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APPLICABILITY ANALYSIS OF THE MODEL NCTP – NOVELTY, COMPLEXITY, TECHNOLOGY AND PACE IN THE ELETROBRAS DISTRIBUIÇÃO PIAUÍ PROJECTS

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To God for always being with me every moment of my life.
To my family, who gave me entire educational base that have today and who always supported me in my decisions.

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Abstract

Participation in Module VI International Project Management from George Washington University (GWU) has provided the knowledge model Novelty - Complexity - Technology - Pace (NCTP) through the lecture of Prof. Young Hoon Kwak on "Challenges and Best Practices of Managing Governement Projects & Programs". This paper presents the model application in Eletrobras Distribuição Piauí projects accompanied by its PMO using traditional methodology. Gains will be demonstrated in using the NCTP model.

Keywords: Project Management, NCTP model, Best Practices and PMO.

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1 Introduction

In March 2008, a new board was sworn Eletrobras and began the effective process implementation of reorganization and repositioning the company through the Plan of the Eletrobras System Transformation (PTSE) (CENTRAIS ELÉTRICAS BRASILEIRAS SA, 2010). This allowed the realization of a series of projects and initiatives that converged to a new future's vision in which Eletrobras System companies should operate in an integrated, competitive, profitable and sustainable for social and economic development of Brazil form.

Also in May 2008, the Eletrobras Distribution's Board was created with the intention to unify the six companies' management of the group's energy distribution. With this, there would be the standardization and unification of processes between companies generating economies of scale and optimization efforts. So, from that moment, Eletrobras Holding began to actively contributing their experiences to increase the efficiency and growth of these companies Eletrobras Distribution (EDE): Eletrobras Amazonas Energia, Eletrobras Distribuição Piauí, Eletrobras Distribuição Alagoas, Eletrobras Distribuição Roraima, Eletrobras Distribuição Acre and Eletrobras Distribuição Rondônia.

Among the actions planned in PTSE was to create a single project management model. This model would allow: Greater economic, physical and financial progress of projects about organizational performance of generation, transmission and distribution, national and international visibility, Increased economic financial predictability, and physical undertakings so that the "holding" can take corrective action to achieve the expected return for the same, Better anticipation and management of risks that may affect the expected enterprises' profitability and Standardize systematic, processes and tools for integrated management within the Eletrobras companies.

In April 2010, the Operating Manual Energy+ Project (CENTRAIS ELÉTRICAS BRASILEIRAS S.A., 2010) was approved by Eletrobras' Executive Directors through Resolution number 358/2010. This project is aligned with the PTSE and aims to improve the operational and financial performance and corporate governance of EDE. The project implementation is planned for the period of 2012 to 2015, are budgeted at $ 709.3 million and consists of a set of actions contemplated into two components: Component 1 (Reduction of Total Losses and Improving the Quality of Services) and Component 2 (Institutional Strengthening).

The above components are responsible for interventions in the technical areas of the business and organizational modernization of EDE. Mainly by the application of best management practices in existing market. It is important to mention that the scope of such management practices should extrapolate Energy+ Project and characterize a true process of cultural change in EDE, or reshape existing procedures and outdated practices in companies.

Therefore, among the actions contemplated in the second component of the Energy+ Project is the implementation of PMO by hiring specialized services Consultancy to support the deployment and consolidation of a Management System Project consists of methodology, computational tool and seven PMO.

The PMO supported by a consultancy will provide a catalyst for professional training and EDE acculturation to better management of projects, programs and business portfolio. With this, there will be a better allocation of resources, reach the goals of the projects and, consequently, the best return on investment.

In August 2012, the PMO were established by resolutions of specific board for each of the six companies. At the end of that year, it formed a PMO of EDE (SILVA, 2013), among the actions of implantation were: physical structure for teams, definition of software project management, mapping existing processes and development of methodology. Therefore, there

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was a diagnosis of stage of maturity in project management of EDE. At the time, the measurement of the level of maturity has become an essential tool to guide the whole plan of office's operation, because the actions and services developed by these aimed at addressing the shortcomings identified by the diagnosis of maturity.

