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Understanding Adoption of e-Government: *Principals, Agents and Institutional Dualism*

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Table of Contents

ABSTRACT	1
INTRODUCTION	2
A. CONCEPTUAL FRAMEWORK.....	3
B. METHOD.....	5
C. CASE OVERVIEW	7
D. ENFORCEMENT	10
D1. ADOPTION OF E-GOVERNMENT	13
E. INSTITUTIONAL DUALISM.....	14
F. CONCLUSIONS.....	17
REFERENCES	19

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Abstract

e-Government innovations are of central importance to the public sector. Yet they face the challenge of adoption: getting the new e-government system implemented and used. This paper builds from principal-agent ideas to understand this process. It proposes a model which sees e-government innovation designers (as principals) might use one-, two-, or three-party enforcement mechanisms in seeking to get adopters (as agents) to comply with their intended role. But it also sees this as taking place within a context of institutional forces that extends basic ideas about principal and agent. The model is supported by its application to the case study of a large-scale financial monitoring e-government system.

This also supports the proposition that enforcement mechanisms act within an institutional context that can best be understood in terms of "institutional dualism". This conceives public innovations as forcing an intersection – quite possibly a conflict – between two different "institutional systems"; that of the designers and that of the adopters. The outcome of this intersection and, hence, the outcome of e-government innovations will be complex, moving well beyond simple principal-agent models, and best seen as a journey rather than a destination. Institutional dualism explains actions that reinforce one or other institutional system. But it also explains opportunities for agency and change that further our understanding of e-government adoption.

Introduction

Innovation – whether developing new policies or new systems or new processes – is seen as fundamental to the modern public sector (Walker 2006). Yet those who design public innovations are distant in various senses from the intended adopters – those who will implement and use them – particularly as innovations increasingly cross organisational boundaries (Maddock and Morgan 1998; Pardo et al. 2006; Fedorowicz et al 2009). Innovators thus face what can be seen as a compliance or enforcement challenge: how to get the distant "others" to adopt (i.e. implement and use) their innovation (de Lancer Julnes and Holzer 2001; Walker 2006). Some apparently choose, at least initially, to ignore the challenge. The literature on public innovations is run through with reflections of a "build it and they will come" mentality that some innovators seem to hold (Stowers 2001; Jupp 2003; Blakemore and Craglia 2006). However, such worldviews often come to be associated with poor adoption rates, and innovators soon find the challenge of enforcing adoption pushed to the top of their priorities.

New e-government systems are no exception. e-Government – the use of information technology in the public sector – forms a major strand of current public innovation; involving hundreds of billions of US dollars invested annually worldwide (Heeks 2006). e-Government seems to epitomise the adoption challenge. There are many reports of built systems having low usage rates (Margetts and Yared 2003; UNDESA 2003; Holden 2006). The reasons given often relate to the gap between designers and adopters; including the worldviews of the e-government innovators (Heeks 2006; Fedorowicz et al 2009). e-Government systems therefore face the enforcement challenge.

But how should this challenge be understood? Unless it can be understood, e-government designers may continue to face problems in getting their systems adopted.

In this paper, we offer a framework for understanding that draws particularly from a new institutionalist perspective on principal-agent ideas. It builds incrementally on past literature on enforcement, innovation and public institutionalism to identify three different ways designers seek to enforce adoption of their innovations. And it places this within a context of institutional dualism that both separates designers and adopters, but also unites them through the innovation.

In the section that follows, a conceptual framework will be developed that provides insights into the process of e-government adoption using the innovation literature. The particular methods used are then presented, followed by an outline of the individual e-government case study – an intra-government system for reporting of expenditure in the Brazilian public sector – through which the conceptual framework ideas are applied. Findings are divided into a discussion about enforcement of adoption, and a discussion about the potential institutional dualism seen between the institutional systems that incorporate designers and adopters of public innovations.

A. Conceptual Framework

As indicated in the Introduction, new e-government systems can be seen as one type of innovation. We therefore turn to the literature on public sector innovation to develop our initial conceptual framework.

Some years back, O'Toole (1997: 119) noted that in relation to the public sector "Scholarship on innovation has rarely emphasized its implementation". This was an important gap given that the actual adoption of public innovations (defined here to cover the operationalisation of innovations including their use) is obviously central to their efficacy. Subsequently, a number of researchers have undertaken work looking at the type of factors that may have an effect on the implementation of public innovations. This research has identified a series of contextual factors – either environmental (e.g. competitive forces, external pressure groups) or organisational (e.g. size, structure, resourcing, leadership, culture) – that may play a role (see, for example, Lonti and Verma 2003; Frederickson et al 2004; Sapat 2004; Holden 2006; Walker 2006; Pärna and Tunzelmann 2007; van Duivenboden and Thaens 2008).

In this paper, though, we wish to take a somewhat different perspective on adoption of public sector innovations – one that understands adoption as based on the behaviour of individual actors set within a contextual framework. This could be taken in the direction of investigating the individual characteristics of those actors (e.g. Damanpour and Schneider 2009). However, our starting point is the recognition that innovations such as e-government involve two groups of actors with potentially differing interests (UNDESA 2003; Heeks 2005). On the one hand, are those who have designed the innovation, and are seeking to promote its adoption. For a policy innovation, these might be a group of legislators; for an administrative innovation such as e-government, these might be a group of managerial or technical staff. On the other hand, are those who adopt the innovation by putting it into practice. These might be bureaucrats at a different level of government, might be staff in civil society partner organisations, or might be citizen-consumers. In the case of policy or process innovations, they would likely be seen as "implementers". In the case of product or service innovations like e-government, they would likely be seen as "users".

