

INVESTIGATION OF E-GOVERNMENT INFORMATION SYSTEMS AGILITY

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Abstract: Since their appearance around '90s, agile software development methods have gained significant attention in the software engineering community. What about the application of these methods in the electronic government (e-government) field? This paper aims to explore the possibility of applying these methods in e-government projects development, especially for developing agile e-government information systems.

1 INTRODUCTION

The emergence of RAD (Rapid Application Development) in the late 80s has marked the beginning of a methodological revival upsetting the traditional methods of software development and IT project management. In fact, past practices (V life cycle, waterfall life cycle, UML ...) were forced to give way to approaches more adapted to changes and new technologies, quality-conscious and based on iterative processing. Thus, agile methods have emerged in the 90s and were derived, almost all, from the industrial world. They were born in response to the new economic context, in which, software products are becoming larger and more complex. At the same time, stronger market pressures are forcing software engineers to develop projects rapidly with maximum profit. Furthermore, customers are demanding more with better quality, and requirements keep changing (Juha 2003).

In e-government, the concept of agility is new, but seems attracting, due to the permanent changes in the environment (economy, technology, social...) which in turn cause changes in the governments' regulations that may affect public administration processes and systems. The objective of engineering e-government information systems is to support human activities efficiently, to clarify processes and

to make decision making more transparent. The development of agile information system for agile public institutions requires consideration of evolutionary aspects and involves development of methods and techniques supporting agile responses against the various changes.

This work aims to investigate the possibility of applying agile software development methods in e-government projects development, especially to develop agile information systems dedicated to e-government. Hence, it is organized as follows: Section 2 introduces the concept of agility. Section 3 describes the main existing agile methods. Section 4 explores the possibility of applying these methods in e-government projects. Section 5 gives some conclusions and future work.

2 AGILITY CONCEPT

Agility is defined as the ability of an organization to respond quickly to market changes and adapts and reacts flexibly to unpredictable changes in order to face the threats of its environment (Breu et al. 2001). For some ones, agility is more synonymous with the ability of reconfiguration, and for others it is more synonymous with flexibility, reactivity and sometimes with adaptability. Kidd (1994) argues

that agility is not only the flexibility and reactivity, but it is a broader concept that incorporates both flexibility (which measures the ability of an enterprise to be aligned, with equivalent technology, to a given level of production); reactivity (which corresponds to the speed at which an enterprise responds to the changing demands of its customers, including unanticipated requests) and even adaptability (which is the ability to cope with newness which is often translates as positive and flexible attitude to meet needs for change).

3 AGILE METHODS

Agile methods are a set of methods of IT project management and software development that are characterized by their adaptability to the context (Guillaume 2005). They focus on generating early releases of working products and on delivering business value immediately from the beginning of a project (Juha 2003).

A key difference between agile methods and past iterative methods is in the length of iterations. In the past, iterations might have been three or six months long. With agile methods, iteration lengths vary between one to four weeks, and intentionally do not exceed 30 days. Research has shown that shorter iterations have lower complexity and risk, better feedback, and higher productivity and success rates.

The various existing agile methods and techniques they propose are relatively similar within a common trunk from the RAD (first agile method developed). Nevertheless, they all offer technical complement each other or more appropriate depending on the type and the size of project.

3.1 RAD

The RAD (Rapid Application Development) method is the first agile method developed in 1991 by James Martin (Ducept 2002) and consists of a short development cycle based on three phases within 90 days of ideal and 120 days maximum.

3.2 DSDM

DSDM (Dynamic Software Development Method) was developed in 1994 as a framework of controls for RAD, supplemented by guidance on how to apply those controls.

3.3 SCRUM

SCRUM has been developed in 1996. SCRUM'S main idea, is that systems development involves several environmental and technical variables (requirements, timeframe, resources and technology) that are likely to change during the process.

3.4 XP

XP (eXtreme Programming) has been invented for the first time in 1996. XP process can be characterized by short development cycles, incremental planning, continuous feedback, reliance on communication and evolutionary design (Beck 1999).

3.5 RUP

RUP (Rational Unified Process) method was developed in 1998. It is an iterative approach for object oriented systems and it strongly embraces use cases for modeling requirements and building the foundation for a system.

3.6 FDD

FDD (Feature Driven Development) was developed in 1999 (Williams 2007). It is a highly iterative agile software development process that is focused on delivering frequent, tangible and working results.

3.7 ASD

ASD (Adaptive Software Development) was developed in 2000 (Pekka et al 2002). It focuses mainly on the problems in developing complex large systems. The method encourages incremental, iterative development, with constant prototyping.

3.8 CRYSTAL

More than a method, Crystal is a family of methodologies developed by Alistair Cockburn in 2000 (Pekka et al 2002). Crystal family includes different methodologies for selecting the most suitable methodology for each individual project.

