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Do Agile Worth: A Survey of Three Agile Methods

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I. Introduction

The need for better quality of software has given rise to many software methodologies. During (40) forty years we observe the proliferation of methods in the software development life cycle (Fig 1.1). Some of these methods have been characterized[1] as hard (technically oriented), soft (human-centred), hybrid (the combinaison of hard and soft) and specialized (application oriented).

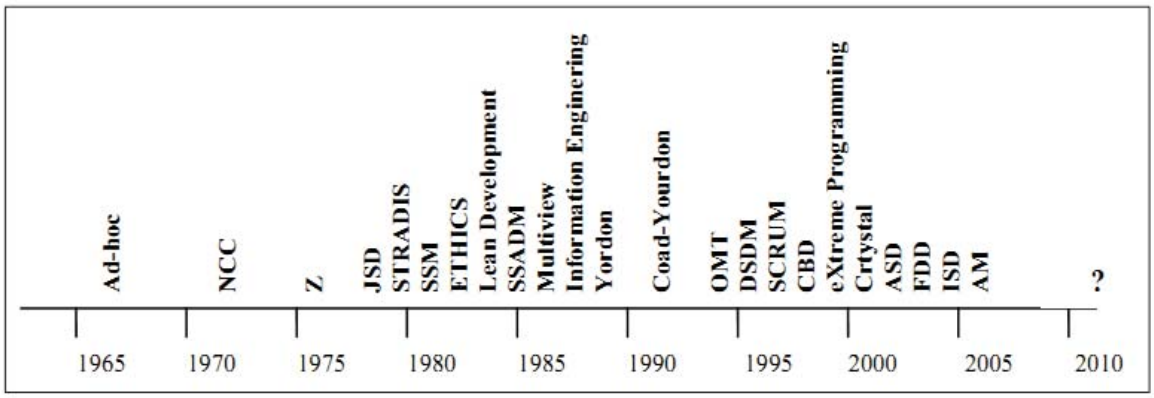

Fig 1.1 Forty years of information systems development methodologies

Iterative software lifecycle appeared around the middle of the decade, which consisted of using a planned sequence of programming enhancements until computer software was complete (Basili & Turner, 1975). Agile methodologies work in shorter iterations and promote a collaborative approach where project teams include members representing business, development and test work closely together throughout the entire lifecycle. Agile methods are an approach for managing the development of software, which is based upon obtaining early customer feedback on a large number of frequent software releases (Beck, 1999).

Nowadays Agile raises still more and more questions. Discussion around "the power of agile methods" is confused with many voices and ideas. In our work we have tried to know more about the impact of using agile methods in software production. The impact was study among four factors in the original research of our master of philosophy thesis untitled: " Evaluation of the most used agile methods with the definition of quality developed by Toyota: (XP, SCRUM, LEAN)".

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Debates are still going on inside agile development area. Practitioners and researcher argue against or in favor of placing practices before values. We have designed a framework which combined the values and principles of agile method as return in Agile manifesto in one hand and in the other and the Toyota Production system. The framework lead us to produce a series of question about the Teams, Organization and Usage factors that was allowed us to determine how the set of agile values and principles influence practices and lead to produce a quality product. The figure below (Fig 1.2) represents the basic idea of the framework build.

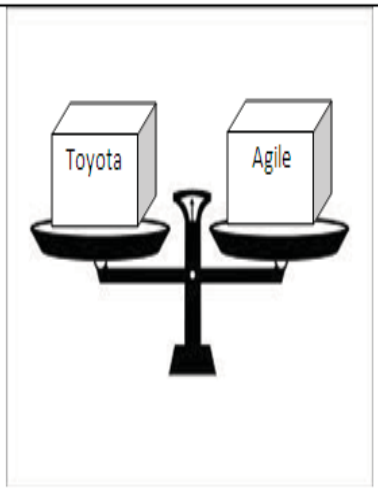
Toyota Principles	Framework Link of Team Factors	Agile Principles
TP09- Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others. *TP10- Develop exceptional people and teams who follow your company's philosophy.* *TP 11- Respect your extended network of partners and suppliers by challenging them and helping them improve.*		AP07- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done AP08- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation AP09- The best architectures, requirements, and designs emerge from self-organizing teams
NB: The survey question relatives to evaluating contribution (add values) of agile is given on the question n°24 to 29		

Fig 1.2 Balance idea of Agile and TPS: Team Factor

The present paper reports our finding about three factors: Team, Organization and Usage.