Seen in this light, an understanding of adoption of public innovations could draw on the literature on compliance or enforcement – the way in which one group seeks to get another group to comply with its interests, or to enforce its directives. Indeed, although not typically labelled as such, this literature does tend to deal with innovations; though not with innovations like e-government. Instead, it typically discusses the adoption of new policies and looks either at the way legislators seek to enforce adoption among bureaucrats (e.g. Waterman and Meier 1998; Selden et al 1999) or at the way in which central government actors seek to enforce adoption among actors at lower levels of government (Weissert 2001; May and Winter 2009).

One main model used has been that of principal and agent, in which the latter acts on behalf of the former. As just noted the typical identities for policy innovation are politicians-as-principals seeking to have their policies implemented by bureaucrats-as-agents. At root, principal-agent ideas draw from economic rational actor theory, and assume each of the two groups will decide on actions likely to maximise its own utility. In other words, both politicians and bureaucrats act in their own self-interest;

often assumed to be vote-maximisation for politicians and budget-maximisation for bureaucrats (Waterman and Meier 1998).

In our discussion, because of our interest in e-government, we wish to avoid a focus on specific groups – such as politicians and bureaucrats – and wish, instead, to discuss roles in more generic terms as being that of "designer" and "adopter". However, we can use this example to illustrate the potential divergence of interest between these two role groups; a divergence that can lead to an enforcement challenge. The agents may not implement the innovation or may not implement it in the way the principals intend. The principals may therefore need to devise mechanisms to enforce their innovation on the agents to make the latter comply with their wishes.

Drawing from previous literature (North 1990; Waterman and Meier 1998; May 2005; Kim et al 2009), we have identified three different types of enforcement mechanism:

- One-party enforcement: this involves only the agent directly. It is driven by the values and preferences of the agent, and it is self-enforcing because the implementation behaviour required by the principal is produced by those values and preferences.
- Two-party enforcement: this involves an interaction between principal and agent in which the motivations of the agent are shaped by voluntary sanctions (informal or formal rewards or penalties) enacted by the principal.
- Three-party enforcement: this involves the existence of a third party that supervises the interaction of principal and agent, and which typically imposes sanctions on the agent for non-compliant behaviour.

This categorisation would be useful in investigating the relationship between designers (as principals) and adopters (as agents) of e-government innovations. Before doing this, however, we wish to somewhat expand our perspective on principal-agent relations. Principal-agent models drawn simply from rational actor theory have been criticised because they assume a freedom of agency that is not found in practice (March and Olsen 1984; Lane 2000). Enforcement literature (e.g. Hooton 1995; Worsham et al 1997, public innovation literature (e.g. de Lancer Julnes and Holzer 2001; Lonti and Verma 2003) and e-government literature (e.g. Kim et al 2009; Williams et al 2009) utilises new institutionalism to address this criticism by bringing in structure – i.e. the institutional context – which contains human behaviour. Some of this literature recognises an interplay between structure and agency; seeing that institutions shape but are also shaped by behaviour.

In seeking to understand the implementation of e-government, we therefore utilise a new institutional model of enforcement. This categorises enforcement in one-, two-, and three-party terms but sees those mechanisms through an institutionalist lens by seeking out both formal and informal rules that enable and constrain human decisions and actions.

Building on the idea of the division between designer/principal and adopter/agent, we may go further than this to investigate the notion of institutional dualism. Used explicitly, this has so far found relatively limited use in the literature but one can see implicit origins in the idea that change in organisations comes from some mismatch of institutional forces. This has been variously referred to as "sets of values ... in competition" (Greenwood and Hinings 1988:301), "institutional contradiction"

(DiMaggio and Powell 1991:29), or institutional "cross-purposes" (Worsham et al 1997:436).

A few writers have built on this to posit the idea of understanding organisational change by conceiving of two sets of institutional forces in conflict. Friedland and Alford (1991) paint these in broad societal terms – democracy vs. bureaucracy, or kinship vs. state. Greenwood and Hinings (1988) look within organisations to see the potential conflict between two "design archetypes". Others have looked specifically at innovation in the public sector, and at the conflicts and compromises emergent from the interaction between the existing institutional arrangements in the public sector, and a new set of institutional forces that are introduced with the innovation (e.g. Westney 1987; Edelenbos 2005).

A very few authors have named this – "institutional dualism" (Amonoo 1981, Brinkerhoff and Goldsmith 2005) – meaning the existence of two different institutional systems that are seen to come into contact because of attempted innovation in the public sector. This presents one final concept; that of "institutional system". Similar ideas are expressed in the notions of institutional "configurations" (Miller and Friesen 1984), "archetypes" (Greenwood and Hinings 1988) or "networks" (DiMaggio and Powell 1991). Drawing from the first two sources, we can define these as a set of interdependent and mutually supportive institutional elements – norms, beliefs, values and structural arrangements – such that the importance of each element can best be understood by making reference to the whole. We prefer the term "institutional system" to describe this because the idea of elements being part of a greater whole is a foundation to systems thinking.

B. Method

To investigate and expose these issues, we selected the case of an e-government innovation introduced into the Brazilian public sector: an inter-organisational e-government system that links three levels of government and that is used to try to improve transparency of health budgets and expenditure in local government. We believe this to be an apposite choice for two main reasons. First, it epitomises the type of boundary-crossing innovation noted as being on the increase with a significant organisational "distance" between designers and adopters. Second, it has faced a series of adoption challenges, yet has managed to be relatively long-lasting. (Its longevity was also the basis for more methodological reasons behind selection of this case: it could provide insights into adoption strategies and outcomes over time, yet almost all of those involved in the innovation's history were still readily contactable.)

We adopted a case study methodology which "examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)." (Benbasat et al 1987:370). The case study approach consists of gathering enough information about a particular object of enquiry – in this case adoption of a specific e-government system – to permit the researcher to understand the system, processes and context involved and the dynamics present (Eisenhardt 1989; Hartley 1994).