Another important measurement aspect of maturity is being able to compare how companies are evolving with regard to project management and forward positioning which other companies. Every new diagnosis of maturity plan should be developed to minimize the deficiencies found. The research of maturity is held once a year targeting the public who directly or indirectly engages in projects within the organization.

Among the research models of maturity found in the market, we chose to use the Maturity Model Project Management - MMGP designed by Darci Prado and which has been widely used in Brazil as a tool to benchmark under the concept of Maturity by Project Category Model - MPCM - developed in conjunction with Archibald Russell (PRADO, 2010).

The option of using the model developed by Darci Prado was made because of it being free to use, simple application and tabulation, provide a roadmap for organizational development, being mostly used by Brazilian companies in the public and private sector and provide benchmarking between companies in the same industry that EDE.

The MPCM application in 2012 indicated a maturity of 1.91, that is, early or embryonic level. The company was in the early stages of project management, which are executed on the basis of intuition, "goodwill" or "best effort" individual. No standardized procedures exist. No standardized procedures exist. The success was the result of individual effort or luck. The possibility of delay, cost overrun and not meeting the technical specifications (DARCI, 2010) were great. This was the starting point for the activities of PMO in order to deploy the traditional project management methodology based on PMBOK.

Already in 2013, the MPCM reached 2.45, it reached the level known. The organization has made several investments in training and acquired project management software like MS Project. There were isolated initiatives of acquired knowledge use. Initiative to standardize procedures occurred, but its use was in its infancy. Realized the need to make an extensive use of standardization to facilitate projects' planning and control through the creation of a specific methodology for Eletrobras Distribuição Piauí. The PMO in partnership with a consultancy specializing assisted in the training of project managers, but the structure is still weak matrix.

For 2014, with a solid and mature PMO, the target is 2.77, it approaching the standard level. In this there is a standardization of procedures, disseminated and used in all projects under the leadership of an PMO. A methodology is available and practiced by all and part of it is computerized. Appropriate and possible to the industry and the types of projects their organizational structure was implemented at the time of implementation. Wanted perform an alignment with organizational strategies. Tries to obtain the best possible principals involved compromise.

The processes of planning and control are practiced by the leading players. Project managers evolve in technical, behavioral and contextual skills. Has become aware of issues that affect the project performance (time, cost, scope and quality) but, although we did see a significant improvement in this performance, these problems were not rectified. It has been a knowing that improvements are needed (DARCI, 2010).

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2 Methodology for Project Management of Eletrobras

The project management application throughout the lifecycle of a project allows to evaluate the performance, collect lessons learned and manage risks during implementation.

Some benefits obtained by the project management are: Risk degree reduction, Guidance on project implementation, Better allocation of material and human resources, Transformation of empirical knowledge into formal knowledge through documentation, Better control and management supervision, Agility in strategic decision making and Better communication between those involved.

The first edition of the Project Management Methodology for the Distribution Board and Distribution Companies Eletrobras - MGP (EDE, 2013) - is a Project Management Methodology Eletrobras derivation (RP492_06/10) based on best management practices projects planned by the Project Management Institute (PMI®) in their publication - Knowledge Guide to the Project Management (PMBOK Guide) 4th. Edition, which is the highest standard of acceptance today.

Processes, document templates and practices were adequate to the reality of the projects in the Directorate of Distribution and Distribution Companies Eletrobras - EDE according to their immediate needs and practicability in terms of withdrawals made on their maturity level. Procedures detailing the actions assigned to each part involved in the various phases of project management were described.

In DD and the EDE projects and programs are means used to driving changes that help to achieve the goals, vision and fulfilling its mission as the Eletrobras System's Strategic Plan defined. The targets set in the unfolding of the strategy will be achieved through projects or programs, or projects will be as challenging as they are the targets of the Company.

