

The Scrum Product Owner – Customer Collaboration & Prioritizing Requirements

Empirical research in a sample of Irish Industry

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Abstract— The existing body of literature on Agile Scrum is extensive. Many authors, ([1], [2], [3], [4]), concur that the role of the Product Owner is to represent the customers' requirements to the development team and set the priorities for the work to be completed. The Agile Manifesto specifies customer collaboration as being of more importance than contract negotiation. So, we might expect that in addition to setting priorities the Product Owner role in Scrum would work closely with the Customer. This paper investigates a sample of Irish software development organizations to determine the level of adherence to Agile Scrum guidelines with regard to the two key aspects of customer collaboration and requirements prioritization.

Keywords-Agile; Scrum; Requirements Product Owner; Customer collaboration;

I. INTRODUCTION

In the absence of any *a priori* knowledge, it is generally believed that if companies claim to be Agile then they are, in fact, following the precepts and guidelines of their chosen Agile methodology, whether this be Scrum [5], eXtreme Programming [6], Crystal Clear [7] or indeed any of a plethora of Agile practices.

It may then come as something of a surprise to discover that “there is often a substantial difference between the textbook ‘vanilla’ version” [8] of the method and the method actually enacted in practice, what Senapathi et al [9] refer to as the “method-in-action.” Conboy & Duarte [8] elaborate: “Prescribed practices are inevitably interspersed in diverse ways or tailored to suit the specific needs of teams.” So, can self-described Agile enterprises really lay claim to being Agile or are they, perhaps, using an *ad hoc* approach which pays lip service to Agile principles with the (unintentional) benefit of keeping the stakeholders happily deluded? To what extent do companies that describe themselves as being Agile actually follow Agile guidelines as documented by the pioneers of the various Agile methodologies?

Many authors [38], [39] agree that lack of user involvement is a primary cause of project failure. The CHAOS report of 2010 [40] stated: “projects that lack user involvement perform poorly.” Consequently, the degree of user involvement in organizations that describe themselves as being Agile was of immediate interest to the author.

This paper, based on empirical research, examines the author's contention that because “agile methodologies intentionally leave a lot to be defined about exactly how the methodology is implemented” [4], what results is sometimes an extemporized approach to implementing Agile methods with a resultant lack of project success. Because many of the Agile practices are somewhat loosely, if at all, defined, it is possible that some organizations might take this as *carte blanche* to omit some of the fundamental aspects that made Agile so pertinent at the outset.

The research hypothesis of this work was to ascertain if this *ad hoc* implementation of Agile methods extended to the customer involvement / Product Owner domain.

Whilst it may be argued that a plan based or prescribed method of developing software might not always be easy to work with due to constantly changing customer requirements or “software requirements churn” [10], Addison & Vallabh [11] advocate that to control software projects it is important to “develop and adhere to a software development plan.” Fitzgerald [12] also contributes to this argument citing that “experienced developers are more likely to use a methodology, as they would be aware of its benefits”. Fitzgerald [12] further claims that “inexperienced developers are more likely to follow a methodology

rigorously”, perhaps because it lends structure to an otherwise chaotic endeavour.

Thus, although it is widely accepted that “standard software development models often provide explicit detailed guidelines” [13], the author decided to conduct some quantitative research into aspects of actual Agile implementation in a sample of Irish software industry with a view to gaining an understanding of the level of compliance to documented Agile precepts. In the interests of brevity, this paper will deal only with the Scrum Product Owner, prioritization of customer requirements and customer collaboration aspects.

Section II of this paper briefly outlines the background to one of the foremost Agile methods, Scrum, which incorporates the role of Product Owner. Section III briefly describes the research design of the study. Section IV presents the results of the study and this is followed by a discussion of the findings in Section V.

II. BACKGROUND

Agile software development methods emerged in the late 1990s with the Agile Manifesto [14] being published in 2001 (<http://agilemanifesto.org/>). There are many different approaches to implementing Agile and each has its own ‘vanilla’ version. Sutherland [15] explains “Each Agile methodology has a slightly different approach for implementing the core values from the Agile Manifesto, just as many computer languages manifest the core features of object-oriented programming in different ways.” The methodologies chosen for the study were Scrum and XP, since previous work in this domain by Bustard [16] identified these as the most prominent of the Agile methodologies currently in use. Salo, & Abrahamsson [17] refer to Scrum and XP as the “perhaps best known agile methods”. However, in the interest of brevity only Scrum will be discussed in this paper.