"Case research is particularly appropriate for certain types of problem", of which adoption of e-government was seen to be one: "sticky, practice-based problems where the experiences of the actors are important and the context of action is critical" (Bonoma 1983 cited in Benbasat et al 1987:369). Case research is also seen as particularly appropriate for addressing the type of questions posed here: issues of "how" and "why" that seek to move beyond factor-based models of innovation implementation in a complex situation requiring a holistic and in-depth investigation (Paré and Elam 1997; see also Moynihan 2005).

A case study was also appropriate because of its ability to encompass multiple research methods, seen as necessary given a need to combine quantitative techniques that could generalise across multiple e-government implementation sites with more in-depth qualitative work that could provide insights into the causal mechanisms at play; this combination enabling endogenous explanations of the processes under investigation (Cavaye 1996; Rondeaux 2006).

A single in-depth "instrumental" case study approach was adopted rather than an "intrinsic" study because the specific case was of secondary concern compared to the aim of gaining insight into the particular issue: enforcement and non-enforcement of adoption of e-government (Stake 1995; Berg 2001). There are constraints to generalisation imposed by single case research but applicability to other cases is provided by the conceptual foundations of the case, which "inform and enrich the data and provide not only a sense of the uniqueness of the case but also what is of more general relevance and interest" (Hartley 1994:210).

We also had confidence in the relevance and strength of case research given its past application to public sector innovation adoption issues generally (Hooton 1995; Rondeaux 2006) including e-government adoption (Nedovic-Budic and Godschalk 1996; Holden 2006; Fedorowicz et al 2009), and to work more specifically using an institutional perspective (including items cited above such as Amonoo 1981; Westney 1987; Edelenbos 2005).

A prime focus for validity was the use of triangulation: the gathering of data from multiple sources via multiple methods, which is recommended in case study work (Dubé and Paré 2003; Flick 2009). It is seen to reduce the imperfections that arise through the subjectivity of perception, although not eliminate them (Olsen 2004). Triangulation can also help compensate for limitations in any particular method.

Triangulation drew on the following combination of case-focused methods undertaken during fieldwork in 2004 and 2005, with core interview and survey work running from February to July 2004:

- Semi-structured interviews with key case study stakeholders. Those interviewed were: the three main national officials involved with e-government application emergence and development; the four key national officials in charge of managing roll-out of the application; ten agents at state and local level in three different states involved with application adoption; and three members of the technical team responsible for programming the application. In addition, five staff involved with two other potential national transparency systems were interviewed. In line with an iterative approach some of the actors were interviewed more than once, and there were ongoing conversations with a few key contacts. Interviews

averaged two hours each and relied largely on open questions guided by an emergent conceptual map of the research domain.

- A survey of staff at state and municipal level who were involved with implementation of the e-government application. Questionnaires were distributed to 81 registered staff, of whom 70 (86%) returned them.
- Focus group sessions undertaken with all members of the state-level support units in each of two states involving two-hour discussions of emergent research themes.
- Episodes of participant observation which arose towards the end of the research period as author Santos was asked to participate in the work of the central team, including negotiations with other public agencies.
- Document analysis of archives, government documents, and state-level support unit files.

Given the subjectivity of data interpretation, we ensured that material from field data-gathering was organised, labelled and stored to allow for independent scrutiny.

Data analysis drew on the template-based approach, which supports the emergence of categories and underlying structures from field data, and which is explicitly iterative in its design (King 1994). An iterative approach is seen as particularly appropriate to case study research (Eisenhardt 1989) and we saw this as part of our broader methodology that "is neither purely deductive, nor purely inductive. It operates rather simultaneously in a deductive-inductive dialectic. ... an iterative process of abstracting theories based on an immanent critique and the grounding of abstractions in concrete data" (Yeung 1997:63). The linear structure of presentation in this paper, then, rather belies the true and time-consuming iterative nature of the research process. The overall appearance may be of a single journey of deduction from literature through data gathering to analysis and conclusions. The actual route taken, though, has been a continuous retroductive process; a cycle of elements that included: data gathering in the Brazilian public sector, emergent categorisation of phenomena, attempted abstraction of underlying mechanisms, further reading around categories and mechanisms (gradually focusing in more depth, for example on institutional concepts such as principal-agent or models of enforcement), and testing or retesting of hypothesised concepts through further data gathering (Ragin 1994; Mingers 2002).

C. Case Overview

Our focal innovation is a new e-government application – SIOPS (*Sistema de Informações sobre Orçamentos Públicos em Saúde* (Information System on Public Health Budgets)). SIOPS consists of three software modules: a Web-based data collection module, a data store, and a Web site that disseminates the analyzed data. Brazil has a three-tier government system: central, state, and municipality/local. SIOPS aims to provide data since 1998 for all of Brazil's 27 states and 5,559 municipalities on total public revenue, health expenditure, and water/sanitation expenditure. The data that is available can be viewed by health function, type of expenditure, and actual vs. budget. Various overall and comparative indicators are automatically calculated and displayed, but customised query is also possible.

From an institutional perspective, an understanding of this public sector innovation requires an explanation of system history. This can be read at two levels: one more distant and deeper, one more proximate.

The deeper story must begin with the historical nature of Brazilian public sector institutions which are seen to originate in Brazil's colonial history and to have been reproduced particularly during the dictatorships and military regimes that ruled during much of the 20th century. These are marked by a set of five inter-locking characteristics (Lobo 1995; Silva 1995; Davies 1999; Menezes 2001):

- Centralisation: resources and decision-making power were concentrated at the heart of federal government, with implementation in practice the responsibility of federal agencies.
- Exclusion: not only were the other two tiers of government – state- and municipal-level entities – largely excluded from the decision-making process, but so too were organisations of civil society.
- Fragmentation: theoretical responsibilities for any given area (such as health) were fragmented both vertically (between different ministries) and horizontally (between federal, state and local levels, despite the exclusion and denial of resources to the latter in practice).
- Unaccountability: there was a widespread lack of accountability. This reinforced the exclusion of other groups since they lacked even the basic information necessary to begin any process of engagement with, let alone control of central government.
- Politicisation: assisted by the lack of controls, central government decisions were shaped more by personal political ambitions and interests than by technical, rational criteria.

