Information integration – an essential pillar in e-government development

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ABSTRACT

The purpose of this paper is to explain and promote the need for ERP implementation in the public sector, to support the growing request for effective information systems, from the e-government viewpoint and under its influence. The paper also debates the major challenges in ERP implementation issued from research of published case studies. The challenges analysis turns out four major issues to address in order to overcome the integration obstacles and create a solid infrastructure for e-government.

1. INTRODUCTION

Public sector organizations need processes, structures and systems that enhance employee productivity. They also need to improve responsiveness and flexibility as administrations change much more often than in private business, and government-wide conditions change frequently. Integrating information and producing a decision-oriented environment is a complicated task, especially in the public sector, set apart by disruption.

There is a temptation to introduce Information Technology (mostly progressive software), which is successful in the private sector, into public administration without much modification. More often than not this approach fails, because the goal of public administration is not to maximize output and profit. The public sector targets to drastically reduce paperwork, bureaucracy and the output of new and improved regulations and procedures. A successful IT employment must therefore look at the goals of public administration, and must first and foremost lead to better ways of achieving them. Although the theory and means may be the same, the goals and outcomes are substantially dissimilar.

The main goal of public administration can be described as to carry out the government's policy – consistently, without fail, within the law. Profit does not need to be maximized, but the administration must operate within resource constraints, especially personnel and budgets. Unlike businesses, public administration should not have to act competitively, but it does have to satisfy its stakeholders, by means of their representatives, both elected and unelected (e.g. the press).

A United Nations Report (World Public Sector Report: E-Government at the Crossroads, 2003) emphasizes that "E-Government is the use of information technology to support government operations, engage citizens, and provide government services". This definition is the most appropriate for this paper purpose, as it indicates the explicit directions of e-government: back-office, e-democracy, and front-office. If

e-democracy is comprised in the front-office, e-government can be divided in two parts that should be integrated in an e-government system (see Figure 1).

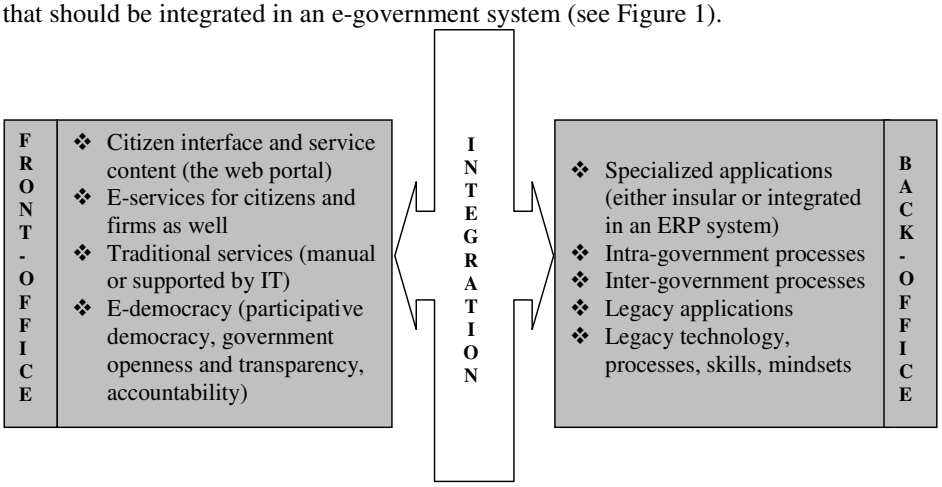

Figure 1 E-Government composition
(Source: adapted from Millard J., The R(e)-Balancing of Government, in Upgrade IV(2), 2003, p. 49)

To provide more efficient government and better services to citizens, public administrations and agencies have invested in Enterprise Resource Planning (ERP) systems as their basic technological infrastructure for e-government. Our review of the published studies (see for example Raymond L., Uwizeyemungu S., Bergeron F., 2006) showed that the actual motivations that lead to the adoption of ERP systems in e-government vary from operational motives like improving process efficiency to strategic purposes, like information integration.

2. IMPLEMENTING ERP IN E-GOVERNMENT: MOTIVATIONS AND ACCOMPLISHMENTS

Public organizations face many challenges, like cost issues, system rigidity, obsolete system architectures, impediments to true information integration.
The most common concern is the need to reduce costs by reason of limited or declining resources. Paper-based and manual data processing are pricey and wasteful. The major problem in this matter is that computer-based processing activities claim substantial budgets, as well as replacement of old manual capture and classification methods with electronic forms and records.
Many public organizations have already solved the manual processing issue by implementing different applications. The relentless predisposition to set up new computerized applications triggered the "islands of automation" situation.
Currently, applications that may be found in the public organizations are:

- Accounting;
- Budget;
- Taxes;
- Payroll and HR function;

- Fixed assets management;
- Expense reporting;
- Forms processing;
- Archive;

and also:

- Help desk;
- e-Learning;
- Customer Relationship Management systems;
- Executive dashboards or other Business Intelligence applications;
- Collaborative systems etc.

