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ICT STRATEGIC PLANNING AT PUBLIC HIGHER EDUCATIONAL ORGANIZATIONS: BUILDING AN APPROACH THROUGH ACTION RESEARCH AT UNIRIO

PLANEJAMENTO ESTRATÉGICO DE TECNOLOGIA DA INFORMAÇÃO E COMUNICAÇÃO EM INSTITUIÇÕES FEDERAIS DE ENSINO SUPERIOR: CONSTRUINDO UMA ABORDAGEM ATRAVÉS DE PESQUISA-AÇÃO NA UNIRIO

Luiza Goncalves de Paula
Renata Mendes Araujo
Asterio Kiyoshi Tanaka
Claudia Cappelli
Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro, RJ, Brasil

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ABSTRACT

This paper´s main contribution is the description of the process and experience in developing Information and Communication Technology strategic planning at a Brazilian public higher education institution. Action research was used as the scientific method and each of its research steps are presented. It also presents the instruments that were built for assessing organizational needs, the institutional diagnosis form, the required adaptations in the SISP ICT strategic planning model, as well as the reflections about the ICT strategic development process for this particular organizational context. The results evidence the feasibility of use and adaptability of the SISP ICT strategic planning model, enabling the effective ICT strategic development in similar contexts.

Keywords: Strategic planning, public educational organizations, action-research, ICT

RESUMO

Este artigo apresenta como principal contribuição a descrição do processo e experiência de formulação de planejamento estratégico de Tecnologia da Informação e Comunicação (PDTIC) em uma Instituição Federal de Ensino Superior (IFES). A

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Address for correspondence / Endereço para correspondência

Luiza Goncalves de Paula, Mestre em Informatica, Endereço: UNIRIO - Universidade Federal do Estado do Rio de Janeiro- Programa de Pos Graduacao em Informatica - Av. Pasteur, 296 - Urca - Cep 22290-240 E-mail: luiza.paula@uniriotec.br

Renata Mendes Araujo, Doutora em Informatica, Endereço: UNIRIO - Universidade Federal do Estado do Rio de Janeiro - Programa de Pos Graduacao em Informatica - Av. Pasteur, 296 - Urca - Cep 22290-240 E-mail: renata.araujo@unriotec.br

Asterio Kiyoshi Tanaka, Doutor em Ciencias da Informaçao, Endereço:UNIRIO - Universidade Federal do Estado do Rio de Janeiro - Programa de Pos Graduacao em Informatica - Av. Pasteur, 296 - Urca - Cep 22290-240 E-mail: tanaka@uniriotec.br

Claudia Cappelli, Doutora em Informática, Endereço:UNIRIO - Universidade Federal do Estado do Rio de Janeiro - Programa de Pos Graduacao em Informatica - Av. Pasteur, 296 - Urca - Cep 22290-240 E-mail: claudia.cappelli@uniriotec.br

Pesquisa-Ação foi o método científico utilizado e as etapas do desenvolvimento da pesquisa são narradas. São apresentados os instrumentos construídos para levantamento das necessidades organizacionais, o formulário para diagnóstico institucional, as adaptações indicadas para o modelo de planejamento estratégico do SISP requerido pelos órgãos de gestão, assim como as reflexões sobre o processo de elaboração do PDTIC neste contexto. O planejamento estratégico de ICT resultante deste trabalho demonstra a viabilidade de utilização e adaptação do modelo de planejamento estratégico do SISP, permitindo a efetiva construção do planejamento estratégico de ICT em contextos similares.

Palavras-chave: Planejamento Estratégico, Instituições Federais de Ensino Superior, Pesquisa-Ação, Gestão de Tecnologia de Informação

1. INTRODUCTION

Planning is part of a basic principle of Administration, set forth under the Federal Public Administration (FPA) through Decree-Law 200, from 1967. All Brazilian public organizations must develop and perform planning and monitoring (coordination, supervision and control) processes at the various institutional levels and in the Information and Communication Technology (ICT) area (Federal Court of Accounts of Brazil, 2008).

Although Brazilian laws enforce strategic planning development and performance, it has been ascertained that government bodies face difficulties in performing these tasks (BRASIL, 2008) (Federal Court of Accounts of Brazil, 2010). Findings on ICT governance surveys led the Logistics and Information Technology Secretariat (SLTI), from the Ministry of Planning, in charge of planning and coordinating the Information Technology and Information Resources Administration System (SISP) to create the General Information Technology Strategy (EGTI), in 2008, and setting forth as a target for 2009, for the entire Federal Public Administration, the existence and effective use of a master information technology plan (PDTI) (Brazilian Ministry of Planning, Budget and Management, 2008).

There are probably restrictive factors in the Federal Public Administration context regarding ICT strategic planning (Nutt, 2005 *apud* Hendrick, 2003) (Araujo, 1996): leaders' viewpoints and manipulations by interest groups being at times more important than economic issues; what defines "good performance" in public organizations as arguable; public organizations with broader aims, which are hard to grasp and measure; decentralized decisions ; different concepts of university coexist; ambiguous and disperse power; existence of a reduced task coordination.

According to Meyer Junior and Meyer (2004), university institutions, on account of their complexity, always require, from their administrators, creativity in model development and managerial approaches which allow them to act in a complex context entailing academic freedom, diffuse aims, and great sensitivity to environmental factors. Rational and analytical managerial models have not helped administrators to deal with the university environment, giving rise to the need for a discussion on the problems faced when applying the existing approaches and the existence of new forms of acting and thinking vis-à-vis the obstacles encountered in the Brazilian public university environment.

UNIRIO, just like other Federal Higher Education Institutions (IFES), is being required by the Information Technology Resource Administration System (SISP) to develop its ICT strategic planning so as to make better use of the investment received,

and better control of the ICT costs at the institution. The purpose of this research was to study the needs for adopting or complementing the SISP ICT Strategic Planning Model, as well as to create instruments for its application, taking into account internal features which are common to the IFES. The research also aimed to observe and describe the difficulties faced during the construction of an ICT strategic planning at an IFES.

2 ICT STRATEGIC PLANNING

Affeldt and Vanti (2009) define ICT strategic planning as a set of tools used in the development of ICT strategies, seeking to identify the ICT elements which enable the support to corporate business. The tools and techniques used should be based on ICT user needs, and the result of this process is a formal plan akin to institutional strategic planning for the ICT area.

