had to enter the picture.

automatic payments system, the SII must have in place a computer-based information structure with adequate interoperability. It also requires staff with the appropriate skills to support the operation. Both of these affect the image of SII as a trustworthy state agency.

Trustworthiness is also influenced by citizen participation in the processes and the public's impression of the relevance of the institution's functions in their own lives. The contribution that national information policies can make to individual well-being is a function of the opportunities available to people, which reflects distributive justice, equality and civic participation. For the effects of the SII's reforms to reach beyond the middle and lower-middle class to embrace wider segments of the Chilean population a more radical income distribution process would be required. In contemporary society, social trust (as distinct from interpersonal trust) is closely associated with one's own chances for a decent life within society.

Our research has uncovered that the public's attitude toward the SII ranges from indifference to admiration and satisfaction to fear and suspicion. Given that filling out tax returns is an unpleasant task, most people are happy to turn over the task to someone else. Online tax returns that already are partially (or entirely) completed, therefore, provide an important service by making it possible for taxpayers to complete their obligations with a few clicks of the computer mouse. Some people, however, see it as a big institutional black box and hire accountants to complete their tax returns for them. While these attitudes may shift as e-literacy advances, the problem of e-literacy and access to computers by lower-income persons remains, and is much more difficult to address. For the moment it is reasonable to assume that the transition to online tax-return filing and the changes associated with it may not have had a

substantial impact on the relationship of SII to a large portion of Chileans for the simple reason that it is not yet a part of their life.

Aversion to matters dealing with taxation may cut across income and demographic groups, but it is usually significant among the elderly, lower income groups and the less educated. However, higher income groups and those with higher levels of education appear to be accepting the shift to online tax administration. Many are grateful for the way in which e-filing has simplified a rather annoying task. Thus, they see the SII as a modern, forward-looking state agency offering up-to-date services. This group of people has a positive opinion of the agency, they value its contribution and consider it vehicle for the modernization of State.

Nonetheless, challenges remain. There appear to be some microentrepreneurs and small businesspeople who remain suspicious toward the SII. They raise issues of privacy, control and the distribution of power in reference to the agency and consider online tax administration as epitomizing the State's quest for control and increased tax revenues through a potent technology of surveillance. Some even praise the old system because of the personal attention it provided, and decry impersonal Internet interactions. They also point to a number of deficiencies in the ways the SII utilizes the new information and communication technologies. Our anecdotal evidence in this case is supported by the results of the survey undertaken by the Santiago Chamber of Commerce, which showed that more than 30 percent of the companies queried raised similar concerns with respect to electronic invoicing.

The attitudes of these groups may reflect different demographic, economic and educational factors mediated by beliefs and political ideologies. But there are other institutional and

judicial issues that may impact the trustworthiness of an institution like the SII. A major issue in this respect relates to the conflation of administrative and judicial (and normative) jurisdictions. As already indicated, the agency is in charge of tax compliance, auditing and enforcement. It also has jurisdiction over the interpretation of interpreting tax laws and is the first judicial stage in tax disputes. Obviously, an open and trusting relationship between the SII and the populace depends, among other things, on the availability of institutional opportunities for appealing its decisions, as well as the taxpayers' perception of how impartial and effective it is.

ChileCompra

Government procurement has long been considered a problem because of the lack of transparency and the absence of publicly available information about government acquisitions, as well as cases of corruption and inefficiency. As a consequence, there has been little competition in Chilean government acquisitions. Thus, government procurement was identified as a prime target of the Project for the Modernization of the Public Administration (CIMGP). The response was the development of the ChileCompra system under the *Dirección de Compras y Contractación Pública* (DCCP). ChileCompra is an electronic procurement system whose aim is to increase the transparency, accountability and efficiency of procurement procedures by means of an electronic B2B marketplace.

The problems of transparency and efficiency in public procurement have been at the center of the political debate in Chile since the late 1990s. It became a priority in 2002 when cases of corruption in government acquisition came to light. President Lagos committed himself and his government to speeding up the

transformation of the public procurement system. Parliament enacted legislation that made the use of ChileCompra mandatory for all government agencies and all public purchases.¹⁸ In addition, a new strategy for ChileCompra was developed, which resulted in changes in agency's leadership.

