On e-Government Project Development in Balmeda

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Abstract. An e-government project management and development scenario in a fictional country is described. Emphasis is given on how local culture undermines project quality. A detailed fictional project development scenario is presented. The interplay between different players, i.e. project developers, reviewers, and public services, is illustrated. While the rules of technology are the same everywhere, local adaptation due to socio-economic factors can bend them to the degree of making them ineffective.

Keywords: e-government, project management, life-cycle, requirements, implementation.

1 Introduction

Is ICT project management in less developed countries performed in the same way as in top of the GDP list countries? Are the project development rules equally effective everywhere? How do the characteristics of local societies affect this process and the final quality? Can formal specification methods be applied with equal success everywhere? Is the outcome of the project of the same quality everywhere? How do differences influence the ICT infrastructure, which is offered to the citizen and to the business sector? These are some of the questions, which are addressed in this paper by giving a condensed scenario of project management and development.

Information Systems in Developing Countries (ISDC) research cites ICT development as a process of technology and knowledge transfer and adaptation to local social conditions [1]. The important theme of ICT failure is often discussed in connection with ICT systems design and implementation research issues, emphasizing on the complex interplay of action and local context and the gap between the professional knowledge and practice of systems development and the actual conditions of organizational practice in developing countries. Within

A.B. Sideridis and Ch. Z. Patrikakis (Eds.): e-Democracy 2009, LNICST 26, pp. 259–269, 2010.

current e-government research, significant recognition of human and other contextual factors that influence or mediate the impacts of e-government has been achieved [2]. Considerable research efforts have been made towards improving the understanding of the interaction among technology, organizations, and environments in e-government initiatives [3], and the primary challenges are categorized according to their core aspect into: (1) information and data, (2) information technology, (3) organizational and managerial, (4) legal and regulatory, and (5) institutional and environmental.

While M. Ayyad thinks that "all nations face the same problems" w.r.t. e-government [4], M. Yildiz supports the view that e-government research suffers from oversimplification of the e-government development processes within complex political and institutional environments [5]. According to the technology enactment view of e-government, adoption and implementation processes transform the objective form of ICT to its enacted form, in other words, technology is customized to the needs and the environment of a specific organization through the process of enacting. The context of the existing institutional arrangements, organizational forms and the involved stakeholders interacting, determine e-government initiatives as complex socio-technological systems [5], rather than deterministically approached technological ventures. In a few words, e-government quality can be poor and e-government projects can fail for complex reasons.

Spectacular project failures are not rare in history. A recently popular story is the history of Vasa. Vasa was a warship, which was built between 1625 and 1628 for the royal Swedish navy. It sank in the bay of Stockholm only half an hour after it was launched, thereby causing a huge waste of resources and a plunge in national prestige. The documentation of the trial, which followed the spectacular failure, has allowed today's researchers to partially assess the underlying reasons. In the literature of software technology and project management Vasa [6] serves as an example of patterns, which can also be found in these areas and should be avoided.

In modern times another spectacular failure has been documented by H. Goldstein in [8]. He explains how 700,000 lines of code in a $170 million project were scrapped together with the project itself. The Virtual Case File (VCF) "was supposed to automate the FBIs paper-based work environment, allow agents and intelligence analysts to share vital investigative information, and replace the obsolete Automated Case Support (ACS) system."

In a broad sense both failures can be regarded as a (lack of) know-how problem, not only in their specific technology areas (ship-building and software engineering respectively), but also in project management and formal specification. Swedish shipbuilders of 1620's had never before constructed a ship with two rows of canons. They did not know how to prepare and use a detailed plan before moving to actual construction. Management was chaotic, and the broader management group included non-experts, including the king himself. Requirements were not clear from the beginning and they were changing even within advanced phases of development. Finally, pre-launch testing was inadequate. The

VCF was more of a complexity problem, which could be confronted by modern formal specification and description technology.

Such failures are treated in the literature as examples of breaking the "rules." Rules consist of mainly two sets: (a) Project management rules (which, in the area of software development, usually embody a clear life-cycle model), and (b) formal specification. The second set is optional, but it is strongly recommended in the design of complex systems or systems with intense reliability requirements. Note also that we are speaking of today's rules and technologies, which were largely unknown in the age of Vasa.

On the contrary, in this paper we present a scenario, which involves persons who usually are aware of the rules, but they consciously decide to bend them. We show that local culture can have a profound effect on project execution and on final product quality. The scenario is not real in the sense that it consists of a mixture of elements that (a) may belong to different occasions or (b) may be fictional, but, to the best judgement of the authors, could possibly happen.

