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HOW CAN SCRUM BE SUCCESSFUL? COMPETENCES OF THE SCRUM PRODUCT OWNER

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HOW CAN SCRUM BE SUCCESSFUL? COMPETENCES OF THE SCRUM PRODUCT OWNER

Research paper

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Abstract

For decades a structured development process was followed when developing software. However, the suggested predictability of such an approach has long been proofed erroneous and in its place, more flexible methods have been suggested. Such agile methods are less structured and trust in the creativity of the development team in countering unpredicted events and realizing a solution. Currently one of the most popular agile methodologies is Scrum. There are only three roles in Scrum: the development team, the Scrum master and the product owner. As the product owner is responsible for maximizing the value of the product and the work of the development team, this role is key in the success of Scrum. However, the competences needed by the product owner are unclear. Based on this the research question underlying this study is: Which competences of the Scrum product owner are related to team effectiveness and stakeholder satisfaction? In order to answer this question empirical data was collected from 141 employees in organizations in the Netherlands. To analyse the data, we have conducted correlation analyses, t-tests and regression analyses. The most important findings are that the competences 'Relationship management' and 'User support' are the main predictor for both Team effectiveness as Stakeholder satisfaction.

Keywords: product owner, Scrum, Agile, team effectiveness, stakeholder satisfaction.

1 Introduction

The manner in which software is being developed is changing. For a long time structured development processes, such as for example the waterfall method, were the standard approach to building software. However, the suggested predictability of such an approach has long been proofed erroneous and therefor more flexible methods have been constructed (Vlaanderen et al., 2011). Such agile methods are less structured and trust in the creativity of the development team in countering unpredicted events and realizing a solution in line with the customer's requirements (Nerur et al., 2005). According to Overhage et al. (2011) the most popular agile methodology is Scrum. Scrum is an incremental and iterative method to manage development projects (Schwaber and Beedle, 2001) that has first been

suggested by Schwaber and Sutherland (Schwaber, 1997). One of the core elements of Scrum is working in short sprints (Moe et al., 2010). This is a time boxed development cycle that takes two weeks to one month.

There are only three roles in Scrum: the development team, the Scrum master and the product owner (Bass, 2013). The product owner is responsible for maximizing the value of the product and the work of the development team (Sutherland and Schwaber, 2013). Furthermore, the product owner is also responsible for collecting customer requirements, which are then listed on the product backlog. The development team is responsible for implementing functionality based on this backlog (Vlietland et al., 2015). Finally, the Scrum master makes sure that the Scrum values and rules are executed correctly (Cho, 2008) thereby facilitating the activities related with the development team. According to Yin et al. (2011) the relationship and collaboration among the three roles in Scrum are crucial. Bass (2013) describes the product owner role as a central role in the development process. The product owner plays an important role in the communication between customer and development team, and as such represents the voice of the customer during the project.

Working according to agile methodologies puts more emphasis on the personal knowledge and skills of employees than traditional development methods. Individual competences of employees are therefore seen as a success factor (Cockburn & Highsmith, 2001). This focus on competences coincides with the trend in the European IT community where attention to competences, and transparency in how these are described and measured, is growing (Plessius and Ravesteyn, 2016). An example is the initiative to stimulate the adoption of the European Competence Framework (e-CF). “E-CF offers a common language for competences, skills and proficiency levels that can be understood across Europe. E-CF can be used by HR departments to define the IT functions needed within the organization in relation to the strategy” (De Waal, Van Outvorst and Ravesteyn, 2016).

As discussed above the product owner has a key role in the Scrum process and his or her individual competences are a success factor, it is important to know what competences are needed to successfully fill in the role of product owner. However so far there has not been much attention for the role of product owner in academic research. Most studies focus on teamwork and productivity of agile development (Judy and Krumins-Beens, 2008; Bass, 2013; Yin et al., 2011). Sverrisdottir et al. (2013) studied the role and made a comparison between the theory according to the Scrum method and the perceptions of product owners themselves about this role. According to this study, the product owner role is a very difficult role because its success depends on many factors, like organizational culture, team interaction and management style. Another study performed in the Netherlands shows that the role of product owner is still a serious challenge for organizations (Xebia, 2014). Many organizations struggle with the challenge to determine who should be the product owner, as they don't have enough insight in what is to be expected from the product owner (knowledge and skills) and don't know how to relate this new role to existing roles in the organization.

