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TRADITIONAL VS. AGILE: THE CHALLENGE MINDSET SHIFT IN PROJECT MANAGEMENT

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Abstract: In nowadays the traditional project management methodologies are continuously challenged to address the fast-changing business industry context with an appropriate response. For a dynamic industry like Software, Agile methods seems to be the perfect answer. If the new Software companies can easily adopt the Agile methods, there are a numerous other company, different sizes and or maturity, that are striving to improve the way they develop their projects. For those, the migration to the new Agile methods needs to be plan and execute carefully, since this change come with a significative impact in organizational culture. Starting from the study conducted by Boehm in 2003 we look to understand if there are specific differences among these methodologies that make the migration impossible. Changing the tools or processes are the first and easy steps already done. But these are not the only ones that different in both methodologies. Based on lately studies issued on the current topic and bringing into the analysis the new SAFe© (Scaled of Agile Framework) we conclude that the biggest differentiator of Agile methods is the new Lean-Agile mindset of project teams and stakeholders, focused on customer's needs and continuously delivering value to them.

Keywords: project management, waterfall, traditional, Agile, SAFe©, hybrid

1 INTRODUCTION

Organizing companies, project based it's a today current way of working. Businesses migrate in this direction (Proștean, 2001) understanding the advantage of managing focused small teams that deliver tangible results to their customers. Delivering values to the customer (SAFe, 2020) often and receiving fast feedback, it's a way of working very well know in the Software industry especially.

This new way of understanding was foreseen by PMI when launch the 4th PMBOOK, describing the project in the business context.

But a real change was accelerated after Agile frameworks was launch (Committee, 2001). For many years it was perceived as disruptive project management methodology. Build it as a reaction to traditional methodology approach the Agile framework polarized software professionals and for more than two decades continue to be a challenger to know and wide used predictive methodologies like PRINCE2©, PMBOK©, etc.

There is no final call in taking this decision of implementing projects using traditional methodologies or Agile ones, nor all the arguments where added.

The aim of this paper is to synthesize the well-known comparison parameters between these two methodologies to have a clear picture about the challenges you may face when you start a project and an implementing methodology needed to be indicated. While Agile framework address the software industry challenges, in this paper we are referring mainly to software projects. These challenges can use as reference to compare projects from other industries but with some limitations.

2 PROJECTS AND METHODOLOGIES

Project are defined in such way that a structured approach in developing, implement and close the project is needed. Any known methodologies definition emphasis the importance of managing resources into a certain amount of time with defined qualitative products (PMI, 2017) (OGC, 2009). Those two concepts are in close relation and dependable by area or industry may be defined. For projects – the definition is universal, and the characteristics are easily identifiable. Choosing the methodology, mandatory to manage a project, need to be related with type of the project and at least the industry is come from. In Software industry Agile methodologies has become the most used frameworks for small projects. The challenge with big projects is related with handle the changes across big number of stakeholders. SAFe© (SAFe, 2020) start to become an Agile challenger for big traditional methodologies.

2.1 Traditional methodologies

Traditional or waterfall methodologies were defined in the context of big infrastructure construction and propose a complex structure of processes, tools, methods to manage the project. Starting from the assumption that the projects are working into a known environment and the minor variation will be managed by risk assessment and risk management, the predictive traditional methodology guarantee the project goals achievements within the defined triple constrain money, time, and quality.

For big software projects the most used methodologies are developed by Project Management Institute which develop the Project Management Body of Knowledge (PMI, 2017) – a collection of best practices in project management that systemized all the knowledge into easy-to-use handbook of process, tools, and methods. Another well know methodology is developed by the office of British Government Commerce Office and is extensively used in more than 20.000 organizations around the globe. PRINCE2© (OGC, 2009) – Projects IN Controlled Environment – is built based on experience of many contributors like Project managers, trainers, consultants academics and tested in a large number of projects.

