



STRATEGIC ICT PLANNING: A PROPOSAL USING SCRUM CONCEPTS

Ronny Peterson Guimarães

ronny@ufam.edu.br
Federal University of Amazonas –
UFAM, Manaus, Amazonas, Brazil.

**Armando Araújo de Souza
Júnior**

armando-jr07@bol.com.br
Federal University of Amazonas –
UFAM, Manaus, Amazonas, Brazil.

ABSTRACT

The use of information and communication technology (ICT) as a strategic vector in organizations and the constant changes in the internal and external environment have increased the need for dedicated planning in this area. This paper aims to propose a strategic planning model for information and communication technology (PETIC) using concepts from the Scrum framework. It is a qualitative research, based on a case study that used the observation in the Information and Communication Technology Center (CTIC) of the Federal University of Amazonas (UFAM) and the documentary research in the artifacts generated during its elaboration and execution process of ICT strategic planning for the period 2016-2017. The proposal adds to the PETIC process elements of agility, focus on strategic alignment, waste reduction, communication improvement, collaborative and participatory planning, concept of pull production, continuous monitoring, continuous quality improvement, and artifacts that enable a tracking of the whole planning process.

Keywords: Strategic ICT Planning; Strategic ICT Alignment; *Scrum*.



1. INTRODUCTION

Information and communication technology (ICT) is one of the areas that have evolved most in recent decades, to the point of making modern societies hostage to this evolution, since little or almost nothing can be done without its use. ICT causes great transformations in the lives of people and organizations (public and private), significantly affecting human actions and the scenario of competition between companies. This advance and its speed increase the degree of uncertainty and unpredictability about the future, making managers have a different posture regarding the strategic value of information and communication in organizational environments (Weill et Ross, 2006).

The narrowing of information technology and business strategies places the ICT area as a prominent representation in the organization and as a differential factor in market competition, as it provides actions vital to many organizational activities and establishes peculiarities in relation to competitors with differentiated products and services. Thus, a specific planning for ICT area becomes necessary (Atese et Tanriöver, 2014).

The PETIC is classified as a strategic level planning, complementary to the institutional strategic planning (ISP) and its implementation is based on the principle that this process adds several benefits for organization, improving the organizational performance from strategies based on information technology. It presents tools to improve the management of ICT services, processes and resources, applying them properly and rationally, as well as establishing guidelines for monitoring the proposed actions and their results (Atese et Tanriöver, 2014; Alberticn et Alberticn, 2009).

The lack of strategic information and communication technology planning (PETIC – *Planejamento Estratégico de Tecnologia da Informação e Comunicação*) established in an organization can cause problems such as rework, incompatibilities, insufficient infrastructure, waste of resources (human, material and financial), lack of knowledge of ICT in internal and external environments, lack of vision of the business and its critical processes, lack of vigilance for technologies that can add value to the organization's services or products, poorly designed and executed actions, high costs, unnecessary or poorly sized investments, and ICT actions that are closer to failure (Newkirk et al., 2003).

In this context, it is necessary to have plans that are more dynamic and flexible to adapt quickly to the new conditions of the corporate environment and this is one of the factors that most influence the failure of the implementation of a PETIC, since in most cases the strategic planning of ICT does not consider the dynamism of the organizational context, does not have the means to react to change and becomes

only a historical artifact, with obsolete or reactive actions, instead of being a dynamic instrument and of potential value for the strategic objectives of the organization.

Thinking and acting in a strategic way requires change of concepts and culture by every organization on the vision of the ICT area; thus, it is necessary that its strategic ICT planning be systematized with a focus on business and aligned with the development of the overall strategy of the company. However, many strategies are defined in a restricted way, with policies and projects for a very long period of time and with virtually no margins to accommodate the constant changes that arise.

In this direction, the objective of this article is to propose a model of strategic planning of information and communication technology (PETIC) using concepts of the Scrum framework.

This paper is divided into five parts, including this introduction. In the second part the theoretical reference that guided the realization of the research will be presented. The third part refers to the field of research and methodological procedures used, and then the fourth part describes the results obtained and in the final considerations the conclusions and contributions of this study will be presented.

2. THEORETICAL REFERENCE

2.1 Strategic planning

Planning is the act of planning, and since the earliest civilizations, the human being has needed to organize to carry out its tasks and manage the resources available, as well as to make huge and complex constructions. Currently, in the corporate context, planning is applied in companies as an organizational process to manage looking ahead (Faria, 1997).

Strategies are the paths to be followed with the intended standards and methods, the way an organization can allocate available resources to achieve the various business objectives, as well as establishing limits for actions and a control to drive the company in a rational way for the goals, identification of opportunities, threats, estimates and risks (Mintzberg *et al.*, 2006; Meyer, 1997).

Combining the concepts of planning and strategy, one of the main management tools that companies have is strategic planning, which is an administrative process used to indicate the best direction the company should follow, as well as to optimize the integration with the environment in which they are inserted, besides acting with innovation (Oliveira, 2008; Kotler, 2008).



Strategic planning has a high relevance for an organization, since it is a set of basic actions and principles that define the institution, including the mission, vision, challenges, policies, objectives and goals that must be achieved, and it has a clear perspective in terms of what it is intended to achieve in the future and what decisions and actions should be taken, whether in the internal or external environment, taking into account that these definitions and strategies should be feasible and that all people involved should be engaged and mobilized for the planning success (Costa, 2007; Chiavenato, 2004).

