

Framework for Government ICT Projects

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Abstract—In its efforts to utilize the information and communication technology to enhance the quality of public service delivery, national and local governments around the world are competing to introduce more ICT applications as tools to automate processes related to law enforcement or policy execution, increase citizen orientation, trust, and satisfaction, and create one-stop-shops for public services. In its implementation, e-Government ICTs need to maintain transparency, participation, and collaboration. Due to this diverse of mixed goals and requirements, e-Government systems need to be designed based on special design considerations in order to eliminate the risks of failure to compliance to government regulations, citizen dissatisfaction, or market repulsion.

In this article we suggest a framework with guidelines for designing government information systems that takes into consideration the special requirements of the public sector. Then we introduce two case studies and show how applying those guidelines would result in a more solid system design.

Keywords—e-government, framework, guidelines, system design.

I. INTRODUCTION

E-Government can be defined as: “A *broad-based transformation initiative, enabled by leveraging the capabilities of information and communication technology; (1) to develop and deliver high quality, seamless, and integrated public services; (2) to enable effective constituent relationship management; and (3) to support the economic and social development goals of citizens, businesses, and civil society at local, state, national, and international levels*” [1]. Examples of online public services include: service charge payment, licensing requests, information finding, complaining, and petitioning. The emphasis of e-governments on the notion of citizenship makes it necessary for system designers to consider additional requirements that may not exist in the systems for the private sector. However, much public sector information systems literature draws on private sector frameworks [2]. One special consideration of the e-Gov. ICTs is that they are built on the pillars of: transparency, participation, and collaboration [3]. Another consideration particular to public sector information systems is that the understanding that the government is a dynamic mixture of goals, structures, and functions [4]. Another implication of the complexity and special nature of e-government is that it is a continuing process that requires multiple stages of development or “maturity” [5]. In principle, the main concern in e-government ICTs is not technical but is rather driven by the operational context and obligations of the public sector [6]. This finding is also supported by the findings on the main

challenges that may be faced during the implementation of e-government programs that have been summarized in the E-government handbook of developing countries [7]. Among the addressed challenges are: building trust within agencies and citizens, providing transparency, benchmarking, and the public/ private competition/ collaboration. In this last point the challenge centers around defining where government control ends and the private sector takes over. Grant and Chau considered this challenge in the general framework they proposed in which they identified the criteria of a “noise free” representation of the government in the sense that no interference shall be generated by the different requirements and expectations of the different stakeholders (citizens, businesses, civil society, and policy makers). Another point is the framework shall enable identification and articulation of e-government goals and objectives. The goals and objectives have to be clearly defined and the vision needs to be shared and communicated effectively [1].

In a related endeavor, the Working Group on E-government in the Developing World [8] proposed ten questions e-government leaders should ask themselves upon planning for ICTs implementation projects. Among these questions is the question of whether there is a clear vision and priorities for E-government. Another question is on the shape of the relationship with the private sector. It also covers the concern of how the E-government can improve citizen participation in public affairs.

In an attempt to tackle the complexity of e-government ICT system design and analysis with its special criteria and considerations, we present here a framework for analyzing e-government ICTs along with guidelines that can be used at the system design stage.

II. FRAMEWORK FOR DESIGNING ICT SYSTEMS IN THE PUBLIC SECTOR

A. A Generic Framework

The context of the public sector e-Government projects shape the choice and design of the project. Different design considerations and technology tools can be used for different contexts. For this reason, we have listed the different contexts and identified different tools that can be used in each context, as in the table below so it can be used for analyzing any e-government ICT project.

This framework differentiates between three main purpose of the e-gov. projects, mainly: to regulate or impose enforcement of some laws or decrees for the sake of maintaining the public interest and the control of the state, to empower the citizen, and to drive the market or industry. Each area embeds a different consideration for the context, objectives, actors, design patterns, best practices, and

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corresponding mechanisms to be considered at the time of project analysis and planning.

TABLE I
 THE PROPOSED FRAMEWORK FOR ANALYZING E-GOVERNMENT ICTS

	Regulate/Control	Empower/Facilitate	Drive
Context	Law/Resolution enforcement Policy execution Service charges collection	Citizen orientation	Market channels and opportunities
Focus	State Public interest Policies	Citizen	Market/Industry
Mechanisms	Regulatory framework Enforce compliance.	e-services One-stop-shop	Incentives
Prime Objectives	Achieve accountability. Achieve Transparency. Reduce operational costs.	Increase efficiency. Citizen Participation.	Create opportunities. Extending reach, capacity, and dynamism.
Interaction Type(s)	G2G (Government to Government) G2C (Government to Citizen) G2B (Government to Business)	G2C (Government to Citizen)	G2B (Government to Business)
Examples	e-Licensing e-Permits	e-Complains e-Bills	e-Property Listing e-Tender

When the main focus of the ICT project is the state or the public interest, the objectives typically span around enforcement of some law, execution of some policy, or more administration over the collection of some tax or service charges. The typical state's tools for carrying out these objectives are the designing of policies and regulatory frameworks. On the other hand, when the main objective of the project is to empower the citizen (or the tourist in the case of the department of tourism), then the project aims at providing more citizen orientation, elevate the levels of citizen's satisfaction, transparency and trust in the government. It provides more services for the citizen to facilitate his interaction with the government. Pursuing these objectives the government can plan for more e-services reaching the stage of grouping the services in one-stop-shop portal that would span over the multiple unified services provided by different government entities. At some cases the government entity may want to serve public interest indirectly by driving the market through providing some incentives to serve objectives such as: creating more opportunities, extending the market capacity and dynamism by opening new channels or extending the reach of some existing channels.