Projects can contribute to Strategic Objectives finalistics' achievement, aimed to end activities, or Strategic Objectives and Management Skills that aim to support the final activities, such as domestic infrastructure projects, technology and business management. These are usually performed by means areas.

During the life cycle of projects, it is necessary to report their performance, covering the collection and reporting of information related to the progress and commitments of the project to all stakeholders. This information underlying trend analysis projects of detecting whether their performance complies with the planned or unplanned.

In this context, the results of the indicators enable comparison between what was planned with what is being done during the project development, and enables the prediction of their future behavior and alert the project manager about the need for preventive action.

The results of the indicators will be collected and disseminated by the PMO progress report. Table 01 shows the indicators of MGP.

Table 01 – Key Performance Indicators of MGP

Indicator	Definition	Form of Verification
Development Index Scope – IDE	Shows a relationship between the deliveries scheduled and held on a certain date, identifying project delays.	It is the quantity of completed deliveries sum (100% completion) multiplied by its weight divided by the number of planned deliveries sum by the date of appointment.
Performance Index Time - IDP	Shows a relationship between the tasks planned and carried out by a certain date, identifying project delays.	It is the weighted average of the line by line schedule execution to the date of appointment.
Cost Performance Index - IDC	Establishes a relationship between the predicted budget and the cost carried by a certain date.	It is the ratio of the realized cost on the budget until the date of appointment.

Source: Project Management Methodology Eletrobras (1st Edition, 2013)

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3 Model NCTP – Novelty, Complexity, Technology and Pace

Despite the good results obtained with the application of traditional model other authors working with different approaches that do not focus only on efficiency, operational performance and save time and budget. In this model, usually do not uses approaches with guidelines to distinguish the projects and to select the appropriate approach for a project. Does not take into account the uncertainty, complexity and changeability. Furthermore, as most non-technical problems is the management but must take into account changes in the environment.

So understand that the analysis and monitoring of projects by a strategic perspective would be necessary for project success (SHENHAR ET AL., 2005).

The NCTP model presented by Prof. Young Hoon Kwak at the VI International Module in Project Management from George Washington Universty (GWU) is an alternative to the project management traditional model. It analyzes the success of projects in multiple dimensions. Takes into account the degree of project performance and the contribution made to the business strategy.

The diamond approach is also useful to evaluate a project on the way, identify possible gaps in a troubled project and select the corrective measures to put the project back on track. Another major problem is to assume the traditional optical capabilities that are more gaps forward. With that rode a static plan that does not meet expectations. Therefore, the NCTP born in the classical contingency's theory (uncertainty, complexity and pace) to address the need to find the gaps. The model, also known as Diamond, is composed of four dimensions: (SHENHAR & DVIR, 2007):

a) **Novelty:** Determines the degree of product novelty or service to market, customers and potential users. This dimension impacts, especially in the marketing approach and project management. Since it will define the level of uncertainty about the goals and project scope. Therefore, the higher the novelty less depend on market research. Since customers would have no way to measure the usability of products. The levels are: Derivatives (improvements or extensions of existing products, Platform (New generations of existing products) and Breakthrough (totally new products).

b) **Technology:** Determines the level of technological uncertainty. Therefore directly impacts the budget, communication and interaction, the number of planning cycles and the project manager's expertise. The higher the level of uncertainty, later to be frozen the plan. The levels are: Low (existing and well used technologies), Medium (existing technologies with implementations of new features), High (new and available technology at the project beginning) and Super-High (new technology not available at project start).

c) **Complexity:** Determine the degree of system's complexity for achieving the project outcomes. Is closely related to the scope and mainly affects the project organization. Therefore, the increased project complexity becomes greater the need for formal procedures. The levels are: Assembly (Produce simple and independent product), Systems (produce complex products and consist of several subsystems) and Array (produce products formed by various systems, it large number of interacting elements in a disorganized manner.

d) **Pace:** Determines the project urgency, or is directly associated with the availability of time required. Mainly affects the teams autonomy, the bureaucracy, the speed of decision making and the intensity of the involvement of top management. Furthermore, the fast pace can increase the incidence of errors. The levels are: Regular (Projects where time is not critical), Fast (Projects geared to supply market demands), Time-Critical (with specific projects to completion date) and Blitz (and urgent projects that must be completed in shortest time possible). Figure 01 shows the NTCP framework.

