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THE AGILE TRANSITION PROCESS OF ORGANIZATIONS IN SOFTWARE DEVELOPMENT PROJECT MANAGEMENT

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ABSTRACT
Organizations which use Traditional Project Management Models face the great challenge to transform their processes and their culture. In this context, this research aimed to develop a set of recommendations to be adopted by the organizations to facilitate the transition from the traditional to the agile model in software development project management. Exploratory qualitative research was carried out in two steps: a Systematic Literature Review and semi-structured interviews. The conclusion was that the ATP causes great impact on people and the main practices should aim to reduce team resistance. In addition, it should be an initiative of the whole organization.

Keywords: Agile Adoption Challenges. Agile Transition Process. Agile Transition Framework. Agile Project Management.

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1 INTRODUCTION

The current market scenario within the digital transformation process demands that even non-technology organizations running traditional business - where technology is used only for value generation - transform themselves to offer digital products and services (Schwab, 2015). In order to launch products desired by customers in the shortest time to market, it is imperative for organizations to adopt efficient Project Management Models (PMM's) in their software development projects (Chen, Ravichandar, & Proctor, 2016). Traditional PMM's, created some decades ago, are based on project planning and on fixed scope, which do not offer the dynamism required by the current market (Boehm, 2002; Lindvall et al., 2004). Thus, they have been criticized for being a limiting factor for fostering innovations in organizations since they impact on projects cost and schedule.

In that regard, new software development PMMs have emerged since 2001 to simplify these processes, based on functionalities prioritization according to their business value (Schwaber & Sutherland, 2017). These models, also known as Agile, allow organizations to respond to this new accelerated scenario by means of short development cycles and rapid response to the frequent changes called for the market. Many start-ups founded after 2001 have always used Agile PMMs to manage their software development projects. On the other hand, older organizations, which used traditional PMMs, had to change their processes and culture to implement the new agile model.

Despite the benefits of the agile model, there are several challenges associated with the agile transition, making it complex and time consuming (Gandomani et al., 2013; Javdani et al., 2015; Gandomani et al., 2014). Nevertheless, the agile transition is paramount for traditional organizations, as it improves their internal processes and enables the organizations to remain competitive on the market. For a sustainable adoption of the Agile PMM, organizations should fully comply with the agile values, requiring not only the implementation of a new process, but also a brand-new mindset (Tolfo et al., 2009).

Due to the duality between the need of adopting an Agile PMM and the challenges faced during the Agile Transition Process (ATP), the objective of this article is to present a set of recommendations to reduce the risks of the agile implementation in traditional organizations, and to validate if organizations are following these recommendations.

The following structure is presented: section 2 contains the discussion about the ATP challenges. Section 3 explains the research method. Section 4 presents the results analysis, followed by the conclusion in Section 5. Finally, section 6 explains the contributions and limitations of this work.

2 THEORETICAL REFERENCE

2.1 Project Management Models (PMM's)

While Traditional PMM's are based on planning, Agile PMM's are based on people; traditional models are best suited to large, distributed, and complex projects, while agile models are better suited to smaller, and local projects; traditional models are suitable for environments that require higher predictability and for projects with well-defined requirements, while the agile ones, for fast changing environments and for projects with uncertain requirements.

These differences mean that each PMM has characteristics that perform better in specific environments, and no model is adaptable to all types of organizations or projects (one size does not fit all) (Lindvall et al., 2004; Conboy & Fitzgerald, 2010. To better suit this need, organizations started to combine practices of traditional and agile models, resulting in hybrid PMM's (Kalus & Kuhrmann, 2013; Mahanti, 2006; Lindvall et al., 2004).

This new approach was motivated by the challenges encountered in implementing agile models in traditional organizations, such as the need for a new culture, resistance to change and decentralized decision-making (Campanelli & Parreiras, 2015; Fitzgerald et al., 2017. In this case, organizations should only implement the agile practices that make sense for their organizational context and that contribute for achieving strategic objectives. Thus, hybrid PMM's have additional benefits when compared to the adoption of only one model, since they add advantages from both models, meeting the specific requirements of each project and organizations' processes (Boehm, 2002; Boehm & Turner, 2003; Conboy & Fitzgerald, 2010). The challenge for organizations is to define the best combination between traditional and agile practices (Boehm, 2002; Campanelli, Camilo, & Parreiras, 2018).

As agile models are usually implemented first in software development areas and later expanded to other areas of the organization, there will often be a period of coexistence of agile and traditional models, which may result in some challenges. Several authors argue that it is possible to implement agile models in large and traditional organizations, as long as agile practices are customized and integrated into the traditional organizational environment (Lindvall et al., 2004; Waardenburg & Vliet, 2013). However, it is also necessary to assess whether the agile flexibility does not jeopardize the organization's culture and to understand the impact of agile practices on areas that still use traditional processes (Mahanti, 2006; Lindvall et al., 2004; Gandomani et al., 2013).

Boehm & Turner (2005) defend the construction of the hybrid model through the selection of practices that are indispensable to the business needs while adapted to the current processes, increasing them gradually, according to their priority, until reaching the appropriate level of agility. According to the authors, the best way to determine the appropriate level of agility for the organization is to assess, for each project, the risks of exceeding versus lacking agility and compare the consequences of each extreme.