One of many results was poor public service delivery with problems of undersupply, access barriers, and low service quality (Medici 1995; Costa 2001).

Financial and political pressures ultimately put paid to the military regimes that had grown out of, and strengthened, this institutional system. Organisations of opposition and conflict – including a "sanitarist" movement of health workers and activists – came to form the basis of government and, in 1988, a new constitution for Brazil was delivered. It was intended to enshrine the virtual mirror image of the inherited institutional context, being based on principles of decentralisation, public participation, integrated services, audit, and impartial decision-making (Albuquerque and Knoop 1995; Souza 1996; Draibe 1998). In health, for example, a new Unified Health System was created based around a strong and quasi-autonomous role for all municipalities, the creation of local participatory health councils, and universal access to services.

The function of central government was rolled back to one based more on monitoring and control. With this in mind, a much stronger Public Ministry was created – independent of legislature, executive or judiciary – with rights to request information on and investigate any issue in the public interest. More sector-specific institutional changes were also felt with upgrading of the country's National Health Council. It was given a more strategic role in health policy planning and implementation, and a much broader membership drawn from bodies representing government, health professionals, labour unions, patients' associations, and research institutions.

Against this background, SIOPS' more proximate origins lay in Brazil's health funding crisis in the early 1990s when federal money allocated to health was diverted into pensions. This had direct and negative health impacts, particularly in poorer regions where state- and local-level funding was unavailable to compensate for the federal funding shortfall (Costa 2002). In turn, this led to political impacts as questions about health expenditure began to be asked by politicians and representatives of civil society; questions that government was unable to answer due to its lack of information (Genoino 1995). Members of the National Health Council lodged a complaint with the Public Ministry about this problem.

As a result, a small advisory committee was created in 1993 under the control of Brazil's Public Ministry, though drawing on members from the National Health Council and staff of the Ministry of Health. This group began building a prototype e-government system, requesting initially one or two, and then gradually a few more, municipalities to send in data on budgets and health expenditure. As the committee chair stated:

"We were not quite sure whether the system would be 'for real' or just an academic exercise."

However, it began to prove useful, for example in identifying continuing diversion of funds that had supposedly been ring-fenced for health. In 1998, it was transferred from the Public Ministry to the Ministry of Health and acquired the status of an official, "for real" project.

At this stage there were four main actors involved in development and operation of this e-government innovation:

- The SIOPS central management team, drawn partly from the original advisory committee, which has varied between seven and ten members based in the Ministry of Health in Brasilia. They coordinate the overall project and make strategic design decisions related to the system. They also seek to promote data entry compliance by local government, and help analyze the financial information provided by the system.
- The SIOPS central information technology team which has varied between three and five people based in the Ministry of Health's Rio office. They undertake any technical design and maintenance work required to support the system. Together with central management, they constitute the "SIOPS team" that has borne responsibility for design and promotion of this e-government application, and which can be seen to take the main role as principals for this system.
- The SIOPS technical chamber consists of 18 representatives drawn from agencies of the Ministry of Health, from other federal, state and local health organisations, from the Ministry of Citizen Rights plus representatives from the Treasury and other accounting bodies. They have a strategic advisory role and support the principals..
- Municipal governments are responsible for entering data into SIOPS. We can characterise staff working for municipalities as the main (potential) adopters of the system given their huge preponderance in numerical terms and their fundamental (intended) role in providing the data that is the basis for this information system. They therefore play the role of agents. As will be seen, they are users in the sense of data sources and data entrants whose compliance is a prerequisite for system

implementation more than they are users in the sense of information recipients who make use of system outputs.

Given the connection of staff in the municipalities with data input, a key indicator of this e-government application's viability comes from the proportion of implementers complying with the requirement to input their data to the system. Initially, there were severe problems with this, with only a small minority of municipalities engaging with SIOPS. As detailed next, this led to a set of ongoing adaptational actions which sought to increase compliance rates and to ensure this new innovation was adopted across government.

One of these actions was the addition of a fifth set of actors – state-level support units – in 2001, three years after the project went live. The 27 units were the outcome of an informal agreement between state governments and the Ministry of Health, and consisted of staff seconded part-time to help SIOPS. Each unit typically had four staff on paper although not all of those were active in the units' intended role of encouraging and supporting data entry by the municipalities and, in some cases, conducting state-level analysis of data for entry into the national system.

D. Enforcement

From the details of the case overview, we can see the outline of a principal-agent story related to a public sector innovation. On the one side we have the principal-designers of the innovation who sought to enforce its adoption – the "SIOPS team" based in two offices of the Ministry of Health. On the other side we have staff in thousands of local government units intended to act as agent-adopters of the innovation on behalf of the principal-designers. What, then, happened in practice?

At first, our interviews showed the principals perceived the challenges of getting the e-government system adopted as related not to enforcement and motivation, but to capacity. Local municipalities in Brazil were short of Internet connections, and short of technical, informational and financial skills. Survey evidence indicated that basic financial data was also either absent, or spread across several agencies, or treated as an asset to be kept by the most powerful actors in municipal public administration; the Mayor's or Finance Offices. These technological, skill and data capacity problems were, in turn, a reflection of Brazil's historical institutional norms: a centralisation and exclusion that provided little for investment in local government with unaccountability further undermining investment in information systems; and a fragmentation and politicisation reflected in those relatively few municipalities that did have relevant data (Petrei 1998).

In an attempt to address these capacity challenges, some compensating workarounds were introduced:

- Our survey indicated about half of all municipalities outsourced responsibilities for SIOPS data compilation and entry to skilled local accountants who had computerised operations and who were already providing accounting services for the municipality.

- As noted above, a set of state support units (SSUs) was created in 2001. They helped undertake data entry and pre-entry data processing tasks on behalf of the municipalities. Some SSUs also stated they had launched training programmes to try to build up relevant skills in local government staff.

