Distribution-Collaboration Networks (DCN): An Organizational Transformation Perspective on the Development of E-Government Services

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ABSTRACT

The focus of this paper is to show that the development of e-government services needs to be fundamentally reconsidered if it is to achieve its raison d'être – the transformation of bureaucratic public sector agencies into a web of citizen-centric service providers. The status of current e-government initiatives is discussed and an emerging context for developing e-government services is presented: responsibility for public service provision may be distributed to multiple entities, and "public" value no longer needs to be provided by government alone. It can be provided through a system comprised of public agencies, the private sector, community groups, or citizens themselves, using communications networks as a mechanism for process management and conducting transactions. To investigate the intricacies of such a complex system, which we call a Distribution-Collaboration Network (DCN), we have developed a DCN Service Transformation Model. The main properties of this model are presented and its differentiating characteristics are analyzed, from an organizational transformation perspective. Based on that, we present certain guidelines for the development of e-government services along three dimensions: strategy, process engineering and technical infrastructure development.

1. INTRODUCTION

It is no secret that citizens across the globe are now asking for more efficient and effective public services that are citizen-centric - moving away from the bureaucratic status quo of the majority of organizations in the public sector.

Unfortunately, such a modernisation is not a straightforward task. Governments have been experimenting for a long period of time with a number of socio-political theories and models (Carnevale, 2002; Denhardt and Denhardt, 2002; Frederickson and Johnston, 1999; Kettl, 2002; Kettl, 2000). E-government has been more recently recognized by governments, researchers and practitioners alike as a source of potential solutions. This discipline investigates how information and communications technologies (such as wide area networks, the Internet, and mobile computing) can be used by public sector organizations to exchange information with and provide public services to citizens, businesses, and other arms of government.

Current research and practice in the realm of e-government is mostly technology-driven, focused on issues related to the transfer of existing processes and services to the digital world. This is, in turn, reflected on the most widely used e-government service development models.

Such a model is promoted by the European Union's Information Society Directorate General (Bradier, 2004) and is comprised of five different levels: a) *Publish*: services at this level act as passive information bulletin boards; b) *Interact*: citizens can search for and browse dynamic content on the web site of such an e-government service; c) *Transact*: this level corresponds to interactive systems and services, where citizens can exchange information with a government agency; d) *Integrate*: existing processes integrate with e-government activities for e-services belonging to this level; e) *Transform*: encapsulates radical implementations, often including significant process reengineering and new service development.

Cap Gemini, the international management consultancy, has introduced a similar model (Wauters and Van Durme, 2005) comprised of four development levels: *a) Information*: services at this level act as passive information bulletin boards; b) *One-way interaction*: simple interactive services, offering basic functionality, such as downloadable forms; c) *Two-way interaction*: this level corresponds to interactive systems and services, where citizens can exchange information with a government agency; d) *Transaction*: full electronic case handling for citizen requests.

We believe that most of such research efforts are missing the *organisational* and *transformative* aspects of e-government service development. Our baseline argument is that public services (online or otherwise) may be delivered by public sector entities in collaboration with third-party entities, such as the civil society, corporations, etc. The extent of service providers' distribution and the type of service providers' collaboration (organizational transformation issues) may have a severe effect on the development of an e-government service. In turn, this should eventually affect the adoption of the service by the public.

Interestingly, this twin concept of 'distribution – collaboration' is oftentimes not considered in the realm of e-government because:

- Provision of public services (online or otherwise) is considered to be an almost exclusive right of public sector agencies
- Adopting a collaborative model of distributed public service providers will necessitate organisational transformation - a traditionally difficult realm to incorporate in service development.

2. OBJECTIVES

This paper aims to bridge the above research gap by describing an exploration of: a) the organizational structure of systems arising from the creation of different links among entities involved in e-government service provision; b) the influence

Figure 1. Our research model
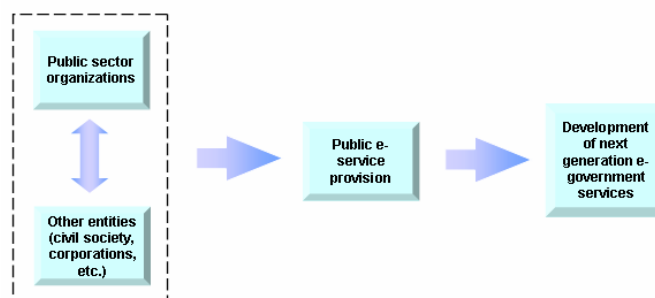
of this structure on the development (from design to implementation) of e-government services. Figure 1 depicts the broad research model.