Boehm & Turner (2003) also suggest five factors that should be considered when deciding whether an organization is better suited to traditional or agile practices: a) Project size, since small projects are more adaptable to agile models while large ones are more adaptable to traditional models; b) Criticality, as agile models are considered more tolerant to defects; c) Culture, as agile model is based on team empowerment, while traditional model emphasizes policies and procedures; d) Dynamism, since agile models are suitable to both stable and dynamic environments, while traditional models are more suitable to stable environments; and e) Personnel, as in agile models, the customer is part of the development team and is fully dedicated to the project, while in traditional ones, customers participate in several projects simultaneously.

Kalus & Kuhrmann (2013) also suggest a catalog of tailoring criteria to select traditional or agile practices, divided into four categories: a) Team, including size, distribution, and knowledge; b) Internal Environment, involving management support, requirements definition and project cost; c) External Environment, involving number of stakeholders, contract types and customer's environment; and d) Objectives, including project complexity and degree of innovation. Campanelli and Parreiras (2015) add two additional criteria to Kalus & Kuhrmann (2013) for agile practice selection: Previous Knowledge, based on the organization's tailoring experience; and the Maturity Level that the organization intends to reach after implementing the agile model. As mentioned by Chen, Ravichandar, & Proctor (2016), there are no best

practices for agile deployment adaptable to all contexts, but better practices for each specific organizational context.

2.2 The Agile Transition Process (ATP)

In order to attend the current competitive scenario, organizations must adopt highly efficient PMM's in their software development projects, when launching digital products and services. For this reason, many organizations are transforming their software development processes from traditional, planning-based models to more flexible and less bureaucratic agile models, which are more adapted to the current accelerated market (Cockburn & Highsmith, 2001; Waardenburg & Vliet, 2013).

However, the implementation of Agile PMM's in traditional organizations does not guarantee its success. The adoption of the agile model by organizations in a sustainable way requires a mindset transformation, considering not only their processes but also their culture (Boehm, 2002; Dikert, Paasivaara, & Lassenius, 2016; Tolfo et al., 2009). The challenges not only refer to the application of agile practices at project level, but also to their alignment with organization's values (Lindvall et al., 2004; Tolfo et al., 2009). That is why organizations need to run an assessment before starting the transition, to tailor the agile practices to their current context and to not implement a model that is not suitable to their culture and processes.

Due to this disruption in relation to the previous process, the transition from the traditional project management model to the agile model can be complex and take a long time to consolidate in the organization (Gandomani et al., 2013; Gandomani et al., 2014; Gandomani & Nafchi, 2015). The lack of knowledge about its challenges makes this transition even more difficult to plan, execute and manage (Nerur, Mahapatra, & Mangalaraj, 2005; Conboy et al., 2011; Gandomani et al., 2013; Gandomani & Nafchi, 2016; Jovanović, Mas, Mesquida, & Lalić, 2017).

To mitigate transition risks, it is important that organizations are prepared to face certain challenges before and during the transition. Waardenburg & Vliet (2013) highlight the complexity of Information Technology environment and low business involvement as challenges to implement agile models in traditional organizations. They also describe contingency actions to deal with these challenges, always based on collaboration and communication between agile and non-agile areas (Lindvall et al., 2004; Waardenburg & Vliet, 2013).

Nerur et al. (2005) classify challenges as Technology, Processes, People and Management. Jovanovic et al. (2017) highlight the difficulty of creating agile environments in organizations focused on traditional management. Gandomani et al., 2013 use the same criteria established by Nerur et al. (2005), but in a broader context of the organization, also considering the organizational structure and supported by a Change Management process. Espinosa-Curiel, Rodríguez-Jacobo, Vázquez-Alfaro, Fernández-Zepeda and Fajardo-Delgado (2018) classify the challenges into Personal, Social, Managerial, Organizational and Project-Related. Finally, Gregory et al. (2016) categorize them into seven distinct groups: Limitations, Organization, Sustainability, Organizational culture, Teams and Leadership, Scaling, and Business value.

2.3 Frameworks for Agile Transition Process

The transition to the agile model takes time and effort, as it affects the entire organization and changes company's mindset and culture. Therefore, some authors suggest the application of frameworks, to carry out the transition with the least possible impact.

Chiniforooshan Esfahani (2012) and Sidky, Arthur, & Bohner (2007) argue that, before starting the transition to the agile model, it is necessary to validate whether it is adaptable to the

organization's context, both from a strategic point of view and from the agile practices point of view.

The Strategic Agile Pre-Adoption Analysis Framework (SAAF) (Chiniforooshan Esfahani, 2012) proposes a pre-assessment before starting the ATP, applying a checklist to verify if the organization is prepared to the agile model and adherent to the new processes. This framework assesses the future impacts of the agile model on the organization's strategic objectives. For the transition to be efficient, it is necessary to implement only agile practices that are adapted to the organization's reality and compatible with its current processes, assessing whether their problems will be solved with the adoption of agile practices.

Another framework proposed by Sidky et al. (2007) recommends the application of the Sidky Agile Measurement Index (SAMI), to measure the organization's agility level, and the application of a four-phase process to identify whether the organization is prepared for the agile model. Finally, they should identify which agile practices should be adopted by the organization, considering the project objectives and its agility level. Another approach defended by the authors is the application of the agile philosophy to implement the agile model, that is, gradually, iteratively and continuously.

