A Design Method for the Development and Deployment of e-Government Systems that Emphasizes Good Governance

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Abstract: - There is an implicit agreement in the research community that e-Government systems enhance governance, but there is a lack of empirical/experimental evidences to build on this hypothesis. In a close collaboration with the Fez municipality (Morocco), we developed a pilot e-Government system that will facilitate citizens' access to governmental information and services. From the outset of the e-Fez Project that lasted 18 months, our aim was to collect experimental data in order to verify if the development and deployment of e-government systems really improve governance. We set up a method that emphasizes good governance at each step of an e-Government project and enables us to assess the outcomes of the resulting e-Gov system on governance. We present here this method and illustrate its application in the e-Fez Project.

Key-Words: eGovernment Systems, Design Methodology, Good Governance, Case study from Morocco.

1 Introduction

E-Government is presented as promoting the responsiveness of government institutions to growing citizens' demands to get improved access to public services as well as to concerns about fostering public institutional efficiency and improving security measures [4]. Based on several studies, E-government systems (eGov systems for short)/have been promoted as producing a number of benefits that foster good governance [3] [4]. It is interesting to notice that most studies address the link between e-Gov systems and governance on a fragmentary, contextual and, in many cases, theoretical basis. Hence, there is apparently an implicit agreement in the research community that eGov systems enhance governance, but there is a lack of empirical/experimental evidences to build on this hypothesis. We argue that a formal methodological framework and measurable indicators is needed to support this claim and to formally demonstrate this relation between eGov systems and enhanced governance. If such a relation could be proved, that would definitely benefit decision makers, especially at the top political level, to foster the deployment of eGov systems as an asset of good governance.

In a close collaboration with the municipality of Fez (Morocco), we carried out the Fez-eGovernment Project (eFez Project) that aimed to develop a pilot E-Government system to provide the municipal government of Fez with an advanced Information and Communication Technologies (ICT) system that supports the operations carried out by the city employees and enables online delivery of citizen-oriented services to the local community. Further to its technological challenges (developing the ICT system including back-office, front-office, a web portal and a related kiosk available for public use in the municipality's offices and adapted to illiterate people), an important goal of this project was the creation of a method to support the development and deployment of E-Government systems in Morocco and the assessment of the impacts of such systems on citizens' life and on governance in general.

The concept of governance has been defined differently depending on authors and contexts. We selected the United Nations Development Program's (UNDP) definition of governance described as being: "*among other things participatory, transparent and accountable. It is also effective and equitable. And it promotes the rule of law fairly…*"

Good governance [6] is quite dependent on the context in which it is assessed. In the context of the eFez Project we selected the appropriate general UNDP's attributes of good governance and refined their definitions as follows: 1) *Transparency* as bringing visibility to the service workflow for citizens by means of an automated service delivery; 2) *Effectiveness and efficiency* as enabling optimal use of resources for citizens and tax payers in the service delivery; 3) *Participation* as mainly enabling the process of empowering citizens to legally control the service delivery to their advantage; 4) *Equity* referring to citizens receiving the service on an

equal basis; 5) *Rule of law* as ensuring that the laws and regulations governing the service are applied in an impartial way; 6) *Accountability* as creating standards against which the individuals providing the service and the service delivery can be held accountable; 7) *Responsiveness* as serving all citizens in a consistent and predictable way.

We found out that it is critical to make these attributes of good governance explicit from the project outset, and to get a consensus (or at least a shared vision) from the main stakeholders (decision makers) relatively to the project's goals with respect to enhancing governance. Based on this experience and on related projects, we set up a method that emphasizes good governance at each step of an eGov project and enables the project team to assess the impact of the resulting eGov system on governance. In this paper we present a generic version of this method.

2   The Fez e-Government Project

The e-Fez Project lasted about two years and was completed by June 2006. It was funded by the Canadian International Development Research Centre (IDRC) and conducted by a team of researchers, professionals and students from Al Akhawayn University in Ifrane, Morocco, with the collaboration of Canadian experts. The eFez project aimed to: 1) develop a pilot E-Government system that enables online delivery of citizen-oriented services to the local community; 2) propose a method that may be used to replicate the experience in other Moroccan cities; 3) to assess the influence of such systems on Moroccan's everyday life and on enhancing governance in general. The envisioned pilot system should enable citizens to receive services easily, efficiently, quickly, and equally, and should enhance local governance in a measurable way. Consequently, a special emphasis was put on motivating all stakeholders on sharing these goals and on the careful elaboration of indicators and measurement techniques to assess the project outputs with respect to enhancing governance [2].