2 The Environment

The aforementioned scenario is presented in the context of a fictitious country, which is called *Balmeda*. Balmeda is a typical country of the European South. Its inhabitants exhibit a mixture of Mediterranean and Balkan mentality. European South is less industrial and less well organized than North. The lack of organization is partly balanced by the warmer climate. Eventually this gives a subjective feeling of happiness and well being, which gives high values to life quality indices. GDP in the South is typically lower than the GDP in the North, but it is underestimated since it does not include black market, which is again typically stronger in the South.

Balkan mentality has inherited reactions from an era, in which Balkans belonged to the Ottoman Empire. This era is for some regions less than a hundred years distant. Around 1900 the organization of the Ottoman Empire was substantially different than European organization. The latter was mainly industrial and offered a large collection of public services including public order, healthcare, transportation and communication infrastructure. The Ottoman Empire was forced by the Great Powers to adopt most of these services in an effort towards modernization, i.e. incorporation in a global production scheme. Brailsford, an English journalist, gives a detailed account [9] of the results in 1906: "In a vague way the bureaucracy has learned that certain institutions utterly foreign to its own civilisation exist among the greater Powers, and for ends of its own it has attempted to imitate them ... This comical anxiety to ape Europe has no other result than to confuse the minds of the official class, to burden the treasury, and to distract the Government from humbler work less hopelessly beyond its competence ... Its inhabitants are not citizens but subjects. No sense of a commonwealth has grown up in their minds to bridge this isolation, or to cement warring races in a care for their common country ... Before the superficial and insincere aping of Western peoples during the last generation, there was no place

even for civil law, not to speak of such comparatively modern functions of the State as the care of education ... The military proper and the gendarmerie were concerned not so much with the preservation of order as with the maintenance of the system of ascendancy ... There are no terms in our language in which this system can be adequately described." In other words, the Ottoman State was a system optimized for conquest and occupation, not for industrialization.

However, Balmeda is not an underdeveloped country. It is an EU member and, therefore, it satisfies the EU economic and political criteria, albeit some of them marginally. A detailed analysis of the country would entail a description of its educational and economic structure, but for the sake of brevity casual references will be made only when necessary.

3 The General Projects Office

A few years ago Balmeda decided to set up a General Projects Office (GPO). All projects of almost any nature must be submitted to the GPO in order to get a license (and pay a fee). GPO has more than 100 local offices, which deal with local project submissions. If they are within the competence of the local office, the proposal is reviewed locally, otherwise it is forwarded to the closest competent office. A central office in the capital city of Balmeda can deal with any kind of proposal, therefore it ensures that all proposals can finally be accommodated.

GPO ensures that the proposal is sound, useful, financially and technically feasible, manageable, and well documented. Projects fall into a number of categories. For each category a set of concrete review steps has been determined. The rules are the same for both private and public projects. GPO claims that its reviews are unbiased and purely technocratic Some general policy criteria (for example, environmental protection, respect to local tradition etc.) apply in its decisions, but the criteria are open, well known and have been set by the parliament. Occasionally criticisms regarding the influence of local financial, political and personal relationships on GPO's decisions find their way to the press. Also, some cases of bribery have been uncovered, and GPO decisively lowers Balmeda's CPI (the subjective Corruption Perceptions Index of Transparency International), which is close to the CPI averages of Mediterranean countries and Balkan countries, but very far from the average CPI of Nordic countries. The government has considered a random re-distribution of the reviews among GPO's offices, but this solution was found impractical, as most of the proposal reviews require a series of local inspections.

In Balmeda e-government is rapidly gaining momentum for a number of reasons: (a) It is recommended and partially funded by the EU, (b) it relies on automation of decisions, which can possibly reduce favoritism, (c) it brings cost reduction and it increases efficiency, (d) it improves the quality of services, which are offered to citizens, and (e) it gives an incentive to citizens and businesses to buy computers and fast Internet connections; this improves the country's ICT infrastructure. Such conceptualizations of the e-government are common [5,7].

4 The Main Story

4.1 Call for Tender Phase

A few years it was decided that GPO should enter the electronic era. An open tender for proposal was launched. Some of the terms of the tender have been:

- All local offices of GPO and all of their procedures should join e-government.
- Any existing electronic infrastructure should be incorporated into the new system, unless it is definitely obsolete.
- The final set of requirements should be formulated by consulting all GPO's offices. The development phase would be able to start only after a thorough review of the requirements and only if they were found complete.
- Testing should include a pilot phase, in which the system would run in selected offices for a few months.