Gandomani & Nafchi (2015) suggest that the transition considers the following process: Indicators' definition, to measure the transition process; Iteration, according to PDCA method (Plan, Do, Check, Adjust); Continuous improvement, with the implementation of some practices, analysis of results and definition of the next practices to be implemented; and Gradual transition, prioritizing the implementation of changes that have greater impact and adherence to the company's values. Once this change is consolidated, repeat the process until the desired degree of agility is reached. This gradual implementation approach also helps to reduce resistance to change, as the implementation of new practices does not start until the team is adapted to current practices.

Another approach of frameworks is related to agile practices customization (tailoring), according to the organization's strategy. Qumer & Henderson-Sellers (2008) propose an ATP called ASSF – Agile Software Solution Framework, aligning agile processes to value generation. Like Gandomani & Nafchi (2015), they also understand that the transition to the agile model should not be carried out in a big bang mode, but incrementally over time, until the organization has reached the desired agility level adapted to its governance model. This framework is based on two steps: first, the application of the Agile Toolkit, to assess the agility degree in the organization's software development processes; then, the application of the Agile Adoption and Improvement Model (AAIM), a roadmap to support the implementation of agile practices according to the organizational context obtained during the assessment phase. First, the organization is evaluated and then the agile practices are selected and gradually implemented to result in a successful and efficient transition.

The framework proposed by Cao, Mohan, Xu, & Ramesh (2009) also addresses tailoring concept, investigating how to adapt agile practices to different organizational contexts. In this model, agile practices modified according to organization's needs, resulting in a hybrid model that meets the needs of top management while also implementing agile principles.

Boehm & Turner (2003) also propose the application of an initial assessment, detailing current and desired state, and the gap between them. After the assessment, the organization should define an action plan to achieve the desired state, including training and communication to all levels of the organization about the transformation objectives, to engage all teams and make them feel part of the process. During the agile implementation, it is also important to track the transformation progress compared to the initial plan and communicate it to all organization, requesting their feedback. This process must be iterative, promoting continuous improvement until it is adapted to the organizational context.

Campanelli et al., 2018 also emphasize agile practices customization and gradual implementation, keeping some traditional practices already used by the organization and increasing them with agile practices, prioritizing those that generate greater value for the business. To support this process, the authors developed the SAAP – Strategic Analysis for Agile Practices, a framework to associate agile practices with organization's business objectives and, to select the best practices based on projects characteristics.

Pikkarainen, Salo, Kuusela, & Abrahamsson (2012) propose a framework to be used in agile transition considering four phases: first, organization should define transition objectives, such as the motivator for implementing the agile model, the desired level of agility and the agile practices to be implemented; in the second phase, the organization should plan the implementation, prioritizing agile practices to be applied and selecting the pilot project; the third phase considers the implementation of the agile model, starting with the pilot project and incrementing iteratively based on teams' feedback; in the fourth and last phase, the implementation results are analyzed, based on the feedback obtained in the pilot project, and the continuous improvement process is applied.

Based on these frameworks, it is found that the implementation of agile models has a great impact on organizations' culture. Therefore, many organizations prefer to use hybrid models, implementing only some agile practices that are suitable to their culture, rather than adopting the full agile model, which would require a major organizational change to adapt. Furthermore, organizations must identify which agile practices will be prioritized, according to their business value, and implement them iteratively, as the teams are adapted. The transition planning phase is essential for defining transition objectives; for selecting pilot projects and agile practices to be prioritized; and for creating awareness throughout the organization about the ATP.

3 METHODOLOGY

To achieve the proposed objectives, exploratory qualitative research was conducted. This method was selected due to the investigation of a behavior that is not yet broadly explored and the intention to generate a new theory (Almeida, Francesconi, & Fernandes, 2019, p. 51-59). Such research was conducted in two steps: a secondary data collection, obtained through a Systematic Literature Review (SLR), and then a primary data collection, achieved through semi-structured interviews. Finally, the author conducted a Results Analysis, to compare the results obtained in the SLR with the ones obtained in the interviews.

3.1 Systematic Literature Review (SLR)

The collection of secondary data was held through an SLR, with the main objective to understand how Agile Transition Process (ATP) had been approached by academic literature. The research was based on the RSL process described by Kitchenham (2004), due to its adherence with the Software Engineering area, including the following phases:

3.1.1 Research Objectives

The first phase was the objective definition, which raised the following research question: "What are the main practices that organizations should adopt during the transition from the Traditional to the Agile Model in software development project management?"

Moreover, the following complementary questions were defined:

Q1: Which challenges were identified by the organizations during the transition to the Agile Model?

Q2: What are the proposed recommendations to overcome these challenges?

3.1.2 Research Strategy

The literature research was performed at Scopus database (www.scopus.com), using the following keywords: Agile Adoption Challenges; Agile Transformation Process; Agile Process Tailoring; e Agile Transition Framework. The articles from the following areas were selected: Computer Science; Engineering; Business, Management and Accounting. Document type article and source type journal were also limited. No date filters were applied, as the topic is relatively recent, and all publications have been written after 2001 Agile Manifesto (BECK, 2001). Only articles in English were considered.

3.1.3 Document Screening

The search using mentioned criteria resulted in 158 articles. Then, a document screening was performed, searching for the adherence of their Title and Abstract to the proposed research question, which resulted in 19 articles, excluding duplicates.