2.2 Information and communication technology

Information and communication technology (ICT) continuously covers people's lives. Activities such as scheduling medical appointments, bank transactions, voice recognition, auto pilots and even the economy with the growth of e-commerce are examples of how ICT maximizes human tasks by improving efficiency and effectiveness (Albertin, 2010; Tapscott, 1997).

According to Derntl et Motschnig-Pitrik (2005) and Rezende et Abreu (2011), information technology is any technological and computational resource (hardware, software and telecommunications systems) that processes data and/or information in a punctual or systematized way, and it can be used both in a product and in a process, as well as having an expressive role in the lives of people and organizations, that is, it covers all the activities that happen in society and that depend on technological resources; however, for Laurindo (2008), ICT also involves human, administrative and organizational resources.

2.3 Strategic ICT Planning

Turban et al. (2004), King (1988), and Lederer et Salme-la (1996) describe the strategic information technology planning as a product of inputs, outputs and processing that uses a variety of information to produce a plan that has items such as new systems, objectives, and resources necessary to execute the planning, and the operation of the organizational infrastructure and its production. It encompasses the internal and external environments, activity plan and alignment with the organization's business plan and Pollack (2010) defines PETIC as a process that aims to align ICT actions with the organization's strategies and to meet the various demands that arise.

In order to initiate ICT strategic planning, it is necessary for the organization to have a general plan, called institutional strategic planning (ISP), which must be integrated and the actions and strategies proposed in PETIC must

maintain full alignment with the strategies defined in the ISP (Tonelli et al., 2014; Rezende, 2011).

The lack of dedicated strategic planning for the ICT area can bring innumerable drawbacks to an organization, such as loss of opportunity, mismanaged costs in elements incompatible with the needs of the company, and use of unnecessary and repetitive efforts. It should also be considered that, even with an established PETIC, it may not achieve the desired success due to the lack of integration of managers and users with planning, since it is worth mentioning that the execution of the PETIC is carried out by these people in their sectors and they must be fully adherent to PETIC and have full knowledge of the processes involved from it (Turban *et al.*, 2004; Ward et Peppard, 2002).

2.4 Strategic Alignment of ICT and Business

The concept of strategic alignment originates from studies that involved business strategies aligned with the environment where the organizations were inserted, with their threats and opportunities, being a constant process and coordinated by the high management of the different areas of the company, to ensure a good performance maintain interconnections between businesses and ICTs, achieve the planned goals and define responses to internal and external scenarios. (Joia et Souza, 2009; Barros, 2007).

Luftman (2000) and Reich et Benbasat (1996) conceptualize the strategic alignment of information technology as the level of adherence of the IT plan from an organization's mission, objectives, demands and business, causing IT actions to be properly implemented and at the right time.

2.5 Scrum

In 1986, Takeuchi et Nonaka wrote in the article "The new new product development game", that teams with few members and with multidisciplinary characteristics had excellent results and therefore presented a high level of productivity to a play carried out in Rugby, called Scrum, in which all the players are needed to compete for the ball replacement, perform a team work and if one player fails, all fail (Pham et Pham, 2014; Cruz, 2013; Takeuchi et Nonaka, 1986).

Scrum emerged in a context of change to an agile mindset, but not as a process or a technique, but as an iterative and incremental framework for the implementation of complex products with agile concepts and standards. It was initially developed for software project management,



and it was created by Ken Schwaber and Jeff Sutherland in the 1990s and was inspired by the Lean principles of the Toyota Production System (Schwaber et Sutherland, 2017; Machado et Medina, 2017; Souza, 2016).

The Scrum process is all driven by the Scrum Master, a kind of project manager, starting with the definition of customer demands in an artifact called Product Backlog (PB) that is elaborated and prioritized according to the client's vision that participates in the time Scrum, and this actor is called Product Owner (PO) (Schwaber et Sutherland, 2017).

With the backlog defined, a meeting is held between the Scrum team to plan (Sprint Planning) which demands will be executed in the next stage of development. Each stage of the cycle is called Sprint, has a period of two to four weeks of execution and at the end of the planning an artifact called Sprint Backlog (SB) is generated; the development team starts the product implementation, focused on the defined demands in Sprint Backlog; and during Sprint, daily control meetings (Daily Meeting) are held in about fifteen minutes to discuss the progress of the project, possible difficulties, and impediments (Schwaber et Sutherland, 2017).

Sprint ends with two meetings: one with the Product Owner's submission of results (Sprint Review) and it can accept or request modifications; another meeting is held only among developers to identify the lessons learned that will be applied at the next Sprint in a process of continuous improvement (Schwaber et Sutherland, 2017; Larman, 2004).

3. METHODOLOGICAL PROCEDURES

The nature of this research was applied, since the knowledge produced is a process of practical application, focused on solving a specific and concrete problem. It is also classified as an exploratory research regarding the objectives, since it had as purpose to offer a better knowledge of the problem to make it more explicit or to allow the construction of the hypotheses, using several forms for data collection, such as interviews, laboratory researches, recordings, forms, case studies, and informal observations (Gerhardt et Silveira, 2009; Gil, 2010).

The approach of this research is qualitative, since there is no concern in terms of numerical data representation, but rather with the construction of a proposal focusing on the meaning of the problem within the context in which it occurs, capturing its essence and explaining its origins, relations, changes, and their effects and solutions, and it is not possible to quantify this dynamics of relations that involve research (Gerhardt et Silveira).