In addition, the overall e-government system was redesigned to adapt to on-the-ground realities in local government. Coding schemes were rewritten to match those used in municipality annual balance sheets. Guidance material was rewritten to better fit the terminology of municipality staff. And the designers explained that the overall ambition of the innovation was scaled back from one that required quarterly reports and which sought data back-dated for the whole of the 1990s to a design that sought only annual reporting and data from 1998 onwards.

However, these capacity-related actions did not prove enough to produce widespread adoption of the new system. We therefore turn to investigate the adoption of this innovation using the notions of one-, two-, and three-party enforcement. This is very much what the SIOPS team itself did (albeit they never conceived their actions in terms of this exact model). From 2003 onwards – as part of what its senior manager described as his "double-C" (*confinando, convencendo*) strategy – the team moved from a focus on just the "constraining" factors of capacity to attend more to "convincing" factors related to enforcement. We will consider each one of the enforcement options in turn.

One-party enforcement requires that the institutional values of the principals (in this case values such as transparency, audit, rational decision-making and social participation in public affairs) are shared by local agents. Our survey and focus group data suggests the values of the local agents often did not match those of the principals (i.e. those it was intended that the new e-government application should reflect). Examples are seen in the relative lack of engagement with SIOPS by municipality officials; low levels of compliance; and the resistance to changing working practices to conform to SIOPS' requirements (leading to redesign of SIOPS to conform more closely to actual practice in municipalities). These values were also transmitted to those accountants working for local government, as one SSU manager complained:

"The local authorities do not tell the private accountants about the importance of SIOPS ... [so] it is not a priority for them [the accountants]."

A further example is seen in the treatment of participatory councils, intended to work alongside SIOPS by supporting accountability and citizen control of local government in areas such as health. Interview and other data (Oliveira 1997; Davies 1999) revealed that these were typically staffed by mayoral appointees "to legitimise the government, instead of exerting public control upon it" (Davies 1999:30) and/or were starved of resources and administrative support by local officials. There thus appeared to be a mismatch of institutional values between principals and most agents.

Three-party enforcement was present and should, in theory, have had an important coercive influence on the behaviour of local officials. In 1998, the Public Ministry disseminated a requirement that local authorities fill in the SIOPS table, backed by the potential for prosecution of those who did not comply. However, we know from institutional theory that the capacity of such formal rules to align the behaviour of principal and agents in a relationship does not stem from the formal content of the

rule itself (North 1990; Lane 2000). It stems from the interpretation actors have of the rule, and the credibility of those in charge of enacting it. Interview data suggested that the credibility of the Public Ministry was undermined by a stronger institutional legacy which meant that the judiciary – the actual third party that would enforce compliance with innovation adoption – was discredited, leading formal rules involving judicial enforcement to be disbelieved and disregarded. One SSU manager at the time remarked:

"In my opinion, the major difficulty lies in having many threats, but little punishing actions. Nowadays, when we threaten municipal managers, they do not believe it anymore. The worst is that they do not feed the system and nothing happens."

It was the initial intention that judicial sanction would run alongside additional third-party enforcement through social control: the use of the local participatory councils which would require and use the data to hold local government accountable. This was abandoned, though, for two reasons. First, SIOPS did not produce data in a way that was compatible with participatory council requirements. More decisively, the whole credibility and power of these councils was undermined by the problems of political capture or resource starvation noted above.

Given the limited ability of the e-government principals (the SIOPS team) to alter the historical institutional values undermining one- and third-party enforcement, their compensating tactic (though not understood by them in these institutionalist terms) was to turn instead to two-party mechanisms. These sought to manipulate the local agents' perceptions of costs and benefits of compliance with the new e-government application. As regards costs, most of the redesign actions taken during 2001-2003, as well as compensating for capacity deficits, also aimed to reduce local costs of implementing the innovation. Examples include matching application requirements more closely to existing local data realities, transferring responsibilities from local to state level, and scaling-back the ambitions of the overall project.

From 2004, there was a greater effort by both central and state-level SIOPS actors to actively promote benefits to local officials. Field data suggested that promotion of SIOPS as a tool for more rational management of existing health resources had been a relatively ineffective "sales pitch". In line with the interpretation of values given above, interview and survey data reported many local officials feeling their existing intuitive and politically-oriented management style had served them well. A subset ran the risk that the more transparent and rational decision-making favoured by the SIOPS team would expose their negligence or corruption.

Instead, promotion of benefits came from the SIOPS team identifying a role that the e-government application could play in *new* initiatives such as:

- Financial transfers from state/federal governments; since data from SIOPS could strengthen the local government's negotiating position.
- Inter-municipality consortia; with SIOPS data again supporting foundations for negotiation.
- Proposed autonomous management of health resources; for which proper use of SIOPS would be a fundamental.

Not all of these were available to all municipalities, and not all municipalities were motivated by them. Some, for instance, based on its position within their system of institutional values, saw autonomy more as threat than opportunity. Nonetheless, in a patchy manner these emergent actions affected the perceptions and thence the behaviour of some local stakeholders and helped increase the number of municipalities complying with system implementation. The SSU manager in Maranhao state, for example, reported:

"In my state, now the municipalities are showing signs of changing their orientation [towards health resource management] and signing agreements with the Ministry [of Health]. So, they are rushing to feed SIOPS and update the fiscal years 2000, 2001, 2002 and 2003."

D1. Adoption of e-Government

What, then, was the impact of the enforcement actions listed above on adoption of this innovation? Case studies of change in the public sector often appear to categorise those changes into the simple pigeon-holes of "success" or "failure". A more longitudinal perspective, though, suggests e-government innovation is better thought of as a journey rather than a destination (Heeks and Stanforth 2007). We might therefore use the language of "unresolved change" to describe the mixed picture of evidence (Greenwood and Hinings 1988).

