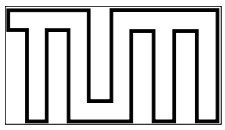

FAKULTÄT FÜR INFORMATIK
DER TECHNISCHEN UNIVERSITÄT MÜNCHEN

Master Thesis in Information Systems

Development, Evaluation and Application of an Agile Maturity Self-assessment Survey

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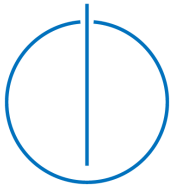

Situation

According to Marnewick and Langerman from 2018, IT projects „are not adding value to organizational strategies“ (Marnewick & Langerman, 2018, p. 233) due to their high failure rates. Agile is seen and preliminary proven to be a solution to address this problem. The 2015 Chaos Report, comparing agile projects with waterfall projects, states that agile projects are more successful (39% instead of 11%) and have less often failed (9% instead of 29%). (The Standish Group International, 2015) As adapting agile principles seems to increase project success (Marnewick & Langerman, 2018; Nurdiani et al., 2019; Ozcan-Top & Demirors, 2013), agile software development becomes more and more relevant to and is increasingly applied at organisations and companies. (Nurdiani et al., 2019; Ozcan-Top & Demirors, 2015)
Consequently, agile information systems development is not only a hype but already established in most companies as the 13th Annual State of Agile Report from 2019 shows. According to the report, „97% of respondents report their organisations practices agile development methods“. 22% of the respondents stating that „all of [their] teams are agile“ and 26% stating that „more than 1/2 of [their] teams are agile“ emphasises the relevance of agile development. (CollabNet VersionOne, 2019)
While the organisations of only 18% of the respondents have achieved a high level of competency or better concerning agile practices, most of them are still maturing (53%), (CollabNet VersionOne, 2019).

Adopting agile methods, practices and principles to improve software development is complicated and frequently unsuccessful. (Ozcan-Top & Demirors, 2014) Thus, organisations request and require support when adopting these. (Ozcan-Top & Demirors, 2013) Assessing the degree or level of this adoption can be done by assessing an organisations agile maturity. Being aware of its agile maturity, an organisation can identify the next steps to adopt further agile practices and, thus, improve its agile maturity. (Yürüm et al., 2018)

To provide a tool „to guide organizations in agile process improvement and agile adoption“ (Ozcan-Top & Demirors, 2013, p. 130), a number of agile maturity models have been developed. (Ozcan-Top & Demirors, 2013) However, these models lack a substantive definition (Yürüm et al., 2018), are „not sufficient“ (Nurdiani et al., 2019, p. 48) to be used in industry and as guidelines and there is no agreement, which agile maturity model is applicable. Additionally, most models are not developed in an academic setting, making their empirical validity insignificant. (Fontana et al., 2018)
gap
Alternatively, surveys, called „agile maturity self-assessment surveys“, are regarded as a tool to improve agile maturity. (Yürüm et al., 2018) Yürüm et al. evaluated 22 available agile maturity self-assessment surveys concerning comprehensiveness, fitness for purpose, discriminativeness, objectivity, conciseness, generalizability, and suitability. Because no survey „fully satisfied the expected features“ (Yürüm et al., 2018, ü. 311), the applicability of those instruments is limited.

This master thesis is going to deal with the measurement of agile maturity and its influence on software project outcomes and quality. The goal is to create a questionnaire that provides a measurement tool for agile maturity. The questionnaire will contribute to the scientific discourse by giving companies the opportunity to reflect and improve its agility.
The empirical data collection will be performed in cooperation with pharma4u GmbH and the development of the company’s web application.
possible conflict of interest notified

Purpose of the Master Thesis

As stated above, currently there is no valid tool that identifies the agile maturity of a project. (Fontana et al., 2018; Yürüm et al., 2018) Therefore, the purpose of this thesis is to develop a questionnaire that realises a valid measurement of agile maturity. Subsequently, the thesis will provide information about the influence of the identified agile maturity of a software project on the projects outcomes and success.

Thus, the following three research questions will be addressed in the course of the thesis:

Research Question 1:
What is agile maturity?

This question covers the definition of agile maturity. According to Fontana et al. (2018), authors define agile maturity in the context of software development by the highest level of the corresponding agile maturity models. Because these models are not consistent about which practices are included in which maturity levels, they do not provide a uniform definition about agility and maturity. (Nurdiani et al., 2019)
It is evident that agile maturity is dependent on a number of factors.
In the context of this question, already by researchers identified factors will be collected.
Additional factors will be detected in the thesis. Furthermore, RQ1 includes the identification of additional factors. Finally, an evaluation must be conducted: What are the factors influencing agile maturity? How can these factors be estimated and weighted? And how can they be combined to create an objective measurement?
The result of this evaluation leads to RQ2.

Research Question 2:
What is a valid, objective and reliable questionnaire to measure agile maturity?

The main target of the research is to develop a questionnaire that measures agile maturity. For this purpose, the identified factors from RQ1 will be gathered, evaluated, validated and summarised. The precise methodology to create the questionnaire is described in the section „Approach“ more detailed.

Research Question 3:
What is the influence of agile maturity on software project outcomes?

As the 2015 Chaos Report indicates, agile projects are more successful than waterfall projects. (The Standish Group International, 2015) But because there is currently no valid tool for measuring agile maturity, current research lacks a statement about the actual influence of agile maturity on software project outcomes and success. Determining the impact of agile maturity on the success of projects will enhance the information about agile processes in modern software development.
To approach this question, both agile maturity and software project outcomes and success must be measured. The output of RQ2 delivers an approach to identify the first aspect, agile maturity. The method to pursue the second aspect, software project outcomes and success, is explained in the section „Approach“. Additionally the section contains the approach to evaluate the gathered data from the measurements to draw conclusions about RQ3.