The law and the regulation provided the proper groundwork for the nationwide adoption of ChileCompra. Nevertheless, technological and organizational impediments needed to be overcome before the new public procurement procedures could be fully implemented. As a result, the implementation process is still underway and all public agencies (especially municipalities) are not yet using ChileCompra. The DCCP is taking major steps to accelerate the diffusion of the system by undertaking educational programs for public servants as well as providing ad hoc support services. These programs are run internally and in cooperation with other public and private organizations. Indeed, the reforms entailed in the ChileCompra system must be understood within the context of the national project created by the Digital Agenda framework and other projects efforts to close the digital gap in Chile. One of these efforts involves a pilot program run by SERCOTEC (*Servicio de Cooperación Técnica*)¹⁹ in the Araucanía region (region IX) to train microentrepreneurs and small businesspeople in the use of ChileCompra. Although Araucanía is one of the nation's poorest regions, businesspeople there have a relatively higher rate

¹⁸ The few exceptions were clearly spelled out in the legislation.

¹⁹ SERCOTEC is a state institution whose mission is to support initiatives to improve the competitiveness of microenterprises and small businesses and to strengthen the management capacities of businesspeople. See: <http://www.sercotec.cl/index.asp> and <http://www.redsercotec.cl/>.

of participation in ChileCompra than in other regions.²⁰

Government procurement agencies as well as those of large municipalities have already begun using ChileCompra. Smaller municipalities and some local administrative agencies are in the process of adopting it. By the end of 2004 all central public agencies as well as 123 municipalities were using the new procurement system. The remaining municipalities were expected to become full users of the system in 2005, extending ChileCompra to the entire country. ChileCompra expects to have handled supply tenders worth a total of US\$1.5 billion by the end of 2004 compared to US\$945 million in 2003. The site now lists 84,000 suppliers and manages tenders on behalf of 655 entities.

The ChileCompra Platform

ChileCompra is a B2B marketplace organized around a website (www.ChileCompra.cl) that provides two main services: the actual procurement platform and information tools for public procurement offices and their providers. Thus, ChileCompra serves several purposes: it helps to improve transparency and accountability in public procurement and helps to simplify and rationalize the procurement process.

The information tools provide detailed descriptions of the procedures that have to be followed in order to participate in the marketplace, as well as all the regulations regarding public procurement activities and links to support services for both buyers and suppliers. The information portal also details the rationale behind

the project and provides various options to system users.

The user support function is outsourced to the company that actually developed and maintains the platform. Support regarding the new procurement rules and procedure is provided by DCCP.

The Procurement Functions

The procurement functions embedded in the system are the direct result of the new national procurement organization created by the electronic procurement law. The reorganization of the procurement functions is framed around the creation of the DCCP as the central office that organizes, and enacts the electronic procurement reform. The DCCP also serves as the government's central procurement unit. Public procurement activities are then organized around the procurement office of each one of the separate (national, state and local) government agencies and DCCP, the centralized procurement agency.

This is not a duplication of functions but an effort to maximize the opportunities offered by the electronic marketplace and provide new and better services and reduce costs and complexity. The DCCP collects information about suppliers of goods and services and creates electronic catalogues that group specific goods or services in an organized form. The DCCP also carries out the process of selecting suppliers and enters into agreements (*Convenios Marco*) that require them to provide goods and services whose specifications, quality and prices are established in the agreements. In this manner the DCCP acts as a monopolist and procures the best prices and quality for all national, state and local purchasing agencies.

Another function of ChileCompra is to create an open marketplace where procurement

²⁰ It would be interesting to undertake a study of whether this is due to the training provided by the pilot program, particularly since Region IX (Araucania) also has a relatively higher incidence of online tax filing compared to other regions.

officers publish their requests and specifications for goods or services. The procedures governing these requests for bids are clearly described in the law and regulation that established ChileCompra. The procurement officer is the only person authorized to access the system and issue a request for bids for specific products or services. The law even establishes the time allotted before the tender can be closed, which can be from three days for very small tenders to 25 or more days for larger ones. Once the tender is closed, the evaluation process begins immediately. The evaluating committee ranks the offers and assigns the contract to the one that best fits the requirements. This procedure ensures transparency in the procurement activities of the public sector.

