Redefining the Role of Testers in Organisational Transition to Agile Methodologies

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Abstract. Many challenges confront companies when they change their current software development process to an agile development methodology. Those challenges could be rather difficult but one that requires considerable attention is *the integration of testing with development*. This is because in heavyweight processes, as in the traditional waterfall approach, testing is a phase often conducted by testers as part of a quality assurance team towards the end of the development cycle whereas in the agile methodology testing is part of a continuous development activity with no specific "tester" role defined.
In this paper we consider several options for testers when an organisation transit to agile methodology, and propose a new *project mentor* role for them. This role aims to utilize the knowledge that testers already have in both the business domain and the development technology together with their expertise in quality practices. This role will enhance the stature of testers as well as enable the company to effectively deploy the testers in the new environment. Motivations and benefits for this role are presented in this paper together with our plan for evaluation of this proposal.

Keywords: Agile processes, Process transition, Role of Testers, Quality Assurance.

1 Introduction

Software development processes have evolved over time in line with projects becoming costlier and complex. The biggest change since Royce [8] proposed the Waterfall model came with the introduction of Agile methodologies. Unlike heavyweight processes such as the Waterfall model, agile processes have encouraged customer involvement throughout the development cycle. However, initially agile processes were implemented in smaller projects with smaller teams where the risk of trying out a new process was relatively small. Increasingly, larger organisations are looking at transition of their processes to agile methodologies [7].

Testing is a prominent and continuous activity in agile processes. Paradoxically, however, testers who migrate from heavyweight processes could find their role to be diminished when their organisation implements agile processes. The reasons for this paradox include:

- the shift from testing being a high profile quality control phase to a low profile routine (daily build and test) activity
- the developers having the responsibility to test the units they build
- the need for regular interaction between developers and testers as the system gets built incrementally

Those who transition from a heavyweight process to an agile method sometimes feel that they are being micromanaged because of the constant interaction with project leaders [3]. Testers, who had the role of policing the quality of the product, could feel even more out of place in an agile environment, unless the transition is gradually made with the cooperation of the testers and with adequate training. The important question to consider is not whether we need a role for testers when transitioning to an agile process but what role will they transit into.

In this paper, we study different models for the transition of a tester's role from a heavyweight process to an agile environment. We intend to test the models to assess their suitability for transitions in the real world. The rest of the paper is organised as follows. In Section 2 we discuss the issues involved in transition to agile with respect to the role of testers. In Section 3 we discuss two other approaches from the literature. Section 4 presents the *project mentor* model. In Section 5 we outline evaluation strategies to check the validity of the approach and finally Section 6 provides the conclusions together with the future work.

2 Transition to agile

Before investigating possible options for a tester or testing team, organisation should define goals and parameters of transition in order to choose the appropriate option for existing testers within the company.

2.1 Organisation goal for transition

Organisation should clearly define its goal for the proposed transition to agile environment.

One of the possible goals could be to reduce the number of employees and often the first target is the testing team. Every employee is a valuable asset to the company and when observed as a resource testers are much more valuable than often perceived. If down-sizing is the main goal of transition then it must cover other teams as well and not only the testing department.

Most common goal for a company would be to maintain current number of employees with minimum or no investment during the transition process. The only concern for having this goal is a period of transition that could take longer than necessary. Testers will have to learn and adapt to a new process as they enter the transition. However, without any formal training or right motivation, they could have suspicion whether agile is a correct way of doing development.

Setting up an efficient transition process as an organisational goal would require having existing number of employees in place and if possible hiring additional experts. Most importantly, provide significant investment in training of the personnel. This company goal will provide employee trust in the whole process of transition and raise motivation for its successful implementation.

2.2 Parameters of transition

Different parameters should be taken into consideration when making the transition decision. Possible parameters could be:

1. To what extent: Pure agile or Hybrid?
   Some companies can adopt their development process to agile methodology only up to certain extent. On micro level, software engineering can be done in agile manner, but on a macro level things might look like developed in stages (waterfall). Example for this set-up would be in companies where product development includes hardware and software parts.
2. Physical Location/Distribution of teams
   Consideration regarding physical location of the development and the testing teams is important because some options would not be possible to successfully implement if teams are distributed. Also, if one of the team itself is distributed among several locations, that could create obstacles in implementing certain options for transition.

2.3 Options for testers during transition

Here we describe several options for the organisation regarding testers in transition to agile. For each of options we also describe their pros and cons.