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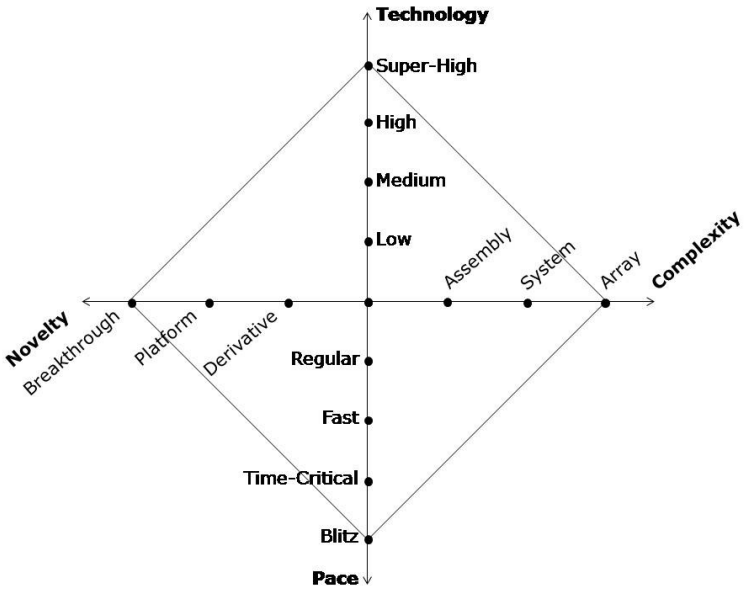

Figure 01 – NTCP Framework.

The NTCP model allows the correct management approach projects selection still in the planning phase. Therefore allows the comparison between the current model of management and what is actually required for the project. Such gaps are easily visualized through graphs.

Although the use in its fullness the adaptive approach is especially recommended for cases where the traditional model can no longer meet the demands for the success of a project, the use of NCTP can help traditional mechanisms in the treatment of risks, opportunities and selection portfolio. The improvement implement the stages of initiation and commonly used design, as shown in the following tables (SHENHAR & DVIR, 2007).

The four dimensions covered in the NTCP model produce positive expectations by expected benefits and negative aspects within the potential risks, according to the table shown in Table 02:

Table 02: Comparison of Benefits and Risks.

Dimension	Expected Benefits	Potential Risks
Novelty	New opportunities market and competitive advantages.	Inefficient forecast of market demands and copy ideas by competitors.
Technology	Breakthrough performance and improved functionality.	Lack of skills to implement and failures technologies.
Complexity	Results proportionate to the complexity.	Failure of integration and communication.
Pace	Larger market shared.	Errors in execution.

Source: Adapted from Shenhar (2007)

Furthermore, the use of NCTP allows more precise sources' analysis of risk by dividing the risk of separable and measurable components. Simply put, one can see that as larger is the diamond, greater is the risks involved. Thus, a numerical scale associated with each dimension can be created in order to define which projects have a higher level of risk and which dimensions should be the treatment of prioritized risks. Below is diamond with assigned risk scale.

With the levels of risks identified for each dimension (N, C, T, P) in order to obtain the level of overall risk (R) (involving all dimensions), requires only the insertion weights (a, b, c and d) for each dimension according to the formula: R = a x N + b x C+ c x T + d x P. As these weights are dependent on the specific context organization to Eletrobras Distribuição Piauí occur as follows: a = 0.1 b = 0.4, c = 0.1 and d = 0.4. This is because the most relevant dimensions in the current scenario are those on the complexity and pace, shown in figure 02.

