Moving from Waterfall to Agile: Perspectives from IT Portuguese Companies

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ABSTRACT
This study investigates the main motivations, difficulties and good practices in the migration process of software development models from Waterfall to Agile experienced by IT Portuguese companies. For that, we adopted a quantitative methodology based on multiple case studies that allowed us to explore five research questions. In a first step, we propose to identify the main reasons that motivate the companies to adopt Agile development processes and we intend to characterize this migration process. We also explore a set of good practices that can be followed in this migration process and we suggest a set of measures that can be used to assess the success of projects in an Agile environment. Finally, we explore the organizational and management impacts with the introduction of Agile processes.

KEYWORDS
Adoption Challenges, Agile, Case Study, Software Development, Software Engineering, Waterfall

1. INTRODUCTION
In 1970, Winston W. Royce presented the first known formal description of the Waterfall model, although he did not employ the term “Waterfall” (Royce, 1970). Since then, software development has known several other approaches. But as developers started to face more and more various requests from clients, in February 2001, 17 software development organizations met to discuss new and lightweight methodologies to develop software projects (Stoica et al., 2016). This meeting gave rise to the Agile Movement as an alternative to the traditional Waterfall approach. The Agile approach helps teams to deal with unpredictability by developing projects incrementally and iteratively assisted by empirical feedback (Agile Methodology, 2008). Under Agile, solutions emerge through the collaborative effort of small and self-organizing cross-functional teams. Agile software development methods include methodologies like Scrum (Sutherland, 2014), XP (Extreme Programming), Kaizen, Kanban, etc.

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Today, the Agile approach tend to lead the software development market (Stoica et al., 2016). In Rigby et al. (2008) view, Agile revolutionized the software industry but is also about to transform other functions in many other industries. At this level, we emphasize the lean philosophy in which its basic principles of eliminating waste, including quality in the process, creating knowledge and empowerment of the teams are applied to the software field (Aikhuele & Turan, 2018).

In the Waterfall model, it is assumed that all the project’s requirements are identified, before the design and implementation phases. In a software project, it hardly works this way. If the development team builds the project from the initial set of requirements, in the end, they will have a solution according to what they were asked to do. What most frequently happens is that in the time the team was developing the solution, business realities changed, and the solution does not suit the new realities and is most likely obsolete. With Agile methodologies, the team can react to changes in the business context and build software that is still relevant when finished (Agile Methodology, 2008).

The Waterfall model can still be used in simple, straightforward projects, when all the requirements are very well known and stable. Furthermore, Munassar & Govardhan (2010) consider that Waterfall model minimizes wasted effort and can be a good alternative for technically weak and inexperienced staff. However, when we need to build digital products that contain a high level of uncertainty, the Agile approach is the appropriate choice.

The importance of the Agile approach has been recognized by an increasing number of IT (Information Technologies) companies, and most of them started a transition from the Waterfall model to Agile. It is possible to find online guides or online courses and other resources (Rigby et al., 2016; Deb & Datta, 2017) on how to make the transition from Waterfall to Agile.

However, there is not much information about the success of the transition and concerning the difficulties that companies face to make it, only a few case studies are known. With more information available, companies starting their transition could benefit from the experience of others and get better chances of success. Regarding this concern, this paper investigates a particular reality: Portuguese IT companies that moved from Waterfall to Agile. How was this transition made? Which were the difficulties? Which Agile methodology is more used?

In recent years, Portugal had a significant increase in the number of IT companies with many successful IT-based startups like Farfetch, Feedzai, Uniplaces or Talkdesk. Therefore, the Portuguese IT companies’ reality was considered a relevant context to conduct this study, in the authors’ knowledge, regarding the transition process. The study is intended to give a contribution to this problem and help companies facing the transition. This paper is organized as follows: this section gives an overview of Waterfall and Agile and presents Portuguese IT companies as a target for a study in the transition from Waterfall to Agile. Section 2 discusses some of the challenges that companies, in general, and Portuguese companies, in particular, have to face within the transition process. Section 3 presents the adopted methodology. Section 4 presents and discusses the main findings of this work. Finally, section 5 draws the conclusions.

2. CHALLENGES ON MOVING TO AGILE

Agile methodologies also have proven outside the software industry and companies’ IT departments and spread to other areas, industries, and functions. But the transition process can be hard, because each business works differently. As Deb & Datta (2017) point, “…it is a struggle for companies that have followed the clearly defined structure of Waterfall to suddenly become pro-change and embrace a new work culture and mindset.”

The introduction of Agile usually begins in IT departments, because software developers are more likely to know and understand Agile principles (Rigby et al., 2016). But organizations’ resistance to change is considered a main challenge, due to managerial or functional issues constraints, which difficult the adoption of Agile methodologies on a large scale (Stoica et al., 2016; Turetken, Stojanov, & Trienekens, 2017). According to Rigby et al. (2016), a Scrum Alliance research found that “more
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