According to Teixeira Filho (2010), the first ICT strategic planning models/methods were defined at the end of the 1960's (Sullivan,1985), (Teo and King,1997), (Mentzas,1997), (Cassidy,1998), (Min et al, 1999), (Gordon and Gordon,2006) (Newkirk and Lederer,2006). In addition to the highlighted authors, Ward and Peppard's (2002) and Boar's (2001) models were appraised in this research. These models were proposed for organizational contexts which seek to use ICT to secure competitive advantage in highly-competitive markets, including stages to evaluate competitors and anticipate market trends.

This research environment context aims to apply ICT to secure operational efficiency and efficacy, not necessarily to gain competitive advantage. The ICT strategic planning carried out in this research inherits the features of the public planning process (Hendrick, 2003): a) objectives are broader and harder to understand and measure; b) decision making involves more informal interactions, more hurdles, it is more heavily based on negotiations and requires higher-level authorizations; and c) what defines good performance is arguable.

For this reason, the models known from ICT strategic planning in the related literature need to be adapted to this context. Of the various models found in the literature, the model proposed by the Information Technology Resource Administration System (SISP) (2010) was chosen as the starting point of this research for being specifically developed for the most diverse types of public organizations with the greatest variety of purposes, such as ministries, universities and hospitals.

2.1 - ICT Strategic Planning Model for the SISP Resource Administration System

The Information Technology Resource Administration System (SISP) has created up a guide (Brazilian Ministry of Planning, Budget and Management, 2010) containing a model aiming at rendering information to aid in the drafting of the Information Technology Master Plan (PDTI) with the Federal Public Administration. This guide defines 3 main processes for ICT strategic planning: Preparation, Diagnosis, and Planning.

Activity flow in the Preparation, Diagnosis, and Planning processes are presented in figures 1, 2, and 3, respectively:

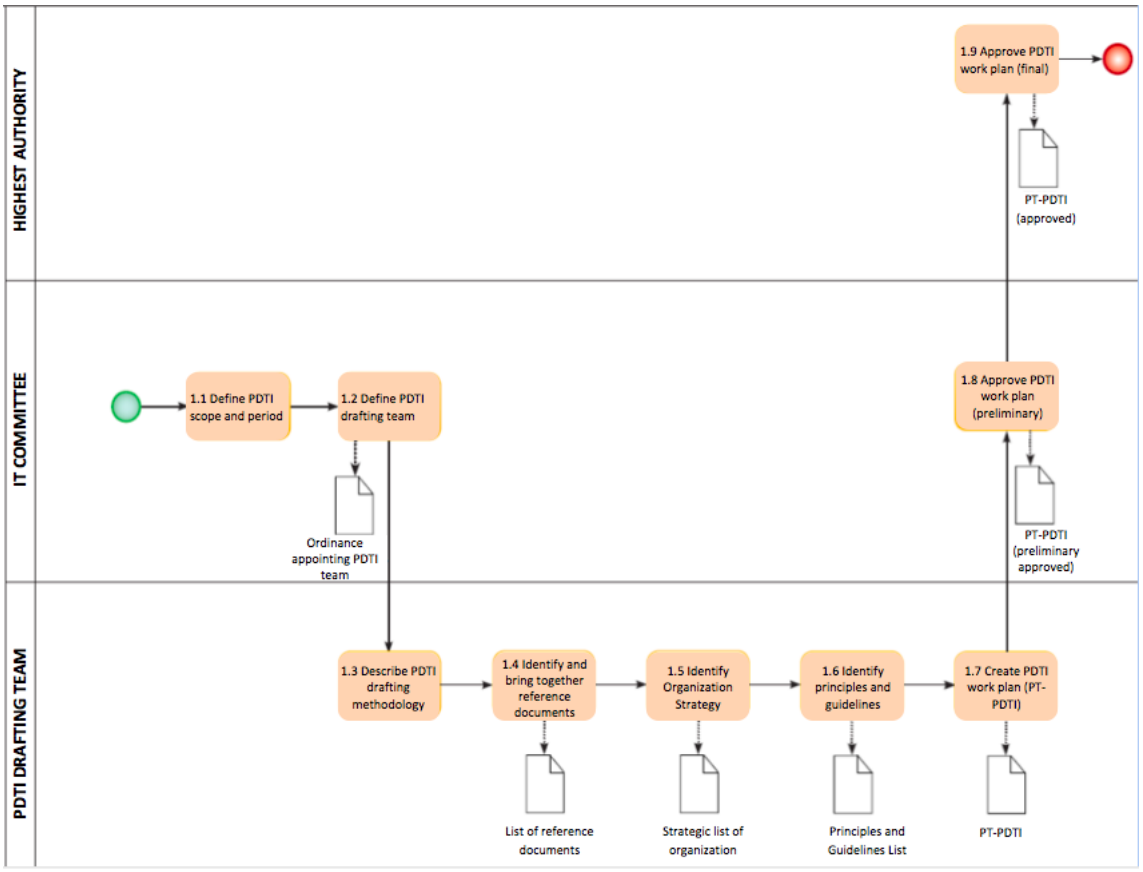

Figure 1 – Preparation Process Activities. Source: Brasil (2012a)

Preparation begins with the IT Committee defining PDTI scope and length, and appointing the PDTI team. This appointment is formalized by means of an instrument that assigns members' tasks, etc.Then the activities are performed for defining the PDTI methodology, identifying reference documents, principles and guidelines, which comprise a Work Plan proposal to be approved by the IT Committee and by the institution's Highest Authority, at the end of the process. Higher-nature decisory aspects are set forth in this process (BRASIL, 2012a).