Regarding the Procedures, this study was:

- a) Case study: the research was carried out at the Information and Communication Technology Center of UFAM and it analyzed the process of elaboration and execution of UFAM's strategic ICT planning, which used concepts from the Scrum framework;
- b) Documentary: different sources of data were consulted, mainly electronic messages (e-mails) between the PETIC elaboration and execution team and the other UFAM managers, similar to the bibliographic research, but their diverse data sources, such as documents that have not yet been processed analytically, belonging to personal archives or organizations, can be changed according to the progress of the research, letters, films, paintings, photography, as well as second-hand sources that have already been verified as company reports and statistical tables (Lakatos et Marconi, 2011; Gil, 2010);
- c) ex-post facto: the PETIC of UFAM was drawn up in 2016 and its actions were executed in 2016 and 2017. The investigation was carried out when the facts had already happened and from abductive hypotheses, making impossible the manipulation of the variables and the data or the interference at the moment that the process happened, having as its main characteristic the collection of data after the occurrence of the events (Prodanov et Freitas, 2013; Gil, 2010).

For this study, the data collection techniques applied were: observation and documentary research, whose main scenario was the process of ICT planning carried out by the Information and Communication Technology Center of UFAM and the observation of the steps taken during this process and its results, as well as the collection of artifacts produced, such as e-mails, documents, photos, news, information systems, and internet websites.

The first phase of the data analysis was directed to an analysis of the content of the communications via electronic messages between the CTIC elaboration team, the UFAM managers and information registered in the information systems used during the CTIC-UFAM planning process. The objective was to capture the thoughts of the actors involved and the conditions of production and execution of PETIC.

The second phase was dedicated to documentary research with an analysis of the artifacts produced in the CTIC/UFAM planning process. The artifacts analyzed were performance questionnaires and their results, SWOT analysis, list of prioritized demands with GUT Matrix (Gravity x Urgency x Trend), Power Point presentations of the PETIC process ela-



boration, Strategic Map from the application of the Balanced Scorecard (BSC), photos of meetings, ICT-related committees, news about the planning process and its execution, document of the administrative reform of the CTIC and, especially, the final document with the consolidated planning of the PETIC of UFAM.

The observation method was applied directly in the Information and Communication Technology Center of UFAM, analyzing the activities related to PETIC, the results obtained through its actions and the interaction of the team and the stakeholders with the planning. The objectives were to identify how the stages for the elaboration and execution of the PETIC were configured, which actors were involved, what Scrum concepts were applied, how these concepts were implemented, what the results of the Scrum ideas were, how they were communicated throughout the process, the applicability of the artifacts generated, the conceptual and technological tools used, and the mechanisms of control and quality.

From this technique, it was possible to understand how the PETIC of UFAM was elaborated and executed, as well as what elements of Scrum were effectively applied during the process and how they were implemented. The proposal of a process with agile concepts of information and communication technology planning, using Scrum concepts, took into account the positive and negative points of the planning promoted by the UFAM ICT area, from a detailed analysis of this process, from the communications between the participating actors to the artifacts produced.

4. DATA ANALYSIS AND DISCUSSION

4.1 Characterization of the study site

The institution that is the object of the case study is the Federal University of Amazonas, in the headquarters campus located in Manaus (AM), whose foundation occurred on January 17, 1909. It operates in the areas of undergraduate, postgraduate, research, extension and innovation, having an academic community estimated at 40,000 students and 5,000 employees, according to information from its management system (UFAM, 2017).

The study was set in the Center for Information Technology and Communication, responsible for the management, policy and implementation of information technology of the university. It was the sector responsible for the elaboration and execution of strategic ICT planning for the 2016-2017 period of UFAM.

4.2 Proposed process for producing and implementing a PETIC

From the studies of the concepts of the Scrum framework, the analysis of the PETIC of UFAM and the identification of positive and negative points, during its elaboration and implementation, a process model was proposed for the production and implementation of PETIC based in Scrum, aiming at improving response time to changes during the PETIC lifecycle, maximizing communication among those involved in planning, and providing more effective monitoring of their implementation and results.

Scrum is generally used for the management and development of individual projects; however, strategic ICT planning is more complex and has several projects that individually could be managed with the Scrum framework. It was a challenge to establish a PETIC process with these concepts, since it was not possible to define a 100% alignment and mapping of the steps, artifacts and individuals involved in UFAM planning with the respective Scrum elements. However, many concepts and values of this framework were observed and identified, especially during the implementation of PETIC at UFAM. Artifacts such as Product Backlog and Sprint Backlog, events compatible with Sprint Planning, Sprint Review, Sprint Retrospective, and follow-up meetings that, although they did not have a daily routine, they had the same goal as a Daily Meeting. The implementation was organized in iterative cycles, such as Sprints and, according to content analysis and documentary research, it was possible to identify Scrum values such as transparency, Redmine use, inspection and adaptation with events that occurred during cycles, as well as the active participation of the CTIC staff throughout the process.

It is worth highlighting the transparency of the planning steps with many news on social networks and institutional sites, the use of Redmine to socialize the information about the process, as well as the care and focus in maintaining the strategic alignment between PETIC and PEI, an essential item for the success of ICT planning.

Many gaps and negative points were also identified in the PETIC life cycle of UFAM. There was a lack of formalization of the artifacts, absence of minutes of meetings, lack of clearer and more effective participation of a figure similar to the Product Owner, whose role could be exercised by ComTIC and the inconsistency of information registered in Redmine, since many items were out of date or with inconsistent information.