II. Factor In Study

By analyzing the agile values and principles with the Toyota Production System; we have found four factors in which the study was done. Here we present the three main factors studied: Organization, Team and Usage.

- Organization, means how the decision is taken. How the IT industry using Agile manage their business and also seeing the emergence of Toyota way organization.
- Team, was a factor which is expected to take care of all domain member like developer, tester, quality manager etc. how they interact and improve their work by using agile methodology.
- Usage, is the criteria of practice and techniques. What are the methodologies practices and is their any similar or difference with the practice given under the Toyota way. This criterion includes the perception of success. Usage takes also in compt the tools support by the agile methodology, to review if there are in the same goals of the Toyota way.

a) Factor 1: Organization

The term Self-organizing for defining agile methods introduces a notion to the management. The emergent nature of agile methodologies means that agile software development is in fact a learning experience for each project. In a case of XP (Beck 1999b) said "Any resistance against XP practices and principles on behalf of project members, management or customer may be enough to fail the process". This makes sense that the way we manage the production system will impact the result of the end-product.

The concept behind scrum is drastic simplification of project management. Scrum is especially self organizing team, Since Scrum does not require any specific engineering practices, it can be adopted to manage whatever engineering practices are used in an organization. (Schwaber and Beedle 2002).

Lean organization split into three generic layers how to manage their responsibilities and purposes[3]. The Figure (Fig 2.1) show how the hierarchy of a "lean" adaptable organization looks like.