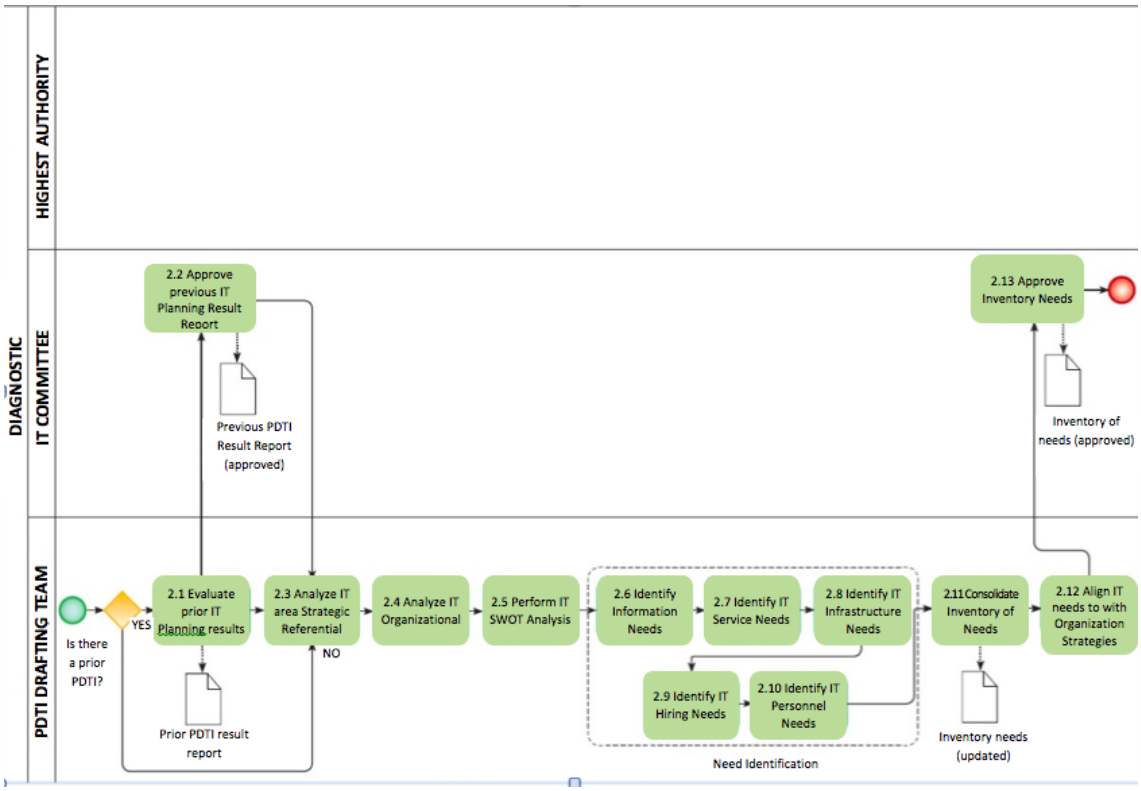

Figure 2 – Diagnosis Process Activities. Source: Brasil (2012a)

The Diagnosis Process is highlighted by the attempt to understand the institution's current IT status, so that, in association with the scheme herein, the needs (problems or opportunities), which are expected to be solved, may be identified. To this end, it contemplates the activities related to prior planning analysis, strategic analysis and assessment of needs. Prior planning analysis aims to appraise the status of previously planned actions: whether they are ongoing, or cancelled, or performed, or whether needs exist to realign them with the institution's and IT's needs. Strategic analysis is performed to position the intitutions's IT within its organizational context. Assessment of needs stems from those related to information and unfolds itself into all others associated to IT: services, infrastructure, IT personnel hiring (Brasil, 2012a).

The SISP strategic planning model sets forth that the alignment between IT and the institution occurs within the Diagnos is process, in the *Align IT needs with Organization's Strategies*. Henderson and Venkatraman (1993) established an IT strategic alignment model which bears four fundamental domains: Business Strategy, IT Strategy, Infrastructure and Organizational Processes, and Infrastructure and IT Processes.

Four IT strategic alignment prospects are derived from this model (Souza, 2008):

- Strategy performance: where the business strategy defines the infrastructure and organizational processes, also producing the infrastructure and IT process requirements.
- Technological Transformation: implies the development of an IT strategy in response to a business strategy. IT infrastructure and processes are develop from these requirements.

- Competitive Potential: exploits new IT features and potentials, redefining business strategy and, consequently, the infrastructure and organizational processes.
- Service Level: focuses on producing an IT organization to be considered "world class"; IT strategic alignment stems from the quality and quantity of IT services provided to the institution.

According to the prospects defined, the SISP would promote alignment through Technological Transformation, as it derives IT service needs from the institution's information needs.

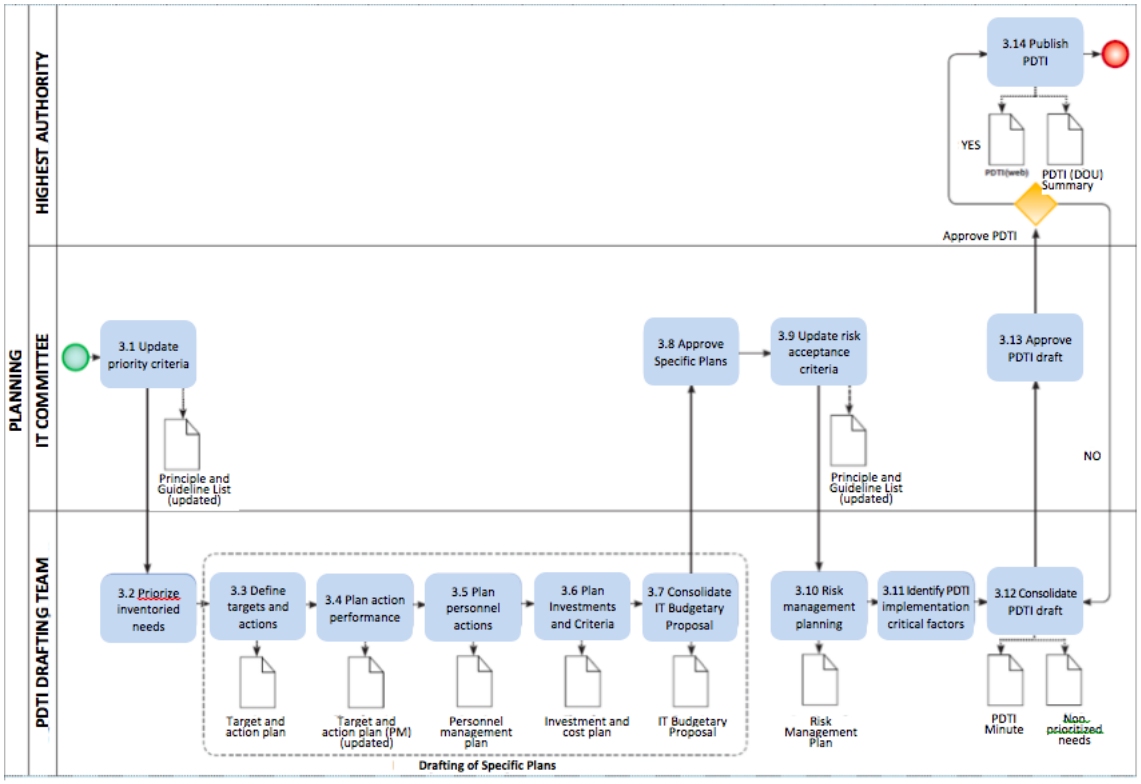

Figure 3 – Planning Process Activities. Source: Brasil (2012a)