4.2.1 Elements needed to start PETIC

In order to initiate a process of strategic planning of information technology and communication, the prerequisite is



the existence of a strategic institutional plan in force, since the PETIC is an extension of the ISP and all its actions must be aligned and focused on reaching the organization's strategic objectives. Therefore, it is not possible to start a PETIC without the organization having an existing ISP.

Another item considered necessary to start the PETIC process is the establishment of an Information and Communication Technology Committee (ComTIC) as an essential instrument of ICT Governance, with the attribution of proposing and monitoring ICT planning, defining the strategic alignment between institutional strategic planning and PETIC, as well as having attributions that enable decisions on ICT resources, investments and their applications. This committee is composed of representatives of the organization's business areas with effective decision-making power over their respective sectors, as well as representatives from the ICT area.

4.2.2 Guiding values of the proposal

This proposal is based on the theories and concepts of the framework Scrum, which uses an iterative and incremental approach in its production process, aiming at continuous quality improvement and risk mitigation in each new stage, as well as being based on the concepts of ICT Governance of COBIT and ISO 38500.

Thus, the values that guide all the actions of this proposal are:

- a) Transparency - relevant process information should be available to those responsible for the results (Schwaber et Sutherland, 2017);
- b) Inspection - Processes, tools and artifacts must be analyzed periodically without this activity hindering the execution (Schwaber et Sutherland, 2017);
- c) Adaptation - Identified problems must be corrected as soon as possible and the solution should be adopted as standard or to correct processes, as well as new opportunities, environments and demands must be considered at the planning execution time (Schwaber et Sutherland, 2017);
- d) Communication - Improving the efficiency of communications by targeting people (Darveau, 2013; Giampaolia *et al.*, 2011);
- e) Responsibility - All planning elements must have responsible individuals with the necessary permissions to do so (ISO, 2008);

- f) Strategic Alignment - Each item defined in the PETIC should consider alignment with the IEP (ISO, 2008).

4.2.3 PETIC lifecycle

The life cycle of an ICT strategic planning is the organized set of steps, artifacts and actions to be implemented from the conception, beginning, development and termination of its validity.

The proposed macro process of the life cycle is divided into three phases and each has subdivisions aiming to improve and organize the development of the actions, as well as to facilitate the understanding of the process by the people involved, as the steps' progress.

The phases are related in a chronological way, so that the end of one begins the next phase, allowing a segmented control and monitoring of each stage of the process and its subsets.

The process begins with the Elaboration phase, whose objective is to develop actions necessary to produce an artifact that consolidates all the information of strategic ICT planning, such as diagnosis of the current situation of ICT, definition of guidelines, mission, vision, values, strategic objectives, goals, indicators, demands, strategic alignment, and budget. The final result of this stage is a document called Strategic Planning of Information and Communication Technology (PETIC - *Planejamento Estratégico de Tecnologia da Informação e Comunicação*).

The second phase, called the Execution Phase, consists of the development of actions to achieve the established goals and objectives, as well as meeting the identified demands and the monitoring of these actions. This step is dynamic and divided into iteratively implemented execution cycles that are repeated until the planning term.

The Finalization phase is carried out after the execution of the planning and consists of the analysis and updating of the information on PETIC (objective, goals, indicators, demands and general results), generating a report with the results of the planning.

4.2.4 Actors Involved in the PETIC Lifecycle

Strategic planning at any level is conceived, designed, executed and monitored by people, so it is important to identify the actors that participate in PETIC, as well as define their attributions and responsibilities in the process.

For this proposal, six actors have been defined that interact at some point with the PETIC: Maximum Authority,



Information Technology and Communication Committee, Process Manager, Stakeholder, and ICT Team:

Maximum Authority - Executive Manager of the highest graduation organization, main sponsor of PETIC, responsible for the homologation and formalization of PETIC and responsible for the finalization and approval of the Results Report;

ICT Committee - Group of business and ICT managers or representatives with autonomy in decisions, responsible for decisions on ICT application, responsible for decisions on PETIC, responsible for the creation of the PETIC Elaboration Team, responsible for Planning the Cycle of Execution and responsible for finalizing the Execution Cycle. Role similar to the Scrum Product Owner;

PETIC Elaboration Team - Group of people appointed by ComTIC to prepare the PETIC, generally people of the ICT Team and business areas, responsible for defining the guidelines of PETIC, responsible for the Diagnosis and responsible for PETIC's Production;

Stakeholder - Customer representative of a particular Demand, responsible for defining the Demand actions together with the ICT team, responsible for monitoring the execution of the actions together with the ICT team and should participate in the Finalization Cycle meetings. Role similar to the Scrum Product Owner;

ICT Team - Group of people from the ICT Sector, responsible for defining the actions of Demand together with the ICT team, responsible for monitoring the execution of the actions together with the ICT team, responsible for recording the information in the management system of the PETIC, responsible for updating the information in the PETIC management system and responsible for evaluating the Execution cycle. Similar to Time Scrum;

Responsible for the Process - Must be a member of the ICT Team, preferably the ICT Sector Manager, responsible for leading everyone involved in adopting the process, responsible for removing impediments that disturb the PETIC lifecycle, responsible for ensuring progress of PETIC adhering to the process and responsible for presenting results. Similar to Scrum Master.

4.2.5 Elaboration Phase

It is the initial phase of this proposal, having as sub processes: Preparation, Diagnosis, Production and Homologation.

The preparation stage has as objectives the formalization of the beginning of the process of elaboration of the PETIC,

the definition of the elaboration team and the production of an artifact with the guidelines for the planning.