A. SCRUM

According to Ken Schwaber [5] (co-creator of Scrum with Jeff Sutherland), “Scrum is an enhancement of the commonly used iterative/incremental object-oriented development cycle.” It is more of a framework than a methodology but it nevertheless takes, according to Millett et al [18], an “iterative approach to software development.” Sutherland [15] explains Scrum “structures development in cycles of work called Sprints. These iterations are no more than one month each, and take place one after the other without pause. The Sprints are timeboxed – they end on a specific date whether the work has been completed or not, and are never extended”.

Schwaber [19] describes product requirements as being “contained in an ordered list known as the Product Backlog.” At the beginning of each Sprint, the requirements are prioritized into a list known as the Sprint Backlog with the aim of completing an agreed set of deliverables by the end of the Sprint. Sutherland [15] explains further, “During the Sprint, the chosen items do not change. Every day the team gathers briefly to inspect its progress, and adjust the next steps needed to complete the work remaining. At the end of the Sprint, the team reviews the Sprint with stakeholders, and demonstrates what it has built. People obtain feedback that can be incorporated in the next Sprint. Scrum emphasizes working product at the end of the Sprint that is really “done”; in the case of software, this means code that is integrated, fully tested and potentially shippable.”

Barari [20] advises that “it is important to follow the guidelines defined in Scrum but the ultimate goal is to deliver what you promised”. With regard to the guidelines, Schatz & Abdelschafi [21] state quite categorically that “there aren't many rules in Scrum but you need to adhere to the ones that (do) exist”. Unfortunately, the rules of transitioning software development from a plan-driven approach to an Agile approach are not set in stone and

this may be where the confusion lies. The ‘rules’ that exist are the implementation of the 12 principles set out in the Agile Manifesto [14]. It is the author’s opinion that it is the interpretation of these rules that is often confusing and sometimes even problematic.

Most authors on Agile ([1], [3], [22], [23]) agree that the Scrum framework should include a Product Owner. The role of the Product Owner will now be reviewed.

B. THE PRODUCT OWNER

According to Deemer et al [24] “The Product Owner is responsible for maximizing return on investment (ROI) by identifying product features, translating these into a prioritized list, deciding which should be at the top of the list for the next Sprint, and continually re-prioritizing and refining the list. The Product Owner has profit and loss responsibility for the product, assuming it is a commercial product. In the case of an internal application, the Product Owner is not responsible for ROI in the sense of a commercial product (that will generate revenue), but they are still responsible for maximizing ROI in the sense of choosing – in each Sprint – the highest-business-value lowest-cost items”. How well this focus on the “highest-business-value lowest-cost items” correlates with the customers’ requirements is, in this author’s opinion, debatable. Deemer et al [24] offer the opinion that “‘value’ is a fuzzy term and prioritization may be influenced by the desire to satisfy key customers.” Thus, the role of the Product Owner in Scrum might not appear to be as clear cut as the original proponents of Agile might have wished.

Stober & Hansmann [3] concur and define a Product Owner who “represents the stakeholders, such as customers.” Consequently, it might be apposite to assume that there should be a tenable link between the Product Owner and the customer.

However, Sutherland [25] identifies a ubiquitous dilemma... “In some cases, the Product Owner and the customer is the same person; this is common for internal applications. In others, the customer might be millions of people with a variety of needs, in which case the Product Owner role is similar to the Product Manager or Product Marketing Manager position in many product organizations. However, the Product Owner is somewhat different than a traditional Product Manager because they actively and frequently interact with the Team, personally offering the priorities and reviewing the results of each two- or four-week iteration, rather than delegating development decisions to a Project Manager”. Deemer et al [24] summarize, “It is important to note that in Scrum there is one and only one person who serves as – and has the final authority of – Product Owner, and he or she is responsible for the value of the work”. Schwaber [26] describes the Product Owner as “the single wringable neck”. Insofar as it is the Product Owner who represents the customer requirements to the development team, the success or failure of the project can ultimately be attributed to this one individual. Beyer [2] sees the Product Owner as “the customer representative” and outlines his responsibility to “find out what the stakeholders and end users actually need.” Having requirements which are “prioritized by the product owner” [3] is yet another prerequisite of Scrum. In the Scrum approach, according to Cohn [27], “requirements are maintained in a backlog, called the Product Backlog, prioritized by business value.” Having been prioritized, the work (or as much of it as possible) is accomplished by the Scrum development team in fixed timeframes “known as Sprints” [27], which usually last two to four weeks, depending on the product or service. Items are taken off the backlog in priority order to be worked on as parts of the Sprint Backlog in the current iteration. At the end of the Sprint, there is usually a Sprint review [22], where the team demonstrates what it has accomplished to the customer with a view to soliciting feedback.