This process is characterized by planning the fulfillment of needs, setting forth the appropriate plans and actions to meet the expected targets. To this end, it contemplates processes related to setting priorities and planning targets and actions, comprising personnel, budgetary and risk aspects. One of the main artifacts produced in this phase, and which is quite important to the entire PDTI drafting process, is the Target and Action Plan. Information is found therein on the indicators, the parties in charge, the terms and resources (both human and budgetary) to be used by the actions (BRASIL, 2012a).

The performance report on the activities mentioned herein is described under section 3.2 – Acting Stage. Reflections on the usage of the SISP strategic planning model are highlighted under item 3.3 – Reflecting Stage.

3. RESEARCH METHOD

Action research is a scientific method for systematic investigation, which is collaborative, self-reflective, critical and carried out by investigation participants (Mccutcheon, Jung (1990) *apud* Herr e Anderson (2005), Stringer (2007)).

According to Oates (2006), research action is featured by: i) concentration on practical issues: action research drives its attention to complex problems expressed by persons who live, work, and act in the real world; ii) a plan-act-reflect iterative lifecycle: the researcher plans to do something in a real-life situation, performs the plan, and reflects on what has happened or that has been learned, and then starts a new plan-act-reflect cycle; iii) an emphasis on changes: the researcher not only observes and describes, he/she is worried about doing things which make a difference, and about learning how these things affect change; iv) multiple data generation methods: no restrictions exist as to the type of data appropriate to research action (both quantitative data and qualitative data can be used); and v) action outcomes and research outcomes: action research outcomes may be reported both in practical discoveries in a problem situation and in learning about the problem solving process.

According to Stringer (2007), one of the strengths of action research is that this scientific method accepts different prospects from the various interested parties and finds ways of incorporating these prospects into mutually-acceptable forms of understanding, allowing for work on solving the investigated problem. This action research feature also directly benefits this research work given that strategic planning drafting should involve the different functional classes usually found in the environment under study, where widespread participation and internal democracy are cultivated.

Establishing the researcher's positioning becomes necessary for research internal validity issues and for ethical issues (HERR and ANDERSON, 2005). In this research work, the researcher is a member of the institution under study, with experience in IT-strategic planning related matters, not only observing and describing the problem, but also working with other members of the IT Committee of the institution the so as to bring about changes. Data, information and reflections described herein are also recorded in the meeting minutes.

To Herr and Anderson (2005), action research results in products and instruments which may be used in other similar contexts. It is expected that the research results presented herein (research environment features, data, documents, analyses, procedures and reflections on the IT strategic planning formulation process) may be used in other IFES present when IT strategic planning is developed, thereby fulfilling the scientific requirement of external validity.

According to Stringer (2007), the Planning stage comprises understanding

those involved in the problem and the quality of relationship between them: who they are, what their knowledge, skills and viewpoints are. In the context of this research, the Planning stage comprised the appraisal of the factors influencing the ICT strategic planning at UNIRIO and the analysis of the ICT strategic planning models existing in the literature.

The execution of the plan defined in the previous stage is the main purpose of the Act stage. In the research, there was the application of the ICT Strategic Planning Model developed by the SISP, leading to UNRIO's ICT Master Plan. It is expected that

the Act stage presents considerations and conclusions at the Act stage that has been performed, thereby resulting in considerations on effects arising from the SISP model application, with the identification of possible improvements for future ICT strategic planning cycles.

3.1 – Planning Stage

3.1.1 – Scenario Description - UNIRIO

In action research, the investigated problem does not exist in an isolated form, but it is part of a complex network of events, activities, perceptions, beliefs, values, routines and rules, comprising a cultural system kept through group, organization or community lifetime (STRINGER, 2007). It is necessary, therefore, to build an image from which the research problem develops, identifying the main groups of interest and sources of information, so that one then may investigate the most appropriate solution on a theoretical basis.

It is then applicable for this section to present both UNIRIO's ICT area, and the Information and Communication Technology Committee (CTIC), set up to carry out the ICT strategic planning, also presenting other SISP's ICT strategic planning activities, performed at this stage of action research.

Scenario description for this research took into account the following dimensions: the institution's creation history, strategic planning development history, organizational structure, services offered, budget, and ICT area management aspects.

UNIRIO is a Federal Higher Education Institution (IFES) subordinated to the Ministry of Education (MEC), created on June 5th, 1979, by Law nº. 6.655, which turned the former Individual Federal School Federation of the State of Rio de Janeiro into a federal university. All information presented herein refers to the year of 2012, when the research was performed.

UNIRIO has a total of 1.800 staff members and 15.000 students across six physical units, five academic units, five dean´s offices for graduate and research, and seven supplementary bodies directly subordinated to the Dean's Office. The highest deliberative bodies are the high Teaching, Research, and Extension Councils (CONSEPE) and the University Council (CONSUNI), comprised of representatives from all community segments. One hundred and twenty-five courses were offered to the community, including undergraduate, specialization, master's and doctoral degree courses. UNIRIO reorganized its ICT area in 2010, starting to incorporate the fixed, mobile and VoIP (Voice over Internet Protocol) telephone systems, with the transformation of the former Data Processing Center (CPD) into the current Information and Communication Technology Directorship (DTIC). This transformation was the first step in the search for its modernization, which had been playing, hitherto, a predominantly operational role.

The DTIC is structured in user service, information systems, infrastructure and support sectors, relying on nineteen technical and administrative staff. The services provided by DTIC comprise technical service to users, procurement/maintenance of hardware and software, development and maintenance of information and communication systems for the administrative and academic areas, in addition to supporting institutional portals creation/maintenance.