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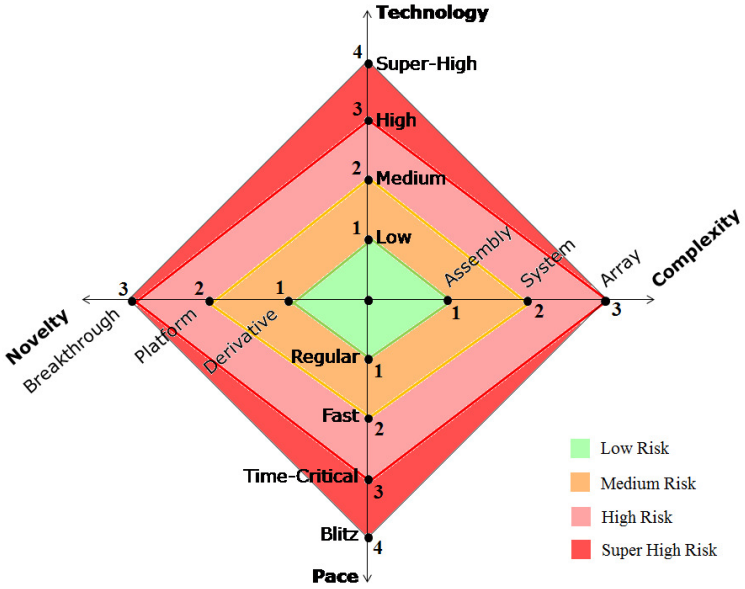

Figure 02 – NTCP Risk Assessment.

Levels contained in each dimension directly impact the management of each project. In technology, the higher the level, the greater is the need of time to complete the project and the need for prototyping or pilot models. Regarding the news, the more innovative, smaller quantitative data about the product and the harder it is to define the requirements. Regarding the complexity, increasing it requires a better formalization of the processes and activities of the organization for the smooth project progress. Finally, the more rapid the rate, the greater the need for autonomy of the team.

The NTCP model emerged as a complement to traditional project management (SHENHAR & DVIR, 2007). It's possible to take preventive action and mitigate the effects of identified risks and uncertainties envisioned.

4 Application of the Model NCTP in Eletrobras Distribuição Piauí Projects

The overall increase in competitiveness between organizations and rapid technological change are factors that contribute to the frequent changes in the strategies of organizations and conducting projects optimally. For this, it is essential that the company understands what level of skills in project management it is necessary to establish and continuously improve skills such actions.

In this sense, the NTCP model applicability analysis for company's project management is the first and fundamental to developing strategies that will move the organization from the current state to the desired state in which step the best practices in project management will be used.

The portfolio of Eletrobras Distribution Piauí currently has 30 projects. Among them are: Telemetry for Networks and Power Quality, Telemetry Consumer Units in Medium and Low Voltage, Mobile Dispatch System and Modernization of Data Infrastructure, Voice and Image System. These were selected for analysis because they are diversified and strongly impacting the company's strategic objectives.

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4.1 Telemetry for Networks and Power Quality

The project concerns the installation of 420 three-phase automatic circuit reclosers, allowing the service time reduction for permanent faults in distribution networks of electricity. Consequently, reducing the duration and frequency of interruptions in electricity supply. The project also includes the installation of 108 Voltage Regulators and installation of 250 Capacitor Banks in the company's distribution network, allowing the voltage profile improvement to fit the reference standards requirements of the regulatory agency, which deals with variations permitted voltage. It will greatly reduce the abuses of company's power quality indicators. Therefore, reducing operating costs and avoiding the regulator fines for exceeding quality targets.

Figure 03 shows the comparison between the style used and the required style. Can be seen that, as the technology and the novelty, the classification is low and derivative, respectively. Since the form of equipment and installation are quite widespread in the market and the company itself. Regarding the complexity, the project should have been treated as a system. There was a need for more detailed planning for the study and implementation of protection of the electrical system in order to obtain the ideal points for installations of equipment.