The objective of this paper is to provide insight in the competences that are important for the proper exercise of the role of product owner in relation to the development team and business stakeholders (most predominantly the customer). Therefore, the following research question is formulated: *Which competences of the Scrum product owner are related to team effectiveness and stakeholder satisfaction?*

The remainder of this paper is organized as follows. The next section describes the main concepts of this research. Section 3 describes the research methodology and in section 4 the results are presented. In section 5 the conclusions and recommendations are presented as well as the limitations of this research.

2 Success of agile software development and e-competences

As described in the introduction the central concepts in this research are the scrum product owner, the competences to fulfil that role, team effectiveness and stakeholder satisfaction. Therefore, these concepts are discussed in more detail in this section.

2.1 The role of product owner

The product owner has a central role in the Scrum process and has several important tasks and activities. The first activity according to Deemer et al. (2012) is defining the product vision. Following this the vision is transited into the backlog. The backlog is an overview of requirements for the product as desired by the customer. This is supported by Sverrisdottir et al. (2013) who also state that creating a vision for the product is a responsibility for the product owner. After collecting backlog items the product owner needs to prioritize them (Vlaanderen et al., 2011). According to Schwaber (2004), the product owner uses the product backlog to be sure that the most valuable functionality is to be developed first. Pichler (2010) states that the product owner leads the team in the creation of the product that generates the desired benefits, by prioritizing the backlog. Therefore, it is necessary that there is a vision for the product. The product owner has to make sure that the product backlog is clear and transparent and shows what the priorities for the development team are. The team has to have a good understanding of the items that are on the backlog (Sverrisdottir et al., 2013).

Other important tasks of the product owner are cooperating with the development team and representing the customer. Involvement of the customer is very important in agile methods like Scrum. Inappropriate cooperation with customers can lead to problems for the team (Hoda et al., 2011). This is confirmed in a study by Cho (2008), which shows that customer involvement is an important factor for project success. Bass (2013) states the role of product owner to be important for the communication between customer and development team. Also, according to Vlietland and Van Vliet (2015), the product owner is the voice of the customer. Sverrisdottir et al. (2013) state that it is very important that the development team has unrestricted access to the product owner. They should be able to ask questions or have issues clarified whenever needed. Cohn (2010) and Pichler (2010) also state that it is important that the product owner is available for the team. According to Sverrisdottir et al. (2013) the product owner has an important task in motivating the team.

From the overview above we can conclude that while the role of the product owner is described in literature and of clear importance to how the development team functions and delivers a product in line with the customer's requirements, it is not clear what exact competences are needed. Before this can be answered it should first be clear what a competence actually is.

2.2 Competences of the product owner

The term competence is used in many domains like HR, Management and Education. There is however not one uniform definition. Holtkamp et al. (2015) define competence as skills, attitudes and capacities that contribute to the solution of a problem in a situation. Boyatzis (1982) defines it as a capacity. When this capacity is consistent with the needs of the function in work and the surrounding of the organization, there is maximum performance. According to Boyatzis (1982) the competences of a person are very important for effective job performance. Liikamaa (2015) states that a competence has a causal relation with effective performance. A competence therefore determines how and why a person acts in a certain way and reveals where a person is capable of. In the European Competence Framework (e-CF) a competence is defined as a capacity to apply knowledge, skills and attitudes to reach an observable result. The e-CF consists of 40 IT competences. The aim of the framework is to standardize IT functions and speak a generic language in Europe (CEN, 2014). As the e-CF is now a European standard the framework is selected as a basis for this study, for the same reason we decided to use the definition of the e-CF as described above.

In the context of agile and Scrum there is not much written about competences. Matturo et al. (2015) described soft skills in Scrum projects from the perspective of product owners, Scrum masters and development team members. They find that collaboration, communication and customer orientation are the most valuable skills for product owners. According to Sverrisdottir et al. (2013) the product owner needs to have good communication skills. Their research shows that the product owner needs to have good expression capabilities, both oral and written, so he/she can create a common understanding between business and the development team. While these studies described knowledge and skills that a product owner should have, it does not provide a conclusive list of competences.