The UNIRIO integrated management system, named Information System for Teaching (SIE) has been in operation with its academic module and in the putting in place of administrative modules. In addition to SIE, DTIC provided support to the

Distance Learning Portal, which contains classes, didactic materials, and online tests.

UNIRIO's strategic planning was developed in 2006, in use until 2011. Drafting of the new 2012-2016 Institutional Development Plan was started in 2011, under the coordination of the Planning of the Dean's Office for Graduate and Research Studies (PROPLAN). This new planning was also carried out in a participatory form, using the Balanced Scored (KAPLAN and NORTON, 1997) methodology for its development. The Information and Communication Technology Master Plan (PDTIC) developed during this research work was built parallel to the development of the new PDI and entails the first ICT strategic plan of the Federal University of the State of Rio de Janeiro (UNIRIO).

The Information Technology and Communication Committee (CTIC) was set up in December 2010. According to the Federal Public Administration General Information Technology Strategy (EGTI), the creation of a committee has as its purpose establishing, prioritizing and following up the services provided by the public body´s ICT. In UNIRIO's case, the initial purpose of the Committee's first board members was developing the regulation and drafting of the first Information Technology and Communication Master Plan (PDTIC). UNIRIO's Planning of the Dean´s Office for Graduate and Research Studies was then appointed by the Dean's Office as the Chair of the Committee, having as their executive coordinator the Director of Information Technology and Communication Directorship (DTIC). The Committee's first board totaled thirteen members, representing the various organizational units.

3.1.2 IT Committee Characterization

Still in the Planning stage, it was possible to establish contact with participants, identify interest groups, get to know the background of UNIRIO's strategic planning history and build up an image of the ICT Committee and of the ICT Directorship.

ICT's Committee's Board reflected the representation of functional classes found in UNIRIO as teachers, administrative experts, and students, taking into account a democratic and participatory planning style found at that moment at UNIRIO.

A questionnaire was circulated aiming at identifying the IT committee's participants' perceptions in four areas: UNIRIO's ICT user satisfaction , individual knowledge of participants in institutional controls and strategic planning/management; UNIRIO's environmental factors and perceptions regarding IT strategic planning. The question on ICT user satisfaction section allowed for identifying a number of points where the community recognizes that there could be improvements in the IT area. The objective of the individual knowledge section questions was to identify the participant's degree of knowledge of tools and strategic planning techniques to be used in the next strategic planning stages. UNIRIO's environmental factor perception section was important to identify sources which could have influence on ICT strategic planning, such as organizational changes and monitoring of factors external to UNIRIO. The ICT strategic planning section sought to identify the importance of IT strategic planning to committee participants and possible obstacles to its development. Questionnaire results have generated an institutional diagnosis of ICT strategic planning.

The greatest perceived dissatisfaction with the IT area occurred in the Information System for Teaching (SIE) and in Institutional Portals. When asked whether there would be any services that could be supplied provided by ICT, but not currently provided , 83.3% of participants answered 'yes', and most complemented the answers saying that the services that could be provided by IT would be supportive to

the development of portals and their related implementation.

Only half of CTIC participants knew about the Institutional Development Plan and of the strategic management tools, such as Balanced Scorecard (Kaplan and Norton, 1997). There was little monitoring on the external factors influencing the ICT strategic planning, such as the ICT Brazilian federal legislation, institutional programs and actions, ICT solutions existing in the market and community's satisfaction.

The type of change which most occurred in the university departments was the number of people, followed by change of management/direction/coordination. A great number of management/direction/coordination changes implied possible priority revisions by the new managers and, consequently, in ICT strategic planning.

In the ICT area there was a set of rules and regulations, regarding role and responsibility definitions; however, it had become evident that only half of the participants were aware of their existence. As for ICT priority definition, it was shown that 58.3% of the respondents believed that there were priorities set forth for ICT, but that they were not communicated.

Most participants (83.3%) believed that it was indispensable to have an ICT strategic plan developed for UNIRIO, the biggest hurdles for the development of an ICT strategic plan being the lack of a method geared to UNIRIO's reality, in addition to not knowing how to do it.

3.1.3 Considerations on the Planning stage

At the end of the Planning stage, it was possible to perceive that UNIRIO, including the ICT area, found itself pressed by regulatory bodies to develop strategies, but it had no knowledge of what to do, and a superficial and unfollowed prior strategic planning history. The ICT area until then had reflected a stance which would be more concerning about infrastructure support than organizational support, thereby playing a limited role in the support to the fulfillment of a number of organizational objectives.

There were not structured processes in the DTIC to deal with organizational requirements. This led to a lack of control of what had been required, by whom and deadlines. This scenario brought discredit on the capacity of ICT area to perform the necessary tasks. The DTIC only responded to organizational requirements, which even resulted in difficulties in creating budgets for the coming years.

The PDTIC Drafting Process Guide (Brasil, 2012a) was the one chosen by the CTIC, for contemplating the ICT strategic planning alignment with the objectives contained in the institution's strategic planning, in the public organizational context. It also brought the tasks to be performed in a clearer and more detailed manner, including examples for the creation of documents.

3.2 - Stage: Acting – Developing UNIRIO's PDTIC

The Acting stage consisted of setting priorities, defining tasks, implementing activities, and helping participants to complete their tasks. SISP's ICT strategic planning model was used to define the activities to be performed and their sequence.

Participants, upon returning to their daily activities, found themselves divided between their routine tasks and the tasks established in the work plan, being necessary to keep Committee members focused on achieving PDTIC tasks, promoting talks for knowledge sharing on ICT strategic planning. Meeting minutes recorded what the activities to be delivered in the following meeting were, as well as the people in charge. At the beginning of each meeting, activity delivery was evaluated, with alternatives

presented whenever a certain activity had not been performed.

Below, the main activities which happened at the Acting stage are described, with emphasis on the instruments built and the main results achieved.

3.2.1 Organizational Need Survey (LNO)

Through reading of UNIRIO's (UNIRIO, 2006) PDI, identification was sought of the prior institutional targets in need of ICT support so that they could be reached and which would serve as an entry level, such as the needs to be met in the PDTIC to be built.