Another point not regarded with due attention was the process of imported equipment customs clearance and the expertise of the team. In this case, the project should have been conducted as time-critical, because besides having to pay fines for each day that the imported equipment remained stranded at the port of Rio de Janeiro by failures in clearance, poor power quality in future points installations of such equipment required immediate action.

For the risk analysis we have: R = 0.1 x 1 + 0.4 x 2 + 0.1 x 1 + 0.4 x 3 = 2.2

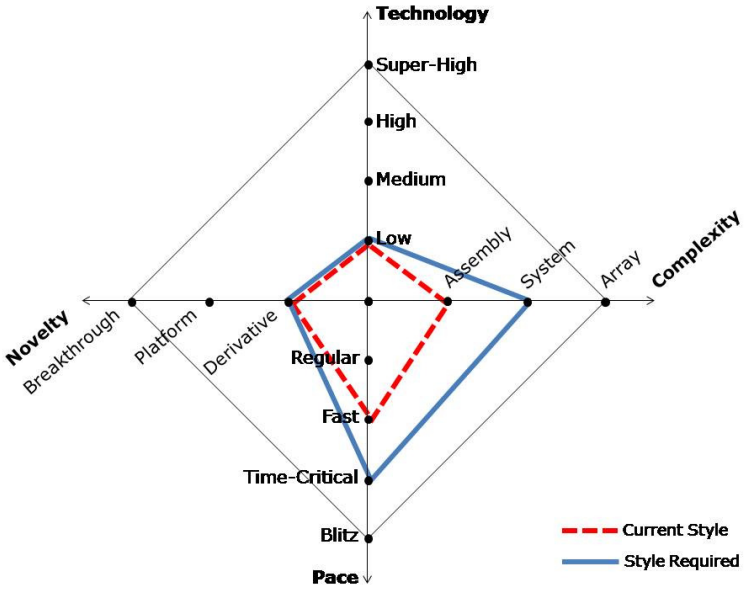

Figure 03 – NTCP in Telemetry for Networks and Power Quality.

4.2 Telemetry Cosumer Units in Medium and Low Voltage

The project proposes the telemetry of 16,840 consumer units from Group A (Medium Voltage) and B (Low Voltage). With that, the park electronic meters will be renewed. Furthermore, communication hardware with these meters, which will make them less vulnerable to fraud measurements are installed. It will provide improved quality of service, improved monitoring of electrical quantities of consumer units, the sustainable reduction of

non-technical losses in electricity supply, technology updates, eliminating losses metrological errors, constant remote monitoring of consumer units and improving the speed and quality of revenue from large customers.

In figure 04 you can see that the comparison between the style used and the required style only converges as to novelty.

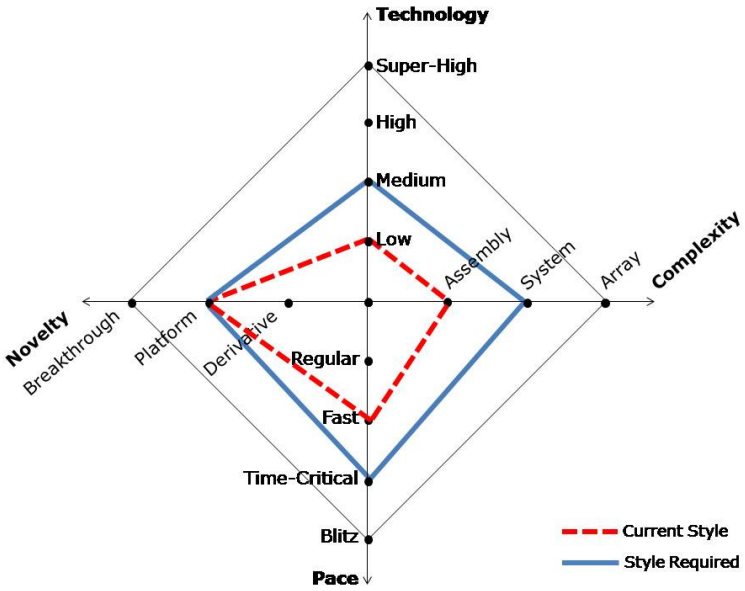

Figure 04 – NTCP in Telemetry Consumer Units in Medium and Low Voltage.