According to Schwaber [19], the Product Owner is “responsible for representing the interests of everyone with a stake in the project and its resulting system.” Many of the proponents of Scrum, including [4], advocate “as much customer collaboration as possible” but he counsels that the “Product Owner represents the voice of the customer and is expected to provide overall direction to guide the project toward producing the value to satisfy customer needs” [4]. This should most likely involve close collaboration with customers and stakeholders. In most Scrum training workshops, it is advised to ensure customer involvement throughout the development process. This is often referred to as capturing the “voice of the customer” [28] in an attempt to deliver the required content. It has been widely accepted [29] that customer involvement is critical to successful

software development. In fact, Paetsch, Eberlein et al [30] state “customer involvement was found to be the number one reason for project success, while the lack of user involvement was the main reason given for projects that ran into difficulties.”

III. RESEARCH METHOD

The research on which this paper is based was conducted as a quantitative study that was descriptive in nature. Leedy & Ormrod [31] describe this type of research as “identifying the characteristics or exploring possible correlations among two or more phenomena.” The authors also state that “descriptive research examines a situation as it is.” However, as Oppenheim [32] explains, “no valid causal interpretations are possible”, thus, whilst the data collected may describe the actual situation, the research is limited to being solely a descriptive analysis.

There are many ways to conduct descriptive quantitative research. Thomas [37] refers to three methods: surveys, correlation analysis and experiments whilst Leedy & Ormrod [31] also include “observational studies and developmental designs”. Having reviewed the suitability of each of these methods it was decided to use an online survey to collect primary research data. Leedy & Ormrod [31] explain that a survey “involves acquiring information about one or more groups of people by asking them questions and tabulating their answers”. The authors indicate that “the ultimate goal is to learn about a large population by surveying a sample of that population.” It needs to be stressed, however, that survey research “captures a fleeting moment in time” [33]. It is possible that the response to a particular question might be totally different in two or three months’ time. Once this precept was understood, however, it was felt that a survey would be a perfectly acceptable way to discover information about the topic to be investigated. De Vaus [34] states, “Survey research is widely regarded as being inherently quantitative and positivistic and is contrasted to qualitative methods that involve participant observation, unstructured interviewing, case studies, focus groups, etc. Quantitative survey research is sometimes portrayed as being sterile and unimaginative but well suited to providing certain types of factual, descriptive information – the hard evidence.”

If survey research has a drawback it would seem to be that the results are dependent on the participants’ willingness to participate, in addition to their ability to correctly answer the questions asked. Leedy & Ormrod [31] refer to the fact that the method relies on “self report” data. The authors caution that “people are telling us what they believe to be true or, perhaps, what they think we want to hear.” Survey research can be conducted via a number of different methods: the face-to-face interview, the telephone interview or the documented questionnaire, which can be either paper or Internet based. As Salo & Abrahamsson [17] note “web-based data collection also overcomes some limitations of ordinary mail surveys and other data collection mechanisms in terms of speed and cost.” It was also planned that a limited amount of interviewing would be required to ensure that the correct conclusions were drawn. Thus, to conduct research into this domain a sample of software professionals at both management and Scrum team level in a cross section of Irish Software development companies, who profess to use Scrum, were polled for their perspectives. This is described next.

A. THE PARTICIPANTS

In an ideal scenario, it would be preferable to obtain a totally random selection of Irish software development companies to answer the research questions. However, given the likelihood that the response rate would be low (which is one of the main drawbacks of this research method, what Leedy & Ormrod [31] refer to as “low return rate”), it was decided to indulge in a degree of “purposive sampling” [35]. Nardi [35] explains purposive sampling as sampling one or more specific pre-defined groups. This approach was adopted as it was felt to be important to collect data on organizations that had some prior knowledge of Agile practices as opposed to taking a completely random sample, which may have resulted in confused responses. To generate survey data, a random sample of software companies was targeted from software groups known to be somewhat familiar with the concepts of Agile software development, groups such as AgileIreland, Information Technology Association Galway (ITAG), the Irish Software Association (ISA), the Irish Software Innovation Network (ISIN) training companies, blogs etc. All of these were contacted to host

the online survey on their websites, where it would be visible to their members.

Using these organizations, it was possible to distribute the online survey to a diverse audience of software development professionals who had an established history with, or at the very least, a passing knowledge of, Agile and who, it was hoped, would be more likely to respond to the questions. In an attempt to capture a representative view, cross-functional participants, including both Scrum team members and software development management in organizations that use Scrum, were targeted. In this way it was hoped that the findings would be representative of the actual state of play of software development in Irish industry. The breakdown of Scrum team participants is shown in Table I.

TABLE I. SCRUM TEAM SURVEY PARTICIPANTS

Role	Organization Size		
	1 to 50	51 to 500	500+
Designer	1	1	1
Senior Developer	2	3	1
Developer	2	4	3
Test Engineer	2	3	2

Similarly, the breakdown of Scrum management participants is shown in Table II.