Among the 159 targets envisaged in the PDI 2006-2011 (UNIRIO, 2006), the Committee identified 57 targets related to the ICT area. The form created (Table 1) allowed the CTIC to conclude that around 70% of the ICT-related targets in PDI 2006-2011 had not been fulfilled or no information was obtained from the departments responsible for their accomplishment, which denotes that such targets were not realistic and/or appropriate to the ICT area operational capacity, or that the PDI had not been used as a guideline for setting priorities. Such conclusions also allowed the CTIC to know that the lack of accountability for objectives and targets leads to difficulties in carrying out strategic planning and allowing for constructing a PDTIC with clear attributions as to which unit is in charge of a given target or when an objective should be achieved. Organizational needs were directly translated into the actions planned for each strategic initiative documented in the PDTIC (UNIRIO, 2011b).

Table 1 – Organizational Need Survey Form

OBJECTIVE	TARGETS	% REACHED	Notes
1.6 Provide use instructions and ensure access to information sources both to in-house and external use.	1.6.1 Updating and promoting of a catalog of academic activities by print, magnetic or electronic media.		
	1.6.2 Holding of yearly lecture cycles to the staff and the student body, promoting information about academic and administrative structures.		

3.2.2 PDTIC

Following analysis of organizational needs, and evaluation of the targets set in the previous PDI (UNIRIO,2006), the following ICT strategic objectives were established:

- Institutional Results

1. Continuously improve electronic service provision to the comunity.

2. Automate organizational processes relating to academic and administrative activities.

3. Support organization communication.

4. Meet institutional and community's demands with appropriate quality, costs, and terms.

- Internal Processes
  5. Adopt Electronic Government technological standards.
  6. Provide technological support aiming at information transparency.
  7. Institute the information security and communication policy.
  8. Promote ICT environmental sustainability.
  9. Enhance ICT process management.
- Personnel and Resources
  10. Ensure appropriate infrastructure for ICT services.
  11. Develop technical and ICT management competences.
  12. Ensure effectiveness in performing budgetary resources.

Later, ICT's strategic aims were divided into initiatives and actions. Strategic alignment occurred between the strategic objectives defined in UNIRIO's Institutional Development Plan (UNIRIO,2011a) and the actions defined in the PDTIC (UNIRIO, 2011b), allowing for directly visualizing the impact of each ICT action upon the established organizational objectives. Table 2 exemplifies the alignment between UNIRIO's strategic objective *Ensuring production, publication and preservation of knowledge* in all fields of knowledge and corresponding ICT actions set forth in PDTIC.

Table 2: Alignment of PDTIC Actions with PDI Objectives/Initiatives. Source: UNIRIO (2011b)

PDI Objective	PDI Initiative	PDTIC Action
1. Ensure production, spreading and preservation of knowledge in all knowledge fields.	1.2 Produce instruments for academic production spreading.	3.1.1 Create main site institutional TEMPLATE (Joint action with Communication and CEAD Designer).
		3.1.2 Create institutional TEMPLATE for sites in the 1st level of the organizational structure.
		3.1.3 Create institutional TEMPLATE of INTRANET Site.
		3.1.4 Migrate content of main site to new template.
		3.1.5 Migrate from main site to PLONE.
	1.4 Promote organization and access to UNIRIO's scientific production through digital media so as to enhance their visibility and impact.	2.2.1 Put in place DSPACE system.
3. Extend cultural, artistic, scientific and technological benefits generated at the institution to society.	3.4 Enhance services offered to society.	1.1.1 Put in place integration to the Capes Journals Portal.
4. Ensure organizational transparency.	4.2 Promote institutional information transparency to society.	6.1.1 Identify how to apply features of Access and 131 laws to Unirio databases.
		6.1.2 Define technology mechanisms which may allow adhesion to Law features.
8. Promoting improvements to the organizational process.	8.2 Automating processes through information systems.	2.1.1 Implement library services manager.
		2.1.2 Develop external and in-house system integration (SIE and E-UNI)
		2.1.3 Develop external and in-house system integration (SIE and SIMEC)
		2.1.4 Develop external and in-house system integration (SIE and E-MEC)
		2.1.5 Develop external and in-house system integration (SIE and SISTACAD)
		2.1.6 Develop external and in-house system integration (SIE and SISUAB)
		2.1.7 Develop external and in-house system integration (SIE and PINGIFES)
		2.1.8 Put in place a management system for the entire Service cycle (1st to 3rd).
		2.1.9 Put in place DTIC Documentation Portal (internal/informative) in WIKI format.
		2.3.2 Put in place the Central Archive module.
		2.3.3 Put in place the students' Portal module.
		2.3.4 Put in place the teachers' Portal module.
		2.3.5 Put in place the HR module.
		2.3.6 Put in place the Selection and Access module.
		2.3.7 Put in place the Hospital module.
		2.3.8 Put in place the Budget module.
		2.3.9 Put in place the Equity module.
		2.3.10 Put in place the Procurement module.
		2.5.1 Customize operating process functionalities in SIE.
		2.5.2 Develop functionalities via WEB with OpenSource tools.

The PDTIC then enabled the DTIC to cease to be evaluated in subjective terms by the academic community and by the administration department and started to justify the investments and costs in ICT. With the improvement of management processes, the DTIC starts to plan its actions instead of only performing what is being demanded by other organizational units. The DTIC management acquires an instrument which facilities its decision making in prioritizing its projects and activities, allowing for answering regulatory body queries.

The budget created for this plan is greater than the budget spent in the previous years, which does not allow for obtaining the cost reduction advantage observed in other organizations which carry out ICT strategic planning. However, the increase in spending is justified by the return that UNIRIO would receive in terms of services.

With the increase in DTIC maturity, some PDTIC items may be improved in a new version. The set of best ITIL (Information Technology Infrastructure Library OGC, 2007) practices could be used for establishing DTIC processes and routines, as it has processes which have already been used and approved by other organizations. It would also help in the audit processes which check whether best practices are used or not. In this PDTIC, only the Services Center, which is one of the functions established in ITIL (OGC, 2007), was addressed.

In a coming cycle, there would also be the need to perform activities established in SISP's ICT's strategic planning and not performed in the cycle, such as the prior PDTIC result appraisal.

Drafting the risk management plan is another improvement which should occur in the PDTIC's next version. The Committee considered that UNIRIO, at the moment, did not have necessary maturity to bring forward risk planning, with the identification, probability of occurrence, impacts, preventive actions, mitigation and contingencies.