2.3 Team performance and stakeholder satisfaction

As stated, the product owner is an important link between the customer (stakeholder) and the development team. In this research, we therefore measure the effect of the competences of the product owner with variables that measure the customer's satisfaction and the effectiveness of the development team.

Customer satisfaction is an important metric when measuring agile methods (Kupiainen et al., 2014; Serrador and Turner, 2015). According to Serrador and Turner (2015), stakeholders have the best judgment of the success of the project. Mahnic & Vrana (2007) investigated monitoring of the performance of Scrum teams and find that customer satisfaction can be measured by several indicators like quality of the product, whether it meets the requirements, business goals and needs of the customer, reliable planning, and flexibility in changing requirements. In this study, we follow the definition of stakeholder satisfaction and the indicators by Mahnic and Vrana (bottom-right in Figure 1) as they focused specifically on customer satisfaction in an agile/Scrum setting. The definition of stakeholder as used in this research is: a representative from the business, in the role of client, customer, business owner or user. Hereby, we exclude external (to the business customer) persons, organizations or entities that may have a relationship to the project. Therefore, in this paper, stakeholder is used interchangeable with (business) customer.

There are several models that describe team effectiveness, derived from different research domains (Dingsøyr and Dybå, 2012). However, there is no uniform definition on the effective performance of teams (Guzzo and Dickson, 1996). Van Kelle et al. (2015) investigated social success factors in Agile Software Development. According to them, project success can be measured by effectiveness. In this case, effectiveness is the extent in which the project goals are met, the expected product quality is realized, and the amount of work is realized within the scope of the project by effectively and efficiently carrying out tasks. For this research the indicators of Van Kelle et al. (2015) are used to define team effectiveness (top-right in Figure 1). The reason for this is because of their specific focus on the agile domain when looking at team effectiveness.

3 Research Methodology

In this section the conceptual model is developed, the procedure to collect data is described and the outcomes of the validation of the team effectiveness and stakeholder satisfaction scales is provided. To analyse the data, we have conducted correlation analyses, t-tests and regression analyses.

3.1 Constructing a list of competences

As concluded in section 2.2 there is no conclusive list of competences that a product owner should have. To create such a list interviews were conducted, as part of this research, with 7 persons that have experience with agile and Scrum and one person that participated in the development of e-CF (see Table 1). During the interviews the participants were first asked what aspects are key to fulfilling the role of product owner. Typically, the same aspects were mentioned as found in the literature discussed

above. During the second part of the interview a subset of the 40 competences in the e-CF framework were briefly explained and subsequently the interviewees were asked to list those that according to their experience are needed in the role of product owner. A subset was used, as some of the competences in e-CF are clearly not related to agile Scrum projects and therefore deemed irrelevant.

Role	# interviewed
Product owner	3
Agile consultant/coach	2
Scrum master	1
Business Stakeholder/customer	1
e-CF expert	1

Table 1. People interviewed to determine Scrum competences

Based on the outcomes of the interviews a list of 10 competences is constructed (shown on the left in Figure 1, conceptual model). These competences are chosen based on a threshold of at least 6 (75%) participants that stated a specific e-CF competence as important for the role of product owner. Some of the competences in this list can be mapped to the aspects found in literature. For example, being able to communicate as mentioned by Matturo et al. (2015) can be related to the e-CF competence *relationship management* and *user support*.

3.2 Conceptual model

The conceptual model (Figure 1) is constructed based on respectively the product owner competences (derived from literature and the interviews), the indicators for stakeholder satisfaction and the criteria for team effectiveness as discussed above.

Based on this model the relation of each of the competences to the stakeholder satisfaction and team effectiveness is tested.

