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Hybrid Agile Approach: Efficiently Blending Traditional and Agile Methodologies

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Hybrid Agile Approach: Efficiently blending Traditional and Agile methodologies

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GRAD 699-PMGT

Abstract

Agile development, in its simplest form, offers a lightweight framework for helping teams, given a constantly evolving functional and technical landscape, maintain a focus on the rapid delivery of business value. Traditional project management focuses more on distinct and predefined sequential phases. It assumes that once requirements are fixed there won't be any changes or additions in future. In today's world however this is not true and development teams have to incorporate changes at later stages to be competitive. This is where agile methodologies have an edge over traditional methods. Agile can handle more complex and highly adaptable projects. However, organizations focusing heavily on traditional methodologies like waterfall may find completely switching to agile potentially risky. Agile methods may have these major potential risks like agile methods are easy to misunderstand, highly visible information can be threat to financially sensitive projects. Therefore, many companies fear the adoption of Agile because an enterprise-wide adoption of the methodology will conflict with the traditional Waterfall process and create conflict. Hybrid Agile approach will help the organizations transition to agile efficiently. This paper will focus on the analyzing the successful combination of agile and traditional methodology.

Keywords:

Traditional approach, Agile approach, Hybrid, RUP, Scrum, Sprint.

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Preface

This paper covers how to blend agile and traditional methodologies to extract positives of both. It also talks about the difficulties faced by a company to take a leap from traditional to pure agile methods and how hybrid approach can be a more comfortable jump with more efficiency.

I would like to thank my professor Dr. Thomas Sheives for all the guidance he has provided me throughout the process of writing this paper. He was always available for clearing my doubts and providing feedback which has helped me a lot.

I would also like to thank Dr. Richard Kordel for helping me out with finalizing my thesis topic and providing guidance on writing research papers.

Finally, I would like to thank my friends and family for being always supportive of all my initiative and giving me encouragement at every step of my life, not just personally but professionally too.

Introduction

Background of the paper:

Traditional heavyweight, archive driven programming advancement strategies can be portrayed as broad arranging, classified procedure, thorough reuse, substantial documentation and enormous configuration in advance. The traditional processes were mainly used in the software industry up until the mid-1990s. From that point forward, the ordinary strategies have been supplanted by lightweight agile programming advancement techniques for the most part in small scale and moderately basic ventures. This was due to the inadequacies of ordinary techniques, including a moderate adjustment to quickly changing business prerequisites, and an inclination to be over budget and behind schedule. The traditional techniques likewise have neglected to give dramatic improvements in efficiency, unwavering quality, and straightforwardness.

Recently it is observed that the business professionals that have witnessed success with a few agile projects tend to lean more towards thinking that Agile is always better than the alternative traditional methodologies. Even though the survey suggests that the one approach fits all is not always the way to go, the analysts tend to put the blame more on the organization and the internal politics. It has to be taken into consideration that the agile principles doesn't always suite the requirements of the organizations.

There are lot of things that have to be taken into consideration before choosing the combination of the agile and traditional processes to filter out the winning combination for given organization. For example if the organization demands extensive documentation then there is

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disconnect between the agile principles and the business needs. Therefore, hybrid approach would come into picture here and documenting the requirements, design or coding standard can be addition to the sprint cycle while still following some of the agile principles can be beneficial like having a backlog of work, self-organizing teams, rapid, incremental delivery of new functionality to the users.

Reason to read:

There are lot of mistaken beliefs about Agile and traditional waterfall methodologies used and mixed together. One of the most crucial one is that traditional project management is very organized and inflexible whereas agile is highly unstructured. There is no doubt that there are several crucial difference between the agile and the traditional methodology and there is exactly no use in comparing the two. It would be much more beneficial and productive if the consideration was done based on when to utilize and when not to utilize one of the two methodologies. As a result of the research done in this paper it will be clearer as to differentiate when and when not to go for a certain methodology per the business process.

As an outcome of this research it would benefit the business professional and passionate agile professional to comprehend that successful agile professional have a tendency to unite various exercises, assignments, and deliverables that are from past the limits of what might be called "pure agile". This blending and coordinating of the processes from agile and more formal traditional methodologies is a more pragmatic method for the organizations that cannot go for pure agile methodologies.

Overall Problem:

The overall problem that this research paper will address would be the best practices that we can derive from documented successful combinations of agile and traditional methodologies. Factored into the analysis would be corporate culture, size, project, location and overall turnover of the organization. In spite of the potential benefits of the agile methods, many organizations are reluctant to throw their conventional methods away and jump into agile methods due to several issues. This paper will focus on general overview of several software development methodologies, qualitative study to compare and analyze the strengths and weakness and the way they can be blended to maximize the advantages with very few or no radical changes in the organization.