1. "**Fire the testing team**"
   Process change should not start by firing existing employees. This can lead to wrong assumptions on how efficient new methodology will actually perform. Also, educating software tester and adapting to company context or even a project requires significant amount of resources. But the same could be true for the transition of even developers who have been working long periods using traditional processes. If reducing number of employees is a goal for transition process, then it should be extended to all teams within a company.
2. "**Convert them to developers**"
   Converting testers to active developers would be a reasonable option to consider, but it is not reasonable to expect testers to become developers without any formal education and especially in a short time period. Big risk with this option is a longer period to completely achieve transition.
3. "**Ask them to write test cases with developers**"
   One of the first challenges for developers transitioning to agile will be writing unit tests and understanding test driven development principles. Putting testers to work with them could be a working solution but only in a short term perspective.
4. "**Provide them with a new role Project Mentor**"
   This option represent the proposal of this paper in which we are trying to get more added value to testers in agile environment by providing them a new role of mentoring the whole project development process. This option and motivation for it are explained in Section 4.

3 Models for Transition of Testers

In this section, we are discussing two existing approaches for solving tester role while transitioning to agile environment.

3.1 Sumrell's approach

Sumrell [9] reports their experience in transitioning from Waterfall to Scrum. One of the major issues was to decide how to transform the Quality Assurance (QA) team and their testing strategies to the new environment. The approach taken for the QA team is to continue to have the primary responsibility of testing, but share it with developers and project managers. Instead of testers waiting until the parts are ready for test, the new approach would be a quicker build cycle so that the QA team can do its work rather than having to wait. Retraining is needed for QA personnel to be able to instrument code for testing rather than rely on previous practices of automated testing strategies. However, unit testing becomes largely the responsibility of the developers.

We can identify several characteristics of this approach. One, the role of tester is somewhat diminished because some of the testing is now done by the developer. The tester requires retraining on the technical side. The tester needs to work more closely with developers and project managers thus requiring a higher level of group working skills. We hypothesise that in such an environment, a tester needs to be given adequate training for this transition, otherwise, it is likely that he or she will fail in the new environment where they are not in control of quality, and becomes just another member of a team.

3.2 Gregory-Crispin approach

Gregory and Crispin [4] discuss in detail the role of testers in agile development. Our model has some similarities with their approach. Their recommendation is to make testers a part of the development team. The role of testers is to help clarify customer requirements, turn them into tests, and help developers understand the customer requirements better. Testers need to speak the domain language of the customer and the technical language of the developers.

The characteristics of this approach include an increased role for testers, as the links to customers and developers in addition to their role of testing. Shift in their work environment as they move from the Quality Assurance Division to be part of development pairs or groups. They probably will need retraining on interpersonal skills to work closely with customers and developers more than they are used to in the past.

4 Our approach

We create a new role: *project mentor* in the transition from a heavyweight to an agile process. This role is different from the role of a coach which is promoted in some of the agile processes. While a coach's role is to help people adopt and implement the agile process, the role of the mentor in a project is (1) to interact with all the stake holders, primarily the customers and the developers and (2)

to ensure that all stake holders contribute to the quality of the product under development.

Managing the expectations of customers is a difficult task in any software development project. A major task of project mentors is to manage the expectations of the customers and other stake holders. This requires domain knowledge and the ability to speak in the language of the customers, which often programmers lack. Similarly, for managers, recognising the limitations of programmers is also a difficult task. Managers without a technical background often fail to understand difficulties which are faced by programmers on a daily basis. Project mentors, we believe, will be in a position to better appreciate these difficulties and translate them to other stake holders with the help of their domain knowledge.

Agile processes try to improve quality by making quality everybody's business, not just of a quality assurance division. Testing is spread throughout the development process, not just at the end of the process-chain. Agile processes are sometimes called test-driven methodologies [1] for this reason. However, a drawback of this approach is that while everyone is expected to produce quality, not everyone is trained in quality assurance. A mentor's role of helping others to implement quality in their daily activities could contribute significantly to the success of the project.

We argue that the testers in a heavyweight process model are the best category of people for this new role as project mentors in an agile transition. The reasons are:

- As Gregory and Crispin [4], pointed out, testers have the domain knowledge to interact with the customers as well as the technical knowledge to interact with the developers. They have acquired these skills in order to implement their domain-oriented blackbox testing and the structure-oriented whitebox testing strategies. Therefore, testers are in an ideal position to become the perfect link between the customers and the programmers.
- Testers are trained to be quality assurance personnel. In many heavyweight process organisations, they are part of the quality assurance division. Thus it is much easier for them to transfer their quality assurance skills and mentor other personnel in inculcating the much-desired quality culture in the agile process.