Since all the services provided by the city of Fez could not be automated in two years, the project team, in collaboration with Fez' authorities, decided to concentrate on services delivered by the "Bureau de l'Etat Civil" (BEC).This office which has daily and direct contact with the local community, remained archaic: service delivery was conducted in a manual paper-based manner. Consequently, the project aimed at automating the back-office and enabling an electronic front-office. As a first service,

the team worked on computerizing the BEC citizens' records. The BEC back-office was automated through the digitization of all BEC's Citizen Record Books into a database accessible to BEC employees through networked desk-top computers. The front-office was automated by developing a portal and a related kiosk available for public use and adapted to illiterate end-users in order to facilitate the request of birth certificates and related documents. Hence, since the eFez System deployment in May 2006, citizens can use three different modes for the submission and processing of a birth certificate request: 1) going as usual to a BEC employee's desk; 2) using an interactive kiosk with an easy-to-use touch-screen interface with vocal feed-back (in French and Moroccan languages) such that even illiterate citizens may use it; 3) using an interactive portal accessible through the web from which the document request can be sent. In all cases the citizen has to go to a BEC's counter in order to to get the printed document and to pay fees to an employee.

This pilot project has been a true success with excellent feedbacks and noticeable satisfaction expressed by all stakeholders from the city authorities, to the BEC's officers and employees as well as to citizens. A survey conducted during May and June 2006 with more than 500 citizens (7.9% illiterate, 6.4 with only primary education, 32.9% with secondary education, 6.4% with junior high school, and 45% with university education) showed that 95% of them used the kiosk located in the BEC office. The satisfaction was exceptionally high: 91.2% of respondents were very satisfied (7% were satisfied) and 93% respondents qualified service delivery as excellent (3% rated it as good).

3   A Design Method for eGov Systems Emphasizing Good Governance

In order to deliver better quality ICT/eGov systems that will support enhanced governance, we claim that the whole process of developing and deploying the system should be carried out with the aim of improving governance. Hence, there is a need for a generic method that will guide the various stakeholders during the whole ICT/eGov project. Such a method should not only provide practical guidelines to system analysts and developers during the different phases of the project, but it should also provide means to raise the awareness of the various stakeholders involved in the project with respect to the impacts of their decisions on the governance

changes. This claim is justified by several pragmatic observations:

1) Introducing ICT/eGov Systems usually results in major changes in citizens' habits and in administrative services and these changes should aim at improving citizens' interactions with administrative services and insuring cost efficiency;

2) Numerous decisions have to be made at different levels of the organization's hierarchy, with a constant concern for improving good governance;

3) The main issues are not technological: they are mostly related to persons' openness and willingness to change their habits and to take the means of successfully carrying out these changes; hence, the need for the development and deployment of ICT/eGov systems that emphasize good governance;

4) A vision aiming at improving governance as much as possible should be developed during the earliest stages of the project and be upgraded and sustained during the duration of the project;

5) It is most important to involve all stakeholders as soon as possible in the project, and the best way of explaining them the project vision/orientations and of supporting their deliberations is to focus on the improvement of governance;

6) It is necessary to continually assess and monitor the indicators measuring the project's outcomes to insure governance improvements.

Based on our experience on the development, assessment and deployment of ICT/eGov Systems in Morocco and Canada, we proposed a generic method for the development and deployment of ICT/eGov Systems emphasising the improvement of governance. This method is quality-driven and inherits from the principles of software quality engineering [6]. It encompasses all the phases of system development, deployment and assessment with a special emphasis on the harmonization of the different views of the involved stakeholders in relation to governance improvement [1]. Here are some of the main principles on which relies our *Good Governance egov Development and Deployment Method* (GGegovDD Method).

1) All stakeholders must be involved as early as possible and their involvement and motivation must be sustained during the whole project;

2) A special care must be given to sustain favourable conditions for the project from its onset until its completion;

3) A special care must be devoted to the creation and update of a project vision to which all stakeholders will adhere;

4) Outcomes and outputs of the project must be identified as early as possible and refined during the

project with a special concern for governance improvement;

5) The method must cover all the traditional steps of information system development, delivery and deployment with an emphasis on quality software development related to improved governance.