3.1.4 Data Extraction

After carefully reading each of the 19 articles, the ones that did not address the ATP were excluded. Moreover, some articles not previously identified during research phase but cited as relevant references by the resulting articles, were also considered and added to the bibliography. These additional articles were searched by Title and Author using Google Scholar (scholar.google.com). At the end of the data extraction process, 36 articles have been selected for this study, as detailed in Table 1 below:

Keywords	Research	Screening	Extraction
Agile Adoption Challenges	47	9	15
Agile Transformation Process	78	4	6
Agile Process Tailoring	12	1	9
Agile Transition Framework	21	5	6
Total Articles	158	19	36

Table 1. Research Process

3.1.5 Classification

Each of the 36 selected articles was then analyzed and their information was summarized according to the challenges encountered by the organizations during the ATP. Subsequently, these challenges were classified by similarity, and four research categories were identified by the author: Process, People, Management and Organization. These categories were based on the classification by Nerur et al. (2005): Technology, Processes, People and Management. The challenges and recommendations proposed in the literature were grouped according to each of the four categories, and each challenge was considered as an Analysis Unit (AU).

3.2 Semi-Structured Interviews

Considering the exploratory nature of this research and the need to collect primary data to understand if the organizations' reality reflected the RSL findings, the second step of this research considered qualitative semi-structured interviews. The procedure was based on the information collected in the academic research, as described below.

3.2.1 Interview Questionnaire

The interview questionnaire was developed based on each Analysis Units (AU), as defined during the SLR Classification phase. Subsequently, the questions were reorganized to follow a logical order during the interview, grouped into three sections: Agile Transition Process, Human Impacts and Agile Transition Results. The Human Aspects were considered an important topic during the interview, due to its relevance during the ATP and to the people-centered characteristic of the agile philosophy (Pinton & Torres Jr., 2020).

3.2.2 Interviewees and Organizations Selection

The sample proposed for the primary data collection was of ten interviewees, according to the author's networking, and the main selection criteria were people who actively participated in an ATP in their organization. No specific age range, role or position was defined, as long as they had a wide experience with software development project management. Anonymity of the interviewee and their organization was ensured, so that subjective data and personal perceptions could be collected.

Interviewee	Gender	Age	Role	Organization
I1	Female	44	Project Manager	A
I2	Female	33	Project Coordinator	B
I3	Female	37	Product Owner	B
I4	Female	30	Agile Coach	C
I5	Male	41	Agile Coach	A
I6	Male	37	Project Manager Office	D
I7	Female	43	Agile Coach	E
I8	Female	51	Scrum Master	F
I9	Female	41	Digital Transformation Leader	G
I10	Male	40	Agile Master	H

Table 2. Interviewees Profile

The organizations were identified through the selected interviewees, and there was also no delimitation related to their size, segment, or age, although the probability was that such organizations were more than ten years old, considering that most startups were already created using Agile PMM's in their software development products. The selected organizations were national or multinational, having the only criteria that they had already gone through an ATP, even if not yet concluded.

Organization	Segment	Nationality	Employees in Brazil
A	Finance	National	2.800
B	Finance	National	2.500
C	Technology	Multinational	17.400
D	Technology	National	980
E	Retail	National	40.000
F	Finance	National	150
G	Finance	National	1.500
H	Telecommunications	Multinational	10.000

Table 3. Organizations Profile

3.2.3 Conduction of the Interviews

The main objective of the interviews was to collect information and perceptions of the interviewees regarding their experience during the ATP. The interviews were conducted in two steps: first, an e-mail was sent to the interviewee including a Presentation Letter and an Initial Form. The Presentation Letter included the research objectives, the interview procedure and the interviewee consent for recording and transcribing the interview, as well as the anonymity guarantee and the use of its content only for academic purposes. The Initial Form contained the main information about the interviewee, about the organization, and about its ATP, with the objective of detailing the interviewees and organizations profiles. This form should be filled in by the interviewee and returned via e-mail before the scheduled date for the interview. The second step was the conduction of the semi-structured interviews, either in person or through videoconference, with a duration of approximately one hour each.

3.3 Primary Data Analysis

The analysis of primary data, collected through the ten interviews, was carried out in the following steps:

- Complete transcription of the interviews by the author;
- Reading of the interview's transcripts, to have an overall understanding of each interviewee's answers;
- Elaboration of a matrix with the complete content of the interviewees answer to each question;
- Categorization of the interviewee's answers to each question by similarity, identifying the number of occurrences of each category;
- Identification of the interview questions to each AU and creation of Analysis Subunits, when necessary, to identify additional topics that were raised from the interviewee's answers.
- Analysis of the author regarding the Unit or Subunit, considering the interviewee' answers to each of the specific questions.

4 DATA ANALYSIS AND DISCUSSION

The objective of this research was to summarize the main practices recommended both in the academic literature and in the primary data collection, as well as other aspects emerged only during the interviews, to enable the transition from the traditional to the agile model in software development project management. Therefore, the following artifacts were produced in each step of the research.

4.1 Analysis of the SLR

During the Classification phase of the SLR (as described in item 3.1.5), all challenges and recommendations proposed by the respective authors were grouped in four categories: Process, People, Management and Organization. Each challenge was considered as an Analysis Unit (AU) to be discussed during the Semi-Structured Interviews and the interview questions for each AU were defined according to the tables below.