All requests for goods and services are publicly accessible via the ChileCompra website. However, to be able to bid on published requests potential suppliers must register in the electronic database managed by the Santiago Chamber of Commerce. Once this simple requirement is fulfilled, companies can log into the system and submit their offers.

If a tender fails to receive any offers, the procurement officer can invite specific companies to make a private offer. An offer of this sort is evaluated following standard evaluation procedures. If no successful offer is forthcoming even after this step, then the procurement officer is allowed to go to outside ChileCompra for the needed goods and services.

If the good or service is listed in the DCCP catalogues, procurement officers may only go outside if a better price, quality or specification is found. This provides incentives for suppliers keep prices and quality competitive. Framework agreements are for between 6 and 24 months, a period of time long enough for prices or products to change. Thus, the regulation makes it possible for the suppliers to change their offers

by proposing improved conditions, prices or products during the period they are listed in the catalogues.

ChileCompra is a multilevel platform where local and centralized functions coexist to improve the transparency, accountability and efficiency of State procurement activities. The local and centralized functions provide market control based mechanisms that are open and visible for the monitoring of the national public procurement.

Some Basic Technological Requirements

For suppliers it is very simple and straightforward to participate in ChileCompra. Once an economic opportunity is identified, the supplier makes an offer that meets the tender's requirements. Technologically, all the supplier needs is an Internet connection. The Chilean government is deeply involved in providing public access to the Internet all over the country. Thus, access to the Internet does not imply actual ownership of computers, but only access to them and to Internet connections, which may be available in telecenters, for example.

From a public administration point of view, technological problems are very similar to those encountered in the private sector; that is, Internet accessibility. All procurements units are properly equipped to access and use the system.

The Development Path

Reform of the public procurement system can be traced to the government of Frei Ruiz-Tagle. In 1998, his administration put forth a policy to reform the system of public sector purchasing and hiring that recognized the key role played public purchases in the administration of the State. At the time, central government purchases totaled

US\$2.6 billion. Taking the entire public sector into consideration, purchases accounted for 12 percent of the GDP (CIMGP, 1998). Studies of Chile's public procurement system had concluded that it worked reasonably well compared to other countries in the region. Nevertheless, evidence of corruption and irregular practices that came to light in October 2002 confirmed information that had been glimpsed in the 1994 report of the Commission on Public Ethics. Thus, transparency and accountability became important goals in the development and implementation of the electronic procurement platform. The political commitment that resulted gave a needed push to the widespread adoption of the electronic procurement platform.

A Brief History of ChileCompra

An electronic procurement system was developed in 1999 as a building block for the modernization of the public administration system in Chile. The first version of ChileCompra was only designed as an information tool to help potential suppliers by providing information of the procurement needs of the public sector, as well as the normative and operational processes that governed public procurement. This information tool was also conceived as a means to improve the transparency of public procurement by making it possible to make the results of public tenders and public purchases public. Lastly, this first version of the application simplified the process of sharing information about public procurement as well as the names and characteristics of existing suppliers.

This first phase of development of ChileCompra covers the years 2000 to 2002. The second phase, started in association with a change in the leadership of the DCCP, redefined the project's objectives proposing a long-term plan of action for the DCCP and the inclusion of

all public procurement phases and actions in the platform. These goals were contained in a strategy that aimed at consolidating the transparency of public procurement, increasing efficiency and reducing costs. At the same time, the development of this platform helps facilitate and promote the access of private companies to the Internet. It helped them develop new skills and opportunities that they could also employ to access a wider international business environment.

ChileCompra is therefore the outcome of an effort to guarantee the proper use and integrity of public resources through significant savings and improved efficiency. Before its introduction, lack of competition among suppliers meant that government organizations were purchasing at prices that were approximately 10 percent higher than prevailing market prices, and with significant delays in their processes. The implementation of the electronic system resulted in a drop in prices as competition increased. In addition, the length of time required for interaction between purchasers and suppliers was reduced. This had an important impact on the introduction of e-business in Chile, which, in turn, spurred competitiveness and encouraged innovation. Moreover, it promoted the access of mid- and small-scale companies to information technology.

A third phase of development entails the implementation of the electronic invoice. The consortium in charge of the development and maintenance of the procurement platform is developing a new version of the platform that will integrate the entire cycle of procurement and invoicing and payment, which will be completed in 2005.

