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Project Management and Cloud Computing

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Abstract

The use of Information and Communication Technology (ICT) is changing. A new wave is approaching: Cloud computing. Cloud computing is the provision of computer resources via the network, ideally through Internet.
Such a new opportunity can offer new ways to manage projects. It is especially useful when there are multi-locations projects, either from the point of view of clients, or suppliers or team members. The approach seems particularly suited to many companies with distributed operations, such as the EPC (Engineering, Procurement and Construction) companies. In such a situation, the possibility to access distributed and distinct computing resources can bring substantial advantages.

Cloud computing is particularly useful to support a lean and digitize approach to project management. In this paper, a method is presented to take into account the opportunities of cloud computing. The method is applied to a specific situation of a virtual PMO and a Help Desk. The paper discussed the success factors and benefits of such approach

1. Introduction

Project and program management is becoming more and more challenging. In this situation, it is important to use all the available methods to improve effectiveness, efficiency and economics of project management.

One of the more interesting technologies is Cloud Computing. It is based essentially on offering computing as a utility accessible on demand everywhere anytime. On the other side, more and more projects are becoming virtual in nature. Project resources work in several locations and so often is the client. In such a situation, Cloud computing seems the ideal solution. This paper will consider what is cloud computing and a method to make its best use.

2. Definition of Cloud Computing

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as “a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications,

and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." (Brown 2011). NIST identifies five essential characteristics of cloud computing: on-demand service, broad network access, resource pooling, rapid elasticity, and measured service.

Cloud computing can be deployed in different ways, each of which provides distinct trade-offs for organizations which are migrating applications to a cloud environment. NIST defines the cloud deployment models as follows:

- Private cloud. Only an organization uses the cloud infrastructure. It may be managed by the organization or a third party and may exist on premise or off premise.
- Community cloud. Several organizations share the cloud infrastructure and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations).One of the organizations or a third party may manage the cloud and may exist on premise or off premise.
- Public cloud. The cloud infrastructure is made available to the public or a large industry group and is owned and managed by an organization selling cloud services.
- Hybrid cloud. The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g. cloud bursting for load-balancing between clouds).

There are different service models for Cloud computing. NIST defines them as:

- Cloud Software as a Service (SaaS). This is the capability provided to the user to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email).The user does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities. The only possible exception would be limited user-specific application configuration settings.
- Cloud Platform as a Service (PaaS).This is the capability provided to the user to deploy onto the cloud infrastructure user-created or acquired applications created using programming languages and tools supported by the provider. The users do not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage. They have control over the deployed applications and possibly application hosting environment configurations.
- Cloud Infrastructure as a Service (IaaS). This is the capability provided to the user to provision processing, storage, networks, and other fundamental computing resources where the user is able to deploy and run arbitrary software. The software can include operating systems and applications. The users do not

manage or control the underlying cloud infrastructure. They have control over operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g. host firewalls).

3. The Lean & Digitize Method

A method particularly suited to make the best use of the cloud computing, the best is Lean & Digitize. This is the right method to use since to make the best use of Cloud Computing, it is necessary to take into account both the proper design of the technology as well as the processes.

In other words, it is necessary to re-engineer the existing processes. Make them as lean as possible by eliminating any waste. The waste is whatever does not add value to the customer and to the organization. While re-designing a process without or minimum waste, it is possible to digitize it, making the best use of the available technology. In this paper, digitization would be based on exploiting cloud computing.

The Lean & Digitize method is based on the application of several macro-phases: Preparatory, Define & Measure, Analyze and Process Design, Architecture Design, Develop, Test & Deploy and Verify (Nicoletti, 2012) (see Figure 1). It is essential to apply this method and its tools (Nicoletti, 2010b) in strong partnership between the sectors of the organization involved, quality and support organizations (such as ICT, finance or operations). Stakeholders from all parties need to align in setting up and staffing both the improvement project and the project team. Lean & Digitize specialists can assist, and even help lead these projects at a client organization. Perhaps more importantly, the organizations must treat the initial Lean & Digitize project as the beginning of an iterative cycle for continual improvement.

Process improvement should not be triggered by a 'problem' or 'challenge', but rather become ingrained in the organizational culture.