Within this model the research question addressed was, "How complex are the organizational transformation issues for e-service provision when multiple and potentially conflicting stakeholders are involved, and how does this complexity map into the implementation of e-government systems?" Thus, the focus of our research is on the interconnection of organizational transformation principles and information systems thinking for developing a new generation of e-government services.

3. METHODOLOGY

Initially, we investigated a number of existing and planned e-government services, mostly developed in European Union countries. The focus was on defining comparison parameters and evaluation criteria, with emphasis on three key realms: strategy, process engineering, and technical infrastructure development.

We also analyzed a large amount of statistical and survey data, collected by government agencies and highly reputable corporations (mainly management consultancies). This analysis was complemented by a review of a number of academic efforts on e-government, systems analysis and design, and organizational transformation.

Finally, the authors' professional experience from their involvement in the development and implementation of e-government initiatives in the UK and Greece provided a set of insightful case studies that were incorporated in this research.

4. E-GOVERNMENT TODAY

The majority of current e-government efforts are focused less on the citizen and more on the public sector organizations' own perspective – the need to move existing processes and services to the digital world. In doing so, significant value can be realized. A recent report from the UK National Audit Office (Rohleder and Jupp, 2005) revealed that 20% of postal applications to the UK's Cattle Tracing System were inaccurate. The result has been that the UK Department for the Environment, Food and Rural Affairs has paid UK£9 million each year since year 2000 in extra staffing costs to rectify the errors. In contrast, the National Audit Office found that only 1% of electronic requests were inaccurate. As a result, the Department for the Environment, Food and Rural Affairs has called for more electronic applications to reduce mistakes, cut the number of extra staff required to correct errors and avoid potential fines from the European Union.

However, from a citizens' perspective, survey data from multiple sources increasingly point to a not-so-positive direction. They point to a citizens' perception that many e-government services have been implemented neither with them in mind nor for the benefit of the civil society but for the convenience and own bureaucratic goals of the government agencies themselves. Figure 2 in the following page shows that citizens across the globe are unsatisfied by the use of current e-government services to interact with public sector organizations (Rohleder and Jupp, 2005).

Indeed, the first three barriers to the use of e-government services (shown in figure 2) encapsulate this dissatisfaction. The cause for these established perceptions may range from citizen frustration when using such services, to lack of marketing e-government services to the citizens. The underlying message, however, is that citizens largely fail: a) to experience tangible benefits from current e-government services, and b) to differentiate them from their offline counterparts.

Finally, from a technology perspective, the current e-services' attempt to simply replicate/transfer internal systems and processes to the Web leaves largely unexploited a core technology for e-government, namely networking. Indeed, the main (and yet unrealized by e-government services) benefit of fully exploiting network technologies is the ability to create new forms of value by focusing on core organizational competencies and creating partnerships for non-core activities.

5. DISTRIBUTION-COLLABORATION NETWORKS (DCN)

The above lackluster results combined with socio-political developments of the recent years are creating new realities for public service provision and the related design of e-government services. These realities point to a new direction of how governments will need to operate from now on and turn the spotlight on the twin concept of 'distribution – collaboration':