2.2 Agile frameworks

From the beginning the Agile framework was build based on new and fresh approach that place the customer in the center of the project. But not only that! Looking od Agile Manifesto you can define already four main areas where the new approaches was required (Committee, 2001):

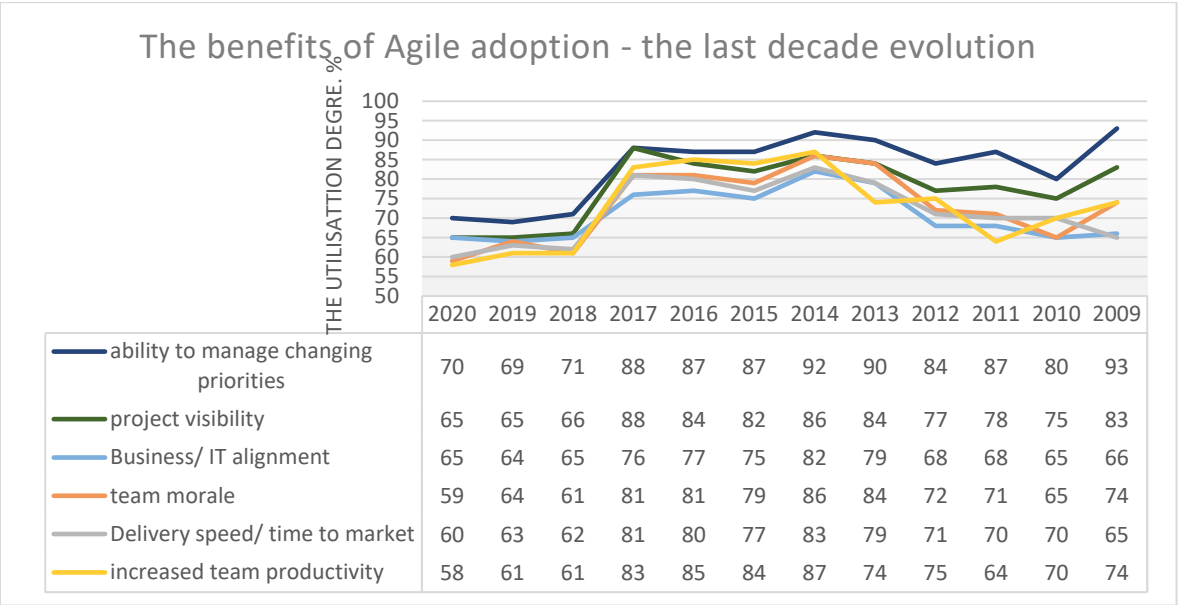
- Individuals and interaction – in the context of engaged teams and dynamic team collaboration.

- Working software – more important for customer that a well-done projects description document.
- Customer collaboration – seeking to identify the real need of the customer trough close collaboration along the project lifecycle.
- Responds to change – even in the late stage of project development, it's a tough promise of Agile team.

Scrum© (Sutherland J., Schwaber K., 2020) and Kanban© (Huang, C-C. Kusiak, A. 1996) are the most used Agile frameworks, crafted for small and self-organized teams. For bigger teams in large companies, we have Cristal© and Xp© framework, or SAFe© which is the new large adopted Agile framework.

2.3 *Traditional versus Agile*

"Ability to mange changed priorities" and "*Project visibility*" are two of first six benefits to migrate to Agile framework, defined by VERSIONONE© (VersionOne, 2020) and assessed during last decade among professionals in software projects areas. These reports, "*The state of Agile"*, are annually issued and the results are based on online questionnaires showing the degree in which Agile adoption was embraced by projects. Compiling the last reports (see Figure 1.), from 2009 to 2020, we can see the dynamic in user's expectation regarding Agile adoption. Even "*Ability to manage changed priorities",* is pointed as first benefit of migrating to Agile framework, in ten years loose 23% of people's credibility. The reasons of this loose can vary: low maturity in applying Agile framework in the beginning raised high expectations; overestimating the real power of Agile that consist not in the process of developing software products but in different mindset of Agile teams; projects diversity and complexity raise the effort spent in developing the products, very close to traditional development methodology; misunderstood of real Agile value proposition, etc.