Approach

To answer the research questions, the master thesis separates into three steps: First of all, a literature review will be conducted to gather necessary information about agile maturity and software project success factors. In the second step, the questionnaire is going to be created. In the final step, a qualitative questioning will reveal the influence of agile maturity on software project outcomes and success.

RQ1: Literature review

Based on the guidelines by Webster and Watsons (2002) and by Brereton et al. (2007), a systematic literature review will be conducted. The review aims at clarifying the term „agile maturity“ and collecting already identified factors that influence it. These factors, deduced from the review, serve as a basis for creating a questionnaire according to RQ2.

The complete review will start with identifying the relevant literature. Searching in academic databases with the keywords „agile maturity“, „agile maturity model“ and „agile maturity self-assessment survey“ will provide a foundation of the most important scientific papers and articles. Based on these findings, cross-linked papers are going to be gathered: This includes papers that are cited by as well as papers that cite the initially discovered ones. Applying a concept matrix will help to sort the content of the papers. The concepts are most likely going to be similar to the keywords: „agile maturity“, „agile maturity model“ and „agile maturity self-assessment survey“.

To a smaller extent, the literature review will also cover the identification of factors of software project outcomes and success. This is not part of the main objectives of the thesis but the factors are needed to answer RQ3.

RQ2: Creating the questionnaire

Afterwards, the number of factors influencing agile maturity will be extended in the course of qualitative methods: conducting and recording guided interviews and group discussions according to Misoch (2019).

Pharma4u GmbH practices agile information systems development since three years, by means of Scrum since more than one year. The software development is divided into two software projects with separate developer teams: Labor+ and MediCheck, a product from pharma4u's parent company MedApo. As MediCheck implements Scrum only recently, the project has a less comprising adoption of agile practices than Labor+. Hence, MediCheck has a lower agile maturity and employees with less agile experience. As a result, the interviews of both teams will have different perspectives, experiences, opinions and suggestions making the identification of agile maturity factors more comprehensive.

Finally, a questionnaire measuring agile maturity will be developed from the gathered data. The analysis of the interview data will follow the guidelines by Roulston (2014): transcribing the recorded interviews into data. Subsequently, reducing, organising and interpreting the data.

The to be created questionnaire will build upon the guidelines by Linåker et al. (2015), Bühner (2011) and Porst (2011).

Finally, the developed questionnaire will be filled out by pharma4u's software developers.

RQ3: Qualitative questioning

To gather more information and understanding about agile maturity, the agile maturity of Labor+ and MediCheck will be compared. According to Yin (2014), a qualitative case study will be conducted.

To measure the influence of agile maturity on software project outcomes and success, a second qualitative case study at pharma4u's software projects Labor+ and MediCheck will be applied.

A cross-sectional study is selected because a longitudinal study would exceed the scope and time of the thesis. The methods to collect and evaluate the data about project success and outcomes will be qualitative. As Labor+ and MediCheck consist of less than 20 software developers, drawing conclusions from quantitative research methods with such a small number of participants could not be argued to have a significant meaning.
Instead, software project success and outcomes will be determined in the course of guided interviews of the software developers (Misoch, 2019), which will contain both qualitative and quantitative questions. The interview questions will aim at measuring to what extent the project success factors are met. The project's most important success factors are going to be clear requirements and objectives, effective communication and feedback, (Hairul et al., 2011) meeting the scheduled time, not exceeding budget and other resources, software quality and user satisfaction (Lamprou & Vagiona, 2018).
After analysing the data according to Roulston (2014), a final evaluation will summarise the results of the cross-sectional study: comparing the agile maturity from the questionnaire with the estimated project success of the individual software developers.

Outlook

The goal of the thesis is to provide a questionnaire that measures agile maturity. Its application should give organisations a starting point to determine its agile maturity. Being aware of its maturity level, an organisation can identify the next steps to adopt further agile practices and thus improve its agile maturity. (Yürüm et al., 2018)
Analogously, the master thesis will add value to pharma4u. The application of the questionnaire and already the conduction of the agility interviews at pharma4u will give the company the possibility to reflect, asses and increase its agility.
With the questionnaire as its main objective, the thesis will also contribute to the scientific discourse by supporting future scientific work about agility. Because the questionnaire gives the opportunity to measure agile maturity, subsequently, longitudinal studies could execute and evaluate such measurements. Drawing conclusions from these evaluation could help to develop approaches or guidelines to improve agile maturity.

Time Schedule

Period		Work
15.5.2020 - 4.6.2020	(3 weeks)	- Literature review „agile maturity“ - Literature review „software project outcomes“
5.6.2020 - 25.6.2020	(3 weeks)	- Preparing and conducting interviews at pharma4u
26.6.2020 - 9.7.2020	(2 weeks)	- Creating the questionnaire
10.7.2020 - 23.7.2020	(2 weeks)	- Applying questionnaire - Evaluating questionnaire
24.7.2020 - 13.8.2020	(3 weeks)	- Case study: comparing agile maturity of different projects - Starting to write thesis (Chapters „Literature review“, „Interviews“, „Questionnaire“)
14.8.2020 - 10.9.2020	(4 weeks)	- Preparing and conducting interviews about project success - Analysing and evaluating data
11.9.2020 - 24.9.2020	(2 weeks)	- Writing findings - Writing other chapters („Introduction“, „Conclusion“)
25.9.2020 - 15.10.2020	(2 weeks)	- Revision - Presentation

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