Analysis

The success of ChileCompra in increasing the level of trustworthiness of the Chilean public

procurement system is based on several factors that can be grouped into structural or context factors and those that are project related. An important factor in the success of ChileCompra was the high level of political support and commitment that it received as part of a process of reform and modernization of the State that began in 1998 with the creation of the CIMGP commission, the establishment of the Digital Agenda, and the role that President Lagos envisaged for ICTs within the reform process. From the administrative point of view, the creation of the DCCP and the clarification of the management, control and support roles of public procurement increased the transparency of the public procurement process, including its management and monitoring. The existence of centralized and decentralized public procurement platforms created an infrastructure that met the needs of both national and local buyers and suppliers. This was due to a national plan of public administration reform that centered on the use of ICT tools and the opportunities provided by B2B solutions.

Another factor in the success of ChileCompra lies in the country's long public administration tradition and its emphasis on the gradual process of accumulating experience and skills. In 1986, the Pinochet government enacted the distinction between policy-making ministries and autonomous agencies providing services, thus creating a system akin to those in the United Kingdom and Sweden. This led to a system characterized by centralized, rigid control of resources and decentralized implementation (budget execution, personnel management and procurement), which made it more service oriented. Chile's decentralized implementation, which is uncharacteristic of developing countries, makes the public administration more dependent on the honesty and dedication of civil servants. The Chilean example highlights the

fact that "effective public institutions are not created out of a pure act of political goodwill, but by the accumulation of experience and capabilities over long periods" (Marcel, 1999).

Technologically, the ChileCompra project relies on a proprietary platform that is very open in terms of usability and accessibility. The exchange collects the tenders and offers. To access the system users are only required to log into the ChileCompra website using a username and password. The system is extremely open and does not require the purchase of specific software to gain access and use it. The platform is the current iteration of an existing exchange run by Iconstruye, which has proven to be successful and reliable. There also exists a specific contractual agreement that prevents all the risk for a possible "lock in" of ChileCompra in the technology provided by the Sonda-Iconstruye consortium, providing a functional solution that is recognized as technologically reliable.

The reliability of the technological platform is enforced by the simple structural functionalities embedded in the system. Both the catalogues and the decentralized tender-based system are very clearly organized. This reflects a radical simplification of the traditional process of public procurement for both the public procurement officers and suppliers. Rules and regulation are uniform, making the evaluation, monitoring, and accountability of public procurement more transparent. The functions of the systems also reduce the complexity and cost of public procurement, which is particularly important for the government offices with the smallest budgets. A system that regulates and organizes procurement along given procedures reduces the effort of the central procurement office in regulating, monitoring and controlling the local procurement procedures.

The system presents an interesting case of paradigmatic switch in the procedural and

technological infrastructure that underpins a specific function of the public administration. It does not require backwards compatibilities from a technological points of view because no other procurement systems were used before. It does, however, require a transitory organizational and procedural phase that is necessary to make the new platform unique for all procurement activities. Both the legislation and regulations covering electronic procurement take these needs into account and provide appropriate solutions.

The DCCP provides organizational support to assist the public administration in overcoming procedural and functional problems that can be encountered during the transition from the local, paper-based procurement system to the open technologically-based one. This support consists of help desks as well as training.

Finally, ChileCompra holds the potential for extending the use of this type of technology to small and medium enterprises.

Conclusion

The ChileCompra system is made of three pillars: an electronic transactions platform, clear rules on how to conduct business with the State, and intensive user training. The DCCP has followed an incremental policy that has led to the successful development and implementation of the procurement platform. The success of ChileCompra is closely associated with the broader project of state modernization that Chile is undertaking. A key element that explains the fast and successful development of the project is the political and legal support that it received. The platform is extremely powerful, but its successful use can only be explained by the attitude of public servants toward innovation and changes in organizational procedures. Chilean public servants tend to be “rules followers.” This attitude, associated with the public and political commitment to state modernization are the fundamental elements that underpin the success of the system.

FACTORS THAT HAVE AN IMPACT ON TRUSTWORTHINESS

This chapter identifies the factors that contribute to generating trust in the government service described in the case studies. The basis of our analysis is the model that captures the relationship between ICT and citizens' trust in government services through the notion of trustworthiness, as presented in Part I of this report.