Figure 2. Barriers to More Frequent Use of E-government Services (Average Values from a Sample of 12 Countries – Spain, France, Italy, Singapore, Belgium, Germany, Australia, Canada, USA, Sweden, UK, Ireland – source: Rohleder and Jupp, 2005)
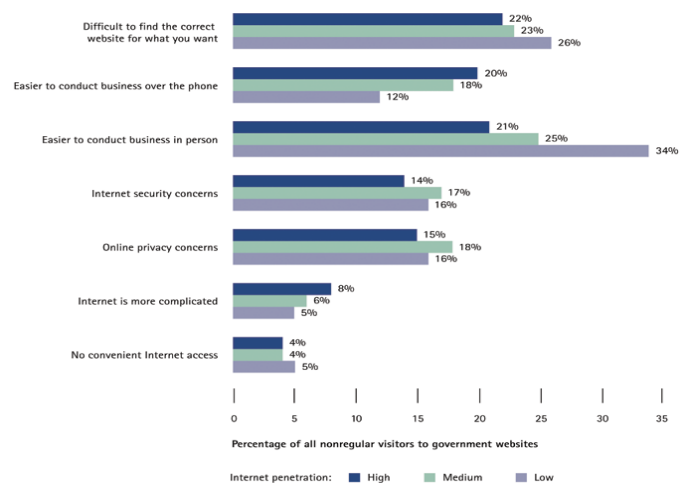
- distribution of public service provision to multiple entities (which may not be public sector organizations), and
- collaboration of multiple organizations for delivering public services.

(Tapscott, 2004) describes a number of such recent socio-political realities. First of all, civil society and corporations are now more involved in governance. The private sector, from individual corporations to entire industries, is increasingly focused on competing in a global economy where borders and national laws are seen as irrelevant or hindrances. Civil society - the collection of associations, trade unions, religious and cultural institutions, advocacy groups and people as individuals - is using network-based technologies to communicate and collaborate in ways previously unimaginable. Together, these actors are redefining the nature of public services. For example, civil society organizations, such as the group that created the US environmental initiative Scorecard, are providing new information services that are superior to those currently offered by government.

In addition, citizens increasingly turn to non-governmental entities for receiving 'public value'. Many governments have given priority to their role as financial administrators, focusing on controlling expenditures, paying down debt and trimming entitlements. This is in almost complete contrast to previous generations when public service and the role of government were expanding. Thus, citizens are turning to other entities for services previously offered exclusively by government. For example, corporations now deliver public services ranging from parking tickets to education.

Furthermore, political power is shifting towards collaborative groups of organizations. Communications networks have made geography less relevant to the formation and mobilization of interests and organizations, such as advocacy groups, businesses, cultural associations and trade unions. The declining relevance of borders is a fundamental challenge to the centuries-old basis of national governments and international institutions, most of which are defined by geopolitical power rather than economics or communications. Power is shifting away from national governments towards collaborating supranational organizations, such as the European Union and the World Trade Organization, or local levels of government.

We note that the above realities exhibit a common pattern: responsibility for public service provision is distributed to multiple entities and "public" value no longer needs to be provided by government alone. It can be provided through a system comprised of various public agencies, the private sector, community groups, or citizens themselves, using communications networks as a mechanism for process management and conducting transactions.

We call such a system of distributed organizations that are collaborating for providing public services a Distribution-Collaboration Network (DCN). At an organizational level, it is comprised of interconnected public, private and/or civil society participants. At a technological level, it is supported by network-based technologies (such as the Internet, mobile computing, etc). The importance of DCNs stems from their structure which positions them to deliver a number of benefits over the established bureaucratic forms of government:

- leverage innovation, value and commitment from a broader group of participants
- deliver higher value to the public, including services previously not possible
- deliver services at a lower cost, because the use of network-based organizational and technical infrastructures can significantly lower the search, contracting, and collaboration costs
- in general, introduce new levels of agility, responsiveness and flexibility to the way governments are addressing public needs.

6. THE DCN SERVICE TRANSFORMATION MODEL

Adopting a DCN model of public service provision can have the benefits described above. However, such an adoption entails a new way of thinking from government officials and a challenging organizational transformation for the public sector – both rightfully considered as being difficult tasks to undertake.

Furthermore, such an organizational transformation will be very closely related to the development of a new generation of e-government services aligned with the DCN concept.

Hence, in order to understand the development needs of such services and their impact on the organizational transformation towards a DCN structure, we have investigated a number of existing and planned e-government services, mostly developed in European Union countries. By analyzing their key success factors and limitations, and combining them with lessons learnt from our own involvement in the development of e-government services in the UK and Greece, we developed our DCN Service Transformation Model (depicted in figure 3). In this model, e-government services differentiate along two dimensions, corresponding to the twin-concept underlying a DCN: Service Providers' Distribution, and Cross-Entity Collaboration.