4.1.1 Processes

AU	Challenges	Recommendations	Authors	Interview Questions
Big Bang transition	The Big Bang transition from traditional to agile model may impact projects execution, due to the new process and culture that need to be adopted.	Execute the transition process gradually, prioritizing some of the agile practices and increment them iteratively. Implement a pilot project in the agile model and add new projects as the processes are aligned.	Cohn & Ford, 2003; Dikert et al., 2016.	Was the Transition Process executed gradually or in a Big Bang model? Was there a pilot project implemented during the transition? Was there a hybrid period with agile and traditional practices being executed simultaneously?
Preparation to the agile transition	The organizations should have a clear motivator to justify the adoption of the agile model and to be prepared for the mindset shift.	Run a previous assessment to define if the organization is prepared for the Agile Transition. Adopt a transition framework to determine the transition process steps.	Chiniforooshan Esfahani, 2012; Gandomani & Nafchi, 2015; Sidky et al., 2007.	What was the main motivator for the organization to execute the agile transition? Did they run an assessment to define if the agile model was feasible? Did they apply a transition framework? Do you think the organization was prepared for the agile transition?
Transition results	Since the agile transition may impact projects and team culture, there may be an impact in overall transition results.	Adopt a continuous improvement process, prioritizing some agile practices and evolving as the teams are adapted and the results have been identified.	Boehm & Turner, 2003; Gandomani & Nafchi, 2015; Sidky et al., 2007.	What was changed in the projects after the agile transition? Do you believe the agile transition objectives were achieved in the organization? Did the organization run an assessment after the transition to evaluate its impact and to compare to the previous assessment? Did the organization become more innovative after the agile transition? What do you think is still missing for the organization to become even more agile?
Organization Processes	When the organization demands to execute agile and traditional processes simultaneously, there may be rework and waste of traditional processes that were working well.	Define which agile processes will be adopted before the transition starts and evaluate the integration between them during the pilot project execution.	Boehm & Turner, 2005; Mahanti, 2006.	Does the organization still implement projects in the traditional model?

AU	Challenges	Recommendations	Authors	Interview Questions
Estimates	Difficulty to estimate projects' cost and timeline in advance due to the absence of a detailed planning and scope.	Provide a high-level estimate on the beginning of the project and approve the initial budget. As the project is detailed, the estimates should be reviewed.	Cao et al., 2009; Cohn & Ford, 2003.	How does the organization estimate projects' budget and timeline? Does the organization apply the MVP concept?
Status Report	The organization management may keep traditional Status Reports to follow-up projects' status and check if they are being executed according to their estimates.	Define project milestones to be followed-up and generate reports based on them. Measure project progress based on burndown graphics and working software.	Boehm & Turner, 2005; Cohn & Ford, 2003; Espinosa-Curiel et al., 2018; Gregory et al., 2016; Schwaber & Sutherland, 2017.	How does the organization follow-up project status? Is the management comfortable with agile status reports?
Contracts	Difficulty to estimate budget and timeline to define suppliers' or customer contracts.	Adapt contracts, redefining metrics and billing model.	Boehm & Turner, 2005; Gregory et al., 2016.	No specific question for this AU during the interview.
Communication	The agile model requires more integration and communication among team members.	Define the new communication model that should be adopted by the teams based on collaboration.	Espinosa-Curiel et al., 2018; Gandomani et al., 2013.	Was the communication among the team members improved after the agile transition?
Knowledge management	The project team may not feel comfortable to share knowledge with other team members.	Create a safe environment to stimulate knowledge sharing within the team and use mentors to transfer knowledge to junior team members.	Conboy et al., 2011; Chan & Thong, 2009; Espinosa-Curiel et al., 2018; Gregory et al., 2016.	No specific question for this AU during the interview.
Documentation	Since formal documentation should be reduced, there may be an impact on knowledge sharing.	Maintain a minimum documentation of the project so that knowledge is not wasted, but in a more flexible way compared to the traditional model.	Espinosa-Curiel et al., 2018; Gregory et al., 2016.	No specific question for this AU during the interview.
Integration with other areas	When other areas of the organization are not adopting the agile model, integration may be more difficult and cause project delays.	Communicate (top-down) the importance of adopting the agile model by all organization areas and the impacts when they are not in sync.	Cohn & Ford, 2003; Dikert et al., 2016.	Is the agile model adopted by all areas of the organization which participate on the projects?

Table 4. Process Challenges and Recommendations

4.1.2 People

AU	Challenges	Recommendations	Authors	Interview Questions
Team organization	Since agile models are more suitable to small teams, large projects with distributed teams may present additional challenges.	Split large projects into smaller teams and allocate distributed teams at the same place at the beginning of the project.	Cohn & Ford, 2003; Gandomani et al., 2013; Gregory et al., 2016; Jovanovic et al., 2017.	No specific question for this AU during the interview.
Roles and responsibilities	Need for high-performance and self-motivated teams with multidisciplinary roles.	Allocate team members in only one project to guarantee focus, agility, and quality.	Conboy et al., 2011; Espinosa-Curiel et al., 2018; Gandomani & Nafchi, 2016; Gregory et al., 2016; Jovanovic et al., 2017.	Which impacts have you observed in team skills and activities after the agile transition?
Decision-making process	Change on the Project Manager role may cause resistance, since they don't want to lose their authority role and teams are not used to take project ownership.	Project Manager should have a facilitator role instead of a leadership role, stimulating the team on the decision-making process and on the project ownership.	Boehm & Turner, 2005; Chen, Ravichandar, & Proctor, 2016; Conboy et al., 2011; Espinosa-Curiel et al., 2018; Gandomani et al., 2013; Gandomani & Nafchi, 2016; Nerur et al., 2005.	Was there any change on the Project Manager role after the agile transition? Did they present any resistance? Do the teams have autonomy on the decision-making process?
Collaboration	Project teams may find difficult to change their mindset to a collaboration model.	All team members should assume a collaborative role and maintain shared ownership on the project.	Chan & Thong, 2009; Chen, Ravichandar, & Proctor, 2016; Dikert et al., 2016; Espinosa-Curiel et al., 2018; Gandomani et al., 2013; Gregory et al., 2016; Gandomani & Nafchi, 2015; Jovanovic et al., 2017; Nerur et al., 2005.	Was there any improvement on the team collaboration? Do the team members have project ownership?
Resistance to change	Since most changes are related to people, the team may present resistance to adapt to agile practices.	Communicate (top-down) to the team the objectives of the agile transition and make it mandatory to adopt the new process in the organization.	Conboy et al., 2011; Dikert et al., 2016; Gandomani et al., 2014; Gandomani & Nafchi, 2015, 2016 Jovanovic et al., 2017; Mahanti, 2006;	Did the organization management communicate the teams about the agile transition objectives? Was there any resistance to change by the teams?
Dedicated customer	Customers should be considered project members and are responsible for project decisions, such as scope and prioritization.	Maintain customers dedicated and engaged to the projects, having the same collaborative roles as the team members, to avoid delays on project decisions.	Chan & Thong, 2009; Gandomani et al., 2013; Jovanovic et al., 2017; Espinosa-Curiel et al., 2018.	No specific question for this AU during the interview.