TABLE II. MANAGEMENT SURVEY PARTICIPANTS

Role	Organization Size		
	1 to 50	51 to 500	500+
S/W Dev. Mgr.	3	3	4
Project Mgr.	2	2	4
Q.A. Mgr.			1
Test Mgr.		1	

Given the fact that the survey was online, it was not possible to compute a response rate, *per se*. However, it was felt that a sufficiently representative number of respondents had contributed to make the results relevant.

IV. RESULTS

Whilst all Scrum teams admitted having a Product Owner it became clear that the Scrum teams were not always aware of the link between the Customer and the Product Owner. When asked how frequently the Product Owners consulted with the customer the responses were as given in Table III.

TABLE III. LEVEL OF AWARENESS OF INVOLVEMENT BETWEEN PRODUCT OWNER AND CUSTOMER

Unaware of involvement	44%
Aware of weekly involvement	20%
Aware of infrequent involvement	8%
As required	28%

Although, in theory, the Product Owner sets the vision for the product and is responsible for prioritizing requirements for the team to work on for the Sprint duration, in practise it was found that for 44% of those who described themselves as being Scrum team members this did not happen. In fact, it transpired that in some cases requirements were prioritized as shown in Table IV.

TABLE IV. PRIORITIZATION OF REQUIREMENTS

Product Owner	56%
Scrum Master	24%
Release Manager	12%
Combination	8%

One interesting comment was that the developer didn't know how priorities were set, but felt that there was a "mysterious process in operation."

When questioned about the involvement of customers at Sprint reviews the Scrum teams' responses were as shown in Table V.

TABLE V. CUSTOMER INVOLVEMENT AT SPRINT REVIEWS

No customers in attendance	12%
Unsure of attendance	4%
Customers in attendance	84%

From the perspective of the developers with regard to customer involvement, it would appear that 16% felt the involvement of customers was either not encouraged, or they were unaware of any efforts to involve customers.

When management at self-described Agile organizations were asked if customer involvement was encouraged (in the form of attendance at Sprints etc) 13% admitted that this was not the case.

V. DISCUSSION

The research effectively offers a snapshot of Irish software industry over the duration of the survey availability window, which was two months from July to August, 2011. Although the sample was not as large as had been envisaged, and it is consequently not possible to make generalizations from the results, it is nonetheless valid to make some observations. When taken in isolation, the Scrum results presented in section IV are somewhat disconcerting; however, they are largely in line with what was expected. It should be noted that the results are not skewed by the presence of a number of responses from organizations who are not using any of the Scrum precepts. A correlation of all of the responses would seem to show that only 12% of those who responded were operating precisely to the Scrum guidelines. The remainder had, indeed, adopted an *ad hoc* approach to Scrum for whatever reason. This might, in part, be the reason behind failed Agile projects.

For any Agile method the theory would seem to indicate that user involvement is crucial. In fact, one might go further than mere user involvement, and in order to gain valuable feedback to the project, cite user participation as being key to a successful software development initiative. Kautz [36] acknowledges "Agile development practices and principles insist on the customer taking control and being constantly involved." This is underpinned by the Agile Manifesto [14], which advocates "Customer collaboration over contract negotiation."

Paetsch, Eberlein et al [30] concur, "All agile approaches emphasize that talking to the customer is the best way to get information needed for development and to avoid misunderstandings. If anything is not clear or only vaguely defined, team members should talk to the responsible person

and avoid chains of knowledge transfer. Direct interaction also helps establishing trust relationships between customers and developers.”

However, in the vast majority of companies it is thought not to be feasible to have the customer on site or actively involved as described. The solution to this in most companies is to appoint a customer proxy. However, Beyer [3] says “Product Owners as defined by Scrum do not make good user surrogates. They may be responsible for representing all the stakeholders of a system, including end-users, the customer who makes the purchase decision, and the internal stakeholders. But they are not any of these people.”

The findings of the study answered the primary research question and found that, as expected, the adoption of Scrum by many organizations was not as rigorous as the proponents of the methodology might have wished. The implications of this approach to software development could have many ramifications not least being poor Scrum team morale, projects being late and/or not delivering what the customer requires.

In the author’s opinion, the results of the survey highlight the need for further research. In particular, it is important to acknowledge that the results of this study were based on a relatively small sample of Irish software industry due largely to the aggressive timeframe in which the author operated. Whilst the preliminary research commenced in February 2011 the completion deadline for the thesis was in August of the same year. It would, indeed, be interesting to investigate whether the findings would be replicated on a larger set of software development organisations.

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