	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
ability to manage changing priorities	70	69	71	88	87	87	92	90	84	87	80	93
project visibility	65	65	66	88	84	82	86	84	77	78	75	83
Business/ IT alignment	65	64	65	76	77	75	82	79	68	68	65	66
team morale	59	64	61	81	81	79	86	84	72	71	65	74
Delivery speed/ time to market	60	63	62	81	80	77	83	79	71	70	70	65
increased team productivity	58	61	61	83	85	84	87	74	75	64	70	74

Figure 1. The benefits of Agile adoption, according to VERSIONONE's last decade reports

The warranty of project delivery and control the quality of the product has been known as key points of traditional methodology. Companies and implementation consultants have proven

the reliability and stability of these approaches, from large to small projects the tailored methodologies version was used daily.

Comparing those two methods came in the context of which more and more projects has started to change the implementation way due to Agile manifesto was issued. The Agile methods was the response of the companies to rising demand of delivering the products faster, at the same quality and with the opportunity to adjust or change the initial requirements without harming the contracts. For the entire IT&C (Information Technology and Communication) industry the Agile methods has created a disruptive wave, by promising better results for the future.

Since 2002, Boehm (Boehm, 2002) start analyzing the two approaches with his primary goal to discover the biggest differences in those methodologies to better assess the risks in the project. Nine project characteristics were identified to compare them in both methods – Agile and Traditional. For each those characteristics Agile discriminators and heavyweight (traditional methodology) discriminators where identified. This extended analysis emerged from the previous one when Boehm defined a "home ground areas" for comparing risks exposure for companies that use Agile and plan-driven methods in the projects. *Risks* and *Planning and control* where two variable whit which the risk exposure analyze was done.

In 2008 Dyba and Dingsøyr (Dyba, T., Dingsøyr, T. 2008) conducts a very well-structured literature review covering, at that point in time, 1996 studies but only 36 where research studies with relevance for the subject. Starting from Nerur's (Nerur, S. Mahapatra, R. Mangalaraj, G. 2005) comparation they are searching for reported benefits and limitation of using Agile methods. For this study the investigation was done mainly for XP© (Wells, 2013), one of Agile methods used in software industry, therefore the final conclusions are limited to it. After they defined in their study four thematic groups to classify all the data, Dyba and Dingsøyr conclude that projects using Agile methodology doesn't provide strong evidence of these benefits. The advice is to use the research as a map of findings on this topic.

Juricek (Juricek, 2014) start comparing these two approaches from Agile principles stated in Agile manifesto (Committee, 2001) with specific areas from PRINCE2© and PMBOK© as representative for traditional, heavyweight development methodology. The comparison brings closer the broad perspective of Agile's methods with specific and clear approaches of PMBOK© and PRINCE2© methodologies. Looking at those two traditional methodologies through Agile' s lens the conclusions were somehow predictable. Further investigation is needed to proper adjust the project setup for Agile method can be applied.

To capture the research findings in a structured way we have labeled the source we use to construct the analysis as followings: first source is Boehm's research label it with (1), Dyba and Dingsøyr research have label (2) and Juricek (3).

The analysis of these results shows that the listed topics could be clustered into six big themes for comparing those two project management methodologies – Agile Software Development Methodologies (ASDM) and Traditional Software Development Methodologies (TSDM). These themes are organizational aspects, managing requirements, customer's involvement, the role of project's team, assuring product and process quality and delivery process.

2.3.1 Organizational aspects

Find these as a background setup, organizational aspects describe the general's expectation for these two approaches and highlight. Agile methods are applied to projects with small teams, testing and delivering

continually along the project's existence, specific to small and medium organizations.