3.2.3 Adaptations to the ICT strategic planning model developed by SISP

The strategic planning model developed by the SISP, as it is generic for all public organizations, needed a number of adaptations so that it could be used in the UNIRIO context. In the Preparation process, the adaptations proposed were the creation of a Committee Evaluation activity, in which the institutional diagnostic context would be used to survey the knowledge of the appointed committee members. Still in this process, it is proposed that a webpage be created to allow for storing the documentations used and produced, and that the Organizational Need Survey Form (LNO), presented earlier in this article, be used.

Use of two additional documents, not mentioned in the PDTIC Drafting Process Guide (BRASIL, 2012a) is proposed for the Diagnostic process, as possible process inputs. The first document is the Target Plan developed by the SISP (UNIRIO, 2011d), which could be used as input for the needed appraisal activities. The second document is the self-diagnostic questionnaire developed by the SISP (UNIRIO, 2011c), which supplies information on the ICT area status.

This research work also proposes the creation of a database at the SISP with information on Balanced Scorecards (KAPLAN and NORTON, 1997), developed by public organizations belonging to this institution. This database would contain the objectives, indicators, targets, initiatives and actions used by the public organization and classified by organizational purpose, such as ministries, universities, hospitals, etc. Such information would make up a query base for organizations without much experience in ICT strategic planning and could be a source of queries for the Planning process

activities, in defining targets and actions.

3.2.4 Considerations on the Acting stage

The members' previous experience in IT strategic planning helped in the choice of documents to be used and added practical examples, being a valuable contribution in an environment where ICT strategic planning had never been carried out.

Following the development of the Acting stage, the DTIC started to count on a set of mission, vision, and values, thus possessing its strategic frame of reference. A new structure was proposed, contemplating new functions and assignments. For the first time, UNIRIO relied on an inventory of the ICT organizational needs, as well as on an inventory of ICT services, equipment and personnel.

At the end of the Acting stage, the SISP ICT strategic planning had not been applied at UNIRIO with all its processes.

3.3 - Stage - Reflecting

This section brings the main conclusions and reflections on the action research cycle carried out.

3.3.1 Reflections on the SISP Strategic Planning Model

In the beginning, the Committee believed there was no approach in the PDTIC construction which would perfectly be adequate to UNIRIO's reality. Following contact with the PDTIC Drafting Process Guide (BRASIL, 2012a), it was ascertained that the model described in the guide met UNIRIO's reality needs, as it had been developed for public organizations and for possessing processes which could be applied to UNIRIO's organizational context; it was necessary to carry out the adaptations pointed out in the section Adaptations to SISP's ICT strategic planning model.

Previous identification of the knowledge of the ICT committee members had a positive impact on the entire following task, so that the understanding of subjects allowed for the activities performed by the committee to flow.

In UNIRIO's case, there were basically three sources of information on the organization's ICT needs. One of these comprised the objectives found on the Institutional Development Plan (UNIRIO, 2006) in force, and which had not yet been executed so far in the organization. The second entailed the needs which were being discussed in the development of a new Institutional Development Plan (UNIRIO, 2011a). The third constituted the needs pointed out by DTIC's director, who holds meetings in person with all organizational units to elicit existing problems A consolidation process of the three sources of information was necessary, seeking to identify redundant points and the gaps among them.

For performing the information need appraisal activity, the PDTIC Drafting Process Guide (BRASIL, 2012a) determines that the organization's business process map and the information systems map should be requested so as to allow for eliciting what the organization's information needs are. However, in most public organizations this information may not exist. Awaiting completion of such processes may render unfeasible PDTIC construction, due to time constraints. The need to have a business process map, and the need to map the processes existing in the ICT area have fostered the creation of a corporate process management coordination at UNIRIO, with an agenda to perform corporate management of processes at organizational units, according to a definition in the PDTIC Drafting Process Guide (BRASIL, 2012a).

3.3.2 Reflections on the Information and Communication Committee (CTIC):

In general, the PDTIC is carried out by private firms through work sessions where participants are assigned with this task during PDTIC drafting. This was not possible at UNIRIO, as several of the CTIC members were teachers and administrative personnel and who would not be able to interrupt the academic year and daily activities to dedicate exclusively to this activity.

The meetings took place once a week and, in some weeks, academic activities clashed with the CTIC meeting agenda, leading to delays in carrying out the planning. A total of twenty-seven meetings were held, between January and December 2011. Whenever a sitting member needed to be absent from a meeting, it was necessary to find an alternate CTIC member to attend such a meeting. This would minimize the problem of cancelling meetings for a lack of quorum. However, the weak point in using alternate members would be in the alternate's level of knowledge on the subjects discussed in the meetings. A number of activities were done at a distance through electronic messages, such as establishing the ICT area frame of reference, the SWOT analysis, and the ICT organization appraisal.

Lack of committee member qualification in ICT strategic planning was not by itself an obstacle for them to partake in the planning process, as a brief training session was held on the theme. On the CTIC webpage (UNIRIO, 2011e) the presentations used were stored, which may be utilized or adapted by other organizations in need of sharing knowledge. On the other hand, participation of members from different academic community organizational units allowed for a more complete and correct vision of UNIRIO's ICT's requirements, as all were able to place their questions, allowing for clarifying questions among the organizational units and the DTIC, thus ensuring the positioning of its demands.

3.3.3 External demand interference:

Despite not being part of the PDTIC drafting work, several requests for audit had to be answered during its course; moreover, tasks were established for the pending issues to be decided, the existence of the ICT strategic planning being one of its main demands. These activities were carried out by the CTIC due to its urgency and the existence of the group. In the beginning, the filling out of SISP and CGU impacted the CTIC activity schedule. In the medium run, however, they contributed considerably to CTIC's increase of knowledge of UNIRIO's ICT.

3.3.4 Reflections on UNIRIO and its planning:

During the need of appraisal (services, infrastructure, personnel, ICT hiring), it was possible to identify that UNIRIO's ICT area had evolved more regarding infrastructure than in services provided. It was identified that the organizational targets related to the institutional portals and to the computerization of the processes evolved little, despite being a latent demand, to be addressed and met in the ICT strategic planning being developed.