Figure 1 presents a graphical overview of the GGegovDD Method. There are four main phases: 1) *Sustain Favourable Conditions during the whole project*; 2) *Inception*; 3) *Development and Deployment of ICT/eGov system*; 4) *Systematic Assessment of Project Outcomes*. These phases have been introduced in order to comply with the principles stated above. Here are the graphical conventions we use. The method's phases or steps are represented by plain rectangles. The main actors such as stakeholders and champions are represented by little 'human like' icons. The main data or knowledge stores which are input or output of phases or steps are represented by round-cornered rectangles. An arrow drawn from a round-cornered rectangle (data/knowledge store) to a rectangle (phase or step) shows that the associated store is an input to the associated phase or step. If the arrow is drawn the other way around, it means that the associated store is an output of the associated phase or step. Sometimes, the same set of round-cornered rectangles may be related to different rectangles, as for example the 'Expected deliverables', the 'Updated vision and expected outcomes' and the 'System quality attributes' in Figure 1. In such a case, we may embed all these round-cornered rectangles in a surrounding round-cornered rectangle: the arrows coming from and going to this surrounding round-cornered rectangle are equivalent to arrows reaching each of the round-cornered rectangles included in the surrounding round-cornered rectangle. A double arrow shows a bi-directional exchange between a rectangle (phase or step) and the associated round-cornered rectangle(s) (stores). The same representation rules apply to the links between rectangles and actors.

A cloud-like shape represents the relevant elements of the 'milieu' in which the method is carried out. In our case these elements essentially correspond to the conditions that influence the project (what we call the situation). The situation encompasses all the elements of the organization (ministry, municipality, company, etc.) that influence the organization's functioning in relation to its clients (mainly citizens in public settings, or the whole society if we consider a governmental point of view) as well as to the organizational, social, political and economical circumstances.

4   Description of the Main Phases

In the following paragraphs we provide an overview of the method presented as a directed walk through the elements contained in Figure 1.

The Phase *Sustain Favourable Conditions for the Project* (Rectangle 1 in Figure 1) is active during the whole project. It consists in creating and maintainning the conditions that will favour the project's progress. It mainly involves the various concerned stakeholders, among which we distinguish the project's champions (called eChampions) that promote and support the project at all the critical levels of the organization's hierarchy. The project's management team must be aware that certain stakeholders and eChampions may change from one phase to the other and act accordingly in order to maintain favourable conditions for the project, given the changes taking place in the organization. The thin dashed arrows in Figure 1 show that these favourable conditions influence every phase of the project.

The *Inception Phase* (Rectangle 2 in Fig.1) is also a critical phase for an ICT/eGov project which can only start when a minimal set of favourable conditions are met, among which the strong will and influence of high-ranked eChampions that support the project. These favourable conditions should build up during the phase. The eChampion and the development team must develop a clear and structured vision of the future ICT/eGov and of the outcomes it must provide to the organization and to its clients. The Inception Phase is paramount in helping eChampions shaping their vision and refining their expectations with respect to the project's output (project's deliverables) and its outcomes (project's results which are different from and often more global in scope than the deliverables). It is also during this important phase that the most critical stakeholders are led to share the project's vision and reach a consensus on its main targets (output and outcomes). This increases the favourable conditions for the project as represented by the large dashed arrow linking rectangle 2 to rectangle 1 in Figure 1.

The Inception Phase is composed of several steps that help understand the relevant elements of the *Before-Development Situation*, mainly be carrying out a *feasibility study* (including models of organizational procedures and of existing relevant information systems) and establishing a diagnosis related to the possibility of achieving the goals set to the project. During the Inception Phase, the development team must help the eChampions and stakeholders to clarify how the vision and project's

output and outcomes will enhance governance. This is a critical issue that aims at assigning the right goals to the project for the right reasons. From a technical point of view, the development team and certain technical stakeholders should also set up technical norms and goals based on quality criteria fostering improved governance in order to orient technical decisions related to the system development and deployment (to be used in the next phase: Rectangle 3 in Fig.1). The Inception Phase ends with a general presentation of the main findings of the phase to the eChampions and decision makers which will have to decide whether to carry on the project or not, taking into account the available resources, the anticipated risks and the presence or absence of favourable conditions. As shown in Figure 1 the main outputs of this phase are the '*Expected deliverables*', the '*Updated vision and expected outcomes*' and the '*System quality attributes*' as well as the *Plan, Method, Resources, Results of the Feasibility Study* which are all inputs to the *Development and Deployment Phase*.