The Information and Communication Technology Committee begins the preparation process by defining and formalizing the team, which will be responsible for preparing the PETIC, in addition to the document that is generated with the Elaboration Team, recording the formalization of the beginning of the PETIC process.

The first task of the Elaboration Team is to define the guidelines for PETIC; this document contains the principles and guidelines that will guide the elaboration process, especially the methodology that will be used and the definition of the PETIC period of validity. This document should be submitted to ComTIC for approval, with the next stage being the Diagnosis.

As the Guidelines document is approved by the Committee, the next step is to make a diagnosis of the current situation: perform ICT sector performance analysis, conduct SWOT Analysis, identify available ICT resources (contracts, equipment and people) and perform a survey of the risks that could cause the failure of PETIC. With all this information, the Elaboration Team produces a Diagnostic.

The next item of this stage is the Demands Survey, which is carried out in the organization's business sectors, considering the objectives and actions of the PEI and following the Lean concept of Pulled Production. For each demand-gathering task a similar report is generated with the identified demands, the people who participated in the step and the person in charge of the business area who will follow the demand (the Stakeholder).

Following the guiding value of Strategic Alignment, after raising demands, the Elaboration Team will perform the alignment of the demands identified with the Institutional Strategic Planning and the prioritization of these demands, generating a list of demands already aligned with the PEI and prioritized. The use of the Prioritization Matrix is suggested for this task.

The Diagnostic Minutes and the Request List are sent to ComTIC for review and approval. In this case, the Committee itself may update the artifacts, if necessary, and, with approval, the Diagnostic stage.

On the Demo List, it is an artifact similar to the Scrum Product Backlog, containing all the demands identified for execution during PETIC implementation, but this artifact is flexible and dynamic as it can be updated at any time as needed. This ensures adaptability to the process and agile responses to changes, as new demands can be included; deferred demands can be deleted or updated.



After the Diagnosis stage, the Elaboration Team starts the Production of the PETIC artifact, based on the information obtained in the previous step, and its sub processes are: Defining Vision, Mission and Values, Setting Strategic ICT Goals, Aligning Strategic Objectives with ISP, Setting Goals, Setting Indicators, Estimating Budget, Setting Plan for People Management, Defining Critical Success Factors, Consolidating Draft PETIC, and Sending Draft for ComTIC.

These tasks should be collaborative, and preferably, they should involve the entire ICT Team, as they ensure participatory planning, socialize PETIC information with the people who will carry out the actions and increase the motivation of the ICT Team in developing the actions and achieving the results, since they participated in all the conception of the strategic structure of PETIC.

It is worth mentioning, in the Production stage, the use of the Balanced Scorecard to generate a Strategic Map that assists the understanding of the strategic items with a visual element and an element that assists the Elaboration Team in terms of how and for whom to generate value. Those responsible for each objective and goal were also defined. This is a way of making the management of PETIC more collaborative, because in this case, the responsibility does not indicate that the person will necessarily define and execute the actions, but will have the function of assisting the ICT Manager in the monitoring of actions with a focus on achieving objectives and goals, thus following the guiding value of Responsibility.

The other artifact produced in the Production stage is the PETIC Draft, a document with all the information produced, consolidated and organized, whose destination is the ICT Committee to start the following stage of PETIC.

Once the PETIC has been sent to the Committee, the Homologation stage is started. This stage has the following sub processes: Consolidating the PETIC Draft; Approving the PETIC Draft; and Formalizing the PETIC.

The Committee on Information Technology and Communication analyzes the PETIC Draft and, if necessary, consolidates the changes and directs the Maximum Authority to take note of the document, analyze and, if appropriate, formalize the final version of PETIC; otherwise, it requests the Committee to review the Minutes.

With the PETIC artifact formalized, it is time to start the Planning Execution Phase, which is based on the Scrum framework, since this is a proposal with iterative and incremental cycles. This phase has the following sub processes (Figure 1): Registering PETIC, Registering Demands, Scheduling Cycle, Registering Cycle Demands,

Defining and Registering Actions, Developing Actions, Monitoring Action Progress, Ending Cycle, Updating PETIC Management System, and Evaluating the Cycle.

In order to enable the guiding value of Transparency and, considering that the planning is conducted by the organization's ICT area, an information system for PETIC management should be adopted. This system should have mechanisms to facilitate communication among the various stakeholders, socialize information about PETIC, provide access, record and update the items, events, artifacts, inspections, adaptations, and progress of activities. One suggestion is the Redmine Project Management platform that was used in PETIC at UFAM.

In this proposal, the Execution Phase is the moment with more elements aligned to the Scrum framework, starting from an execution in cycles, inspired by the concept of Sprint, which is the heart of the Scrum; thus, this is a container for other events that, each, generate inspection and adaptation opportunities throughout the entire Sprint implementation process (Schwaber et Sutherland, 2017).

The first task of the Execution Phase is to record all the PETIC items in the management system, defined to control the process, the involved ones, the objectives, the goals, the indicators and the artifacts produced, as well as to give access to the ones according to the profile of their duties.

After this initial registration, you must create an area in the system designed to be the Demands Inventory, such as the Product Backlog, and record all the identified demands. The iterative cycle of execution begins from this stage, because at each new cycle the List of Demands must be verified to check whether there are changes or new demands and, if positive, to put these changes into effect in the system.

With the updated Demand Inventory, the ICT Committee carries out the planning of the cycle, which consists in defining which demands will be executed, considering the relevance to the business and the duration of the cycle, generating an artifact called Cycle Demands, similar to the Sprint Backlog, as well as to evaluate whether the budget proposal should be updated.