Even though the literature[1] promoted the concept since the 1990s, the integration degree is low. Concepts like integrated enterprise systems, better known as Enterprise Resource Planning (ERP) and business process reengineering (BPR) had the greatest impact on business in the 1990s. The value of information integration within an organization, and business process improvement based on adoption of best practices, is established not only in the private sector, but in the public sector too.
The National Public Academy of Public Administration (see Heeks R., 1999) lists BPR and integration as key trends for public sector reform among other fairly radical changes in the way government conducts its day-to-day business. The report defines reengineering within the public sector as a "radical improvement approach that critically examines, rethinks, and redesigns mission-delivery processes and sub-processes, achieving dramatic mission performance gains from multiple customer and stakeholder perspectives."

The **back-office** concentrates on cost reduction need in the face of limited or declining resources and the efficiency and flexibility improvement. We witnessed governments expanding investments to integrate back-office processes as salaries, budget, accounting, and taxes: ERP projects are the leading integration initiative.
The distressing experience of many ERP projects in the private sector accounts for the defensive government's position on ERP adoption. However, lessons were learned and risks were acknowledged – the public sector ERP developed, especially after year 2000. Most initiatives took place at the local government level – in this respect the lack of processes and tools can be compensated by the development and implementation best practices and skills sharing.

The level of complexity of governments, in general, and the fast rate of social change, has brought bureaucratic administrations to the point of total breakdown. Efficient and effective technological infrastructures are necessary to enable new forms of business. ERP might be view as the first step in the right direction. Essential internal and external information are often spread across departments or different public entities, making it difficult to access. Not only the information dispersion is an issue, but also inconsistent standards for data flow, comprehensiveness, formats and security augment the integration trial. An ultimate representation of the e-government information system

[1] We should mention the contributions of Michael Hammer and James Champy (Reengineering the Corporation: A Manifesto for Business Revolution, Harper Business Books, 2003), Michael Scott Morton (The Corporation of the 1990s: Information Technology and Organizational Transformation, Oxford University Press, 1991) and Thomas Davenport (Process Innovation: Reenginnering Work through Information Technology, Harvard Business School Press, 2003).

brings in integrated, collaborative, flexible, responsive and self-service oriented capabilities (see Figure 2).

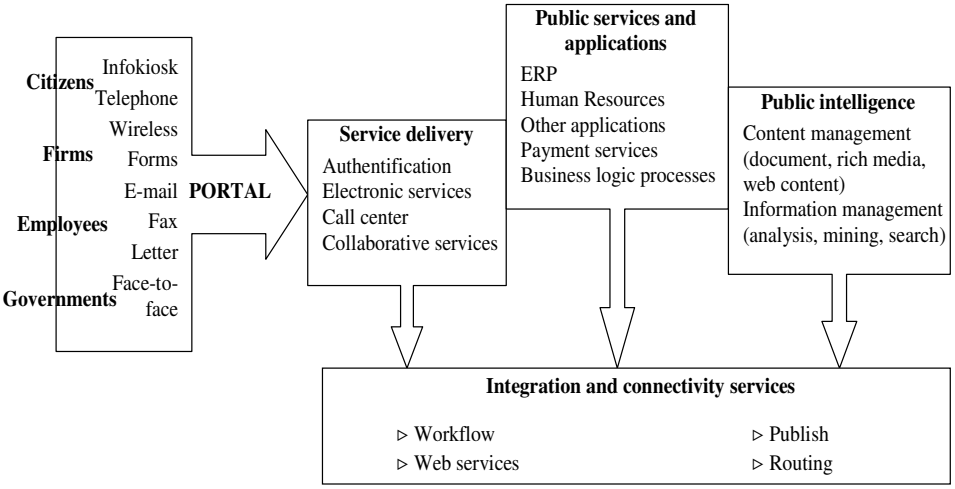

Figure 2 E-Government information system components and actors

Information integration realization is far more complicated than an ERP project, but depends hardly on its success. As in private firms, the integration target is an ambitious one and depends on the continued existence of IT initiatives. The ERP system should be extended with the collaborative and intelligent components (automated workflow, document and content management). Advantages reached with the structure from Figure 2 are:

- automate routine processes;
- minimize paper based activities and redundant data entry;
- assure information integrity and security;
- reduce operating costs;
- certify compliance with standards and regulations;
- increase the speed and quality of responses to information demands.

