Agile Practices in Maturity Model for Testing: an Experience Report

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***Abstract*—Software testing is an important tool for ensuring that software products produced and launched on the market reach the appropriate quality standards. Testing maturity models such as MPT.BR or TMMI, appear in the software scenario as a way to support introducing elements that are essential for developing the discipline of software testing within organizations. Together with this reality, it is observed that there is a strong trend towards using agile methods in software development. Therefore, this paper presents an experience report on the use of agile practices together with MPT.BR.**

Keywords— software testing, maturity models, agile practices.

I. INTRODUCTION

In today's context of software development, given the increase in the demand for products and the reduction in the number of qualified personnel to develop them, quality is a key concept in strategies for winning a share of this market. In the broad context of software quality, one of the common characteristics observed is that it is essential for the specification given to be adequate and in accordance with clients' needs. Hence, testing software before delivering products to clients is one of the ways to achieve quality.

In this context, maturity models under test, such as MPT [1], TMM [2] and TMMI [3], are guides that assist organizations to introduce the essential elements for the development of the discipline of testing, given that it is not always known where to begin to define a testing process. Agile methods, for their part, appear in the software setting as an alternative to software development, which is faster and more readily adaptable to the client´s needs. The practices arising from this context are also instantiable for testing processes, which should be interpreted as if one can map the concepts of agility for testing activities in the software development scenario.

Therefore the aim of this paper is to present an experience report on how some process areas of MPT.BR were implemented together with agile methods based on data collected from implementing the model in 27 software engineering organizations over the last 4 years.

II. EXPERIENCE REPORT

This Section describes an experience report based on the experience of implementing MPT.BR in various organizations all over Brazil, in which agile practices were adopted in the testing environment. Table I shows the mapping of the process areas in agile implementations of MPT.BR.

TABLE I. AGILE IMPLEMENTATION IN MPT.BR

Process Area	*Practices*	*Agile Implementation*
GPT	GPT4	Scrum Taskboard, Kanban Board, Sprint Backlog, Improvement Backlog
	GPT5	Planning Poker, Ideal Days, Relative Sizing
	GPT6	Short Iterations, Sprints
	GPT9	Daily Meetings to Identify Risks
	GPT13	Agile Metrics, such as Sprint Burndown Chart
	GPT16, GPT18	Daily Meetings, Sprint Review, Retrospective
	GPT17	Continuous Feedback, Client Collaboration
	GPT19, GPT20	Daily Meetings
PET	PET1, PET2	Test Driven Development – TDD Behavior Driven Development - BDD
GRT	GRT1	User Stories, Backlog Item
FDT	FDT3	Sprint Review Restrospective
GDQ	GDQ2	Daily Meetings
MAT	MAT1	Agile Metrics, such as Sprint Burndown Chart
	MAT4	Daily Meetings, Restrospective
TES	TES3	Pair Programming Peer Review
	TES4	Daily Meetings
GDD	GDD1	Daily Meetings, Retrospective
AET	AET1 AET2 AET3	Test Driven Development – TDD Behavior Driven Development - BDD

The details of how agile practices were mapped to the process areas can be observed as described below:

- GPT: agile practices were used to introduce the concept of test sprints, in which the requirements to be tested are arranged in backlog and made visually available using scrum boards (or kanban boards). moreover, planning poker, relative sizing and ideal days can be used as techniques for estimating the size of the stories to be tested, particularly as a metric so as to construct sprint burndown, team velocity, lead time, etc. Daily meetings were introduced to monitor the project and as a mechanism to identify and stay abreast of project risks.
- PET: test driven development (TDD) or behavior-driven development (BDD) are techniques that could be used to identify the project's test cases and satisfy the demand of the process area.
- GRT: instead of formal requirements, the scope of projects could be organized using user stories that are part of the project backlog.
- FDT: during the sprint review, the tested items can be packaged so they can be delivered and the test environment can be clean, thus satisfying part of what the test closure process area requires. In addition, the practice of retrospective adds on the lessons learned, thus bringing an implemented agile practice to FDT.
- GDQ: for this process area, the practice of daily meetings can be implemented to include the reporting of items on the quality of the project.
- MAT: the agile metrics suggested by scrum, such as burndown, velocity, and lead time can be used as an option for the indicators of the test project. In addition, the daily meetings and retrospectives can be used to report on these results.
- TES: the static test can be conducted by pair programming, where not only the revision of the code developed is observed but also the dissemination of knowledge. In addition, the daily meetings can be used as a moment to analyze the data from the reviews and to standardize communication with the team.
- GDD: the daily meetings and retrospectives can also be used to identify the root causes of the defects found.
- AET: the test can be automated based on the BDD and TDD techniques, besides which automating the test itself is already considered the introduction of agile design practices.

A. MPT.BR AGILE CERTIFIED ORGANIZATIONS

Based on the results of the current implementations, the consolidated situation is that, of a total of 16 existing process areas in MPT.BR, so far 10 have been implemented using agile methodologies, i.e. 63% of the model has already been instantiated in an agile way. These data were obtained by analyzing the implementation of MPT.BR in the 27 companies that have been evaluated between 2010 and 2014.

The number of implementations with agile methodologies (16) is greater than the number of companies that have implemented it using the traditional method (11), which is another indication that the current trend of software development is to use agile methodologies. The largest number of evaluations so far is at the first level of maturity and 75% of companies have also used agile methods.

III. CONCLUSION AND FUTURE RESEARCH STUDIES

This article presented a theoretical framework for agile methodologies and how these methodologies were instantiated in conjunction with a testing maturity model.

The use of agile methods has been observed as a trend in the area of software development, and this can also be observed when the aspect of software development is directly related to the testing processes of a given organization.

From the data collected from the assessments of the MPT.BR from January 2010 until April 2014, it was observed that most of the companies evaluated made use of agile methodologies when instantiating their processes. It was also observed that the use of agile methods in conjunction with the testing maturity model is not restricted to how large or small an organization is because it was conceived in small, medium and large companies.

Therefore, based on the results obtained so far, it is predicted that this study can be complemented by the following future studies:

- Seeking ways to conduct Non-Functional Testing of agile ways to support the implementation of the TNF - Non Functional Testing process area;
- Seeking agile practices to carry out the process area of CEP - Statistical Control of Processes;
- Enhancing the automation of the tests over all process areas and maturity levels of MPT.BR in order to maximize the results obtained; and
- Understanding the reasons that lead an organization to choosing either an implementation with a traditional approach or an agile approach.

References

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