Table 1. Differences between ASDM and TSDM on organizational aspects theme

Agile development	Traditional development
(1) Deliver Rapid Value	(1) Provide High Assurance
(2) High-quality adaptive software is developed by small teams using the principles of continuous design improvement and testing based on rapid feedback and change	(2) Systems are fully specifiable, predictable, and are built through meticulous and extensive planning
(2) Organizational structure is organic (flexible and participative encouraging cooperative social action), aimed at small and medium sized organizations	(2) Organizational structure is mechanistic (bureaucratic with high formalization), aimed at large organizations
(3) Collaboration between All Stakeholders is focused on reducing project roles	(3) Multi-level management and strict communication and reporting activities cover the collaboration needs in the project

Traditional methodologies are applied to large organization, with a large organizational structure that imply a consistent communication effort. The size of projects is not specified in the analysis and we assume that those traditional methodologies cover the small project. One question is regarding the effort need to be spent for tailoring all these processes to small projects, it worth it. Added to that, the science to tailor the entire traditional methodology could be available to large organizations, but not the small ones, is too expensive for them.

2.3.2 Managing requirements

Starting from the level of the requirements details, importance, the time in the project, all these are major differences in both methodologies.

Table 2. Differences between ASDM and TSDM on managing requirements approaches

Agile development	Traditional development
(1) Largely emergent, rapid change, unknown	(1) Knowable early, largely stable
(3) Changes are usual part of the project.	(3) Change Management is established as a rigors process and change is typically exceptional
(3) Requirements evolve, budget burn-chart	(3) Fixed budget, fixed scope, following plan
(3) Requirement's prioritization in each iteration, planning at each iteration start	(3) No or low requirement prioritization, there is only Business Requirement Statement baseline
(3) Keeping requirements and documentation lightweight, and acknowledging that change is a normal and acceptable reality in software development	(3) Heavy-weight documentation with both the process plans and rich content
(1) Architecture is designed for current requirements	(1) Architecture is designed for current and foreseeable requirements

This theme is the turning point of defining the needs for a project management methodology. For TSDM it's critical to define them in early stages and no major changes are allow during project execution. Based on these all-other project methodology components are defined: budgets, team componence, communication plans, stakeholder management, quality approach, etc., like a house of cards. Uncertainties hurt the traditional system, risk management, and change management are parts of the project management methodology built to reduce them.

On the other hand, for Agile methods the big question is if we can define a deadline for delivering the product in these conditions. Effort estimations are performed in both cases, but the accuracy is different.

2.3.3 Customer's involvement

The project team are professional in producing the project's product in contract's boundaries. They need only the contract's terms. For TSDM those affirmations were true in the times when the developers were part of the business, they understand the benefits of their products for customer's business. In the new reality the business outsources the programming team to build their digital business.

Table 3. Differences between ASDM and TSDM on customer's involvement

Agile development	Traditional development
(1) Dedicated, knowledgeable, collaborated, collocated onsite customers	(1) As needed customer interactions, focused on contract provisions
(3) Role of the Product owner, who is accountable for maximize product's value and team's work, is provided	(3) Role of the Senior user is part of the steering board (projectboard) or project committee
(3) Active users are part of the development team itself	(3) Active user involvement is slightly accented
(3) Increasing visibility to the project through the integrated team of the customer and the supplier	(3) Assure the user involvement primarily through the reporting process
(3) Overall project visibility is stable	(3) Visibility of the project is high in the initiation phase, low in the build phase and high again in the acceptance stage or closing phase
(3) N/A	(3) Defined stakeholder management

The projects teams need to understand customer's needs and some of the business challenges to deliver appropriate products.

Create a Business Analyst role in TSDM to translate the business needs into technical requirements was a smart move but not enough. This role cannot cover industries disruptions, customer's uncertainties, and priorities. Those topics are easily managed in close collaboration with the client.

ASDM brings all customer's concerns at team level to create ownership for the work done and better respond to oncoming requirements.

2.3.4 The role of project's team

TSDM build his approach on fix and rigid structure where the team execute its own tasks, without exceptions or contribution. Based to these plans, some team's members are scheduled to join the team, do their part and leave. Knowing the right moment when these

resources are contributing to the project is one of the optimizing measures provided by the methodology.

