

MyAgile: Sociological and Cultural Effects of Agile on Teams and their Members

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ABSTRACT

Two main concepts in Agile software development are self-organized teams and direct contact with the customer or Product Owner. Additionally, constant feedback on different levels is considered to be of high importance. With constant feedback, transparency goes hand-in-hand. Compared to traditional software development, Agile approaches have much higher transparency, and this might be a problem for some people. What does it feel like to work in such an Agile team or organization for the individual? How do the software developers, testers or other team members experience this environment of high transparency and continuous feedback? In this paper we focus on a subset of the third Swiss Agile Study from 2016, a nationwide survey about software development, to shed some light on the sociological, cultural and cognitive aspects of Agile teams and their individual member. We found that despite the increased transparency, the majority of the participants reported working in an Agile environment, both on the individual and on the team level, as positive and satisfying. The analysis shows these positive influences have some strong correlations with certain Agile practices and with innovation and business aspects.

CCS CONCEPTS

• **Software and its engineering** → **Software creation and management; Software development process management; Agile software development;**

KEYWORDS

Agile, Software Development, Culture, Sociology, Cognition

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1 INTRODUCTION

Agile software development has been gaining popularity since the publication of the Agile Manifesto [1] at the beginning of the new millennium. The motivation for this paper is that we need to learn more about the reception of Agile methods now they have become so popular.

In order to shed some light on the reception, we present our empirical data focusing on human aspects of software engineering. We show that — at least in Switzerland — most individuals embrace Agility and appreciate to work in agile teams and organizations.

The goal of our analysis was to help getting a deeper understanding about the effects and the human aspects of Agile software development. The research questions we posed are:

RQ1 : What are the impacts of Agile on human aspects?

RQ2 : Do these impacts correlate with certain Agile practices?

RQ3 : Do these impacts correlate with certain outcomes?

In the next section, we outline the nature of our survey and the source of our study data in more detail. The results are then explored in more depth, discussing the data in order to better understand the human aspects in Agile software development. We then discuss our results and present our conclusions.

2 RELATED WORK

In a broad study and analysis, Hall et al. [4] report that software developer motivation has an impact on many aspects of project success, independent from the development approach. Gandomani et al. focus in their report [3] on human aspects in the agile transformation process. In their report study with 32 Agile experts, they identify and classify human aspects that can affect the change process as impediments, while others can influence it as change accelerators. Dybå and Dingsøyr [2] provide a literature review about empirical studies of Agile software development. They mention studies that report improved customer satisfaction when using Agile methodologies. They also report about satisfaction from the developer perspective, mentioning a higher satisfaction with the product and customer collaboration. Whitworth and Biddle [8] explore the social nature of Agile teams. They report that people can be stressed by the high social activity and sense of obligation,

and so demand strong engagement. On the other side, this, along with information radiators, can provide the feeling of security and control in a project. In our study we want to analyze especially the effects of agile on the individual from a sociological, cultural and cognitive point of view.

3 STUDY SETUP

The Swiss Agile Study [6], conducted by the authors, is a biennial Swiss nationwide online survey about the usage of development methods and practices in the IT industry, and about the influence of applying agile methods on projects. The study is both neutral and independent, i.e. it is neither sponsored nor conducted by an agile consultant, tool vendor or market research organization which, according to Stavros [7], could reduce its trustworthiness. The study addresses both agile and non-agile companies as well as both agile and non-agile IT professionals. It comprises a catalogue of 23 questions about applied software development methodologies, techniques and practices on technical level, collaborative level and value level as outlined by Kropp and Meier [5]. Additionally, there are questions concerning personal and company information. For this paper, we focus on the results of the agile IT professional participants. In order to better understand the criticism of agile, we have added to the survey a section called “MyAgile”. MyAgile consists of 13 statements targeted only to the agile IT professionals as described above. Table 3 summarizes all statements. The goal of these statements is to learn more about how IT professionals feel about agile and its impact on their professional life. Our data shows that agile methods do not only lead to more successful projects but also has positive impact on the sociological, cultural and cognitive aspects on the individual and team level.

185 IT professionals and 142 companies filled out the complete survey. We emailed 1,399 companies and about 5,000¹ IT professionals in Switzerland. The addresses of the companies and the professionals were collated from the participating IT associations SwissICT² and SWEN³, as well as from our own institutional databases.