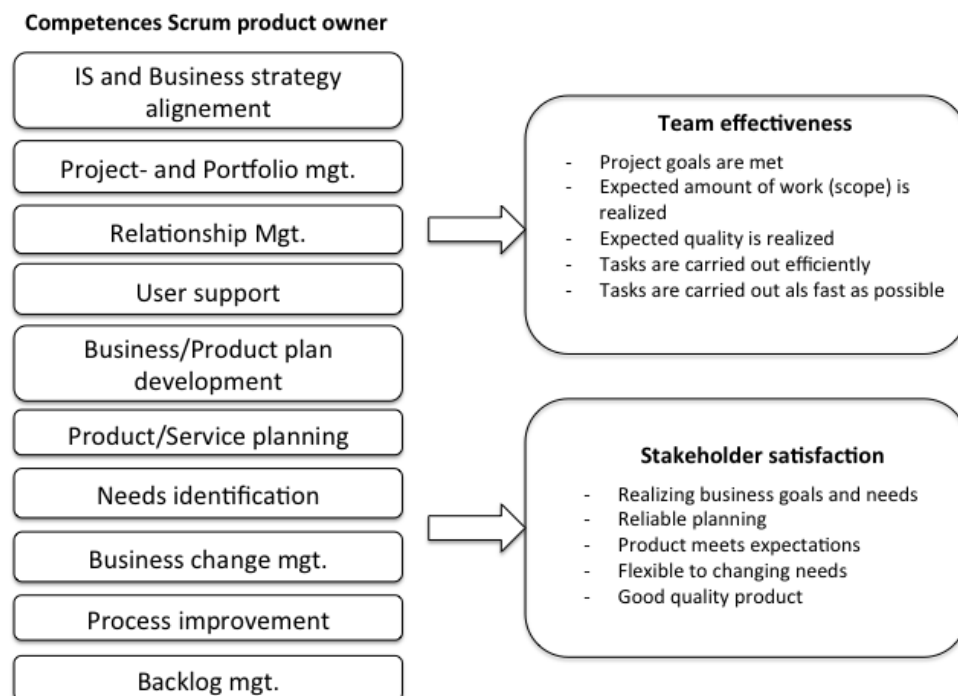


Figure 1. Conceptual model.

3.3 Data collection

Through the researcher's personal internal and external network and convenient sampling, empirical data was collected from employees in different organizations in the Netherlands. The respondents were selected based on their experiences with Scrum projects as part of their professional activities. The aim was to collect data about the competences of product owners and the dimensions of team effectiveness and stakeholder satisfaction. Questions about team effectiveness were not visible for business stakeholders and questions about stakeholder satisfaction were not visible for team members. All items had five answer categories (1 = fully disagree, 5 = fully agree). Before the questionnaire was sent, it was tested by five persons in accordance with the target group: one product owner, one team member and one business stakeholder for the content of the questionnaire, and two market researchers for the layout and structure. Feedback was incorporated in the final version of the questionnaire. The survey was conducted using a web-based tool and it was either sent to the respondents' corporate mail address directly or spread via colleagues and social media groups such as LinkedIn. The respondents had a period of 14 days to fill in the survey. After a week, a reminder was sent. All data was collected in June and July 2016.

In total, 177 people started the survey, of this population 141 participated by completely filling out the survey. Of these respondents, 34.8% were product owners, 28.4% team members and 23.4% business stakeholders. The category 'others' consists of Scrum masters, (project) managers and agile coaches. 24.8% of the respondents had an age between 25 and 35 years, 35.5% between 36 and 45 years, and 34.0% between 46 and 60 years. The respondents were mainly employed in the fields of government/semi-public services (38.3%), business services and IT (29.8%) and financial services (17.0%). Of the respondents 36.2% has more than three years Scrum experience, 50.3% between one and three years.

3.4 Instrument validation

In order to validate the measurement instrument for team effectiveness and stakeholder satisfaction, factor analysis was performed to analyse the construct validity of the items. To measure team effectiveness, the five items by the research of Van Kelle et al. (2015) were used. Stakeholder satisfaction was measured by five items as discussed in the research of Mahnic and Vrana (2007). For both concepts, principal component analysis (PCA) resulted in a one-factor solution. Table 2 shows the results. The eigenvalues values were between 2.884 and 2.606 respectively, accounting for 57.7% and 52.1% of the explained variance. The factor loadings were between 0.822 and 0.616, which can be considered as being significant (Hair et al, 1998). The reliability of the scales was confirmed by Cronbach's alpha value of 0.812 and 0.752 respectively (cf. Nunnally and Bernstein, 1994).