3. ERP CHALLENGES IN THE E-GOVERNMENT SPHERE

Each ERP implementation is unique and presents its own challenges, sacrifices, and accomplishments. This section describes many of the issues faced by the project team on the state's ERP implementation in the public sector.

- **Lack of long-term architecture and operational vision**. Many public organizations have started the ERP implementation as replacement of legacy applications, without a clear understanding of the organizational business architecture. In many cases the definition of the architecture was initiated after the ERP deployment (!), when they realized that the organization did not achieve the promised benefits. The architecture identifies and describes the business processes by developing an understanding of the scope of the

initiative. It starts with understanding of the "as-is" business processes, in order to appreciate where the organization is from a business process perspective. Then it determines where the organization wants to be at the end of the implementation (the "to-be" processes) and it defines the end-state from an operational vision perspective. The business processes should be re-designed, based on new business rules, policies, and procedures that define how the organization will perform. Having the operational vision comprehension from the beginning is a critical factor in determining how large the implementation will be, and which is appropriate strategy for the ERP deployment. Investing early on the definition of business processes architecture will support management of the legacy applications, the cross-domain process integration and facilitate identification and understanding of interfaces.

- **Lack of understanding of current system landscape and portfolio management processes**. Many ERP implementations start at the domain levels instead of at the organization level, due to the functional perspective, instead of a horizontal, end-to-end business process view. An ERP project is about the processes. A great deal of time should be allocated to processes comprehension, determining which processes to reengineer. Understanding the existing system landscape and getting the necessary expertise to support the required legacy applications documentation in the re-engineering effort improve the chances to succeed. As a comment here, the public sector is unique when we look at the number of mandated systems that a public organization has to interface with.
- **Cost issues**. Just like the private companies, the public sector has the same challenges in costs estimation and management throughout the ERP implementation. In addition, the resources approval is more complicated than in the private sector, as it depends on the budgeting process. It is difficult to correlate the budget with an ERP project costs, because the true costs are known only later, in the requirement gathering phase. It is not possible to include in the budget the precise costs of the ERP implementation, so they have to guesstimate in advance of knowing their final scope. The general (human-specific) tendency is to underestimate the costs – sometimes this engenders the project obstruction or even interruption with major, negative consequences. Other times the ERP project confronts the expiration dates for funds (a general problem for the "public money" – they are hard to obtain, but also hard to spend). ERP practice illustrates in many cases schedule slips – for the public sector it could be a distress if there is an expiration term for spending the money. Contrasting the private sector, there is no reward for savings, all the efforts should be bound for avoiding the funds loss.
- **Team expertise**. In a public organization, the ERP project team faces the scarcity of resources and personnel skills. The sensitive positions involve project management expertise, but also organization functional expertise. Important roles in the project have the team members from within the organization, as they are the people driving the business processes change. It is a challenge to get the right people with the right skills to support the implementation. The project manager has to decide between educating their

own personnel and requesting skilled human resources from other departments or outside the organization.

- **Leadership commitment and support**. Just like in the private firms, the ERP project success depends heavily on the top management support from the inception of the ERP initiative, materialized in time, dedication and active participation. The top leaders must be the engine of change, they should initiate the transformation, provide the oversight and approve the proposed business processes changes and new business rules adoption. In the public organizations this is a foremost challenge, because in some cases assumption of best practices and standards requires statute, regulatory or policy changes.
- **The big-bang approach**. Many public ERP implementations try to implement too much functionality, or scope simultaneously. The basis in the implementation strategy should be the end-state operational vision and also the envisioned architecture. The ERP project could be defined as a progressive one, being planned in incremental phases, each of them considered a separate project in order to accomplish an achievable scope and an acceptable ROI. The main scope of integration is achieved by eliminating most of the legacy applications. In fact, for most government ERP implementations the return on investment (ROI) comes from the retirement of legacy systems (Sommer R.A., 2006: 69). The more such kind applications are retired, the more maintenance costs are saved.
- **Lack of system integrator understanding of public business processes**. The integrator's expertise in ERP applications and implementation methodologies is hardly sufficient for the project success. Few firms have experience with complex and convoluted public business processes. Many integrators start a public ERP project without really understanding the current system landscape. The reality reveals a complicated architecture, with multiple systems, some of them isolated, other connected by composite interfaces. These systems have been developed to fulfill a mission, not with an enterprise view in mind, which makes them very difficult to manage.

4. DISCUSSIONS

Many public entities assumed ERP initiatives. Regrettably, most of them have started the implementation of ERP applications as replacements of the old, legacy applications. After the painful realization of the integrated nature of modern ERP systems, many teams comprehended the need for a better understanding of how different business processes would fit within the public organization's architecture. This afterward effort for defining the suitable system architecture leads to many changes in the current implementation and creates a chaotic and unstable environment for the organization. In the end, the customer satisfaction was lost and maintenance costs increased in order to achieve complete, end-to-end business processes.