The project of modernizing the GPO was found sound and was summarily approved. Immediately after the approval the tender was publicly announced. The contestants were three well known companies of the software sector. The contract was awarded to the Balmedan Advanced Software Technologies (BAST) on the basis of a combination of low cost and past experience in developing and installing e-government systems.

Although the GPO was the usual external reviewer of all projects, it was the client in this particular project. Therefore it was deemed inappropriate to play both roles. Of course GPO employees would participate at least in the requirements collection phase, and in the testing phase, but an additional tender for the supervision of the project was launched. Valid contestants would be consulting companies. *Way Forward Consulting* (WFC), a small Balmedan consulting company, was given the inspection and quality control project. Some large international consulting firms operate in Balmeda, and they immediately filed a protest against this decision saying that the WFC offer was too low. They backed their statement by pointing at the large number of local offices, which should be visited by the inspectors at least on a statistical sampling basis in both the requirements collection phase and in the testing phase. Their plea was rejected on the ground that the inspection could be based mainly on paper and software deliverables.

There was a more serious reason, which could have excluded WFC. The technical expertise to inspect a project of that scale did not exist within WFC, since the permanent personnel of WFC mainly consists of experts in finance and general project management. Having foreseen this obstacle, WFC had asked for the cooperation of three university professors, A.B., C.D. and E.F. who did have the required technical expertise. Their CVs had been included in WFC's response to the tender. It is a usual Balmedan practice to include professors in review, inspection and audit committees. When a GPO or other public sector committee is about to officially accept the results of a project (or a tender), it sets up a secondary "committee of experts," who accept the responsibility to review the results (in a tender, to confirm that the chosen contestant was the right one). After all

they are experts, aren't they? Professors who are badly paid or belong to the ruling political party usually accept this risk. The role and effect of external advisors has been recognized in the literature [11].

4.2 Requirements Collection

The first deliverable involved a presentation of the existing situation in local offices, in terms of both infrastructure and procedures. The term "requirement collection" is rather weak in describing the real task, which consists of the following steps:

1. Write down all existing processes and procedures, including alternative actions towards the same end,
2. describe them in terms of concrete and discrete simple steps,
3. redesign processes in order to make them simpler, if possible, and more amenable to mechanization.

Step 3 requires a through understanding of all processes and objectives and its importance and required effort cannot be overestimated.

BAST visited a small number (less than 10) offices and contacted a few more by phone. The BAST emissaries met sufficient resistance from local office employees, who were unwilling or too busy to provide them with suitable input, or they could simply not understand the exact purpose of the visit. Of course the latter carried a letter, which assured the office head that they were entitled to ask for information. Moreover, the office employees often followed less than clear procedures, they had multiple responsibilities, and the forms they finally filled was the only uniform element in all offices.

A BAST employee, who was fairly experienced in writing deliverables was commissioned to prepare the requirements deliverable. Despite the small number of offices that were visited, all existing infrastructure was deemed obsolete. All data found in older systems were considered either unimportant or impossible to port. Effectively this meant that (a) no data migration was needed, (b) no interface or other interworking mechanism with older systems was needed, and (c) new equipment was necessary. A few weeks later the deliverable was presented at a joint meeting of the BAST project team, representatives of the GPO, and WFC members, which included the three professors. After the slide presentation of the main results, which actually were very poor, prof. A.B. made the following observation: "This deliverable describes the process of collecting requirements, and the difficulties in achieving this purpose. However, it does not deliver the promised results, namely the requirements per se. In this sense the deliverable must be clearly rejected". A GPO representative, who probably was offended by the negative colors, in which GPO's response was presented, asked for the addition of a phone number list of all GPO offices in the deliverable. He implied that perhaps most offices had not been contacted. If this were true, the contract would have clearly been violated.

The BAST employee, who served as a project manager, promised that a second version of the deliverable would present the requirements. He asked however for

a deadline extension, which effectively meant that it would appear together with the next deliverable on system architecture. The obvious interpretation of this statement was that requirements would appear as a byproduct of the first version of the real system.