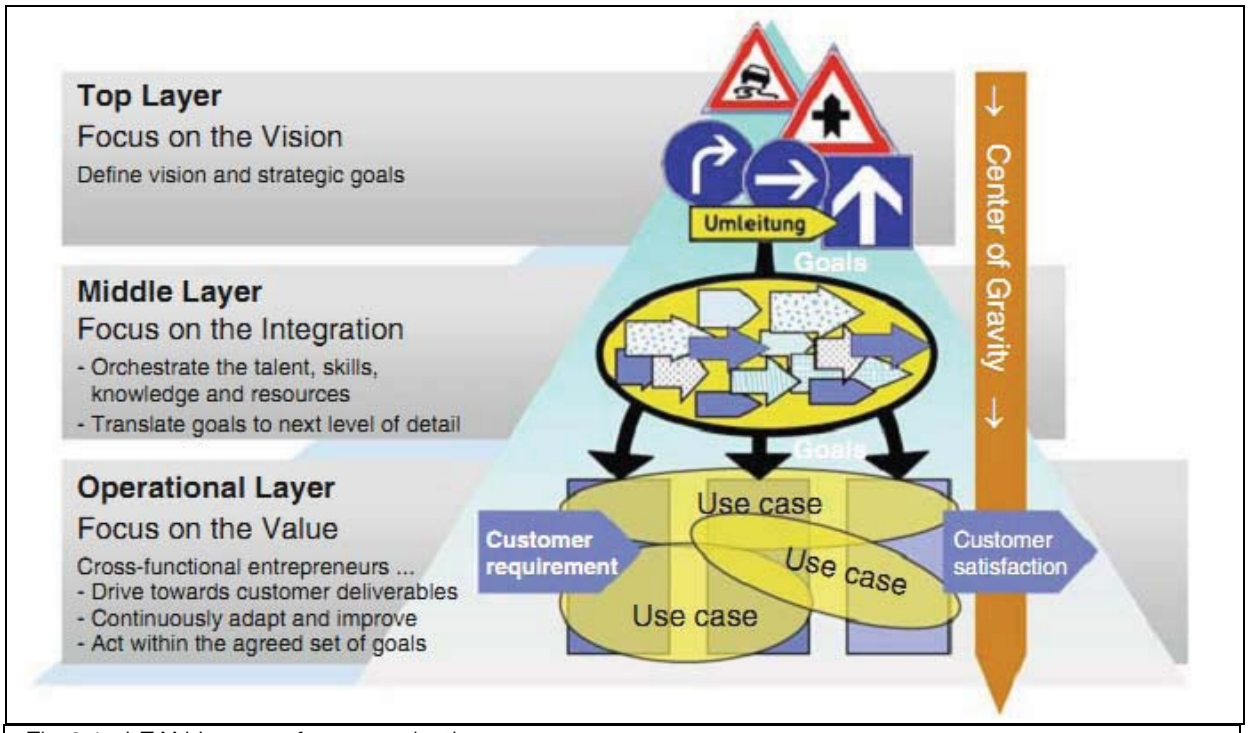


Fig 2.1 LEAN Layers of an organization

b) Factor 2: Team

Scrum is a method suitable for small teams of less than 10 engineers2. Rising and Janof (2000) suggest that "Clearly, [Scrum] is not an approach for large, complex team structures, but we found that even small, isolated teams on a large project could make use of some elements of Scrum. This is true process diversity"

XP is aimed for small and medium sized teams. Beck (1999b) suggests the team size to be limited between three and a maximum of twenty project members.

According to the way some agile practitioners have understood agile methodologies as they used them in real practice; We can say that agile do not require a team with more people because Communication and coordination between project members should be enabled at all times. If more people are available, multiple teams should be formed. The physical localization of the teams is impacting also the end-product development.

c) Factor 3: Usage

MnKandla, 2006 presented an evaluation technique which permit to reveal the similarities among extreme programming, lean development and scrum. The figure of the table below classifies the practices using the superscript 1,2,3,4 and 5.

The same superscript implements the same agile principle.

- "1" represents practices that deal with planning issues such as requirements gathering. The three methods shown here use different terms but the principle is to capture minimal requirements in the simplest available way and start coding.
- "2" represents practices that deal with improvement of quality in terms of meeting the volatile requirements.
- "3" represents practices that facilitate freely working together of developers, effective communication, empowered decision-making, and team dynamics issues.
- "4" represents practices that deal with quick delivery of the product.
- "5" represents practices that deal with agile quality assurance property of ensuring that the product is improved continuously until deployment.

	Practices
XP	The planning process[1], small releases[2], metaphor, test-driven development[2], story prioritization[3], collective ownership[3], pair programming[3], forty-hour work week[3], on-site customer[4], refactoring[5], simple design[5], and continuous integration[5].
LD	Eliminate waste[1], minimize inventory[1], maximize flow[2], pull from demand[2], meet customer requirements[2], ban local optimization[2], empower workers[3], do it right the first time[4], partner with suppliers[4], and create a culture of continuous improvement[5].
Scrum	Capture requirements as a product backlog[1], thirty-day Sprint with no changes during a Sprint[2], Scrum meeting[3], self-organizing teams[3], and Sprint planning meeting[4].

Fig 2.2 Identifying similarities among agile practices

III. Result Of Evaluation

a) *Descriptive Analysis*

General view of data: The population was constituted of 43% of Team manager and 39% are programmer, with 53% of them with the maturity on agile between 2 to 5 years, the method use in order are SCRUM (31%), XP (23%) LEAN (14%) and OTHER (12%).

Factor 1 = Organization Criteria
Factor 2 = Usage Criteria
Factor 3 = Team Criteria

Summated Scales: The plot below split show the summated scaled for the factors studied.