The framework also differentiates between different types of interactions [9], namely: G2G with the primary objective of achieving accountability and transparency, G2C with aims primarily at increasing efficiency of the interactive services, and G2B which aims at reducing operational costs.

For applying this framework on new e-Gov projects, the following steps need to be considered:

1. Identify the project main context (regulate vs. empower, vs. drive) and list the objectives sorted by their

importance. For each objective identify the corresponding focus (state-driven, citizen-driven, or industry/market-driven).

2. List the corresponding tools in order as per the sorted objectives.
3. Start the brainstorming activity to identify main processes and procedures in light of the orderly listed tools.
4. Assess your solution by applying the below guidelines.

B. Guidelines for Using the Framework in Designing e-Gov.

The following guidelines are the practical steps for implementing the proposed framework upon the design and analysis of public sector ICTs.

1. System Design Shall Be in Maximum Correspondence with the Designated Purpose(S) and Context

The design of the e-gov. system shall be in direct and maximum correspondence with the said purpose of the project and it shall act within the corresponding context and utilize the corresponding tools. Failing to do so may lead to failure to comply (for state-centric projects), user dissatisfaction (for citizen-centric projects), or market repulsion due to disturbed balance (for industry-driven projects). System dynamics need to be carefully maintained for mixed-context projects so that achieving desired control won't cause repulsive impact in the industry for example, or won't jeopardize the user's satisfaction by introducing complex workflow for example.

2. Lightest Touch on the Private Sector with No/Minimal Intervention at the Transactional Level

If the government entity steps in to enforce operational processes related to the business on the industry, it may result in the negative result of hindering the business or imposing undesirable restrictions on the way the industry chooses to conduct its business. Instead, when it comes to the public sector initiating new process for the private sector to follow, this is expected to come in the form of the lightest touch on the business processes. Government's role is expected to fall within the boundary of defining a regulatory framework (the "what" aspect of the new process) without mandating how the industry is to conduct their business in response to the new process. Any direct disturbance by the government to the market dynamics that would grow organically in one direction on the basis of supply and demand to shift it into another direction for example may be faced will industry resistance.

3. Get Most Out of Stakeholders and Partners

This is a recommendation on engaging the citizens, involving other government entities by promoting intra-government communication, and communicating with the industry at the early stages of system analysis and design. Different government departments are expected to operate in a complimentary mode and coordinate their services towards a one-stop-shop portal of unified services.

III. CASE STUDIES

In this section will demonstrate two case studies on ICT projects for some department of tourism in some government.

A. Case Study 1: The Tourism Fee

The tourism department in some government is intending to impose a tax (or service charges) on the guest night stays in hotels. This tax varies according to the classification of the hotel, i.e. five-star hotels would have a higher tax than that of the lower rate hotels. The fee is calculated by multiplying the number of night stays by the tourism fee rate (based on the classification of the hotel). Hotels have to collect the fee from the guest and pay the tourism department each month end. This decision comes after researching on existing benchmarks and upon deliberation on ways to finance the tourism promotional and marketing efforts across new world-wide destinations to attract more tourists. The resolution had been issued and the regulations have been defined and fee rates as well as fines for violations have been identified.

It is now the role of the IT department to design and implement the needed system to automate the calculation and collection of the tourism fee. One straightforward solution is to provide an online form for the hotels to be filled with total number of night stays. This can even be an Excel sheet to be filled and sent. Some ETL mechanism can be programmed to extract the data from all the submitted sheets, transform it, and load it to the database. It would be an easy and timesaving solution for the hotels, although extra resources for auditing and inspection may need to be planned from the tourism department side. Then one system analyst suggested broadening the scope so that it includes providing guest information. This information can be used in data analysis and insight discovery. Also providing detailed records at transactional level, instead of an aggregate summary, would provide an additional proof of authentic data that can be easily inspected, hence lowering the audit requirements.

So the final system design shifts from an online form for data entry at summary level, to a transactional system that tracks guest check-ins and check-outs and aggregates the monthly fee to be paid to the tourism department. The main process flow is depicted in the below diagram. We differentiate between processes required for the management (in the Orange color), processes to be done for set up (in grey), and processes for the front desk (in blue). The system ends up with six processes, four of which are directly related to the business operations, whereas the expected system should be only concerned with the user account management and month end data entry and processing.