4.3 Development

In the following few months BAST presented a first version of the system, which mainly consisted of the user interface, but the actual behavior behind the curtains of the interface was largely absent. Nevertheless there was substantial progress, which showed that the development team had acquired significant knowledge of the GPO internal organization, even though this was not achieved from the requirements phase. BAST had hired two GPO employees, who in their spare time provided consulting services to the BAST team and remained invisible throughout the project. The requirements deliverable was also updated. Its bulk consisted of printouts of different instances of the user interface. The person who presented it argued that the requirements were obvious from the interface, since all important functions and their sequencing were represented by the "buttons" and fields of the interface. A long list of comments was written by the review committee and the deliverable was marked as "pending acceptance."

The next meeting of the joint review committee took place prior to testing. In the meantime a new project manager was appointed by BAST. He immediately asked for the extension of some deadlines, in order to find the time to get acquainted with the project. In the meeting version 2.0 of the system was presented, which was ready for final testing before targeting (i.e. before installation at real offices). A test description deliverable was also presented. Prof. A.B. made the following observations:

1. Version 2.0 of the system showed significant improvement over version 1.0, but he was hardly convinced that it was ready for testing.
2. Test descriptions were fuzzy, as they did not describe concrete tests, but they rather indicated possible areas of testing in broad terms.
3. A test plan was absent from the deliverable.

Finally, A.B. asked for direct access to the system pilot, which was installed on a BAST server, for testing purposes.

Prof. C.D. offered a few other angles of view:

1. He said that what actually was done by the system was a duplication of the work of the GPO employees. GPO's main objective was the technical approval of submitted projects. Every project proposal was reviewed and approved step by step. He said that while the system did nothing to really help with the technical review of a specific proposal, it asked the public servant, who was responsible for the review, to write the equivalent of a short status report in each step.
2. Effectively, this system helped the local and global GPO management be in control of the progress of GPO works, but it did nothing to improve the core business.

3. Project proposers, i.e. GPO's actual "clients," were asked to fill and file the same application form, albeit electronically. This might save them one or two visits at GPO's offices, but they were asked to collect and bring any supporting documents by themselves. Moreover, documentation could not be submitted electronically. Therefore personal visits to the offices were not eliminated. He also said that ideally the citizen should not be bothered for documents, which were produced by other public services; they should be collected by using direct electronic communication between the GPO and these services. Effectively, GPO should serve as an *one stop shopping* point for the citizen (or the business).
4. He added that this latter point made the GPO e-government project hardly legal, because there were explicit EU rules saying that the main objective of e-services was to simplify the life of citizens. On the contrary, this project mainly aimed at improving the internal function of the GPO (which also was questionable according to observation 1).

Then a GPO employee stood up and said that he had discovered another annoying problem in the presentation of the system. According to internal GPO rules concerning the review of any project, project steps were approved sequentially (i.e. a waterfall model approach [10] was applied). In system version 2.0 when a step was approved it was marked as "closed." This meant that this step could not be revisited. He was interrupted by a BAST programmer (originally a chemical engineer), who was responsible for the implementation: He said that irreversibly closing a step conformed to an anti-corruption requirement, which protected the citizen from drawbacks in the proposal approval process. The GPO employee offered one or two practical examples, which definitely proved that the waterfall model could not be applied strictrly, i.e. without going back to previous steps. The programmer said that he would consider an appropriate solution without sacrificing the guarantees against corruption.

After the meeting a private discussion between A.B., C.D., and the new project manager took place. Both reviewers criticized the situation of the project and they said that the quality of the software was unacceptable. The manager said that the performance of his company was not below average. He added that this was typical Balmedan software quality. He boldly declared that he was not be willing to spend more than average resources, because if he did so, his company would loose its position in the internal market. Later in the day both A.B. and C.D. received a phone call from their colleague E.F. He said that one of the managers of WFC had called him and asked for the patience and tolerance of the reviewers w.r.t the project.

4.4 Testing

A week later A.B. and C.D. were granted remote access to the system, as they had required. They started a kind of unofficial testing and spent 2-3 days in trying to make an exhaustive search in the different menus and branches of the system. Since they were not real experts in GPO operations they were unable to

find any major logical errors (similar to the one mentioned by the GPO employee in the last meeting). However, they found that safeguards to prevent erroneous and double data entries were largely missing. They also found several input sequences, which made the system crash. Then they produced a detailed report with all their findings, including the error conditions.