We believe that there are several benefits for transforming testers as project mentors while transitioning from a heavyweight to agile process. Some of them are:

- Managers sometimes express more confidence in their testers than programmers because programmers tend to sometimes promise and not deliver ('the code is 99% complete' syndrome) whereas testers tell what is going wrong (i.e., the defects discovered).
- Testers are likely to become less effective or even demoralised if they are asked to be developers, because it may be difficult for them to identify themselves with this new role easily. On the other hand, an enhanced role such as project mentoring is likely to boost their morale.
- The role of project mentors which includes helping customers to write their acceptance tests and developers to write their unit tests utilises the

testers' talent in an appropriate and optimal manner in the new process environment.

- Testers are no longer confined to a single location (the quality assurance division), instead they are made "agile" and are distributed throughout the project locations, consistent with the agile philosophy.

4.1 Comparison of the models

Table 1. Models Comparison on Testers role from Heavyweight to Agile.

Aspect of concern	Sumrell's experience	Gregory-Crispin approach	The project mentor model
Testers' stature	Little change	Slightly reduced	Enhanced
Additional skills needed	Both technical and people skills	Mainly people skills	Mainly people skills
Responsibility	Share with developers, project managers	Share with developers	A unique role
Mobility	Little change	Little change	Enhanced

Table 1 provides a comparison of the two existing models from literature and the "Project Mentor" model with respect to various aspects of concern testers may have while transitioning from traditional heavyweight to an agile methodology. Comparison is based from a testers' perspective covering following aspects (1) Testers' stature (2) Additional skills needed (3) Responsibility and (4) Mobility.

4.2 Motivation for the new role

There are reports [5] [6] of Test Driven Development as a practice which improve quality and provide benefit to testing in general. But in order to gather testers practice and preference in particular, an industrial survey [2] on software process practices, preferences and methods was conducted. Analysing data from this survey, we found out that testers' preference is highly oriented towards incremental design, code and delivery of software. Testers are supporting frequent meetings with project members for the purpose of update on progress, but only if those meetings are planned in advance. They are also positive towards having test cases written prior to writing code. Interestingly, most of testers agree that managers should clearly define each team member's role. We think that those testers' preferences reflected in our survey are indicating high motivating reasons for including them in agile development with the specific *project mentor* role.

5 Evaluation plan

In order to evaluate the validity of the proposed model we have developed the following research hypotheses:

H1: Testers in current heavyweight processes have significant concerns about their transition to an agile process.

H2: Testers who have changed their role to developers when the organisation moved from a heavyweight process to an agile process were not happy to change roles.
H3: Testers favour a role of project mentors (as defined in this paper) in an agile environment in preference to a developer role or a tester role shared with developers.
H4: Managers look favourably at testers transitioning into a role of project mentors (as defined in this paper).

To test the above hypotheses there are two approaches we can take, quantitative and qualitative. Quantitative analysis will be based on a survey of a sample of the population of testers and managers. A survey instrument will be developed with items to assess testers' views on the above issues. The survey data will be statistically analysed to test for significance.

If a quantitative approach proves to be infeasible there are several qualitative solutions possible. One is the method of using case studies. In this case we will choose a limited number of organisations including ones that have already converted to agile process method and others which are considering transitioning to agile process methods. Data gathering will involve predominantly semi-formal interviews with predetermined questions (with the option of asking clarifying questions).

6 Conclusions and future work

Agile process methodology started as a small team small project method for less riskier projects. Recently, the interest in the methodology has grown and large organisations are seriously looking at transitioning from their heavy weight processes to agile methods. One of the major challenges in the transition of personnel is how to find appropriate roles for testers when testing is not a stand-alone major phase in the development process. In this paper we have presented our views on the issue of dealing with the testing teams within a company while transitioning from a heavyweight to agile processes. We argue that it would be beneficial for the organisation to clearly define its goals and options during the transition process. We have also presented the standard options followed by transition managers together with two approaches proposed recently by researchers. We have proposed a new role called "Project mentor" for the testers in the new agile environment, and presented its advantages. In this role testers could effectively use their business domain knowledge as well as technical expertise to become the main liaison between customers and developers in order to manage their expectations and goals, as well as assist both in writing test cases and testing the system as it evolves. We also sketched briefly our evaluation plan which we intend to take up in our future work. Our ongoing work also tries to address appropriate implementation strategies for the proposed project mentor role.

Acknowledgments. The authors would like to acknowledge the partial support provided by FLEXI-ITEA2 project (http://www.flexi-itea2.org) and PROGRESS research centre (http://www.mrtc.mdh.se/progress).

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