Agile methods are increasingly used in the industrial world and respond better to the problems of software development and IT project management. The practical benefits they bring to the field of controlling time, cost and quality explain their growing success. In this next section, we explore the possibility of applying these methods in e-government projects.

4 AGILE METHODS IN E-GOVERNMENT

4.1 e-Government

E-government is simply defined as the use of information and communication technologies (ICTs) to improve the processes of government. Professor Denis Tsihritzis defines E-government in (Khadraoui et al 2005) as “the application of information technologies and the adaptation of the processes and structures in order to improve information, communication and cooperation between the government authorities and the companies, the citizens and the nongovernmental institutions, thus with the centre even of the government”. Many other definitions have been proposed. They can be grouped into three main categories (Finger 2004): in the first, is the satisfaction of citizens which constitutes the major axis of the development of E-government. The second category defines the e-government as a process of interaction, while the third and last category includes definitions which estimate that they are the technological tools and the possibilities that they offer to the users who dictate the development of E-government. The first category is illustrated by the definition given by (Deloitte Research 2000). The second category is illustrated by the definition given by (Schedler et al. 2001), while the third category is illustrated by the definition given by (Gordon 2002).

4.2 Need of Agility in e-Government

The need for agility within government is mainly due to the permanent changes in the environment (political, economical, social and ecological) which in turn cause changes in the governments' regulations that may affect public administration processes and systems. To reduce “time-to-market” with regards to new decisions, regulations, and laws, it is necessary to equip public administration with tools supporting agile response to changes. A change in one activity in a process or in one part of an e-government system may cause many problems in other parts of the same process or system. Therefore, there is a need for resolving changes in an agile manner (Mentzas 2007).

For these reasons, we are convinced that agility must be integrated as a quality of e-government information systems. To achieve this objective, it is important to promote technologies supporting the agility. It is necessary to be able to modify more

quickly and more surely the systems in order to take into account the different evolutions (Bonnet 2008). For that purpose, It is necessary to return to fundamental composition of an e-government information system and investigate the different sources of agility production in each part, mainly the agility of the front office (citizens), the agility of middle office (institution information system) and the agility of the back office (institution), from the points of view tools of development, technologies, involved people and context.

4.3 Agile Methods for Agile e-Government Information Systems Development

The goal of Agile Methods in developing e-government information systems is to allow an institution to be agile, but what does it mean to be Agile? Jim Highsmith says that being Agile means being able to “Deliver quickly. Change quickly. Change often” (Highsmith 2000). While Agile techniques vary in practices and emphasis, they share common characteristics, including iterative development and a focus on interaction, communication, and the reduction of resource-intensive intermediate artifacts. Developing in iterations allows the development team to adapt quickly to changing requirements. Working in close location and focusing on communication means teams can make decisions and act on them immediately, rather than wait on correspondence.

Until today, there is no study proves that the use of an agile method for development, guarantees an agile solution. However, it is extremely probable that the combination of agile development methods with agile tools, techniques, and agile team contribute to obtain agile solutions. This is theoretically true because agile development methods are adaptive to the change, thus it guarantees the agility of developed solution, at least during the development process of the project. In addition, once the project is finished, the agility of the developed solution, in terms of interoperability, integration and evolutivity depend on the agility of the used tools, such as IT infrastructures, middle -wares, and organizational aspect of the IS.

The development of an agile e-government information system by applying one of the agile development methods must pass firstly by the choice of the most suitable method. Among all the agile methods seen in the preceding section, there is not an applicable method in all the types of projects. This means that the choice of the appropriate

method depend strongly on the size, of the project and the internal constraints imposed by each method.

The comparative studies of the principal existing agile methods according to the project size, the internal and the external constraints imposed by each method given in (Benard 2002), makes it possible to visualize graphically that in spite of the advantages offered, each one of these methods has its limits that are related mainly to the size of the project in which the method is applied, the internal constraints like external imposed by the latter. To this end, the idea to combine several agile methods in order to generate a new agile method having more advantages and fewer disadvantages to develop the same information system dedicated to the E-government can be better solution.

5 CONCLUSIONS

This paper presented a state of the art on the concept of agility as well as the principal existing agile software development methods. Since their appearance, these methods are used and being more popular, mainly in the software development community and prove their effectiveness (in terms of controlling time, cost and quality) compared to the traditional methods of software development and IT project management. Being convinced of the benefits of agile methods; actually, we are investigating the possibilities of using these methods individually or collectively, at the different levels of e-government information systems development in order to create agile solutions. However, questions such as: what are the necessary adjustments allowing to integrate these methods efficiently in e-government projects? What are the pitfalls to avoid for their successful use? And what significant contribution in producing agility can these methods provide in e-government projects development and maintenance compared to traditional development methods? Constitute specifications of the theoretical and practical works that are actually under investigation in our research laboratories.

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