The inventory of needs comprised the identification of organizational needs of various UNIRIO's units. The organizational needs encompassed redevelopment of institutional portals, computerization of organizational processes, and the availability of external academic bases, the electronic availability of administrative information and the new solution for managing the central library. ICT service needs consisted in putting in place the 1st and 2nd level of user service, putting in place the new data and telephone system and increase of ICT availability in UNIRIO, through the creation of safe rooms and a service cloud. Personnel needs contained the staff quantity needed for service

performance, as well as their necessary qualifications. Equipment needs contained the equipment quantity which needed to be acquired to provide the new ICT services. This inventory comprised the main resource for setting forth the ICT strategic planning initiatives and actions.

Three perspectives were used in the building of the ICT area strategic map: a) institutional results; b) internal processes; c) persons and resources. A concept exists that a university is not a business and, as a consequence, does not have clients. Thus, it was described at the CTIC that the Clients perspective, traditionally found in the strategic maps of various organizations, would be better represented by the Institutional Result denomination. Another perspective traditionally found in the strategic maps of several organizations is the Finances, which, in UNIRIO's case was encompassed in the Persons and Resources perspective, contemplating the infrastructure and budget necessary for fulfilling the DTIC's mission. It was understood that UNIRIO, as it is a Federal Public University, does not have direct financial objectives.

Among the indicators defined, there were some commonly found in other ICT strategic planning instances, such as users satisfaction index, successful servicing percentage, time spent on servicing, system availability, and qualified labor force percentage. There are less common indicators, such as the transparency increase index and open data standardization index. Many of these are common to the IFES planning, as they are indicators reflecting regulatory body demands.

3.3.5 Notes for the forthcoming action-research cycle:

An ICT strategic planning model was established with this action research cycle, an environment characterization was created, and the structure for completing a forthcoming cycle was provided.

Organizational changes and the lack of instruments were challenges which occurred and faced while this research work was being developed. More time than originally foreseen was needed. The initial forecast was that ICT strategic planning would take six months to be complete, but more than one year was needed. Preparation and diagnostic processes were the lengthiest ones.

The next action research cycle shall determine the ICT strategic planning model and regulation development, as established by the Brazilian government, thus securing new knowhow and instruments facilitating PDTIC drafting. Significant changes to the new committee in a forthcoming cycle will be necessary, and reappraising its knowledge on the model and tools used to carry out ICT strategic planning. It shall be necessary to reappraise the DTIC in terms of processes, persons and resources, so that the impacts of these changes may be ascertained for future planning.

4. CONCLUSION

This article has addressed the problem of how to adapt and apply ICT strategic planning development models already in existence at a Federal Higher Education Institution which had never carried out such an activity, due to the lack of knowledge of such an initiative, and where all decisions are taken in a democratic and participating manner. The Planning, Acting, and Reflecting stages of an action research cycle for the development of UNIRIO's PDTI were presented, containing procedures and reflections on ICT strategic planning drafting process at UNIRIO.

Regulatory bodies had required that UNIRIO develop the ICT strategic planning,

with the ICT area showing a reactive attitude towards the organizational unit demands. Following the PDTIC construction, the DTIC started to rely on a set of mission, vision, and values, thereby, possessing its strategic frame of reference. The DTIC's organizational structure was appraised and a new structure was proposed, contemplating new functions and assignments. For the first time, UNIRIO relied on an inventory of organizational needs by the ICT, as well as on an inventory of the ICT services, equipment and personnel. The DTIC started to own instruments to answer to regulatory body queries, which currently enable the DTIC director to have a complete and clear view of what the institutional demands are and how their actions and plans reflect on institutional results.

For generalization purposes, the use and adaptation of the ICT strategic planning model set forth by the SISP (BRASIL,2010b), and UNIRIO's experience report (difficulties found, results achieved) on using the guide and the method that constitute the contribution by this research work to the Brazilian Federal Public Administration. It is expected that the research results found herein may be used in other IFES which may be developing their ICT strategic planning as well as by the regulatory bodies for enhancing the PDTIC's Drafting Process Guide.

As limitations to this research work, we may mention that ICT strategic planning carried out in this research work is restricted to the UNIRIO's environment. Despite the context of other IFES being akin to that being surveyed herein, adaptations and complementation shall probably be deemed necessary for its application in other contexts. Another limitation is that this report only comprises the action research cycle for the PDTIC drafting at UNIRIO; it is not possible to report herein how the results produced will contribute to a new cycle.

Recently, the TCU has disclosed the 2012 Cycle IT Governance Profile (TCU, 2012), which surveyed the IT Governance Index (iGovTI) of 337 Federal Government Institutions. According to the results conveyed, UNIRIO achieved an iGovTI of 0.56 in a 0 to 1 scale, above the general 0.45 average. According to this index, UNIRIO is in the 74th place among the 337 institutions, in the 25th place among the 204 institutions comprising the Executive Power (average 0.42) and in the 6th place among 88 educational institutions (average 0.41).

Compared to iGovTI 2010 (0.37), the iGovTI 2012 (0.56) showed a change in IT Governance maturity stage, from an Initial level (0.00 to 0.39) to an Intermediate level (0.40 to 0.59).

As expected, in detailing the iGovTI by its six dimensions (Leadership; Strategic and Plans; Information and Knowledge; Persons; Processes; and Results), the greatest contribution to UNIRIO's iGovTI was ascertained in the "Strategies and Plans" dimensions, evaluated with a 0.86 index, which positions it at the Enhanced level (0.60 to 1.00) of TCU's maturity model.

Despite the quote by architect and city planner Lúcio Costathat "the only certainty in planning is that things never occur as they have been planned", certainly UNIRIO's ICT Governance Profile results, according to the TCU, reflects the success of the work performed in the action research scope reported in this article.

As for future works, the use of the institutional questionnaire made for the research is proposed at other organizations, upon identification of the need for adaptations and complementation in other organizational contexts. The development of this questionnaire could be included in the SISP's PDTIC Drafting, Process Guide,

thereby contributing to facilitating the use of the SISP's IT strategic planning model in Federal Public Administration as a whole. Another future work would be the appraisal of the PDTIC's execution by UNIRIO, analyzing the difficulties and challenges found in carrying out the established plan and supplying inputs for a forthcoming research cycle. Finally, its suggested an analysis of tools which has a potential to support discussions and tasks that have occur outside the ICT committee meetings, as it happened in the UNIRIO's ICT strategic reference frame discussions.

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