Reviewing this innovation from the end of our data-gathering – in 2005 – we can say that, some 12 years after first conception and seven years after becoming a "real project", SIOPS was still operating. It had a set of associated and supportive organisational structures and, as from 2004, it had a small line in the federal budget for the first time. Compliance did seem to be improving: to take one comparative example, by early 2005 roughly 80% of municipalities had filled in data for the years 1998-2003, up from 40% at the start of 2004. As a result, the system had been used in various ways: by Brazil's National Congress to support planning of health legislation; on some donor-funded health policy projects; by a few state Courts of Accounts to select municipalities for in-depth audit; and by a couple of states and their municipalities to support negotiation on health fund transfers (see also Nunes 2004).

On the other hand, the SIOPS team perceived an institutional fragility about their innovation; a picture of a young sapling that one strong wind could still blow down.. By mid-2005, less than half of the municipalities in eleven of Brazil's 27 states had provided the data required in 2004; a picture repeated in five states for the 2003 data, suggesting SIOPS procedures had not been universally routinised. The central SIOPS team also rated nearly 60% of state support units as relatively or very inactive, which was hardly the basis for an embedding of process, structure or associated values.

Usage of outputs was largely from organisations external to the system, particularly central government organisations or foreign donors and their local agents who adhered to the kind of institutional norms and values shared by the SIOPS designers. Even here, usage had been instrumental and passing; associated with individual, short-term projects rather than embedded and routinised into their core structures and

processes. Cessation of use would not be met by internal sanctions in these organisations.

The values, norms, even behaviours of many local-level actors seemed resistant to change, at least in relation to pre-existing activities, and such acceptance of the e-government system as there had been seemed motivated by transient and informal benefits rather than by any truly institutionalised system of stable, rule-like rewards or penalties. Even in those states, then, that boasted 100% compliance there was an image we described as "hollow isomorphism". Some municipalities – often through the agency of an outside accountant – may have gone through the motions of compliance, but this surface appearance did not reflect any deeper development of congruent institutions and values.

The SIOPS team recognised this and sought the introduction of some "killer institution" that would provide strong, stable, rule-like enforcement. With this aim, a major focus of their activity in 2004 and 2005 was to try to get the e-government application adopted by the National Congress as the official means of monitoring EC29, a constitutional amendment requiring all municipalities to spend at least 15% of revenue on health-related items. This would change SIOPS from an innovation relying on voluntary enrolment of partners and lying at the periphery of public administration, to one based on credible third-party enforcement at the very heart of public health policies.

E. Institutional Dualism

We can characterise the adoption of this e-government system by the end of the data-gathering period as only partly successful, and with an uncertain future. Why should that be? How can we better understand the difficulties faced?

To answer these questions, we will pull back to look at the broader picture of the institutional context within which this public sector innovation has taken place. Some applications of institutionalism conceive a single external context from which often homogenised institutional forces are drawn (e.g. Granovetter 1985; Goodin 1996). Here, the emergent conceptualisation from our fieldwork – reflecting the dyadic views of our respondents, and supported by the institutional dualism ideas discussed earlier – is an alternative picture: of two different institutional contexts or institutional systems coming together.

From this perspective, we can view this public innovation case study as an intersection of two contrasting – even conflicting – institutional systems (see Figure 1). By institutional system, as noted above, we mean a complex of institutional elements such as norms, beliefs, values, structural arrangements and actions which, alone, would have a tendency to institutional self-reproduction.

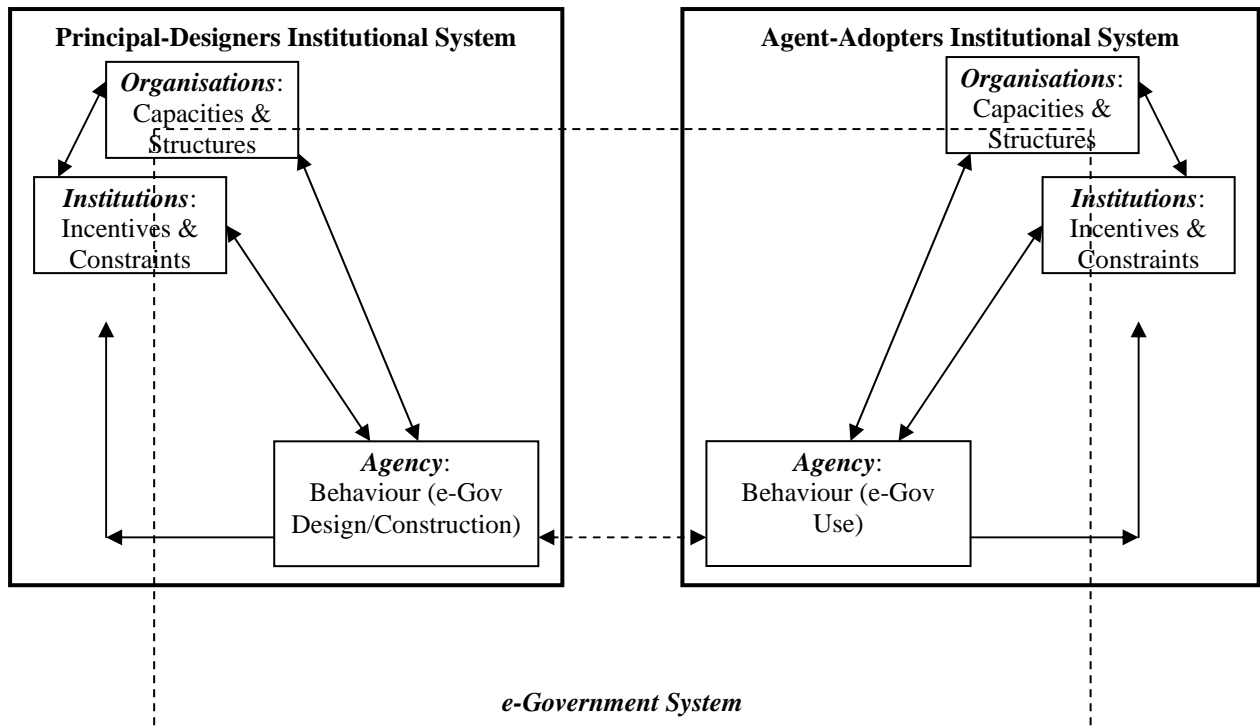


Figure 1: e-Government System as Intersection of Designer and Adopter Institutional Systems