Table 4. Differences between ASDM and TSDM on the role of the project team

Agile development	Traditional development
(1) Agile, knowledgeable, collocated, and collaborative	(1) Plan-oriented; adequate skills access to external knowledge
(1) Smaller teams and projects	(1) Larger teams and projects
(3) Product Ownership is established on the project management level	(3) Manage by exception approach – project manager has a strict budget and all-important changes must be reviewed by board. It takes time and additional effort.
(3) Requirements are priorities and evaluate in the team level of project management	(3) Interference with the board reduces motivation by the team level of management
(3) Periodic teamwork with focus on „value-up" through quick delivery of working software, unknown requirements	(3) Traditional or plan-driven approach with known requirements and comprehensive cost–benefit analysis and established development plan
(3) Agile Development teams capture high level requirements in workshops, working together in a highly collaborative way so that all team members understand the requirements as well as each other.	(3) Project Requirements aligned with project plan must be approved by project board
(2) Leadership and collaboration	(2) Command and control
(2) Knowledge Management Tacit	(2) Explicit
(2) Communication - Informal	(2) Formal

Self-organize team built on collaboration and knowledge sharing, with a strong focus on customer collaboration it's the Agile team way of working. The information is circulating among team's member and the designs and architecture emerge from team's member involvement.

The team's role changes dramatically from a team that execute the plans, designed, and decide by experts, to a team that contribute to customer's business development. In this case the team is the customers partner in building the digital extension of his business. Small number of team member lower the communication and collaboration effort. This new way of working with project teams elevate the expectation of team's members.

The question in this case will be then, it would be possible to manage big projects with big teams using Agile methods?

2.3.5 Assuring product and process quality

There is a big difference in approaching quality in these two methods. TSDM assure the process quality that build the product, and implicitly the product and all other project artefacts are qualitative ones. ASDM promote a try-and-error way of working and assure the quality of the project's product by heavily testing the product even in early implementation stages. Another way of product quality improvement is by delivering often to the customer pieces of the product and capturing the feedback.

Table 5. Differences between ASDM and TSDM on assuring product and process quality

Agile development	Traditional development
(1) Unknown risks, Major Impact	(1) Well understood risks, Minor impact
(2) Continuous control of requirements, design, and solutions. Continuous testing	(2) Heavy planning and strict control. Late, heavy testing
(Refactoring) (1) Inexpensive	(Refactoring) (1) Expensive

The assurance an acceptable of project product and processes quality level, it's a critical condition for delivering digital products. The industries who are dealing with human lives (e.g., health, automotive) or fintech are very selective in working with such methodologies. TSDM has proven the quality delivery but the context is changed and into continuous and unpredictable environment, quality is not anymore, the most important aspect of the process or product.

2.3.6 Delivery process

Deliver fast a piece of the product or deliver perfect product when it's ready this is the big dilemma in addressing this theme. The issue here is timing. The issue here is the time to market - a concept that express the importance of release faster the project product to you clients.

Starting to this point forward, the release strategy is aligned to methodology's philosophy. It's important to deliver SAFe© cars or SAFe© financial applications, or SAFe© buildings but it's also important to deliver digital functionalities to the clients to test the client's need is resolved. Often these tests are done late in the project lifecycle when the cost of rework is high.

Table 6. Differences between ASDM and TSDM on delivering process

Agile development	Traditional development
(2) The evolutionary-delivery model	(2) Life-cycle model (waterfall, spiral or some variation)
(1) Internalized plans, qualitative control	(1) Documented plans, quantitative control
(3) Iteration in several days, check the requirements, attest the function and review with the customer	(3) Initiate – plan – manage product delivery – close the project
(3) Incremental release	(3) Traditional release

The product's test – from functional point of view - cannot be done without the customer itself. If the client cannot participate with the project team in reviewing the requirements and then test the functionalities it would be hard anyway to deliver. In this care the quality process and standardization of the process release can help progress the project.

2.4 SAFe© (Scaled of Agile Framework) approach

SAFe© it's the methodology that address the project challenges in the wide range of any kind of business. Dean Leffingwell, the creator of SAFe©, define a "…state of Business Agility means that the entire organizations is engaged in continually and proactively delivering innovative business solutions faster than the competition" (Knaster & Leffingwell, 2020). It's a dual operating system for Business Agility in between value stream network that support the speed of innovations and functional hierarchy characterized by efficiency and stability.