The responding IT professionals were typically Senior Software Developers (17%), Software Developers (12%), Project Managers (13%), Team Leader (10%), and Designer/Architects (10%). We had a high number of “Others” (17%), which include roles like Scrum Masters, Agile Coaches and Product Owners.

Table 2 shows the distribution of the sizes of the participating companies following the official categories of the Swiss Federal Statistical Office⁴. More than 60% are micro and small enterprises. Among the large enterprises there were four with more than 10,000 employees.

The main branches of the companies are IT Services/IT Consulting (30%), Software Industry/Development (28%). Public Service and Finance/Insurance companies make 8% each. Next comes Telecommunication with 7%. The rest are 4% and below.

¹We do not know the exact number, since these mailings were partially done by partner associations.

²www.swissict.ch

³<http://www.swen-network.ch>

⁴<http://www.bfs.admin.ch/bfs/portal/en/index/themen/06/02/blank/key/01/groesse.html>

Table 1: Distribution of the participating professional roles

Role	%
Senior Software Developer	17%
Project Manager	13%
Software Developer	12%
Team Leader	10%
Designer/Architect	10%
CEO	8%
Development Manager	6%
CTO	3%
CIO	1%
Product Manager	1%
QA Tester	2%
UX Expert	1%
Other	17%

Table 2: Sizes of the participating companies

Size	%
Micro enterprise (≤ 9)	25%
Small enterprise (10-49)	37%
Medium enterprise (50-249)	19%
Large enterprise (≥ 250)	19%

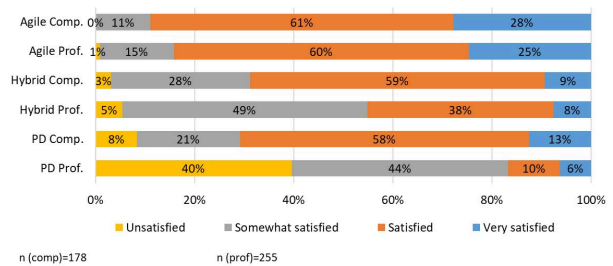


Figure 1: Satisfaction with the methodology distinguished between agile, hybrid, and plan-driven companies and professionals (Agile Comp, Agile Prof, Both Comp, Both Prof, PD Comp, PD Prof).

4 FINDINGS

We asked all participants in the survey how satisfied they are with the current methodology, to find out whether Agile development leads to more satisfaction. Figure 1 shows the results for this question divided into three participation categories, those who do “mostly Agile”, those who do “mostly plan-driven (PD)” and those who do both.

Figure 1 shows a very high satisfaction rate, both for the companies and the individual professionals, with very similar values. In the “Both” category, the companies still report high satisfaction, while the professionals are not quite as satisfied. However, in the “plan-driven” category companies, i.e. management, still report a high level of satisfaction with that methodology (71%), but only 16% of the professionals report to be satisfied or very satisfied. But 40% of the plan-driven developers report to be unsatisfied with the methodology. These results suggest that agile seems to have a very positive influence, especially on individual IT professionals.

In the survey, agile IT professionals were additionally asked questions about their personal perspective on Agile processes, “My Agile”: see Table 3. The question we asked was: “Since introducing agile, to what extent do you agree with the following statements?” The participants could choose on a scale from “completely agree”, “agree”, “disagree” and “completely disagree”. We defined a set of 13 statements targeting sociological, cultural and cognitive aspects of agile software development on the team and the individual. The

My Agile	Scale	M	SD
1 I pay more attention to technical excellence	1-4	2.81	0.68
2 My work life balance has improved	1-4	2.53	0.63
3 Release is not a nightmare anymore	1-4	2.92	0.73
4 We have developed a culture of mutual respect	1-4	2.86	0.62
5 I feel much more committed/dedicated to the team and to the work	1-4	2.91	0.67
6 I have more fun at work	1-4	2.96	0.68
7 I think my work is more valued	1-4	2.74	0.71
8 We have a team environment which is honest and trusting	1-4	3.01	0.57
9 Team members take the initiative to accomplish tasks more often	1-4	2.90	0.58
10 The team has been empowered to make decisions about how to do their work and execute on those decisions without outside interference	1-4	2.83	0.72
11 We have a culture of servant leadership	1-4	2.66	0.71
12 We have a team environment which allows for mistakes	1-4	2.93	0.58
13 The team is encouraged to be creative and to experiment with new ideas	1-4	2.81	0.81

Table 3: “My Agile” questions, each question was ranked on a Likert scale of 1–4, with means and standard deviations shown on the right.

means (M) and standard deviations (SD) are shown on the right of the table. As can be seen, there is much similarity among the scales.