On the one hand, we have the institutional system of the e-government design team which, in this case, was infused with rules, norms, values, etc drawn from the movement around the 1988 constitution and based on rationality, transparency and inclusion. On the other, we have the institutional system of the potential adopters in local government, infused with rules, norms and values of historical tradition such as politicisation, unaccountability and centralisation. These two institutional systems then intersect around the implementation of the e-government system to create the potential for systemic, contextual discord.

What are the consequences of viewing a public innovation like this e-government application in terms of intersecting but discordant institutional systems? To help answer this, we can extend earlier ideas (Westney 1987; Edelenbos 2005) on the outcomes – what Greenwood and Hinings (1988:303) call the "organizational tracks" – seen when a new and an existing institutional system come into contact. From this base, as summarised in Figure 2, we can understand SIOPS-related actions as a continuum of activity from that which tended mainly to reinforce the traditional system (such as political capture or neutering of the participatory councils) through those which were a true mixture (such as the actions taken on two-party enforcement and some of the redesign) to those which mainly reinforced the new institutional system (such as the attempt to have SIOPS recognised as the official data source for the EC29 constitutional amendment).

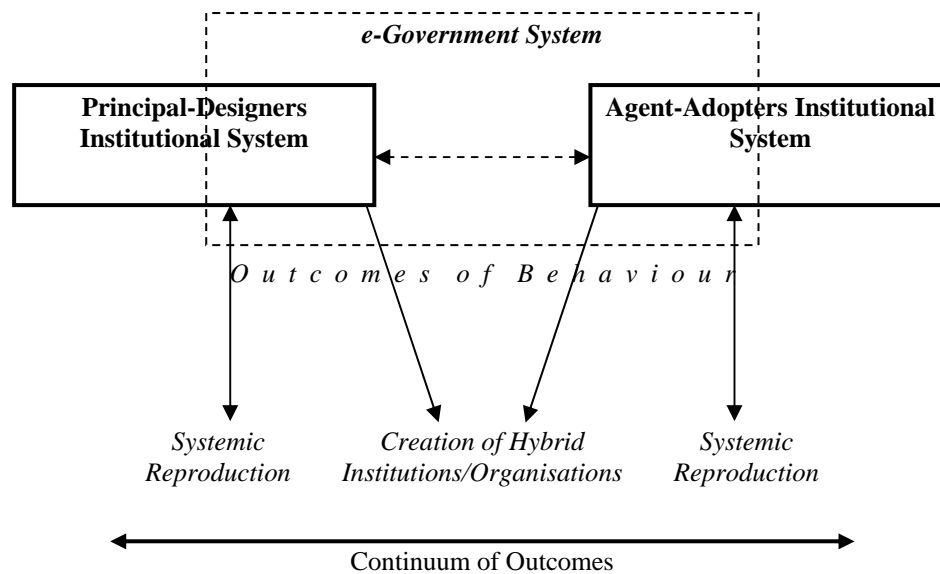


Figure 2: Outcomes of Institutional Dualism - An e-Government System Example

Seen in this way, one can have a further insight into the problems of ensuring adoption of e-government innovations at the local level. This will only be achieved through one of the following: domination of the designers' institutional system over the adopters', or the creation of a stable hybrid. Yet this e-government application – intended to be an emanation of a new institutional order – never directly challenged the traditional institutional system "head on" in an attempt at domination and forced institutional congruence and compliance. Compliance – the adoption of one's intended role within an innovation – can thus be seen as the attempt by the principals within one institutional system (in this case the e-government designers) to enforce behaviour characteristic of that system on agents/adopters who draw mainly from another system.

Yet, in practice, the tactics described above can be read as some kind of back-peddalling on the initial intentions rooted in the new institutional system. The SIOPS team perceived that compromise in order to maintain system operation and "guerrilla activity" to chip away at old institutions was preferable to a "frontal assault" seeking to subdue and replace the old institutional order once-and-for-all. In truth, this is an assault that would almost certainly have failed given the experiences such as one- and third-party enforcement; emanations of the new institutional order that were undermined by the old one.

Taking the compromise route could ensure long-term sustainability if it created stable hybrid institutions. But this does not yet seem to have been significantly achieved. Changing analogies, the hybrid actions to date mainly resemble the mixing of oil and water, requiring constant effort but still leaving the institutional influences liable to separate out. The state support units are a case in point. They could, in theory, be a hybrid organisation that forms the basis for an emergent hybrid institutional system that becomes self-reinforcing. In practice, though, the units remain informal and temporary, and have tended to divide into two camps. One sub-set has tapped into the energetic agency of individuals who share the institutional profile of the central team,

and who have driven compliance rates up to 100% of municipalities in their state. Another set, marked by a lack of commitment from traditionalist state governments, has been largely inactive and represents the majority of such units.

Nonetheless, this is not a completely inertial and conservative picture. One concern arising from institutional insights into public sector change has been that innovations merely provide a new path on the same-old landscape; a path on which the same-old institutional values and processes are played out, undermining the possibility of underlying change (Grindle 2000). Here, we see that innovations – such as e-government applications – provide a new landscape on which tensions between different institutional values and processes are played out, providing at least a possibility for change. e-Government systems may do this particularly because they seek to force a connection between distant contexts – that of designer and adopter – that might be quite different institutionally.