THE ELECTRONIC VOTING SYSTEM IN BRAZIL

Institutional Background Conditions

- Ongoing democratization process, active restoration of democratic institutions in the aftermath of the military government; citizens and political parties are confident about the democratic commitment of the country's institutions. There is no suspicion that *Tribunal Superior Eleitoral* (TSE) has an agenda other than ensuring the fairness of the election process.
- Literacy: the high level of illiteracy in the 1990s was one of the reasons why the system was seen as means to enfranchise the poor.
- Support from different parts of organized society, particularly intermediary organizations such as NGOs and the press.
- Perceived effectiveness of representative democracy to improve the living conditions of the poor: the trust placed on the voting process is impaired by a degree of indifference

to representative democracy among some in low-income groups.

Infrastructural Background Conditions

- ICT industry: the design of the voting machine and the development of all major government IT systems took place in Brazil. The relationship works both ways as the production of the voting machine provided a major boost for the local hardware industry.
- Citizens' positive attitude to ICT: the system benefited from the earlier familiarization with IT in banks (the voting machine resembles a robust ATM).

Organizational Foreground Conditions

- TSE is independent of political influence.
- Intensive back-office computerization of TSE predates the development of the e-voting system (internal computerization in 1983, centralization of the voter registration system by TSE in 1986).
- Commitment to the e-voting system as means for achieving the organization's mission, i.e. fair elections required for the strengthening of parliamentary democracy in the country.
- Technology design drove the redesign of the whole elections process (while this is generally considered to be wrong, in this case reforming the process was streamlined by hardware, software, and security design considerations).

This provided a source of ideas for new organizational possibilities and a tight coupling between the machine's performance of and the actions for using it).

- Legal backing by Parliament provided a powerful mechanism for legitimacy and guaranteed political endorsement; legislation has been passed to reform the election process as a result of the adoption of the e-voting system. Legislation is updated each time system functionality is upgraded.
- Gradual implementation over a several elections reduced risk, and allowed time for improvements and promoting the system's acceptance.
- Continuous adjustment and development: the fact that Brazilian election law changes before every election provides for the possibility for continuous upgrades to rectify.

Technological Foreground Factors

- Collaboration with local IT industry to design and build very robust hardware.
- Both TSE and collaborating vendors have the skills to use open source code.
- Use of encryption techniques.
- Interface design.

Comments

Overall, the voting system enjoys high a level of trust by all categories of stakeholders: the judges that manage the election process, voters, political parties, development NGOs, and the press.

The system is seen as trustworthy because of the following qualities:

- simplicity of voting machine interface: comprising an unambiguous presentation of voting options, confirmation and cancellation

procedures, pictures of candidates and Braille coding on the buttons to ensure universal access by the illiterate and blind;

- security of voting act and counting of votes: there is a long process of carefully designed security measures and tests prior to the elections and the system itself is designed to leave little room for fraud;
- efficiency (fast voting and counting of votes);
- functionality (e.g. report producing mechanisms);
- openness to participation and/or inspection by political parties;
- manageability of election process (judges feel they are in control); and
- paper backup (or rather, lack of it).

The introduction of the voting machines allowed more people to vote. It also eliminated mistakes in voting, reduced corruption (buying the votes of the poor), and provided a means to accurately count the results. There is plenty of evidence for the high level of trust in the voting process. Election results have not been disputed. For example, the votes received by two candidates in a municipality of the state of São Paulo on 31 of October 2004 were very close. Yet, there was no request for a recount, and no doubt was expressed about the validity of the result. Political parties, the press and NGOs are satisfied that the system provides for a totally reliable elections process.

The factors that contributed to the development of this trustworthy system can be traced to: (i) the technology, (ii) the organization responsible for its development and implementation of the election process (TSE) and (iii) the broader socio-technical context in Brazil.

However, efforts are ongoing to make the system one hundred percent trustworthy. Software experts and political analysts have pointed out weaknesses in the technology and the

institutional setting. Specifically, the fact that the system does not produce a paper log of the votes is an inherent risk to the reliability of results. Simply, there is no way to trace a result in the case of dispute. Political analysts have been concerned that because of its institutional nature, the TSE (the guardian of the election process and ‘owner’ of the e-voting system) is unaccountable in its functions of overseeing and implementing the election process. Despite invitations to the political parties to test and approve the system software, it is ultimately in the hands of a powerful Brazilian government authority. The system is trusted to the extent that the TSE is trusted not to abuse its power.