Fig. 1 The main processes of the Tourism Fee system

Assessing the system design using the proposed guidelines; we can reach the following observations.

1. Is the System Design in Maximum Correspondence with the Designated Purpose(s) and Context?

Apparently the main aim of the project is for a government entity to enforce and execute the issued resolution to collect a

tax. For hotels, the main concern is to pay the dues before the deadline and to avoid any fine. For the tourism department to hijack this main direct purpose and introduce additional processes that would require additional time and effort from already busy staff to achieve the indirect purpose of data collection, can introduce difficulties in complying with the resolution in a smooth way. Imagine the loads of transactions the hotel will need to perform in real time for the dues to be calculated correctly so that they avoid the fine for providing inaccurate or incomplete records.

2. Does the System Maintain the Lightest Touch on the Business Process with No/Minimal Intervention at the Transactional Level?

The designed system simulates a real property management system (PMS) in the business processes it automates. The hotel will be required to maintain room occupancy records in both systems and keep an eye on the record reconciliation between the two systems. This is a hard touch on the operational level of the industry by a government entity. This would impose the risk of hurdling the business and result in a huge dissatisfaction from the industry side. If the hotel decides to perform check-in/check-out operations of the Tourism Fee system in real time by the front-desk, in addition to maintaining its own PMS system, then this would result in slowing the time of processing guest admission application. On the other hand, if the hotel decides to perform this from the back-desk then this may result in requiring additional resources to process the transaction log. In both cases, this may result in complicating the business operation, something that is not expected, nor welcomed, from a government system.

3. Is There an Opportunity of a Larger Involvement of Partners and Stakeholders?

The project team can consider this question at the early stages of the analysis. It might occur to them that the municipality has implemented some online application to collect some monthly tax as a percentage from the revenue, and that the two applications can be unified at least in some of its aspects such as the unified account.

B. Case Study 2: Vacation Houses

The local tourism authority in some city has devised a strategic plan for the number of tourists in five years to reach 12M visitor. When putting the execution plan, the team has discovered that one main challenge would be the mass shortage of guest accommodation units. Even when incentivizing investors for building more hotels by putting less requirements, smoother procedures, and reduced taxes, the team found that the shortage on accommodation units still persist. After deliberation and benchmarking, the project team has suggested that one way to overcome this challenge is the idea of people renting out their houses to tourists for short stays at vacation times. The idea seems a good solution, so they created a project to implement it and called it "Vacation Houses".

By implementing the proposed framework, we first see that the project falls in the realm of market-driven projects, and that its main focus should be on catalyzing the market supply so that it meets the desired need. The main tool for implementing this is to devise incentives. The other objective is to achieve higher visitor satisfaction and security assurance rates, empower-based objective, and one mechanism to implement this is to provide e-service(s) that would make it easier for guests to attain more visibility and satisfaction on the quality of the service. The last objective is to impose more control on the residential unit classification, and one common mechanism in this context is the designation of fees and fine scheme.

In light of this analysis, the team has suggested that first step is to devise incentives and flexible regulations for operators to engage in this activity. Second step is to develop online processes to make it easier for operators to apply for the required license and submit required documents, for guests to find and rent vacation houses, and for the tourism back office staff to track the activity. Final step would be the planning of a complain center and the provision of some fine scheme that is kept to the minimal required to ensure credibility and quality of the guest service.

Finally, the team checked this process against the guidelines and ensured that the designated model correspond maximally with the defined objectives and implement the right mechanism for each one. They have also recommended that the ICT system and e-services shall not contain any business-related operational process, such as booking management functionality for example. By considering the third guideline, the team was able to generate more ideas such as partnering with the land department for example to list the vacation houses on their GIS map so that guests can find easily. Another idea that occurred to them is the use of crowdsourcing in rating the listed accommodation units. The devised process is designed and assessed such that it would drive the market without hindering the business operation and in a way that would guarantee high customer satisfaction rates and partner involvement.

This case study demonstrates how applying the devised framework and guidelines could generate an initial map for the ICT system that holds success factors and avoids factors that can lead to failure due to market repulsion.

IV. CONCLUSION

In this article we argue that the public sector require a special frame work for analyzing and designing ICT projects which is different from frameworks that are applicable for the private sector. We present such a framework along with a set of guidelines to be used when designing and assessing e-gov ICT systems. This framework differentiates three different roles of government systems, namely: control/regulate, empower, and drive, each with its own context and implementation mechanisms. We then applied this framework on two case studies. In the first case study we have used the devised guidelines to assess a proposed system design, and we have shown how applying the guidelines highlighted potential

issues in the design that need to be avoided for the system to achieve its objectives. In the second case we applied the framework to generate ideas on the system's main components and flow. Then we used the guidelines to assess the devised design. We have shown how taking the proposed framework and guidelines into consideration at the early stages of system analysis and design can help planning a solid system that is more likely to achieve the main objectives of the project, and avoid approaches that can lead to issues like failure to comply with the regulations, citizen dissatisfaction, or market repulsion.

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