Dimension	Number of items	Eigenvalue	Explained variance	Factor loading (Max.)	Factor loading (Min.)	Cronbach's alpha
Team effectiveness	5	2.884	57.7	.822	.678	.812
Stakeholder satisfaction	5	2.606	52.1	.807	.616	.752

Table 2. Factor Analysis and Reliability of team effectiveness and stakeholder satisfaction scales.

4 Analyses and Findings

In this section the analyses and results of the survey will be described. First, the perception of the importance of Scrum competences will be presented. Second, we show the relationship between manifest Scrum competences, team effectiveness and stakeholder satisfaction.

4.1 Importance of Scrum competences

To determine the difference in perception between product owners and team members/business stakeholders in regards to the importance of Scrum competences a t-test is performed (Table 3). On most competences, the scores of the product owners are higher than the scores of the team members/business stakeholders. As shown in Table 3, the differences for the competences *relationship management*, *needs identification*, *process improvement* and *backlog management* are significant.

	Mean scores			Two sided t-test of equality of means		
	Product Owner (N=49)	Team member/Business Stakeholder (N=92)	difference	t-value	degrees of freedom	p-value
IS and Business Strategy Alignment	3,53	3,37	0,16	-0,973	139	,332
Project- and Portfolio Management	3,49	3,60	-0,11	0,591	139	,555
Relationship Management	4,37	3,95	0,42	-2,838	139	,005
User Support	3,78	3,55	0,23	-1,176	139	,242
Business/Product Plan Development	3,51	3,48	0,03	-0,186	139	,853
Product/Service Planning	3,39	3,60	-0,21	1,269	139	,207
Needs Identification	4,33	3,91	0,42	-2,904	139	,004
Business Change Management	3,65	3,52	0,13	-0,756	139	,451
Process Improvement	3,90	3,45	0,45	-2,653	139	,009
Backlog Management	4,39	3,75	0,64	-3,634	139	,000

Table 3. Differences between product owners and team members/business stakeholders on competence importance.

4.2 Scrum competences, team effectiveness and stakeholder satisfaction

Before presenting the results of the correlations and regression analyses between manifest Scrum competences, team effectiveness and stakeholder satisfaction, the researchers checked that both the dependent variables and the independent variables were not skewed in their distribution. The correlations between Scrum competences and team effectiveness for product owners and team member's subsamples are shown in Figure 2. The correlations of the product owners subsample is reported above the diagonal, and the team members subsample below the diagonal. As we can see, not all correlations are significant. The significant correlations are between .288 and .643, which can be classified as low to moderate (Cohen, 1992). The correlations between the competences *IS and business strategy alignment*, *business/product plan development* and *product/service planning* with team effectiveness are higher for the team members than the product owners.

	<i>Relationship Management</i>	<i>Needs Identification</i>	<i>IS and Business Strategy Alignment</i>	<i>Business/Product Plan Development</i>	<i>Product/Service Planning</i>	<i>Project- and Portfolio Management</i>	<i>Business Change Management</i>	<i>User Support</i>	<i>Process Improvement</i>	<i>Backlog Management</i>	<i>Team effectiveness</i>
Relationship Management	1	.310*								.432**	.367**
Needs Identification	.340*	1	.290*							.424**	
IS and Business Strategy Alignment			1		.371**						
Business/Product Plan Development		.421**	.386*	1		.389**	.439**				
Product/Service Planning		.470**	.341*	.643**	1	.371**		.372**		.288*	
Project- and Portfolio Management			.376*		.513**	1	.571**			.536**	
Business Change Management						.401*	1	.308*	.350*		
User Support				.385*	.505**	.360*	.495**	1			.337*
Process Improvement			.320*			.320*	.564**	.492**	1		
Backlog Management								.329*		1	.421**
Team effectiveness	.335*			.379*	.370*					.372*	1

Figure 2. Significant correlations between competences product owner and team effectiveness for product owners (above the diagonal) and team members (below the diagonal) subsamples (** $p < .01$; * $p < .05$).