In terms of Service Providers' Distribution, a Low value indicates that a small number (one or two) of statically contracted entities are involved in the development/provision of an e-government service. A High value indicates that responsibility for such service provision lies with a dynamically changing large group of organizations.

In terms of Cross-Entity Collaboration, a Low value indicates that collaboration among involved entities is limited to mostly communication tasks for developing the e-service. In contrast, a High value points to the direction of market-like interactions among service providers.

These two parameters combined define the fundamental characteristics of our model, and their corresponding impact on an organization's transformation

towards a DCN structure. Mapping the impact onto guidelines for developing e-government services is achieved by describing it on the basis of certain system-defining parameters:

- *Strategy and Policies*: what are the goals and scope of e-government services to be developed?
- *Processes*: what are the basic processes needed for the execution of Strategy?
- *Technology*: what are the key elements of the technical infrastructure that will enable the successful implementation of Processes?

Based on the above, we can group e-government services that correspond to our model in three major levels: *E-enhanced* services, *Coordinated* services, and *Networked* services.

6.1 E-Enhanced Services

E-government services of this type are under the exclusive auspices of a public sector organization. Usually, a small number of technology firms are contracted for a support role and for infrastructure development. The main focus is on mapping existing processes and organizational structures on the digital realm. Most of the current generation e-government services are of this type.

In more detail, this level is characterized by Table 1.

6.2 Coordinated Services

For delivering Coordinated e-government services, a lead entity (most often but not necessarily from the public sector) coordinates a larger but controlled group

Table 1. E-enhanced services: Key determinant characteristics

Determinant	Characteristics
Strategy and Policies	• One entity for public service provision • "We can do it all ourselves better than others" • Minimal analysis of how well needs are being met • Quality controls are primarily financial • Limited trust of partners • Map offline processes to digital realm
Processes	• Functional silos abound with little formal cross-functional working • Global and local processes conflict or duplicate • Mainly paper-based processes
Technology	• Front-end webization • Little standardisation of data/information definitions between entities involved • Information sharing restricted to non-confidential items

Figure 3. The DCN service transformation model

Table 2. Coordinated services: Key determinant characteristics

Determinant	Characteristics
Strategy and Policies	• One leader for group of entities for public service provision • Some recognition of core competencies and the need to work more closely with other organisations • Some trust relationships in place but more individual-driven rather than organisation-driven
Processes	• Limited engineering of cross-entity processes • Processes mostly automated
Technology	• Basic use of collaboration solutions, e.g. web-based email & video/ computer conferencing • Adoption of some common data standards and taxonomies to ease the information flow, e.g. consistent definition of terms • Confidential information shared on an "as-needed" basis

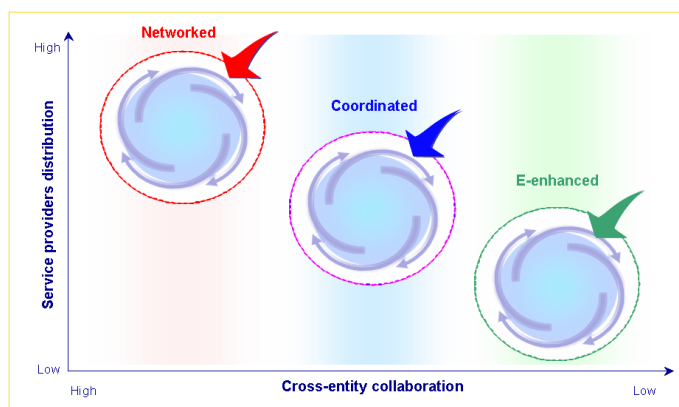*Table 3. Networked services: Key determinant characteristics*