Thus, the ICT Team is responsible for registering the cycle with the demands selected by ComTIC, and also to define in a collaborative way those responsible for the execution of each demand in the ICT team.

Each responsible for the demand must define and register the necessary actions in the system to execute it.

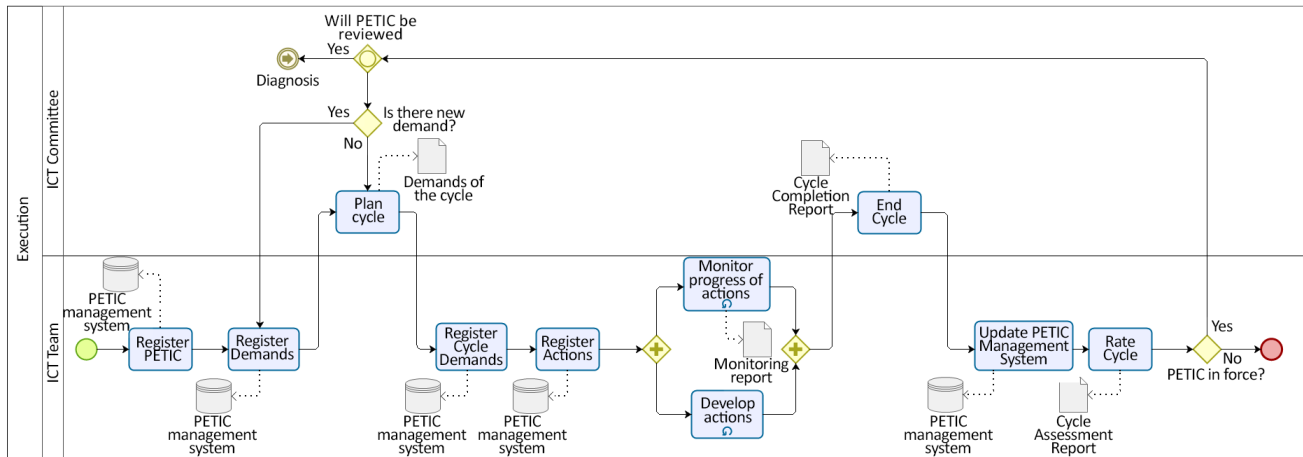


Figure 1. Sub-phases of the Execution Phase

Source: Prepared by Authors, 2017

This process, especially the definition and prioritization of actions, must be carried out jointly and in agreement with the Stakeholder defined for the demand. This action ensures that the parties involved are aware of the scope of the items that will be carried out, their orders of execution and their deadlines.

The execution of the actions is initiated after they are registered in the system and during this execution phase, follow-up meetings between the ICT Team members and the Stakeholder, allocated to meet the demand, must take place in such a way that possible impediments or problems are verified in the process, as items that were performed and actions that will be carried out. This is an event inspired by the Daily Meeting; however, it is not performed on a daily basis; it is suggested that these follow-ups be performed at least three times during a cycle and, at the end of each event, an artifact called a Monitoring Report should be generated.

Finally, the Implementation Cycle of the ICT Committee carries out an end-of-cycle event, with the participation of all Stakeholders involved in the cycle along with the Process Manager. The results obtained in the cycle and the analysis of the execution process are presented, and the situation of each demand is verified, generating an artifact called the Cycle Completion Report, which is sent to the ICT Team to update the PETIC management system, as reported in the report.

Before the end of the cycle, the ICT Team conducts a self-assessment event conducted by the Process Manager. Its purpose is to discuss lessons learned during the cycle, identify the positive and negative points and, if necessary, establish a plan for implementing improvements, thus producing an artifact called the Cycle Assessment Report.

The next iteration is done on condition that the PETIC is still in force and that ComTIC has not decided to carry out a revision in the planning with a current whole, since, in case of revision of the planning, the PETIC Life Cycle returns to the Diagnostic stage; however, if PETIC is no longer in force, the next step is the Completion of PETIC.

In the Completion Phase, the PETIC team performs an update on the management system on all planning items, especially in the records of objectives, targets, indicators and demands, as well as it performs a review of the PETIC results and produces an artifact called Results Report.

This Results Report is presented to the Information and Communication Technology Committee, which consolidates the information and sends it to Maximum Authority, for knowledge of the results obtained and approval of the Results Report, formally closing the PETIC Life Cycle.

4.2.6 Artifacts involved in the PETIC Lifecycle

This proposal is limited to the planning process and the artifacts that must be produced, but it is not necessary to present models of the artifacts, only the objectives of each one and the moment in which they must be elaborated.

5. FINAL CONSIDERATIONS

The main objective of this article was to present a proposal for strategic ICT planning using concepts from the Scrum framework, based on the case study of PETIC from UFAM. The focus of the proposal enabled a more



agile and flexible process, considering feasible steps and artifacts to meet the changes in the appropriate time and the correct strategic alignment with the institutional strategic planning.

In order to better understand an agile planning process and related issues, information was collected on strategic planning, information and communication technology, strategic ICT planning, strategic alignment of ICT and Scrum, and this content composed the theoretical reference of this job.

Based on the theoretical basis obtained, a detailed analysis of the process of elaboration and execution of the ICT strategic planning of the Federal University of Amazonas was started with the objective of identifying its stages and artifacts using techniques such as observation, content analysis and documentary research.