In Figure 3, the correlations are shown between Scrum competences and stakeholder satisfaction for product owners and business stakeholder’s subsamples. The correlations of the product owners subsample is reported above the diagonal, and the business stakeholders subsample below the diagonal. The table shows that the business stakeholders have more significant correlations than product owners. The significant correlations are between .290 and .718, which can be classified as low to moderate (Cohen, 1992). Overall, the correlations of the business stakeholder subsample are higher than the correlations of the product owner subsample. Remarkable are the differences between the correlations between all Scrum competences and stakeholder satisfaction for both subsamples.

	<i>Relationship Management</i>	<i>Needs Identification</i>	<i>IS and Business Strategy Alignment</i>	<i>Business/Product Plan Development</i>	<i>Product/Service Planning</i>	<i>Project- and Portfolio Management</i>	<i>Business Change Management</i>	<i>User Support</i>	<i>Process Improvement</i>	<i>Backlog Management</i>	<i>Stakeholder satisfaction</i>
Relationship Management	1	.310*								.432**	.361*
Needs Identification	.618**	1	.290*							.424**	
IS and Business Strategy Alignment		.369*	1		.371**						
Business/Product Plan Development	.483**	.425*	.537**	1		.389**	.439**				
Product/Service Planning	.404*	.416*			1	.371**		.372**		.288*	
Project- and Portfolio Management		.423*	.654**	.500**		1	.571**			.536**	
Business Change Management	.525**	.387*	.648**	.544**		.518**	1	.308*	.350*		
User Support	.351*	.585**			.487**	.405*		1			.340*
Process Improvement	.573**	.590**		.445**		.368*	.667**	.718**	1		
Backlog Management	.508**	.524**			.532**	.347*		.591**	.385*	1	.470**
Stakeholder satisfaction	.694**	.609**		.433*	.448*	.512**	.546**	.562**	.655**	.526**	1

Figure 3. Significant correlations between competences product owner and stakeholder satisfaction for product owners (above the diagonal) and business stakeholders (below the diagonal) subsamples (** $p < .01$; * $p < .05$).

The way the relationship between manifest Scrum competences, team effectiveness and stakeholder satisfaction was tested is shown in Table 4. A multiple regression analyses was performed (method Forward) for each of the dependent variables *team effectiveness* and *stakeholder satisfaction*, with the ten Scrum competences as independent variables and Role (product owner or team member/business stakeholder) as dummy variable. For the two OLS (ordinary least squares) regression models applied, the potential problem of multicollinearity was investigated by computing variance inflation factors (VIF) for each predictor in the regression model. Although in some cases correlations between independent variables were relatively high, VIF factors in none of the models exceeded 5 – a commonly applied rule of thumb (Hair et al., 1998; Rogerson, 2001).

Dependent variable	Predictor	Beta	p	Adjusted R ²	F	df	p
Team effectiveness	Relationship Management	.27	.017	21,3	3,161	88	.001
	User Support	.28	.034				
	Backlog Management	.32	.010				
Stakeholder satisfaction	Relationship Management	.34	.006	38,9	5,634	80	.000
	Business/Product Plan Development	-.22	.046				
	User Support	.26	.040				

Table 4. Multiple regression analysis between competences product owner and team effectiveness and stakeholder satisfaction as dependent variable with Role as dummy variable.

The results from the two multiple regression models show that regression coefficients are significant, as well as the regression models. Based on the analysis above the main findings can be summarized as follows:

- *Relationship management* and *user support* is the main predictor for both team effectiveness as stakeholder satisfaction;
- *Backlog management* is also the main predictor of team effectiveness;
- *Business/Product plan development* holds a significant negative relation with stakeholder satisfaction;
- The Role of product owner or team member/business stakeholder holds no significant relation with team effectiveness or stakeholder satisfaction.