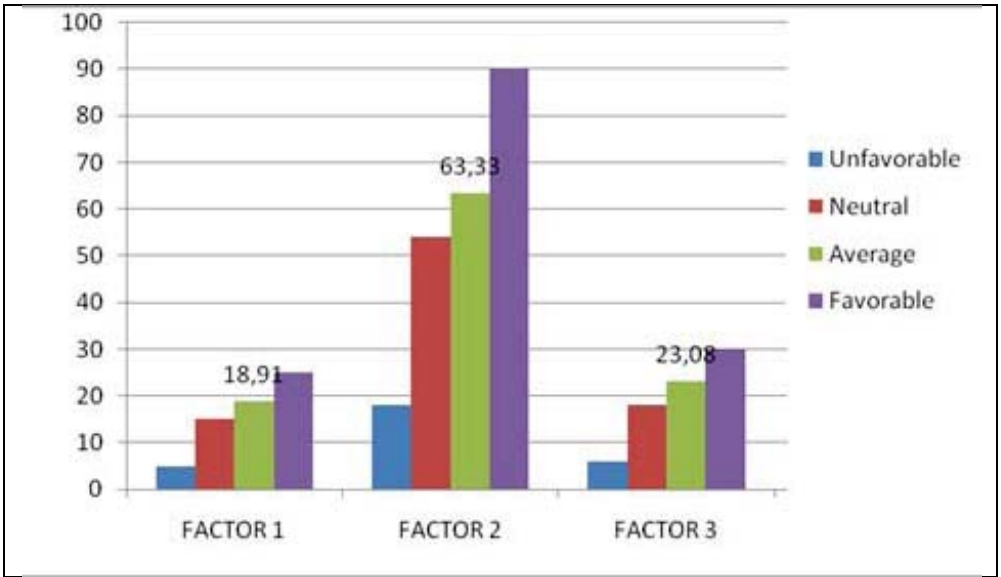


Fig 3.1 Cumulative scales of the survey

The plot show that the average cases of the survey (in purple) are more than the average (Minimum required) for all Factors. We can notice a weak presence of unfavorable cases. We have also notice that more than 50% of the respondent are agree with the questions under the each factor (organization, usage and team). The result shows that the Three (3) factors have really an impact on the quality of production. This can mean that put in different side; agile methods have also greater impact like TPS in producing quality.

b) *Statistical Analysis*

The statistics may used are non-parametric test. In this research two reliability test (Cronbach's α (alpha) and Pearson-Brown coefficient of reliability) and one test of concordance (Kendall's coefficient of concordance (W)) was use.

The Test show the strong dependencies among all the variable and help to conclude that there are a link between the success of production in agile methods and the Organization, team and Usage factors.

Subburaj R.[4] give this formula for the quality rate (Q) = Number of good parts produced / total produced. We adapt this formula to our case to calculate the quality improvement factor (Qi) = mean observed / Maximum expected

The tables below give the measurement of how much production can be improve in agile depending of the factors.

FACTOR	*MEANS*	*% IMPROVEMENT*
ORGANISATION	3.542857143	71%
USAGE	3.490740741	70%
TEAM	3,623015873	72%

Tab 3.1. % of agile improvement into factors.

The survey conducted was in the form of likert scales from 1 to five. So the negative answer will be less than 3 point. In resume: 'Agile Organization' contributes at 71%, 'Agile Usage' contributes at 70%, 'Agile Team' contribute at 72%.

IV. Conclusions

a) Threat to validity

There are several major threats to the validity of this study. First, the instrument to measure agile methods is new and untested, so its reliability cannot be fully determined in advance. Second, the improvement relative of the software production was not compared with any late production result. Third, the respondents are self-selected, so there may be some bias towards the use of agile methods. Fourth, survey research may or may not be the best research method to analyze the impacts of agile methods, in lieu of quantitative methods, which yield richer experiences. Sixth, the statistical analysis may not be sensitive enough to measure greatly the variations in the data we collect.

b) Summary

This full research has generated a numbers of contributions; the literature reviews, the framework developed and the analysis of the survey result. The Technique developed for this evaluation was specially built to this work and can be modified for further more experimentation of agile methods. Using a survey method, we are providing raw data from the respond by many agile practitioners working in different places and in different project; this non homogeneity of the population survey gives general view of how agile worth. The analysis gives a comfortable representation of the impact of agile to organization, team and usage in the IT industry. This work can be view as a complementary support of same authors paper[5] accepted in the International Journal of Engineering Science and Technology (IJEST).

Acknowledgements

The authors would like to thank everyone, just everyone!

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