AU	Challenges	Recommendations	Authors	Interview Questions
Team visibility	Teams may feel intimidated due to the high visibility of their tasks in all organization levels.	Empower team members and provide a safe environment where they can express their opinions. Train team members in technical and communication skills and implement mentoring and pair programming tools to enhance their knowledge.	Dikert et al., 2016; Espinosa-Curiel et al., 2018.	No specific question for this AU during the interview.
Mindset shift	Need to apply agile principles and values of collaboration, communication, and teamwork beside agile process, such as rites and ceremonies.	Train project team on the agile model. Allocate an external agile coach, as well as an internal team to support the transition process and guarantee the implementation by the teams.	Conboy et al., 2011; Dikert et al., 2016; Espinosa-Curiel et al., 2018; Gandomani et al., 2013, 2014; Gregory et al., 2016; Gandomani & Nafchi, 2015; Jovanovic et al., 2017; Nerur et al., 2005.	Was there a transformation team or an external coach allocated during the agile transition? Was it important to the transition process? Do you think there was any mindset shift in the organization after the transition?

Table 5. People Challenges and Recommendations

4.1.3 Management

AU	Challenges	Recommendations	Authors	Interview Questions
Management support	The organization management may be resistant to the agile process adoption.	Apply agile values of communication and collaboration to support transition and accept mindset shift from traditional to agile model.	Cao et al., 2009; Chan & Thong, 2009; Chen, Ravichandar & Proctor, 2016; Conboy et al., 2011; Dikert et al., 2016; Gandomani & Nafchi, 2015, 2016; Jovanovic et al., 2017; Mahanti, 2006; Gandomani et al., 2014.	No specific question for this AU during the interview.
Decentralized decision	The organization management may find it difficult to accept the decentralized agile model, compared to command-and-control traditional model, due to lack of power.	Reduce micromanagement and delegate decision making, redefining expectations for the project control such as estimates and status reports.	Chen, Ravichandar & Proctor, 2016; Cockburn & Highsmith, 2001; Cohn & Ford, 2003; Espinosa-Curiel et al., 2018; Gandomani et al., 2013; Gregory et al., 2016; Gandomani & Nafchi, 2016; Nerur et al., 2005;	Did the organization management present any resistance during the agile transition?

Table 6. Management Challenges and Recommendations

4.1.4 Organization

AU	Challenges	Recommendations	Authors	Interview Questions
Hierarchical structure	There should be a shift in the organizational structure, from functional areas to multidisciplinary teams, and in the roles from traditional to agile roles' description.	Modify the hierarchical structure to a more horizontal level and adopt new agile roles.	Conboy et al., 2011; Gandomani & Nafchi, 2016.	Was there any impact on the roles' description and hierarchical levels after the transition?
Training	Lack of appropriate training in the organization may be a high risk during the agile transition if teams are not aware of new agile processes and values.	Implement training on agile process and values, as well as new soft skills and business skills needed by the team, such as communication and collaboration.	Chan & Thong, 2009; Conboy et al., 2011; Dikert et al., 2016; Gandomani et al., 2013; Gregory et al., 2016; Jovanovic et al., 2017; Mahanti, 2006.	Was there an appropriate training on agile processes and soft skills to the whole team? Did Human Resources or Change Management team participate on the transition?
Talent acquisition	Since agile model requires a multidisciplinary profile, specialists may not be so valued in agile organizations.	Hire professionals qualified in technical and business skills according to the agile values.	Conboy et al., 2011; Mahanti, 2006; Gregory et al., 2016.	No specific question for this AU during the interview.
Performance Review	The performance review should not consider only the individual performance, but also the team collaboration.	Include team collaboration and communication criteria in the performance review and consider rewarding teamwork.	Chan & Thong, 2009; Chen, Ravichandar & Proctor, 2016; Conboy et al., 2011; Espinosa-Curiel et al., 2018; Gandomani & Nafchi, 2016.	No specific question for this AU during the interview.

Table 7. Organization Challenges and Recommendations

4.2 Analysis of the Semi-Structured Interviews

During the Primary Data Analysis phase (as described in item 3.3) the interviews' results were analyzed and compared to the SLR for each AU. The main objective was to identify if the recommendations proposed in the literature were applied by the analyzed organizations. The result of this research can be found below, also classified in the four research categories: Process, People, Management and Organization.