The general results for each question are shown in the bar-diagram of figure 2. As we can see, the results are consistent and mostly positive. Except for statement 2 and 7, 70 percent or more of the agile professionals “agreed” or “completely agreed”! Remarkable are the low numbers to “completely disagree”: Between 0 and 5 percent.

We were interested to compare the results of the “MyAgile” questions with answers to other questions in our survey. Input particular, we wanted to identify any relationships with *practices*: technical practices, collaborative practices, and planning practices; and with *influences* or *outcomes*: business influences, team influences, and software influences. Details of all questions can be found in the full survey report [6]. To explore, we computed correlations between each “MyAgile” scale, and each result for practices, and for influences (outcomes). We used Spearman’s non-parametric “rho” (ρ). We also calculated significance, correcting for the large number of tests, and dismissed non-significant results, and ranked the results. The most significant results are shown in tables 4 and 5. Of course, despite the p-value corrections, this is all post-hoc and exploratory analysis, and principally intended to guide further research.

For practices, only 6 correlations were significant, all involving collaborative practices, mostly the “Self-Organizing Team” practice. This alone correlated with 5 different “MyAgile” scales, showing a remarkable impact. The 6th item, “Pair Programming”, correlated with commitment.

For influences, there was much more variety, involving business, team, and software influences. Moreover, the top 10 correlations involved 6 distinct “MyAgile” scales. Some of the correlations were

Table 4: Myagile correlations for practices.

	practices	myagile	rho	p.value
1	CP Self organizing team	The team has been empowered to make decisions about how to do their work and ex	0.378	0.00038
2	CP Pair programming	I feel much more committed dedicated to the team and to the work	0.371	0.00089
3	CP Self organizing team	The team is encouraged to be creative and to experiment with new ideas	0.362	0.00112
4	CP Self organizing team	Team members take the initiative to accomplish tasks more often	0.355	0.00149
5	CP Self organizing team	We have a culture of servant leadership	0.321	0.01657
6	CP Self organizing team	We have a team environment which allows for mistakes	0.317	0.02020

Table 5: Myagile correlations for influences.

	influences	myagile	rho	p.value
1	TI Team morale motivation	I have more fun at work	0.467	<.00001
2	SI Product software innovation	The team is encouraged to be creative and to experiment with new ideas	0.440	0.00001
3	BI Alignment between IT business objectives	We have developed a culture of mutual respect	0.439	0.00002
4	SI Software architecture	My work life balance has improved	0.433	0.00001
5	BI Alignment between IT business objectives	I think my work is more valued	0.424	0.00005
6	TI Team productivity	I feel much more committed dedicated to the team and to the work	0.416	0.00003
7	BI Alignment between IT business objectives	We have a team environment which is honest and trusting	0.415	0.00011
8	TI Team morale motivation	I think my work is more valued	0.415	0.00003
9	BI Time to market	I think my work is more valued	0.414	0.00007
10	SI Defect rate	My work life balance has improved	0.405	0.00017

straightforward. For example, morale was related to fun at work, and innovation was related to encouragement to explore. Others were more enlightening: alignment between technical and business objections was related to increased mutual respect, increased feeling of work being valued, and a more honest and trusting environment. This is a profound nexus. Two software outcomes also stood out: software architecture and lowered defect rates both related to improved work-life balance.

The correlations made us review the relationships between the “MyAgile” scales themselves. While our intention was to cover social, cognitive, and cultural aspects of the Agile environment, it appears that other dimensions were involved. To explore this, we used hierarchical clustering to produce a dendrogram, as shown in Figure 3. This shows which scales most closely resemble each other, aggregating them as a hierarchy, and showing the distinctions by subtree height. We can see that the clusters do not follow the distinctions between social, cognitive, and cultural scales.