The discrepancy between trustworthiness and trust enjoyed by the service can be explained largely on the basis of the confidence of Brazilian society in their political system today. After the military regimes, the restoration of democracy brought and is sustained by an attitude of general trust in State institutions.

There are, however, other explanations for the system’s success. First, the issue of trust in the e-voting election process could be of minor significance for the majority of Brazilians, namely, those living in poverty. It is the degree to which these groups believe that ICT-mediated mechanisms such as these are trustworthy (fair, helpful, accessible and not working against them) that the possibility of trust in representative democracy might eventually emerge. Second, citizens have little scope and interest in revealing lack of trust. Voting and the use of the e-voting system are compulsory and Brazilian citizens have complied. Therefore, it may be that we only hear the positive voices, while those who have concerns remain silent. Third, some may chose to believe a conspiracy theory that “black-boxing” the voting process and del-

egating control of it to a powerful organization may actually be a sinister plot of the enemies of democracy in the country.

RECEITANET

Institutional Background Conditions

- The system concerns only the more affluent and better-educated part of the population. Citizens below a certain income do not have to file tax returns.
- Positive attitude toward ICT: the system benefited from familiarization with IT in banks.
- A culture of family and community support, no secrecy about earnings: one person often does all the tax returns for his/her extended family.

Infrastructural Background Conditions

- Increasing availability of the Internet in telcenters and Internet cafés.
- Competent ICT industry and government ICT centers form effective partnerships.

Organizational Foreground Conditions

- Forms and tax calculation software can be downloaded through private or public Internet connections.
- On-line information on relevant legislation is available.
- The tax form submission system performs intelligent data checks, permits off-line form filling thus avoiding server connection errors and delays, and provides save and revise functionality.

Technological Foreground Factors

- Commitment of the Ministry of Finance to make tax services more citizen-friendly.
- Government's commitment to providing electronic services that address citizens' rights as well as obligations. Thus, the developers of the tax system are keen to add functionality that is useful to citizens (e.g. provide certificates they need, process refunds quickly) not only the State.
- Highly complex taxation legislation: Highly sophisticated help systems within the tax filing system guide users through the process and are capable of providing information on relevant legislation at multiple levels of detail.
- Sophisticated IT capabilities: SERPRO (the federal IT company that developed the system) has been involved in the development of multiple generations of all major federal IT systems. The company has an intimate knowledge of government processes, acts as a strategic partner in any IT-driven process reform initiative, and as an advisor for IT innovation, such as the development of trusted third party services (digital certificates) and interoperability standards (e-ping) for government IT applications.

Comments

ReceitaNet is the only large-scale e-government application adopted voluntarily. The fact that it has been adopted by 95 percent of users is a clear indication of trust and success. The system makes it easier to complete and submit tax forms (a tedious task because of the complexity of the tax legislation). Another factor that has a significant impact on the system's success is the positive attitude of Brazil's middle class.

The following aspects make the system trustworthy:

- it is considerably less laborious than the completing tax forms manually;
- it offers the option of declaring detailed expenses and moving into more complex tax calculations;
- it provides fast response in getting refunds;
- it poses a low security risk because citizens do not connect on-line to the Finance Ministry's database; and
- it has useful functionality, such as no-debt certificates.

Technologically and organizationally these features are the result of the sophisticated IT capabilities that the government developed over its long history of computerization. The system has high visibility and has been actively promoted by the Ministry of Finance as the system that "tamed the lion" of tax obligations and is also concerned about peoples' rights. ReceitaNet became the benchmark of e-government systems and marked the beginning of a proliferation of similar types of e-government applications.

SIAFI/SIAFEM

Institutional Background Conditions

- Citizens and institutions sensitive to issues of corruption in distributing public money and public works contracts.
- NGOs alert to issues of fairness and distribution of wealth in the country.

Infrastructural Background Conditions

- Availability of data communication infrastructure.

- Competent ICT industry and government ICT centers at the national and state government levels.

Organizational Foreground Conditions

- Decentralized accounting data input by administrative units.
- Driven by a strong financial accountability culture.
- Requirements for increasing details of accounting reports.
- Training: de-skilling/up-skilling (Accountants in the central accounting unit had the necessary skills or were able to acquire them relatively easily.)