Determinant	Characteristics
Strategy and Policies	• One network-based system for public service provision • All policies, functional objectives and procedures are fully aligned and visibly act in accordance with the shared partnership vision • Partners are regularly prioritised and de-prioritised based on their value add to the network • Flat, empowered organisational structure with decisions made at the lowest level possible • Pro-active knowledge sharing to continually deepen relationships
Processes	• Cross-entity processes as *the* modus operandi • Detailed process metrics allow for scenario-based planning and improvements involving all partners • End-to-end processes continually improved with partners
Technology	• Industry standards implemented as an integral part of collaboration platform (SOAP, WSDL, UDDI, WSFL) • Comprehensive use of multimedia to aid interactions • Ubiquitous application level integration with partners • Rich flow of communication upwards, downwards and sideways

of government agencies, businesses and/or civil society groups in order to offer a single point of service. Collaboration among the participating entities is guided and prescribed, and may involve limited cross-entity process reengineering.

In more detail, this level is characterized by Table 2.

6.3 Networked Services

E-government services at this level realize the full extent of Distribution-Collaboration Networks. A large group of organizations (of any type) is participating in the development of the service and such participation can be dynamic and market-like. Cross-entity collaborative processes are in place, data standards have been adopted and there is ubiquitous application-level integration among all involved entities. E-government services of this type are most effectively developed when there is a sense of community among the distributed service providers and a culture of knowledge sharing and consensus can be established.

In more detail, this level is characterized by Table 3.

7. FUTURE WORK

The above research findings are the results of the first phase of our ongoing research initiative on e-government transformation services. There is a number of directions we aim to follow in order to fully understand and develop the DCN system.

First of all, we are intensifying our cooperation with researchers in social sciences, in order to ensure that our work is not an isolated exercise in information systems development. For example, we need to better understand the (potentially conflicting) roles that public service organizations may undertake (supplier, regulator, policy-maker, purchaser, partner, etc.), thus clarifying the roles that they can assume in different DCNs.

In addition, we need to understand the full spectrum of intricacies of complex systems of the kind of a DCN. To that extent, one of the directions we are currently working on is the development of a maturity model, in order to assess an organization's readiness for participating in the development of DCN-type e-government services. A major issue in this effort will be the definition of the organizational and technological parameters (i.e. two of the key transformation drivers) that will be introduced in the maturity model.

Finally, in order to evaluate the practical implications of our propositions, we plan to initiate the development of a service implementation model. Its main goal will be the understanding of critical deployment issues of DCN-type e-government services,

for each level of our DCN Service Transformation Model. The development and testing of the service implementation model will be benefited by a parallel project for the design of an e-government service dealing with the issuance of building permits in Greece (this is a Coordinated service, as per our model).

8. CONCLUSIONS

Many of the current e-government services or service development activities have hit a roadblock. Although the initial results were encouraging, survey data increasingly indicate that citizens consider many e-government services to have been implemented neither with them in mind nor for the benefit of the civil society but for the convenience and own bureaucratic goals of the government agencies themselves.

In other words, it seems that many such services were 'assimilated' by government bureaucracies, instead of targeting the original goal of transforming these bureaucracies into citizen-centric service providers.

These lackluster results along with socio-political developments of the recent years are creating new realities for public service provision and the related design of e-government services. These realities point to a new direction of how governments will need to operate from now on and turn the spotlight on our twin concept of 'distribution–collaboration': a) distribution of public service provision to multiple entities (which may not be public sector organizations), and b) collaboration of multiple organizations for delivering public services.

A DCN encapsulates this concept, from a systems point of view, and our DCN Transformation model aims to shed light on its complex structure. Our research findings point to certain basic guidelines for governments to create significant public value through a new generation of e-government services:

- **Determine the roles and/or competencies that public sector organizations must abandon, retain or attain in the digital era.** As part of a DCN, public sector agencies may be able to deliver value in new ways, or create new forms of value for citizens. This, in turn, may necessitate either a handover of their traditional roles (either partially or totally), or the undertaking of new responsibilities to satisfy new roles.
- **Embrace innovative citizen-centric concepts and gear towards their implementation.** DCNs are about sharing power, opening up the decision-making process, and collaborating for creating public value. The corresponding e-government services that can be developed may offer not just the opportunity to 'do the job better' but to re-engage the society in the process of governing.

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