We speculate that the patterns arise as follows. At the left, by itself, is an expression of relief that release is not a nightmare: an outcome important to individuals. To its right is a cluster involving the individual perspective, feeling valued, mutual respect, honesty, and so on. The next cluster includes four issues that all involve teamwork itself, with servant leadership, empowerment and encouragement. Finally, at the rightmost, it shows how technical excellence relates to work-life balance. Together, this arrangement suggests a model that covers the pragmatic and the experiential, with a focus on both the individual and the team as a unit.

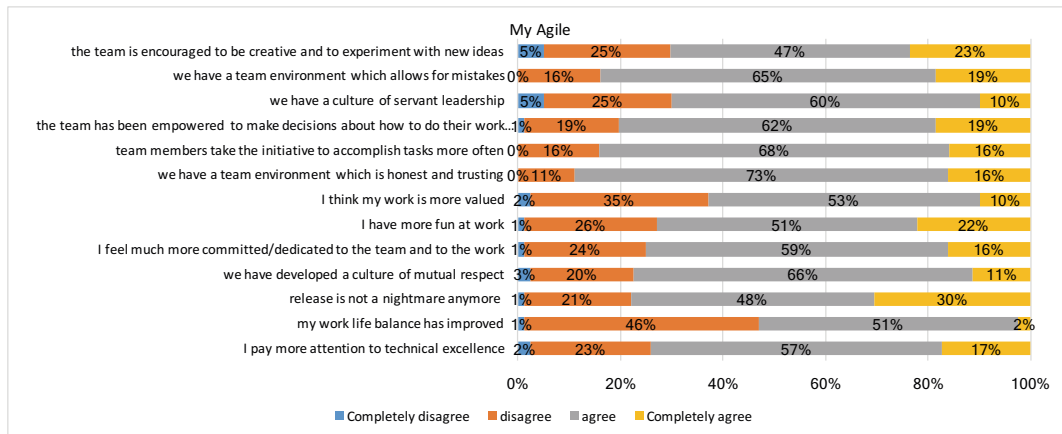


Figure 2: MyAgile: Distribution of answers, on a scale from 1 (completely disagree) to 4 (completely agree).

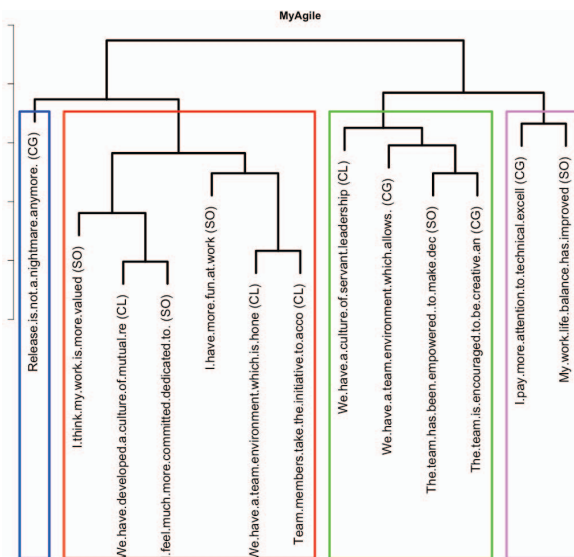


Figure 3: Dendrogram of Hierarchical Clustering of MyAgile Scales, showing Social (SO), Cognitive (CG) and Cultural (CL) distinctions.

5 CONCLUSION

In this paper we set out to explore how IT professionals are experiencing working in an Agile team or organization. Using data from the Swiss Agile Study 2016, we found that – on the contrary – most participants report thriving in an agile work-environment. The data show that Agile methods seem to have a positive influence on many human aspects.

The correlation analysis with Agile practices shows that team *self-organization* correlates significantly especially with team-oriented aspects, but also with the culture of servant-leadership. The impact of self-organization on several aspects of experience suggests that even this practice deserves more careful examination. The correlation analysis with Agile project *outcomes* shows on one hand

unsurprising relationships between fun at work and team morale, but also interestingly correlation between mutual respect and alignment between technical and business aspects. In early advocacy for Agile methods, the collaboration typically emphasized effectiveness of the approach on producing the right software, but the effects may also have a positive impact on the work environment.

However, in our survey there was some dissent: those outlier results should not be taken lightly. Also, we must be cautious about correlation and causation, and post-hoc analyses. Further studies will be necessary to better understand the reasons for their discomfort. Since the results are based on a national survey in Switzerland, we are working to expand the next iteration in more highly industrialized countries in order to sustain the findings.

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