5 Conclusions, Implications and Further Research

The objective of this research is to answer the question ‘Which competences of the Scrum product owner are related to team effectiveness and stakeholder satisfaction?’ Based on data gathered via 141 respondents from organizations in the Netherlands, correlation analyses, t-tests and regression analyses have been conducted. From these analyses, it can be concluded that the competences *Relationship management* and *User support* are the main predictor for both team effectiveness as stakeholder satisfaction. Furthermore, the competence *Backlog management* is also a main predictor of team effectiveness. Finally, we also found that the *Business/Product plan development* competence has a significant negative relation with stakeholder satisfaction. Although the cause for this is unclear it might be reasoned that too much focus on product plan development is considered to be contradictive to agile methods such as Scrum according to the respondents in the stakeholder group. In the survey the knowledge and skills examples provided, as part of the question that relates to this competence, are items such as long term planning and analysis, and determining milestones, such examples could typically be perceived as part of more traditional development methods (e.g. waterfall). Still, more research is needed to determine with certainty the underlying reason(s). The same holds true for the other relations that have been found in this study, more data is needed to

further validate the findings in this research. Future research projects should focus on other factors that might influence the team effectiveness such as the role of the Scrum master and/or the presence of a project manager. Also, maturity aspects such as that of the team or the years of experience that a product owner has need to be studied.

Based on the current findings some implications for both theory and business can already be formulated. First, this study fills a gap in the research on the role of the product owner in Scrum projects. While the role and corresponding tasks have been discussed earlier there has not been any research on the knowledge and skills that a person needs to fulfil the role of product owner in such a manner that the scrum team works effectively and the customer is satisfied with the deliverables. This research provides first results in this direction with a list of competences that needs to be validated further. For example, by case study research in which both the team's effectiveness can be assessed as well as the satisfaction in relation to the competence profile of the product owner. Second, organizations that have agile software development projects should determine what the competences *relationship management* and *user support* mean in the context of their project. More specific which activities and deliverables are required? Furthermore, it is important to identify the competences of the product owner and be aware that these might influence the quality of work that is performed by the development team as well as the customer's satisfaction with the deliverables. Therefore, this should be taken into account when selecting or hiring product owners. Consequently, the emphasis in personal development of product owners should be on relationship management and user support competences. Also the other competences identified in this research can be used by an IT manager or human resources as a guideline when assessing a person for the role of product owner.

References

- Bass, J. M. (2013). Agile method tailoring in distributed enterprises: Product owner teams. In: *Global Software Engineering (ICGSE), 2013 IEEE 8th International Conference*. pp. 154-163
- Boyatzis, R.E. (1982). *The competent manager: A model for effective performance*. John Wiley & Sons.
- CEN (2014). *European e-Competence Framework 3.0. A common European Framework for ICT Professionals in all industry sectors*. URL: <http://www.ecompetences.eu/e-CF-3-0-download/> (visited on 04/06/2016)
- Cho, J. (2008). Issues and Challenges of agile software development with SCRUM. *Issues in Information Systems* 9(2), 188-195.
- Cockburn, A., & Highsmith, J. (2001). Agile software development: The people factor. *Computer* (11), 131-133.
- Cohen, J. (1992). A power primer. *Psychological Bulletin* 112 (1), 155-159.
- Cohn, M. (2010). *Succeeding with agile: software development using Scrum*. Pearson Education.
- De Waal, B., Outvorst, F., and Ravesteyn, P. (2016). Digital Leadership: The Objective-Subjective Dichotomy of Technology Revisited. In: *Proceedings of the 12th European Conference on Management, Leadership and Governance*. Bucharest, Romania, pp. 52 – 60
- Dingsøyr, T., & Dybå, T. (2012). Team effectiveness in software development: Human and cooperative aspects in team effectiveness models and priorities for future studies. In: *Proceedings of the 5th International Workshop on Co-operative and Human Aspects of Software Engineering* (pp. 27-29). IEEE Press.
- Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual review of psychology* 47(1), 307-338.
- Hair, J., R. Anderson, R. Tatham, and W. Black (1998). *Multivariate Data Analysis*. 5th Edition. Englewood Cliffs: Prentice – Hall.
- Hoda, R., Noble, J., & Marshall, S. (2011). The impact of inadequate customer collaboration on self-organizing Agile teams. *Information and Software Technology* 53(5), 521-534.
- Holtkamp, P., Jokinen, J. P., & Pawlowski, J. M. (2015). Soft competency requirements in requirements engineering, software design, implementation, and testing. *Journal of Systems and Software* 101, 136-146.
- Judy, K. H., & Krumins-Beens, I. (2008). Great Scrums need great Product owners: Unbounded collaboration and collective Product Ownership. *Hawaii International Conference on System Sciences, Proceedings of the 41st Annual*, pp. 462-462
- Van Kelle, E., van der Wijst, P., Plaat, A., & Visser, J. (2015). An empirical study into social success factors for agile software development. In: *Cooperative and Human Aspects of Software Engineering (CHASE), 2015 IEEE/ACM 8th International Workshop* pp. 77-80
- Kupiainen, E., Mäntylä, M. V., & Itkonen, J. (2015). Using metrics in Agile and Lean Software Development—A systematic literature review of industrial studies. *Information and Software Technology* 62, 143-163.
- Liikamaa, K. (2015). Developing a Project Manager's Competencies: A Collective View of the Most Important Competencies. *Procedia Manufacturing* 3, pp. 681-687.
- Mahnic, V., & Vrana, I. (2007). Using stakeholder driven process performance measurement for monitoring the performance of a Scrum-based software development process. *Electrotechnical Review* 74(5), 241-247.
- Matturo, G., Fontán, C., & Raschetti, F. (2015) Soft Skills in Scrum Teams. In: *the 27th International Conference on Software Engineering and Knowledge Engineering, {SEKE} 2015*, Wyndham Pittsburgh University Center, Pittsburgh, PA, USA, July 6-8, 2015.
- Moe, N. B., Dingsøyr, T., & Dybå, T. (2010). A teamwork model for understanding an agile team: A case study of a Scrum project. *Information and Software Technology* 52(5), 480-491