4.2.1 Process

- **Align agile transition with strategic objectives**

The literature recommends that, before starting the ATP, the organization identifies its primary motivation, which should be aligned to the organization's strategic objectives. In addition, the interviews showed that, for the new model to be sustainable, the agile transition

must be the objective of the whole organization and not just an initiative of a specific area, such as Information Technology. Transitions that were not aligned with the strategic level of the organization and did not have the support of their senior management (such as C-level), presented a greater risk to be successful.

- **Identify the goals of the agile transition**

The literature recommends that the organization performs an initial assessment before starting the ATP, in order to identify their current agile maturity level and which one they wish to achieve. However, during the interviews, the research identified and additional need to define, during the initial assessment, the main goals of the agile transition and how the results will be measured. These objectives must be aligned with senior and middle management, both at the strategic and operational levels, so that there is an effective support in all levels. It is also important to define the key indicators and milestones that will be monitored during the ATP to assess whether it is successful.

- **Think about the whole process by value stream, but carry out the agile transition gradually**

Carrying out the agile transition gradually and iteratively is a unanimous recommendation both by the literature and by the primary data collection. This approach minimizes teams' resistance, scaling up the agile model to new teams only after the adaptation of the current teams and improving it according to their feedback. All respondents mentioned that the agile transition started gradually in the organization. However, they also mentioned that the transition to the agile model in only one specific area (such as Information Technology) did not add value to the organization. Therefore, in order to avoid bottlenecks in the process, other areas which are part of the product value stream, such as Purchasing, Infrastructure or others, must also be involved in the ATP. When executing the transition, organizations should start with a pilot area, usually the one that has the highest adherence to the agile model and, according to the concept of continuous improvement, gradually include other areas in the process until reaching the whole value stream.

- **Create an intermediate hybrid model**

Executing the agile transition gradually often results in a hybrid model in the beginning, starting with the application of some agile practices and gradually expanding to new practices as the teams are adapted. The literature recognizes the practice of hybrid PMM's. However, it was found during the interviews that the performance of agile rituals must be considered mandatory since the beginning of the ATP, to minimize the risk of the teams abandoning the new model and to be able to evolve the transition until all the benefits of agility are achieved.

- **Adjust the agile model to the organization's processes**

Each organization operates in a different segment, delivers different products, and has a different culture. Therefore, depending on the type of projects that it executes, there will always be a need to adjust the agile model to their current processes, often resulting in a hybrid model or maintaining traditional and agile processes in parallel. The literature states that the agile model is not adaptable to all types of projects. Nevertheless, some of the interviewees reported that organizations are pushing for all projects to be migrated to the agile model, without previous analysis. To overcome this challenge, organizations must analyze, at the beginning of the agile transition, which processes should be migrated to the agile model and which ones should be maintained in the traditional model, considering the efficiency and cost of the transition, and periodically reviewing them, at every maturity cycle.

- **Prioritize projects that generate most value for the business**

The projects prioritization according to their value generation is a mandatory practice of the agile model, as it directs the execution of activities that are extremely important for the organization and increases customer satisfaction. Besides, prioritization improves teams' motivation, preventing them from executing many activities simultaneously or losing focus with the frequent activities exchange. In literature research, project prioritization was not identified as an Analysis Unit. However, during the interviews, it was mentioned as one of the main challenges of the agile transition since organizations still do not execute it efficiently. Project prioritization must be considered a periodic ritual in the organization (for example, quarterly) and must be aligned with their strategic objectives.

- **Adopt the experimentation model**

One of the main concepts of the agile model, used especially in product innovation, is the creation of MVP (Minimum Viable Product). It represents a product that still does not have all the desired features, but that can be launched on the market for experimentation. The interviews showed that there is a great resistance from the organizations to adopt the experimentation model, due to the need to change their mindset when launching unfinished products to the market. However, this model was considered by the interviewees as an important product innovation practice. The application of Discovery processes, such as Inception and Design Thinking, is a great tool to obtain feedback from the internal or external customer and to assist the organization in the projects' prioritization, adding value to the business.

4.2.2 People

- **Communicate the transition objectives to all hierarchical levels**

The literature states that, when starting the ATP, the organization must clearly communicate its objectives and process to all employees, ensuring that the information is cascaded down to all hierarchical levels. It is essential that teams participate on the agile transition since the beginning, so that everyone feels part of the process and contributes to shaping the new model to their context. This practice is recommended by the literature and corroborated by the interviewees. It was found that the decision about the transition in a top-down manner, without the participation of all hierarchical levels, can increase teams' resistance and hinder the ATP.

- **Hire a consultancy specialized in Digital Transformation**

Hiring an external consultancy or Agile Coach is extremely important to apply the assessments, to execute and support the ATP according to organization's context and to conduct the training. In addition to the application of new practices, consultancy is also essential for the dissemination of the new agile mindset, proposing improvement actions impartially and reducing conflicts between areas. This practice is highly recommended by the literature and was carried out by all the analyzed organizations. We found that organizations that started the agile transition without an external consultancy or coach, only obtained traction after hiring them, reaffirming its importance.