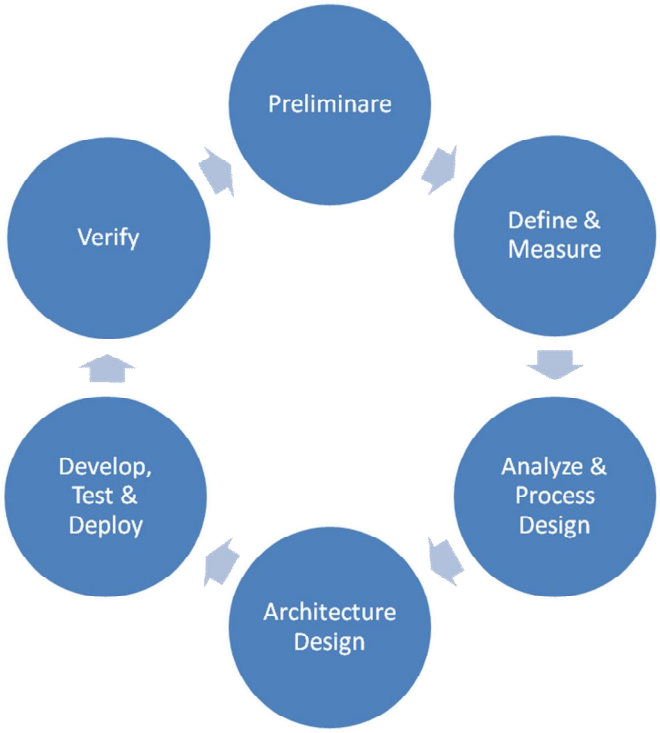

Figure 1 The Lean & Digitize process

Based on research and experience, the Lean & Digitize method can be summarized as follows (see also Fig. 1): It can be subdivided into 6 macro phases and 20+1 phases. Phase 21-ma is optional. A progress control is indicated at the end of each macro phase, called Tollgate, according to the terminology of Six Sigma (checkbox).

Macro Phase 0: "Preliminary"

Context: Identify the requests of clients, partners and staff; the challenge of competitors, the respect for compliance (e.g. legislation);
Culture: Detect the culture of the organization, of the community and of the nation in which the organization is located;
Vision: Tackle problems of effectiveness, efficiency, economy, process quality or, if necessary, the entire organization;
Strategy: Define the processes to be improved and the plans;

Macro Phase 1: "Define and Measure"

Kick off: Launch the project, in a special meeting and notify it to all the stakeholders;
Governance: Conduct the project and constitute the project Group;

Voice of the Customer: Listen to the voice of customers associated to processes. In the case of public organizations, it is the Voice of Citizen. In both cases, the acronym VoC is used;
Metrics: Translating the VoC in Critical-to-Quality factors;
As-Is: Mapping of the existing process;

Macro Phase 2: "Analyze and Process Design"

Lean: Define how to improve the project by means of the project Group in seminars and meetings (in GE, referred to as AWO! - Action Work Out);
Kaizen Plan: Define the improvement interventions plan.

Macro Phase 3: the "Architecture Design" macro phase

Architecture Design: Define the rules, policies and process structure;

Macro Phase 4: "Build, Test and Deploy"

Build and Test: Implement and test the adopted solutions (including the automation of the relevant management aspects: Digitize);
Change management: Managing the changes;
Deploy: Implement the adopted solution;
Documentation: Issue the documents related to the new process;

Macro Phase 5: "Verify"

Verify: Control the improvements,
Internal and external benefits: assess the benefits:
– External: Take notice of customers/citizens, partners and staff satisfaction; - Internal Assess the profitability, market share, internal improvements related to the new solution;
Lessons Learnt: Learn from the accomplished initiative (Lessons Learnt);
Celebration: Acknowledge the project Group's work;

Possible Macro Phase 6: Replicate

Roll-out: Replicate the solution so that it can be applied to the different departments or organizations in the same group.

The macro phase indicated as Replicate or Roll-out has been added. This consists of extending the implemented solution to other similar environments (other functions, departments or organizations in the same group).

is a summary of the method. For the purpose of continuous improvement, once the project has been completed, it must proceed with DMAIC. DMAIC typically leads to the need of a technological change.

4. The PMO Case

In this section, an example of the applications of the Lean & Digitize method to cloud computing applied to project management is considered. It refers to a real application implemented in a large ICT company in Europe, Engineering S.p.A. It is based on the concept of the resource-based view (RBV) theory. The authors (Barbero & Copetti, 2010) developed a charter for the company's PMO, which they established as a project management center of excellence called PMNET.

The Project Management Office (PMO) is defined in Wikipedia in the following way. In a business or professional enterprise, it is the department or group that defines and maintains the standards of process, generally related to project management, within the organization. The PMO strives to standardize and introduce economies of scale in the execution of projects. The PMO is the source of documentation, guidance and metrics on the practice of project management and execution. In some organisations, this is known as the Program Management Office (sometimes abbreviated to PgMO to differentiate). The difference is that program management relates to governing the management of several related projects.

Traditional PMO's base project management principles on industry-standard methodologies. Increasingly influential industry certification programs such as ISO9000 and the Malcolm Baldrige National Quality Award (MBNQA) as well as government regulatory requirements such as Sarbanes-Oxley have propelled organizations to standardize processes. Organizations around the globe are defining, borrowing and collecting best practices in process and project management and are increasingly relying on the PMO to provide overall influence and evolution of thought to continual organizational improvement.

90% of projects do not meet time/cost/quality targets. Only 9% of large, 16% of medium and 28% of small company projects were completed on time, within budget and delivered measurable business and stakeholder benefits (Johnson, 1995). There are many reasons for such failures. As per a KPMG survey of 252 organizations, technology is not the most critical factor. Inadequate project management implementation constitutes 32% of project failures, lack of communication constitutes 20% and unfamiliarity with scope and complexity constitutes 17%. Accordingly, 69% of project failures are due to lack and/or improper implementation of project management methodologies.