Technological Foreground Factors

- Efforts to make the system available to the public and assist citizens to use it, e.g. facilitators in *Poupatempos*.
- Sophisticated IT capabilities (as in the ReceitaNet). SERPRO (the federal IT company that developed the system) has been involved in the development of multiple generations of all major federal IT systems. The company has an intimate knowledge of government processes, acts as a strategic partner in any initiative dealing with IT-driven process reform, and as advisor for IT innovation such as the development of trusted third party services (digital certificates) and interoperability standards (e-ping) for government IT applications.
- Availability of value adding software, such as CIGEM.

Comments

The SIAFI/SIAFEM systems enjoy a high degree of trust both from within the government as well

as from the wider public. Within the government it is seen as providing a fundamental mechanism for good management. The trustworthiness of the system lies in the following qualities:

- common, efficient, effective accounting infrastructure that meets the professional needs of public sector accountants;
- transparency, which enables accountability in budget allocation and public sector spending;
- restriction of autonomy of indirect administration (negative, unnecessary central control); and
- on-line access.

It is interesting that the systems are valued equally at the federal and state government levels (at least in the state of São Paulo) despite different orientations toward new public management reform. The public at large (NGOs, political parties and the press) sees the system as a mechanism for transparency in public spending. This is very important regarding citizens' trust in government generally. Moreover, transparency in monitoring government is particularly important because the issue of income distribution is so fundamental in Brazil and the government interventions to redistribute income are monitored by various stakeholders. In this way, this rather boring, esoteric accounting system may be more significant in terms of citizens' trust in government at large than the two other systems of studied—the e-voting and the ReceitaNet.

ICT-BASED ADMINISTRATION OF TAXES IN CHILE

Institutional Background Conditions

- *Political Support and Commitment:* The government has consistently backed the trans-

formation of SII by providing resources and manpower as well as undertaking legal reforms to introduce the electronic signature and making e-invoice mandatory.

- *National Information Policies:* The information policies that led to the formulation of the Digital Agenda were crucial to the successful online administration of taxes and the provision of new services. In this respect, SII has deliberately become one of the vehicles of ICT diffusion and State modernization.
- *Jurisdictional Clarity:* SII seems to have a clear jurisdictional mandate, but there is still significant space for making the agency more accountable to other institutions, both governmental and nongovernmental, and to citizens.
- *Distributive Justice:* It represents, perhaps, the most challenging link of the entire system that shapes the SII's trustworthiness. To overcome low social involvement and education associated with low-income groups, it is important to carry out effective national strategies of e-literacy and national information policies as contemplated.

Infrastructural Background Conditions

- *Carrying Capacity:* The crosschecking of information from a variety of sources that is necessary in order to prefill the tax returns suggests an infrastructure of adequate quality and impressive interoperability. There are, however, problems with payment of value-added taxes in banks during peak hours.
- *Technology-related Skills:* The diffusion of technological skills and the sustainability of the services that SII provides suggest an adequate level of skills within the agency and the organizations with which it (e.g. banks, employers) has to interact in order to collect the

information necessary to construct the pre-filled tax returns. However, issues surrounding the electronic invoice suggest that there is significant room for improvement.

- *Openness:* To the degree that it is based on the TCP/IP protocol such an infrastructure is significantly open.

Organizational Foreground Conditions

- *Service Orientation:* A pronounced organizational policy for providing all the necessary information and services that facilitate the interaction of taxpayers with SII makes filing tax returns as smooth as possible. The core policy of SII since the restoration of democracy has been to make the process easier for taxpayers.
- *Information Policy:* A long-term information policy to use the opportunities provided by information and communication technology to improve internal administration as well as existing services and providing new ones.
- *Organizational Restructuring:* The capacity and proclivity to restructure the organization to respond to citizens and take advantage of the opportunities associated with contemporary ICT. It has been mainly expressed through the construction of business areas as the crucial organizational units, the development of human resources and software development outsourcing.
- *Organizational Security:* There is a wide organizational concern for safeguarding personal information maintained in the electronic files of the agency.