These considerations point a first major issue to focus on: **long term objectives and operational vision**. Understanding the operational vision from the initiation of the ERP project is a critical factor in determining how large the implementation will be, and what is the best implementation and deployment strategy.

In the large-scale organization-wide systems implementation like the public organizations, the **people and organizational culture related problems** are the hard problems. Technology problems are often well-defined problems and require a smart mind and a lot of hard work to solve. The people and the organizational problems are the difficulties that most often cause havoc. *Bureaucracy* is an important obstacle in technological innovation because most new creations represent a change in the status quo. Each new innovation forces the public servant to alter routines, develop new working relationships, and sacrifice autonomy. The public servants' education is an essential issue and it could relieve the diffusion of innovation and new ideas in the public sector.

The management and collaboration of the diverse groups involved (i.e., State project team members, State change agents, implementation consultants, change management consultants, training and documentation consultants, application software vendor, hardware, database vendor, and different functional and technical project team members) is a challenging aspect of the implementation. The project people should be committed to working as a team, they should communicate and (the foremost) take ownership and responsibility of the project.

Nowadays, technology, and fast changing technology, is clearly what enables and often forces organizational change. Public managers must learn to appreciate the role of technology, understand the implications of technology, and learn to manage technology-enabled change effectively. Of course computing itself cannot solve the problem if the policies and rules of the different administrative departments do not fit together. The third major issue to address is the **organizational change**.
Negotiation at a human level of any common protocols is normally required. Any agreement depends on all parties making some gain in administrative efficiency. Business process re-engineering should be taken into consideration. Business processes improvement can benefit from the adoption of best practices.

At last, we like to say that ERP is a journey, not a destination. The internal integration is expected to expand beyond the boundaries, aiming to include all the actors in **comprehensive and collaborative system**.

Even if ERP systems are becoming increasing widespread, they alone are not the answer for the government collaboration challenge, since they automate and streamline internal business processes. The efforts should be oriented toward a comprehensive government solution for achieving collaboration and process integration across different public entities. The purpose is to accomplish horizontal integration of data across multiple lines of business by integrating government processes, disparate back-end applications, ERP applications and data into a seamless enterprise environment. Moreover, using collaboration tools public entities will achieve people (employees, citizens and companies as well) interoperability, without regard for organizational boundaries.

The public servants at a county level should collaborate through a document management system, a repository for their information and knowledge. The system can

be referred during project meetings, and project teams will use the portal to create communities of practice around their specific topics. These are designed as individual sites and they contain minutes, training materials, agendas and other resources to support their groups. Nevertheless, the greatest benefit to expect is the service to citizens.

4. CONCLUSIONS

Enterprise Resource Planning systems are the most common integration projects in the public sector and they are regarded as the basic technological infrastructure for e-government. The case studies analysis shows that above and beyond the financial effort that should be implicated, the major problem is the *erroneous approach in ERP execution*. The best ERP solution can't offset the problems of flawed business strategy and poorly performing business processes. Many public ERP implementations start at the domain levels instead of at the organizational level, the project being approach from a functional perspective instead of a horizontal, end-to-end business process view. The public sector faces a difficult task in business processes re-design, primarily because of the rigidity of the environment and employees resistance to change.

At the back-office level, different public entities and the departments contained by use different systems to store, organize and retrieve information. We witness departments that feel comfortable with their insular applications and also departments that want to update their archaic legacy systems. Once this aspiration will spread among the public entities, an integrated strategy using document and content management system and web technologies can be developed for all public sector actors.

Our conclusions about the public organizations information systems include the following concerns:

- business processes do not stretch across departments/organizational units;
- procedures and rules are intended to ease administrative burdens of a single department – they don't promote customer convenience across the public organization;
- a culture of isolation and protecting territory;
- closed technology infrastructure and information system architecture.

No matter what type of Information Technology project we are considering (ERP, portal, groupware, document management and so on); these issues are slowing down and limiting the project value. In most government entities employees operate in a *silo mentality* and don't want to move beyond their boundaries. We believe that changing the state of mind is the most challenging duty in creating a collaborative government – in creating a competitive information system, *culture is the key*! Regarding the solution implementation, we consider it needed more assistance than technology alone – it requires new ideas about information sharing. Sharing information through *knowledge management initiatives* can also help government succeed. Moving beyond the silo mentality to establish a culture of communication and then to implement appropriate technologies, the government entities prove the benefits of sharing information internally and externally.

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