The main focus was on the detection of which elements of PETIC/UFAM were implemented based on Scrum framework concepts, as well as the feasibility of implementing them and the effectiveness of their applications in the analyzed process was verified.

Based on the analysis of the process of elaboration and execution of the PETIC of UFAM, in which it was possible to identify the implementation of several concepts and values of the Scrum, as well as other positive and negative aspects related to a strategic planning of ICT, the viability and adherence of Scrum framework concepts was verified for implementation in a PETIC.

Therefore, the general objective of this research was met with a PETIC proposal, using Scrum concepts and starting with the information on the prerequisites to begin a strategic ICT planning; therefore, the existence of a current institutional strategic planning and the creation of an ICT Committee with managers of the business areas is essential, so that one of the main gaps that occurred in the UFAM process can be avoided.

In addition to elements of the Scrum, the proposal is also based on ICT Governance concepts that establish important values guiding the design of the proposed processes, such as efficient communication and strategic alignment.

It also clearly establishes the actors who will interact with the planning process, its attributions and the formal artifacts that will be produced throughout the PETIC Life Cycle, thus covering another gap identified in the PETIC of UFAM.

The proposal does not implement 100% of the Scrum concepts or the way they are established, but presents a

customization directed towards a more complex process, such as strategic ICT planning.

In the proposal it is possible to identify elements of Scrum, such as organizing the execution of Sprints, Product Backlog and Sprint Backlog, events such as Sprint Planning, Sprint Review, Sprint Retrospective and Daily Meeting, actors such as Scrum Master and Product Owner, as well as the application of values such as transparency, inspection and adaptation.

In general, it is a proposal that adds elements of agility to the PETIC process, focus on strategic alignment, waste reduction, communication improvement, collaborative and participative planning, concept of pulled production, continuous monitoring, continuous quality improvement, and artifacts that trace the entire planning process.

This research was directed to a process proposal based on Scrum and, as this one, it was designed to be as flexible as possible, without restricted steps, with pre-conceived execution ways, and concentrating on the items that were considered most relevant to the Life Cycle of a PETIC.

REFERENCES

- Alberticn, A. L. (2010), *Comércio Eletrônico. Modelo, Aspectos e Contribuições de sua Aplicação*, 6th ed., Editora Atlas, São Paulo.
- Alberticn, A. L.; Alberticn, R. M. (2008), Benefícios do uso de tecnologia de informação para o desempenho empresarial. *Revista de Administração Pública*, Vol. 42, No. 2, pp. 275-302.
- Atese, M.; Tanriöver, Ö. (2014), "Investigation of the Cobit Framework's Input\Output Relationships by Using Graph Metrics", *Federated Conference on Computer Science and Information Systems*, pp. 1269–75.
- Barros, L. A. M. (2007), *Alinhamento Estratégico*, Tese de Doutorado, Universidade de São Paulo, São Paulo, SP.
- Chiavenato, I. (2004), *Introdução à Teoria Geral da Administração: na administração das organizações*. Edição Compacta, 3rd ed., Elsevier, Rio de Janeiro, RJ.
- Costa, E. A. (2007), *Gestão estratégica: da empresa que temos para a empresa que queremos*, 2nd ed., Saraiva, São Paulo, SP.
- Cruz, F. (2013), *Scrum e Guia PMBOK®: unidos no gerenciamento de projetos*, Brasport, Rio de Janeiro, RJ.
- Darveau, D. (2013), Denis Darveau [Online], disponível em: <http://www.isaca.org/chapters3/LasVegas/NewsAn>