The *Development and Deployment Phase* (Rectangle 3 in Fig. 1) starts whenever the GO decision has been made by the authorities after the completion of the Inception phase. A critical success factor is that favourable conditions are maintained all along this phase. All the Inception phase's outputs are available during the development of the ICT/eGov system. It mainly consists of sub-phases similar to those found in traditional analysis and design methods applied to the creation of information systems, mainly: requirement analysis, development of a strong system architecture, business analysis, refinements and development of new workflows taking into account the introduction of the ICT/eGov system in the organization, usability analysis, interfaces' and system's design, implementation and tests, deployment and adjustments). Again in this phase both organizational issues (procedures, workflows, business rules etc.) and software development issues are addressed. The technical norms and goals based on quality criteria fostering improved governance and set up during the inception phase are refined during the development phase and give strong directions to the development and deployment of the ICT/eGov system. As in all the method's phases, a special emphasis is put on respecting the project's vision, which has a strong influence on the system's architecture and on making decisions with the aim of achieving the best outcomes set up during the previous phase. Hence, there is a guarantee that the project will provide the best outcomes and achieve the best results that can be achieved, given the situations that prevailed

before and during the development and deployment of the system. This emphasis on working towards a significant improvement of governance should be adopted by all the development team members as well as by the majority of stakeholders.

The *Systematic Assessment of Project Outcomes* (Rectangle 4 in Fig.1) is also a very important phase of the method that is carried out in parallel with the other phases. Its goal is to systematically assess and monitor the evolving situation during the course of the project with respect to the achievement of the expected project outcomes and to the respect of system quality attributes toward improved governance [1, 2]. Again during this phase, favourable conditions should be maintained and they may be different/complementary to those that prevail during the other phases, since the right setting must be set up in order to conduct the various investigations needed to carry out the various assessments. A scientific analysis of the results must be done in order to assess, explain and justify both the outputs delivered by the project with respect to the expected results, and the project's impacts with respect to the anticipated outcomes and the project vision of improved governance. Hence, a first assessment of the situation is done in parallel with the Inception phase to get data which will be used to measure the indicators associated with the expected output of the system. As presented in [1, 2], we developed a specific approach to identify such indicators and measures and applied it to the eFez Project. The first steps of this approach (mainly the selection, definition and refinement of suitable indicators and measures, significantly contribute to the refinement of the anticipated outcomes carried out during the Inception phase (represented as a feedback loop by a dashed arrow linking rectangle 4 to rectangle 2 in Figure 1). In the same way, the assessment of system's quality factors in parallel with the Development and Deployment Phase can raise some warnings that will enable the project managers adjust the course of this phase. This is also shown in Figure 1 by the dashed arrow between rectangles 4 and 3.

As an illustration, Table 1 shows the main Citizen-related governance attributes measured before and after system deployment. Columns 1 and 2 present the governance attributes and the corresponding indicators to measure them. Columns 3 and 4 respectively indicate the indicators' values obtained before and after system deployment. This table clearly demonstrates improvements of citizen related governance. Similar results have been obtained for the assessment of outcomes related to BEC employees and to the city's top-level management

5   Conclusion

In this paper we presented a generic method that emphasizes good governance at each step of an eGov Project and enables the project team to assess the impact of the resulting eGov system on governance. We successfully applied it to automate BECs' services in the city of Fez. This pilot project has been a true success with great satisfaction expressed by all stakeholders from the city's authorities to the BEC's officers and employees as well as to citizens. One of the phases of the method allows a systematic assessment of project outcomes. It enabled us to assess project's outcomes and show significant governance improvements. This method is currently applied in other Moroccan cities and plans are in the works to extend it at a national level.

6   Acknowledgements:

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Governance Attributes	Measured Indicator	Value before automated system deployment	Value after automated system deployment
Effectiveness and efficiency (as a citizen user)	Efficiency: optimal use of resources for citizens to request & obtain birth certificates (BC)	**No,** requesting & obtaining BC is costly for citizens: 1) extended waiting time; 2) several trips to BEC; 3) need to tip (or use social connections)	**Yes:** Citizens making time/money /effort savings in requesting and obtaining BC: (no waiting time, only one trip to BEC, no tip)
Effectiveness and efficiency (as tax payer)	Efficiency and effectiveness of using public scarce resources	**No,** 1) 3 employees needed to deliver BCs, BEC when demand on BC is low to moderate **; 2)** When demand is high (from June to September), All 10 BEC employees only process BC requests	**Yes:** (casual calls on employee time with the elimination of 5 full time employees) ▪ No full time employee is needed ▪ With the kiosk: no employee is needed to process the requests
Equity	citizens served with equity	**No,** Usually queuing/waiting creates motives and conditions for bribery incidents. Citizens find themselves obliged to tip the employee to be served,	**Yes;** 1) ICT eliminated the need for citizens to tip; 2) All citizens are served on a timely and similar manner (regardless of social class)
Rule of law	Laws are applied impartially	**No** 1) Equity is violated; and violations are perceived as normal: 2) Many violations of law as people paid for privilege (queue jumping)	**Yes;** 1)Unnecessary need to tip reinforces the law of equity: 2) Elimination of the need for violations of the law through tipping
Participation/empowerment (i.e. citizens are empowered to legally control the service delivery to their advantage) Process of elimination of middle person in service delivery	Citizens' active participation in BEC services	**No;** Citizens were not participating actively in the service delivery	**Yes;** Citizens through the kiosk/online service delivery: they actively participate in the service delivery,
	Dependence of citizens on employees' good will	**Yes;** Citizens were at the mercy of employees to get served	**No**; Citizens through the kiosk/online service delivery: they are not at the mercy of employees