The framework is scaled at tree configurations: essential – used for agile teams in

the business context; large solution – that group agile teams into release trains to deliver complete solution to the customer and portfolio – that coordinate delivering values trough value streams. All these configurations address the issue of large projects in large companies by scaling lean Agile way of working from the level of normal Agile team to enterprise level. Reported to those six comparation themes we've identified, Table 7 illustrate how SAFe© respond these challenges, especially from Agile approach.

Table 7. Differences between ASDM and TSDM on delivering process

Theme	SAFe© approach
Organizational aspects	The multiple SAFe© configurations accommodate the Agile team's way of working with complex organizational structure, deliver value to customer in a predictable environment. The change and embrace the agility is triggered at business level, SAFe© advocate for entire business transformation. The level of business agility is measured and monitored during SAFe© implementation.
Managing requirements	High level architecture is created at the level of system and each value stream contribute to define and develop the correspondent part. From top to down and bottom to up SAFe© cover the completeness and consistency of customer's requirements development. Getting rapid feedback from the customer trough early and continuous delivery of increments of value reduce the rework effort and the risk of delivering obsolete content to the customer. Synchronize all development teams for planning and resolve the dependencies SAFe© create the context of updating the priorities and requirement's content at each program implement.
Customer's involvement	For the entire solution, the customer is the one who pay for the project's results. For the teams the clients could be other teams that use their work or the system itself that integrate the component. In both cases the client is deeply involved into teams' activities. The product owner / product manager roles are defined according to each SAFe© configuration, covering the component/ product/ solution delivery.
The role of project's team	The simplicity of Agile team is completed with a clear structure and particular roles to cover all framework needs. The entire organization is invited to share agile' s values and mindset. The project team could deliver value to the customer integrating the other business departments results. The integration of the upper structure' s levels are done according to SAFe© principles, built on Lean-Agile mindset and SAFe© core values. This approach assures the team's ownership and participation into large organization context.

Assuring product and process quality	Continuing testing assure the technical robustness of delivered piece of product. This practice is applied at all levels – system or product. Reducing the cost of integration and testing by developing continuous integration and continuous testing services as part of developing the product increase the quality of product itself. *Built in Quality* is one of the four SAFe© core value and define an entire changed mindset not jus a set of procedures to be applied.
Delivery process	The delivery process is described base on four aspects: continuous exploring (aligning what need to be done), continuous integration (built integrate and test the backlog's feature continuously), continuous deployment (make the future available in production environment, without enable them to the end-users) and release on demand (the ability to make the feature available when the customer consider is the right opportunity for his business)

SAFe© complete the Agile methods landscape and move the comparation focus of those methods – ASDM and TSDM – from the form to the content.

3 CONCLUSIONS

The process of defining the important comparation themes was done to emphasis the main differences of those methodologies. All these themes are complementary into a methodology context. Each methodology builds its approach connecting those themes into a known workflow based on their assumptions and philosophy.

What we've learnt in this research was that both methodologies serve well enough to deliver quality products or services. The biggest difference is the mindset of project's team and company people. Focus of delivering value to the customer or focus to deliver in the project contract parameters are those two approaches, that are gamechangers. Based on that, both methodologies are built to transpose those mindsets into concrete workflow steps and strengthen their particularities.

How we choose the proper methodology for managing a project it's no longer dependent by the methodology itself. Both approaches offer enough support like processes, tools, methods, rule descriptions, roles, workflows to deliver good enough quality products or services.

Initial enthusiasm, adopting Agile methods, was replaced by *lean approach* that build a stronger confidence to the customer and deliver the value faster. We need to understand that *the value delivered to the customer* doesn't mean a perfect final product, at list not in Software industry, but a good enough well customized product or service that add value to the entire business at any time, the faster the better.

Further investigations need to be made to investigate what other variable need to be taking into consideration for adopting a project management methodology.

If the focus is moved from methodology itself did a combination of those approaches - ASDM and TSDM – could bring any benefits for project and or for the company? This hybrid could critically improve the processes, or workflows or even project's product quality?

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