The technology involved was treated as low, but there will be the addition of features involving the environment monitoring. About the complexity, the project should have been treated as a system. This is due to the fact that there is a need to integrate the new system to be implemented with the current Commercial Management System Company (Ajuri). Another critical point is the centers of measurements centralization. The time axis, such as project will armor approximately 60% of company revenues and non-technical losses are around 30%, it is necessary to implement the project in the shortest possible time.

For the risk analysis we have: R = 0.1 x 2 + 0.4 x 2 + 0.1 x 2 + 0.4 x 3 = 2.4

4.3 Mobile Dispatch System

The project aims to implement a System of Mobile Dispatch orders of operational and commercial services, with the purpose fleet tracking and teams in real time, using a hybrid communication through automated and integrated analog broadcast via VHF radio, radio digital, GPRS / GPS, satellite and ethernet. With this, the indicators of continuity of electricity distribution regulatory agency services will be improved, there will be order optimization through the geolocation of field teams, reducing operating costs and digital interconnection between the group companies for possible joint operations emergency situation.

In Figure 06 we can see that the style employed differed completely from the required style. The factors that lead to such discrepancies are basically: The lack of integrating the new system with the Commercial Management System (Ajuri) and Distribution Management System Technician (SGTD) of making extremely complex and new deployment, Complexity of data communication due to the large distances that involve the state of Piauí and isolated locations, The lack of software needed to operationalize the tablets to meet the service orders and a challenge for the technology.

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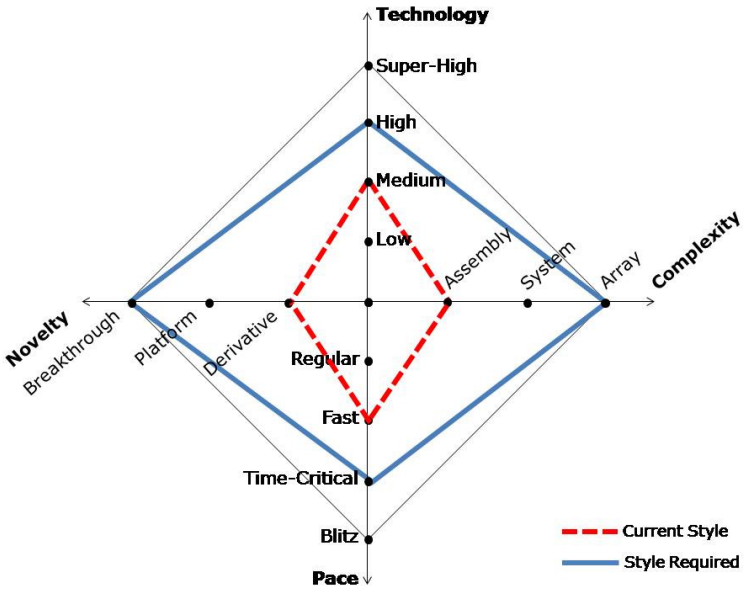

Figure 05 – NTCP in Mobile Dispatch System.

Legal Demand of the National Electric Energy Agency (ANEEL) and the immediate centralization of services implementation and better calculation of indicators, requiring execution in the shortest time possible.

For the risk analysis we have: R = 0.1 x 3 + 0.4 x 3 + 0.1 x 3 + 0.4 x 3 = 3.0

4.4 Modernization of Data Infrastructure, Voice and Image System

The Project for Modernization of Network Infrastructure for Data, Voice and Image, aims at realizing the structured cabling company. This consists in organized and standardized layout of connectors and transmission means for computer networks and telephony, to make autonomous infrastructure cables in the type of application and layout. Allow the interconnection of a network, servers, workstations, printers, phones, switches, hubs and routers.