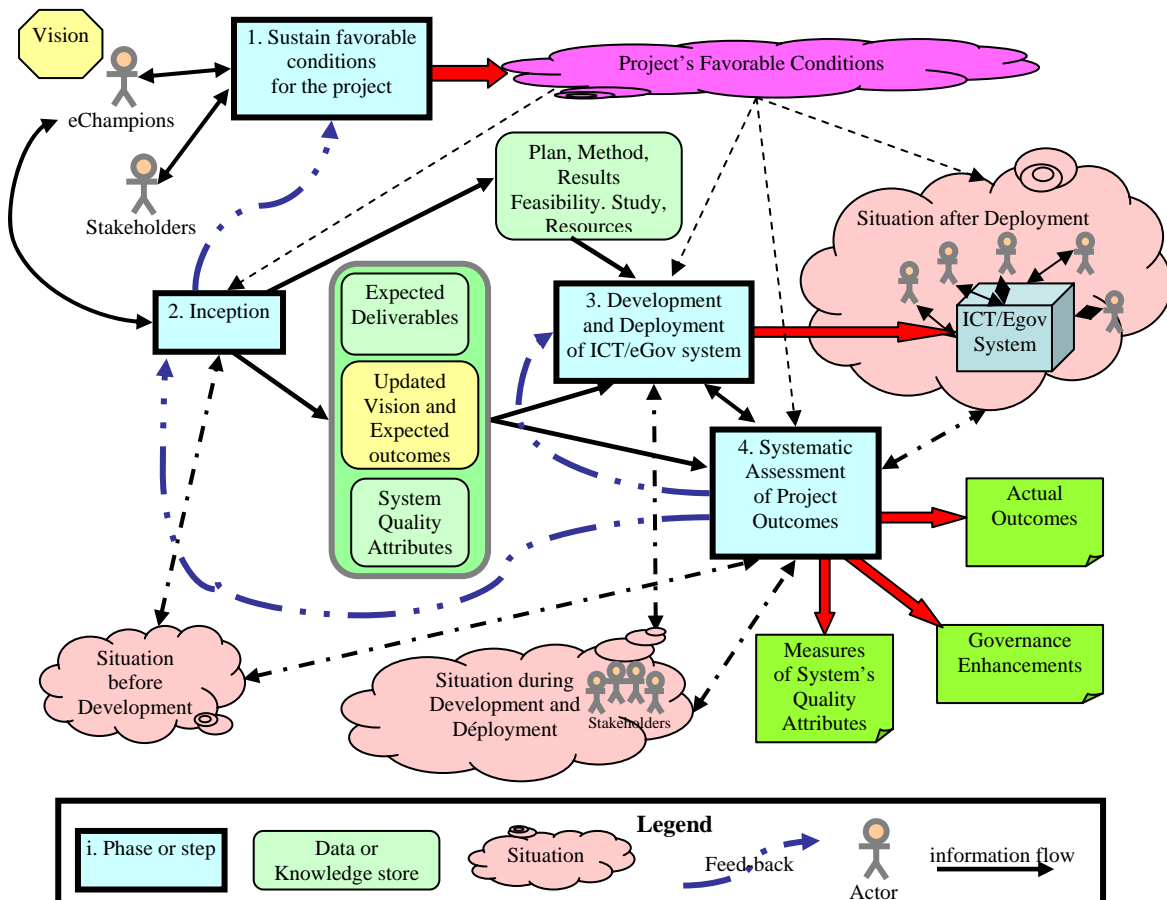Table 1: Citizen-related governance attributes measured before and after system deployment

Figure 1: Overview of the GGegovDD Method