A few days later the first "public" tests took place. It involved actual GPO employees as testers according to the contract. The tests were conducted in the premises of BAST. A sample of 20 GPO employees from five different offices were seated in front of an equal number of terminals. A BAST representative distributed around 50 test sheets of paper. Each sheet described a single test. Then he instructed them to perform each test step-by-step at the same time. At the end of a test they signed the corresponding sheet and wrote a "pass" verdict. The testers were not allowed to conduct their own tests, but even if they were allowed to, most of them would not know what to do. Their experience with computers was limited and they were not aware of the capabilities of the system, which they actually saw for the first time.

Load and stress testing were among the last tests to be conducted before pilot installation in selected GPO offices. Although these tests were mandatory according to the contract, they were insufficiently described in the testing deliverable. One test for each kind test type was performed by using an automated tool. In the next deliverable, which gave an account of all tests (save the tests which were independently conducted by A. B, and C.D.), the results of the load test were astonishing. The more the system was loaded, the better it seemed to perform.

A month later a system beta version was installed in selected GPO offices. A few more errors were located and some last corrections were made. BAST was awarded an education (of GPO employees) and maintenance contract, which assured that unexpected user behavior would be minimized and future problems would be solved. The normal operation of the system started right after the pilot phase.

A few months later a citizen's project was approved by the GPO and he received a notice to pay €1000 for the license. He was assured by the system that a discount of 10% was applicable on immediate payments. He duly transfered €900 from his bank account to the GPO. A month later he received a notice to pay €400 more. He paid a visit to the GPO in trying to find an explanation. He was informed that he had paid only €900 of the total €1100 he originally owed and that the rest €200 was a fine because the payment was overdue. Two hours later a local office employee eventually understood and admitted the mistake. The discount was added to the original sum instead of being subtracted. He said, "alright, this is no big deal. Pay the €400 now, so that you are not fined again by the computer, and within six month time we shall manually correct the mistake and reimburse the money."

5 Analysis and Conclusions

It could be easily argued that, as in the case of Vasa [6], every single rule of good software production was broken. Requirements were incomplete, they were

definitely not fixed before proceeding with development, process re-engineering was omitted, development was done in a rather ad hoc manner, and testing was minimal and erratic. However, and in contrast with the Vasa story, (a) we have a better knowledge of both the story and the environment, and (b) the architects of the system cannot plead ignorance. While Vasa was an innovative ship (in the Swedish environment at least) the GPO system was a rather common e-government system. Among other arguments, which allowed BAST to be awarded the contract, was its extensive experience with e-government projects.

Not only general software development rules were broken, but also specific requirements of the contract. However it is fair to say that Balmedan calls for bids often involve too strict and grandiose requirements, which give an air of impartiality and seriousness to the call. Such requirements also repel some contestants, who think that they are impossible to satisfy. In short, the collection of information of all local offices was rather far fetched. On the contrary, an inspection of a representative sample of offices would be both sufficient and necessary.

Why did the project manager object putting enough human resources into the project? Was the funding insufficient? In fact the funding of Balmedan projects is rarely insufficient. However, rumors exist that the budget is not always consumed for the project per se.

Does the inclusion of strict reviewers improve the final outcome? In as much as their suggestions concern minor details, which can be patched easily, there is some improvement. However, suggestions with serious consequences (e.g. the one stop shopping approach, or the restructuring of processes, or the suggestion for detailed testing) are set aside. Actually in a corrupt environment strict reviews, even if they are sincere, can further reinforce corruption. They can be used as an argument to increase protection money. Effectively this decreases the actual funding of the project.

Is there a lack of education in Balmeda? Each year some thousands of software engineers and computer experts are produced by its higher education. Why do they not apply the principles they have learnt? Obviously for two reasons at least: (a) Because they have a limited resources (time and money) to produce an outcome, and (b) low quality personnel is often hired.

What is the the role and negotiation power of private IT vendor firms and policy networks, and what is the way these actors influence the government policy-making processes, in the case of e-government projects [5]?

Finally, why does the Balmedan society tolerate an e-government quality that degrades public services and the quality of life in general? First of all the bulk of the population has never seen a better quality, with which to establish a measure of comparison. Second, as it was said in the beginning of the paper, the average Balmedan citizen keeps in himself an image of a rather hostile state, which provides minimum care and bad services. Not only are his expectations low, but he also thinks that his interests are best protected when a faulty e-government system exists. In such an incomplete environment there are ways to hide himself and opportunities to negotiate with representatives of the state face to face. Of course, since everything must be built on a thin infrastructure, making business

in Balmeda is more expensive than elsewhere and life quality is only supported by the mild climate.

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