- dAnnouncements/Documents/DENIS-COBIT5-Compare-With-4 1.pdf. (acesso em 30 abr. 2018).
- Derntl, M.; Motschnig-Pitrik, R. (2005), "The rule of structure, patterns, and people in blended learning", *The Internet and Higher Education*, Vol. 8, No. 2, pp. 111-130, disponível em: <http://dx.doi.org/10.1016/j.iheeduc.2005.03.002>.(acesso em 30 abr. 2018).
- Faria, J.C. (1997), *Administração: introdução ao estudo*, Thomson/Pioneira, São Paulo, SP.
- Gerhardt, T. E.; Silveira, D. T. (2009), *Métodos de Pesquisa*, Editora da UFRGS, 1st ed., Porto Alegre, RS.
- Gil, A. C. (2010), *Como elaborar projetos de pesquisa*, 5th ed., Atlas, São Paulo, SP.
- Giampaolia, R. Z.; Testa, M. G.; Luciano, E. M. (2011), "Contribuições do modelo COBIT para a Governança Corporativa e de Tecnologia da Informação: desafios, problemas e benefícios na percepção de especialistas e CIOs", *Revista Acadêmica da Faculdade de Administração, Contabilidade e Economia – PUCRS*, pp. 120–33.
- ISO/IEC. ISO/IEC 38500. (2008), *Corporate governance of information technology*.
- Joia, L. A.; Souza, J. G. A. (2009), "Articulando modelos de alinhamento estratégico de tecnologia da informação", *Cadernos EBAPE.BR*, Vol. 7, No. 2, disponível em: <http://dx.doi.org/10.1590/S1679-39512009000200006> (acesso em 30 abr. 2018).
- King, W. R. (1988), "How effective is your IS planning?", *Long Range Planning*, Vol. 21, No. 5, pp. 103-12.
- Kotler, P.; Armstrong, G. (2008), *Princípios de Marketing. Traduzido por Arlete Simille Marques, Sabrina Cairo; revisão técnica Dílson Gabriel dos Santos, Francisco J.S.M.*, 12th ed., Prentice Hall, São Paulo, SP.
- Lakatos, E. M.; Marconi, M. A. (2011) *Fundamentos metodologia científica*, 6th ed., Atlas, São Paulo, SP.
- Larman, C. (2004), *Agile and Interactive Development: a manager's guide*, Pearson Education Inc., United States.
- Laurindo, F. J. (2008), *Tecnologia da Informação: Planejamento e Gestão de Estratégias*, Atlas, São Paulo, SP.
- Lederer, A.; Salmela, H. (1996) "Toward a Theory of Strategic Information Systems Planning", *Journal of Strategic Information Systems*, Vol. 5, No. 3, pp. 237-53.
- Luftman, J. (2000), "Assessing Business-IT Alignment Maturity", *Communications of the Association for Information Systems*, Vol. 4, Article 14.
- Machado, M.; Medina, S. G. (2017), "SCRUM – Método Ágil: uma mudança cultural na Gestão de Projetos de Desenvolvimento de Software", *Revista Científica Intra@ciência*, UNIESP, São Paulo, SP.
- Meyer, C. A. (1997), "Planejamento formal e seus resultados: um estudo de caso", *Caderno de pesquisas em Administração*, Vol.2, No. 5, p. 39-46.
- Mintzberg, H.; Lampel, J.; Ahlstrand, B. (1999), "*Todas as partes do Elefante*", *HSM Management*, p. 100-08.
- Newkirk, H. E.; Lederer, A. L.; Srinivasan, C. (2003) "Strategic information systems planning: too little or too much", *Journal of Strategic Information Systems*, Vol. 12, No. 3, disponível em: <https://doi.org/10.1016/j.jsis.2003.09.001>. (acesso em 30 abr. 2018).
- Oliveira, D. P. R. (2008), *Planejamento estratégico: conceitos, metodologias e práticas*, 25th ed., Atlas, São Paulo, SP.
- Pham, A.; Pham, P. V. (2014), *Scrum em ação: Gerenciamento e Desenvolvimento Ágil de Projetos de Software*, Novatec, São Paulo, SP.
- Pollack, T. (2010), *Strategic Information System Planning*, in: Congresso ASCUE, 43rd, 2010, *North Myrtle Beach. Proceedings...* North Myrtle Beach, ASCUE, p.47-54.
- Prodanov, C. C.; Freitas, E. C. (2013), *Metodologia do Trabalho Científico: métodos e técnicas da pesquisa e do trabalho acadêmico*, 2nd. ed., Universidade Feevale, Novo Hamburgo, RS.
- Reich, B. H.; Benbasat, I. (1996), "Measuring the Linkage between Business and Information Technology Objectives", *MIS Quarterly*, [S. l.], Vol. 20, No. 1, pp. 55-81, disponível em: <http://dx.doi.org/10.2307/249542> (acesso em 30 abr. 2018).
- Rezende, D. A.; Abreu, A. F. (2011), *Alinhamento do Planejamento Estratégico da Tecnologia da Informação ao Empresarial – análise preliminar de um modelo na prática de grandes empresas brasileiras*, *Anais... XXV Congresso da Associação dos Programas de Pós-graduação em Administração*.
- Rezende, D. A. (2011), *Tecnologia da Informação e Planejamento Estratégico*, Brasport, Rio de Janeiro, RJ.
- Schwaber, K.; Sutherland, J. (2017) *Um guia definitivo para o Scrum: As regras do jogo*, disponível em: <http://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-Portuguese-Brazilian.pdf> (acesso em 13 ago. 2017).
- Souza, F. R. Jr. et al. (2016), *O Uso do Scrum Aplicado no Planejamento do Processo de Ensino-Aprendizagem*, *Anais... III Congresso Internacional das Licenciaturas*.
- Takeuchi, H.; Nonaka, I. (1986), "The new product development game", *Harvard Business Review*, Vol. 64, No. 01, pp.137–46.



Tapscott, D. (1997) *Economia digital: promessa e perigo na era da inteligência em rede*, Makron Books, São Paulo, SP.

Tonelli, A. O. et al. (2014) Using the bsc for strategic planning of it (information technology) in brazilian organizations. *JISTEM - Journal of Information Systems and Technology*, Vol. 11, No. 2. pp. 361-78, disponível em: <http://dx.doi.org/10.4301/S1807-17752014000200008> (acesso em 30 abr. 2018).

Turban, E.; Mclean, E.; Wetherbe, J. C. (2004) *Tecnologia da Informação para Gestão: transformando os negócios*

na economia digital, 3rd ed., Bookman Companhia, São Paulo, SP.

UFAM - Universidade Federal do Amazonas (2017), disponível em: <http://www.ufam.edu.br/> (acesso em 02 dez. 2018).

Ward, J.;Peppard, J. (2002), *Strategic Planning for Information Systems*, 3rd. ed., Hoboken, Nova Jersey.

Weill, P.;Ross, J. W. (2006), *Governança de TIC. Tecnologia de Informação*, M. Books do Brasil Editora Ltda, São Paulo, SP.

Received: 08 Feb. 2018

Approved: 18 Apr. 2018

DOI: 10.20985/1980-5160.2018.v13n2.1387

How to cite: Guimarães, R. P.; Souza Júnior, A. A. (2018), "Strategic ICT Planning: a proposal using SCRUM concepts", *Sistemas & Gestão*, Vol. 13, No. 2, pp.255-266, available from: <http://www.revistasg.uff.br/index.php/sg/article/view/1387> (access day month year).