At the centre, then, the SIOPS team showed a continuing commitment to its original aims and values but showed that it can at least understand, take account of and compromise with other value systems. At state level, there is a fluidity of roles and activity that reflects anything but equilibrium. For example, a few SSU staff have emerged as designer-adopters; both making suggestions about redesign but also helping enter and use SIOPS data. And at local level, some – admittedly a minority – of officials have changed their behaviours in a way that is consistent with new institutional values. Thus, to use Jepperson's (1991) terminology, while there have been several examples of "enactions" that reflect and reinforce a particular institutional system, there are also a few examples of "actions" that represent agency, change and some freedom from institutional determinism. We cannot, then, read this as a simple picture of contextual stasis and institutional self-reproduction.

F. Conclusions

The SIOPS team built an e-government system. Adopters did not come. Some compensating actions were undertaken to address capacity shortfalls. But still adoption rates were very low. Then the design team explored a number of different enforcement actions. Some of these – e.g. those manipulating the perceived potential benefits from new uses of the system – seem to have worked better than others – e.g. those relying on third parties. In all, then, enforcement actions have led to some level of e-government adoption. But they remain constrained by the broader institutional context. That context can be characterised in terms of institutional dualism: the meeting of two institutional systems based on differing rules and values. This encounter of conflicting systems has led to a complex set of interactions with an uncertain future.

Moving on from this quick summary, what can we conclude from this case study? It does seem to offer a "proof of concept" for the proffered model of enforcement. The designers of e-government innovations can be understood as principals; those who potentially adopt the innovation – its implementers and users – can be understood as agents. The actions of designers seeking to have their e-government system adopted can be categorised into those dealing with resources and capacities of the adopters, and those dealing with motivations of the adopters. Viewed from an institutional

perspective, the latter can be further categorised into one-party, two-party and three-party enforcement actions.

This three-way categorisation is a conceptual model but it could equally be used by practitioners in thinking through their options for adoption actions. This case chimes with the ideas of May (2005) to suggest that a first analysis for practitioners would ask why their e-government system faced adoption problems. Was it lack of awareness (in which case some type of "marketing" campaign would be required)? Was it lack of capacity (thus requiring the type of compensating workarounds used in this case)? Or was it an issue of motivation?

If e-government systems do face motivational challenges to their adoption, then a second analysis can ask which of three motivational categories the implementers or users fall into – duty, profit, or fear. Do they act mainly from a sense of civic duty, in which case one-party enforcement may be appropriate? Do they act mainly from a sense of personal or organisational profit, in which case two-party enforcement may be appropriate? Or are they motivated mainly by fear of discipline or litigation, in which case three-party enforcement may be appropriate? As seen, of course, institutional factors would also need to be considered. For example, one-party enforcement actions will be constrained by the prevailing context of institutional norms and values. Two-party enforcement may be hollow and transient unless accompanied by an embedding of congruent institutional values. And three-party enforcement will not work unless the third-party is perceived to be a credible institution of enforcement.

Institutionally, we might also argue that this case study offered a "proof of concept" for the ideas of institutional dualism. Some caution is needed here. Dyadic analyses are readily criticised by "it's much more complicated than that in reality" claims. Hence, for example, network-oriented analyses such as Worsham et al's (1997:435) characterisation of the public sector as a "complex web". Institutional dualism, then, should probably be regarded as a simplified representational model to help us analyze cases of e-government innovation rather than as a complete picture.

Earlier discussions of institutional dualism have tended to characterise it in particular ways. For example, it has been seen as a duality between the rational modernity of innovation versus politicised tradition; a duality cast as particularly appropriate for understanding historical reforms in industrialised countries like the US and Japan, or current-day reforms in developing and transitional economies in Latin America, Africa and Asia (Amonoo 1981; Westney 1987; Brinkerhoff and Goldsmith 2005; Andrews 2008).

The two institutional systems of the SIOPS innovation do seem to fit this characterised duality: that is very much the way the field evidence presented itself. However, we wish the idea of institutional duality to be considered more broadly than this: as the intersecting of the institutional system of the designers with the institutional system of the adopters of *any* e-government system.

In cases like SIOPS – and perhaps many e-government systems being introduced into developing and transitional economies – it is relatively easy to perceive the difference between these two institutional systems. In other cases, the differences may be a little

more subtle but will nonetheless exist because of the distance – professional, cultural, psychological – between designers and adopters of e-government. For e-government applications in many countries this distance – and, hence, the strength and challenges of institutional dualism – may be increasing (Heeks 2005). This will occur as designers are liable to be drawn from "hard", technical institutional systems quite different from "soft", political environments of adoption. It may also occur through the combined effects of outsourcing and consulting, as designers are liable to be drawn from private sector institutional systems rather different from the public sector institutional systems of adoption.

By acknowledging intersection within a given e-government project, the model of institutional dualism described here does move beyond simple dyadism. Intersection of the two institutional systems creates a potential for agency and change through a potential for freedom from institutional determinism. This idea of contextual discord thus gives a fundamental insight into public sector change since it provides the opportunity to break cycles of simple reproduction that merely reinforce one institutional system. It thus stands in contrast to more homogeneous and deterministic applications of institutional ideas by allowing for the emergence of new institutional forms, such as hybrids.

What does actually determine the outcomes seen when two institutional systems collide through an e-government innovation? That remains a question for future research. Following Edelenbos (2005) and Heeks (2006), we can hypothesise that, the greater the difference between the institutional systems of designers and adopters, the greater the risk the innovation will fail. Following Greenwood and Hinings (2005) and Heeks and Stanforth (2007), we can hypothesise that the emergent trajectory will also be influenced by the relative power of the stakeholders involved. One thing the current case does support, though, is the idea that the outcome is unlikely to be some new equilibrium or steady state, as simple principal-agent ideas suggest (Worsham et al 1997). Instead, e-government innovations seem to trigger ongoing, restless trajectories – journeys of multiple paths across a new public sector landscape that do not necessarily have a final resolution.

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