- **Define shared goals between teams**

The definition of shared goals between the teams that participate in the process was not identified in the literature as an Analysis Unit to be studied. Nevertheless, it was mentioned by the interviewees as an important practice to increase teams' engagement during the ATP and to

reduce conflict between project and operational activities executed by the teams. These goals should reflect the prioritization previously defined, cascading down strategic objectives until the operational level. The benefits are the reduction of team resistance and the collaboration of all involved teams in the process.

4.2.3 Management

- **Assess the adherence of the agile model to the organization's culture**

The literature suggests that the organization carries out an initial assessment to verify whether the organization is prepared for the transition. The interviewees considered this practice highly important for the organization, since it analyzes the fit between the agile model and organization's culture and identifies whether it is prepared for the agile mindset (for example, to decentralized management, to multidisciplinary teams dedicated to projects and to the experimentation process). This assessment reduces the risk of implementing a culture that does not fit into the organization, especially the ones that operate in command-and-control model. Therefore, the participation of the executive levels in the training is essential to engage them in the new agile mindset, reducing their resistance and obtaining their support during the transition.

4.2.4 Organization

- **Create a Digital Transformation area in the organization**

The literature recommends the participation of Human Resources area during the ATP. Moreover, several interviewees mentioned the creation of an internal Digital Transformation area as a key factor in the agile transition. In addition to hiring a specialized consultancy, which gives an external perspective to the organization, the Digital Transformation area should be the link between the consultancy and the internal areas, bringing the objectives of the ATP to the reality of the organization. The Digital Transformation area should be composed of a multidisciplinary team, including Human Resources, and should implement a Change Management process in the organization, evaluating the impact of the agile transition on roles and responsibilities and supporting the teams in the application of the new model.

- **Train all teams in agile processes and in soft skills**

As described in the literature, the training content should approach the new agile processes (such as Scrum and Kanban), as well as the soft skills required for the new roles and responsibilities. During the interviews, it was also mentioned that all hierarchical levels should participate on the training, to facilitate the application of the new agile process in the organization and to reduce resistance at all levels.

- **Support the transition with the teams**

Changes are always difficult to implement, especially those that impact people. For this reason, some of the interviewees mentioned the importance of a periodic support by the Digital Transformation area to the teams during the ATP, until the new processes and values are consolidated. This practice reduces the abandonment of new agile practices by the teams and reinforces that the agile transition will not be a temporary practice, but the new process that will be applied by the organization from now on.

- **Disclose transition results to the organization**

Disclosure of the transition results was recommended only by the interviewees, with the objective of engaging the teams and rewarding them after a successful implementation of the new model. Therefore, each milestone of the ATP should be communicated to the organization, for example, each team that has completed the training or the transition to the agile model. At this stage, it is important that the key indicators established before starting the transition are measured to assess whether the initial objectives were achieved.

5 CONCLUSIONS AND FINAL CONSIDERATIONS

The transition from the traditional to the agile model in software development project management is mandatory for organizations that wish to survive in the current market, and it is also an important step towards Digital Transformation. Even traditional organizations, leaders in their segment, had to transform their business to remain competitive and launch new products and services. However, the agile transition requires time and effort from the organizations and not only requires changing their processes, but also their mindset to new agile values of collaboration, decentralized management, and multidisciplinary teams.

The main challenges of the ATP, as described in the literature and mentioned by the interviewees from this research, are referred to people, such as team engagement, management resistance and adaptation to new roles and responsibilities. Another major challenge for organizations, mentioned only by the interviewees, is their difficulty to prioritize projects, which impacts teams' satisfaction due to the need of frequent changing their activities and to the lack of focus in what is really important to the organization. Even with so many challenges to be faced, the agile transition was considered, by all respondents, a necessary process for the organizations, since the benefits outweigh the challenges.

The practices recommended in this article intend to facilitate the ATP in traditional organizations, based both on the actions identified in the academic literature and on the reality organizations, verified through the interviews. The main objectives of these recommendations are to minimize the risks of implementing a new model that is not suitable to the organizational context and to reduce people resistance in the executive and operational levels. However, even the specificities of each organization must be considered, adapting the recommended practices to their context.

The results presented in this research were based on the available literature about the ATP and on the information of ten interviewees, employees of eight national and multinational organizations from different segments, such as Financial, Information Technology, Telecommunications and Retail. The interviewees were selected according to their participation in an Agile Transition Process, and therefore, there was no restriction by nationality, size, age, or segment of the organization.

The author also did not request any proof of the results obtained by the organizations after the transition to the agile model, such as key indicators, cost or time comparison of the traditional and the agile model and so on. Therefore, the interviews result reflects only the perception of the interviewees, since the ATP considers subjective criteria, such as communication and team resistance.

It should also be noted that this is a limited sample, given the universe of organizations that are undergoing the ATP. Nevertheless, this fact does not minimize the importance of this research, since a consistent methodology for the collection, treatment, analysis and interpretation of data was applied, so that the results obtained can be considered reliable. Thus, the obtained results can be replicated to a wider universe of national or multinational

organizations, and they can be used to infer characteristics of the Agile Transition Process, as well as to provide guidelines for possible research.

In an eventual future work, it can be conducted more accurately, based on aspects identified in the literature and in the organizations 'reality, as well as emerging aspects obtained only during the interviews. Therefore, it is proposed that the sample be expanded, involving a larger number of organizations, clustered by size, age, segment or product typology. A more in-depth analysis would allow us to assess whether the agile transition is differentiated according to the specific characteristics of each cluster. Another possible approach may be to conduct interviews with more than one employee from the same organization, covering different hierarchical levels and seeking to identify the impacts on each of the profiles.

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