Establishing a PMO group is not a short term strategy to lower costs (Santosus, 2003). Surveys with companies indicates that the longer they have an operating PMO group

the better the results achieved to accomplish project goals (which might lead to lowering costs).

PMOs may take other functions beyond standards and method. It could participate in Strategic Project Management either as facilitator or actively as owner of the Portfolio Management process. Tasks may include Monitoring and Reporting on active projects (following up project until completion), and reporting progress to top management for strategic decisions on what projects to continue or cancel.

A PMO can be one of three types from an organizational exposure perspective: enterprise PMO, organizational (departmental) PMO, or special–purpose PMO.

The PMO provides an excellent example of how cloud computing can be used to support Project Management. The traditional PMO is composed of a certain number of persons (in the limit just one) which support the project managers in the way we have presented. With Cloud Computing, this is not any more necessary. The most efficient lean and digitize solution is to create a virtual PMO. In other words, the best solution is to connect all the project managers, and in the limit their senior project team members, among themselves. Particularly in the case of a multi-company project, it would be possible to connect "in the cloud" more than one computer system wherever it would be based and independently of where it is based. Once done that it is necessary to create a wiki repository of the best practices and make them available to all project managers. At the same time, it would be possible to create a blog to report new experiences or give to the project managers the possibility to put questions and receive answers. The positive is that the questions and answers sessions would be available to all project managers and could be searched once one project manager have a specific problem.

In the case of a program, this type of solution would be even more powerful. A program is either a large project or a set (or portfolio) of projects. The content (be specifications, plans or other content) of each project in a program could be based on different systems or computers. Cloud computing allows considering them as a unit, supporting both the program management and the exchange of documents and best practices among projects.

5. The Help Desk Case

The support units that manage and maintain key elements of the ICT infrastructure to support a project —such as servers, networks systems, and data storage—are liable to performance breakdowns. These stem from complex and disordered workflows. Productivity can tumble and the quality of service is low.

The project manager's first response has been in many cases to increase overtime and make spot hires for staff augmentation. This approach leads to budget overruns with no real change to the team's workload. A broader transformation is called for. A Lean &

Digitize approach can be applied to the problem. The key piece involves breaking up silo-ed teams that are dedicated to specific components of the infrastructure and prevents a smooth workflow. They can be reconstituted into several distinct teams, each one designed to address a specific level of complexity and type of content. At the same time, the Help Desk requires a new dispatcher function to consolidate assignment streams. Thanks to cloud computing there is no need of a co-location of these teams and/or a co-location with the project or client teams, which could be dispersed through a large territory.

In a specific case (Andersson, H., Moe, G. & Wong, L.A (2011)), applying this Lean and Digitize approach increased the ICT unit's productivity, speed, and quality:

- The number of full-time-equivalent positions required fell by 30 to 60 percent;
- Average resolution times by 40 to 60 percent; and
- The number of incidents per server by 25 percent.

The intangible improvements included:

- Better balancing of workloads;
- Improved staff morale; and
- Increased opportunities for cross-training in technical skills.

6. Benefits

Cloud computing for project management has several benefits (Asava & Mzee, 2010):

- Support large complex projects, which in the past were difficult to manage due to limited collaboration, development or network capacities within an organization;
- Enable the parsing of multiple transactions in a highly distributed environment made up of multiple providers, to be available real-time and aggregated in a suitable way;
- Provide real-time collaboration between globally dispersed teams, clients and suppliers;
- Allow rapid staging, set-up and take-down of a variety of development environments as needed to test/validate an application;
- Allows to use real-time project management software with a wide set of web-based tools.

These are benefits specifically to project management. There are other more general benefits connected with cloud computing. It will:

- Lead to greater resource sharing, greater economies of scale, and greater levels of architectural standardization and process optimization (Gartner, 2008).

- Realize project savings through agility and speed of implementation. It enables projects to cut back on capital spending and optimize operational expenses (Gartner, 2009).
- Enable users of IT-related services to focus on what the services provide to them rather than how the services are implemented or hosted (Gartner 2008b).
- Leverage the virtually instant agility, flexibility and reach, to dynamically access anything or anybody, and the virtually infinite diversity of available functionalities arising from composite applications and components allowed by cloud computing (Gartner, 2010).
- Provide higher value for creativity and innovation as it enables enterprises to focus on business objectives and, therefore, allocate more resources to solve business problems. It enables IT availability to broader masses of individuals, thus creating a pool of talent that has not existed before (Gartner, 2009b).
- Move towards green ICT with less consumption of energy and less production of CO_2.

7. Conclusions

Cloud computing is the next step in the development of ICT. It is here to stay. It is growing year after year. This paper demonstrates how cloud computing could be of great help in project management. This is especially true in the case of multi-company, multi-locations, multi-cultures projects, as in the case of EPC projects. Organizations of this type should develop a clear strategy on respect to the support of cloud computing to their project management challenges. This paper suggests a Lean and Digitize method to provide a framework to make the best use also of this technology while taking into account the complexity of the processes in this type of organizations.

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