Technological Foreground Factors

- *Procedural Simplicity:* to a large extent, tax returns are pre-filled by SII and submitting them requires no more than a few transactional

steps. Payment engines are provided, which substantially simplify the process.

- *Transactional Transparency*: It is clear what sort of information is demanded and how it is evaluated.
- *Transactional Efficiency*: Bottleneck problems commonly associated with periodic peaks in tax return filings have been successfully resolved through a modular organizational infrastructure.
- *Technological Security*: Encryption techniques and authentication procedures ensure the secure functioning of the site.

CHILECOMPRA

Institutional Background Conditions

- The government has consistently backed the transformation of the public procurement system by providing the necessary resources, enacting legal reforms and creating the *Dirección de Compras y Contractación Pública*.
- The information policies that led to the formulation of the Digital Agenda were crucial to the successful online administration of public procurement. ChileCompra was one of the vehicles used by the government to broaden the diffusion of ICT in Chile and modernize the State.
- ChileCompra is based on a very clear set of rules and regulations to establish a clear jurisdictional setting that provides a very accountable and transparent procurement mechanism.

Infrastructural Background Conditions

- The technological platform provides a reliable transactional mechanism. The latest

version of the system overcomes all the limitations that had been encountered in its first deployment.

- The technological maintenance and design of ChileCompra has been outsourced to ensure professional services. The centralization of the procurement process has reduced but not completely resolved the technological skills and related problems in local government offices. There are still problems of diffusion of technology-related skills on the part of suppliers that are mitigated by the Digital Agenda policy; however, there is still much room for improvement.
- ChileCompra runs on an open web platform.

Organizational Foreground Conditions

- A pronounced organizational policy for providing all the necessary information and services that facilitate the interaction of suppliers with public procurement offices is making the procurement process smooth and transparent. E-procurement is a core policy for the democratization of the state.
- A long-term information policy is used to take advantage of the opportunities provided by information and communication technologies to improve internal administration and existing procurement services and provide new centralized services.
- The capacity and proclivity to restructure the organization to respond to citizens' needs and take advantage of the opportunities associated with ICTs. This is reflected in the establishment of the *Dirección de Compras y Contractación Pública* as the crucial organizational units and software development outsourcing.

Technological Foreground Factors

- Public procurement is centrally handled on a common platform. Tenders and bids can be

submitted by following only a few predefined steps.

- It is clear what sort of information is demanded and how it is evaluated.
- Log in and password systems ensure the security of the site.

AFTERWORD

Checks and balances are at the core of all democracies. They provide the incentives and safeguards for citizens to control power and authority. They are needed to build an environment for peaceful and constructive coexistence as well as consensus among groups with diverse values. Such systems, operating within and between legislative, executive and judicial branches of government, are essential for harmonizing minority and majority interests as well as constantly formulating, refining and adjusting the terms of the “social contract.”

To the extent that the checks and balances are fair and perceived as such, groups with diverse interests will respect them for resolving their differences.

In this document, the London School of Economics and Political Science has challenged the reader to think about ways to achieve trustworthiness in ICT-mediated government services as part of the process of moving toward building trust between citizens and their public sector representatives. All of their case studies demonstrate the importance of information checks and balances. LSE has helped us understand that as countries around the world expand their knowledge economy to achieve development objectives, information checks and balances become an increasingly important aspect for building this trust.

Trust depends on shared access and believability in relevant public information so that all citizens can effectively carry out their civic responsibilities. Expanding the deployment of advances in information and communication technology

can provoke deeper citizen understanding of the function that knowledge/trust have always played and will continue to play in systems of checks and balances. Rules of access must be established if citizens are to have access to public information. Information checks and balances emerge from the convergence of a combination of legislation, judicial decisions, techniques, technologies, values of freedom of expression and practices.

Consequently, a commitment to strengthening a system of information checks and balances is an essential aspect of moving from trustworthiness in ICT-mediated services to trust between citizens and their public sector representatives. Constant vigilance is needed to achieve the proper balance between maximizing access to public information while protecting individual rights of privacy.

In a perfect democracy, all citizens would have the information they know they need to make the decisions about how to govern themselves. However, such a situation does not exist. Democratic societies are strengthened by the degree of their commitment to improving the mechanisms for matching information supply and demand for all citizens. Development effectiveness in efforts to improve public administration and strengthening democracy depend on this commitment.

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