Enable cost reduction and greater control of the Information and Communication Technology Park. The Structured Cabling will be guided by national and international standards that deal with the subject, such as: NBR 14565, TIA / EIA-568-B, TIA / EIA-569-A, TIA / EIA-606-A, TIA / EIA-862 , among others. With this, standardize the distribution network, minimizing costs and enabling future expansion.

Figure 06 shows the comparison between the style used and the required style. It appears that there is no disagreement as to novelty. However, technology is not low because there were new features aimed at active monitoring of logical network. As for the complexity, the project should have been treated as a system. This is due to the fact that upgrading the data network directly impact all systems of the company. With this, it is necessary a careful regarding disruptions in the operations of enterprise systems planning. The time axis, such as the network of company data is quite deteriorated and imminent risk of failure and continuity of services, it is necessary to implement the project in the shortest time possible.

For the risk analysis we have: R = 0.1 x 1 + 0.4 x 2 + 0.1 x 2 + 0.4 x 2 = 1.9

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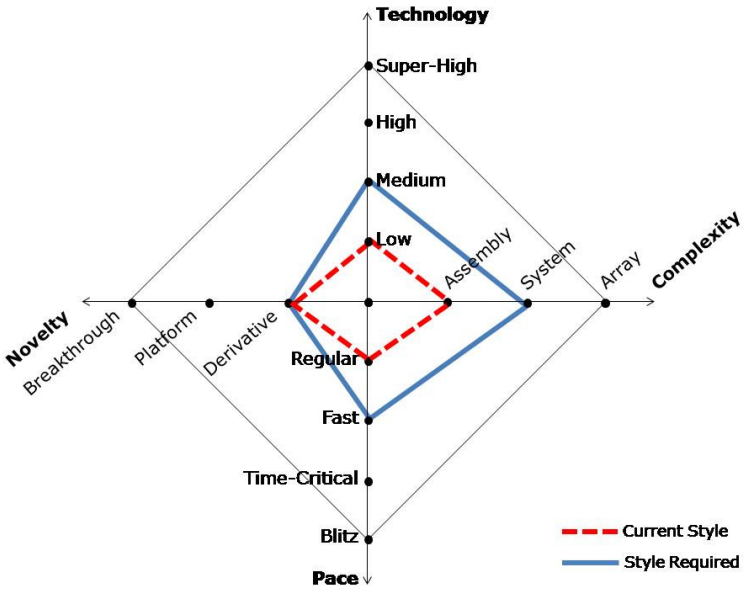

Figure 06 – NTCP in Modernization of Data Infrastructure, Voice and Image System.

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5 Conclusion

As that is a consistent increase in both the strategic importance of the projects, as the effective number of projects undertaken by organizations, it becomes more relevant and necessary to find references that identify new ways to be followed by the organization.

The addition of new practices for project management makes it possible to increase the probability of achieving various organizational goals or benefits, such as cost reduction, waste reduction, increased process efficiency, increased economies of scale, reducing delays, reduction of budget overruns, higher predictability of process, greater predictability of results, reduction of demand management, reducing overtime, attendance and other client expectations.

Risk analysis (Global Risk) based on NCTP model of the selected projects Eletrobras Distribuição Piauí allowed scale, in a new way, the projects to be treated as a priority to minimize the impact of risks. In addition, the NCTP can help effectively the conduction of projects.

All this is possible only through a more dynamic and capable flexible planning and actions related to the company's projects approach. The results obtained through application of the NTCP model on selected projects, are noticeable gains a dynamic approach. The greatest challenge lies in the adoption of measures in extremely hierarchical and bureaucratic public organizations. For this strong sponsorship and the existence of a PMO are extremely important for proper strategic alignment and application of the dynamic model.

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