- Nerur, S., Mahapatra, R., & Mangalaraj, G. (2005). Challenges of migrating to agile methodologies. *Communications of the ACM* 48(5), 72-78
- Nunnally, J.C. and I.H. Bernstein (1994). *Psychometric Theory*. New York: McGraw-Hill.
- Overhage, S., Schlauderer, S., Birkmeier, D., & Miller, J. (2011). What makes IT personnel adopt Scrum? A framework of drivers and inhibitors to developer acceptance. In: *System Sciences (HICSS), 2011 44th Hawaii International Conference* pp. 1-10
- Pichler, R. (2010). *Agile product management with Scrum: Creating products that customers love*. Addison-Wesley Professional.
- Plessius, H., and Ravesteyn, J.P.P. (2016) Mapping the European e-Competence Framework on the domain of Information Technology: a comparative study. In: *proceedings of the 29th Bled eConference* June 19 - 22, 2016; Bled, Slovenia.
- Rogerson, P.A. (2001). *Statistical methods for geography*. London: Sage.
- Schwaber, K. (1997). *Scrum development process. Business Object Design and Implementation*. Springer London.
- Schwaber, K. (2004). *Agile project management with Scrum*. Microsoft Press.
- Schwaber, K. and Beedle, M. (2001). *Agile software development with Scrum*. Pearson Education US.
- Serrador, P., & Turner, R. (2015). The relationship between project success and project efficiency. *Project Management Journal* 46(1), 30-39.
- Sverrisdottir, H. S., Ingason, H. T., & Jonasson, H. I. (2013). The role of the product owner in Scrum-comparison between theory and practices. In: *proceedings of the 27th IPMA World Congress*, Dubrovnik, Croatia.
- Sutherland, J., & Schwaber, K. (2011). *The Scrum guide. The Definitive Guide to Scrum: The Rules of the Game*.
- Vlaanderen, K., Jansen, S., Brinkkemper, S., & Jaspers, E. (2011). The agile requirements refinery: Applying SCRUM principles to software product management. *Information and software technology* 53(1), 58-70.
- Vlietland, J., & van Vliet, H. (2015). Towards a governance framework for chains of Scrum teams. *Information and Software Technology* 57, 52-65.
- Yin, A., Figueiredo, S., & da Silva, M. M. (2011). Scrum maturity model. In: *proceedings of the ICSEA*, pp. 20-29
- Xebia. (2014). *Dutch Agile Survey report 2014*. URL: <https://xebia.com/news/dutch-agile-survey-results-2014> (visited on 12/08/2016)