Larger scope:

This paper will also analyze the strengths and weaknesses of this hybrid type of project management required for the transition and accepting the useful agile principles in managing the software projects.

Motivation:

After working on pure agile project similar to other business professionals, I had developed a notion that the pure agile projects are more successfully and much more suitable for software development companies but then I got a chance on working on the new project where I realized that not all companies can go pure agile and that there may be a disconnect between agile principles and business needs. Moreover, many organizations that have heavily being relying on traditional development methodologies assume that converting into pure agile would be a big risk. Therefore,

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lot of organizations adapt hybrid agile approach where the agile principles can be modified to better fit the organizational structure, culture and development cycles.

Research that I will be conducting in the paper will help me understand more about the best suited combinations of hybrid agile approach. To explain the current methodology followed by the organization that I am currently working with is that we follow two weeks sprint cycle where developers push the code on development servers and then followed by pre-production builds weekly that pushed the code in pre-production environment so that the testing team can work on it. We also have weekly status meetings instead of daily stand up as the work developer's work on independent applications. Retrospective meetings are done after every release. Requirements are not fixed unlike traditional software development methodology and are accommodated within the sprint if not then in next sprint. My current project is with a startup organization with self-organizing teams where each team member is responsible for the work starting right from gathering and analyzing requirements for each sprint to implementing and testing the changes in pre-production environment. Although the process followed by the company are yielding great results but there is lot of room for improvements like the release cycle process is not very organized and formal and so on. The research done for this paper will give a broad spectrum of knowledge to make improvement in the current processes and methods followed by the company. It will also give me insight into the processes followed by the leading companies where hybrid agile approach is followed and how the organizational roles and structures are determined. I am very passionate about learning and following hybrid agile approach and would like to pursue scrum master certification to become a scrum master and facilitate the improvements in the processes in my current organization. I would eventually like to be a Product Owner which is equivalent to Project Manager in traditional methodology

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therefore understanding the roles and responsibilities of Scrum Master and Product Owner in hybrid environments would help me advance in my career.

Statement of the problem:

Agile is widely being adopted by the organizations these days as a way to increase the speed and provide flexibility of software development. The Agile methodology has numerous positive focuses. Although the companies that heavily focused on traditional software engineering fear of complete adoption of agile as it can be a potential risk. It is not a "one-fits-all" arrangement and thus we regularly see business utilizing a mix of methods, hybrid solutions. When Organizations following the Waterfall model switched to pure Agile, the transition brought many issues with it. The reason being inadaptability to a different approach and incompetence to establish suitable combination of hybrid approach for software development and may lead into adding unnecessary complications. Research leading in the paper will offer some more assistance with understanding about the most appropriate mixes of pure agile and traditional methodology like Waterfall methodology and hence trying to address in other words how to efficiently blend the agile and traditional methodologies?

This will help the organizations transition from traditional software development methodologies to agile. As any other change transition to a new process involve issues, and therefore carefully planning and study on impacts of the transition such as quality, schedule, budget and resources can be helpful to execute the transition itself. Hybrid approach will let the companies benefit with agile software development and eliminate the issues with the traditional model. "Agile" is the most recent popular expression and numerous organizations need to "stick their toe in the water" to check whether it fits without really changing over their entire organizational structure to lithe in a blaze cut situation.

Literature Review

Many organizations who have heavily invested in traditional project management methodologies are hesitant to make the jump over to agile methodology. This has resulted in many experiments in hybrid approaches combining both traditional and agile methodologies benefits. Author Parsons and Lal (2006) have very nicely constructed the review to give a background on traditional and agile methodologies.

Period	Era	Methodology types
1960s and early 1970s	Pre-Methodology Era	Ad-hoc approach
Late 1970s -early 1980s	Early Methodology Era - prescriptive methodology	SDLC- waterfall model
Mid 1980s - late 1990s	Methodology Era – proliferation, software engineering, prescriptive methodologies	Structured- STRADIS, Yourdon Systems Method, SSADM, Jackson Systems Development; Data-oriented- IE, Prototyping-RAD, Unified Process, Object-Oriented Analysis, Participative-ETHICS, Strategic-ISP, Systems-ISAC,SSM, MULTIVIEW, Formal methods, Vienna Development Method
Late 1990s onwards	Post Methodology Era	Ad-hoc, Agile methods; Scrum, Dynamic Systems Development Method, Crystal Methods, Feature-Driven Development, Lean Development, Extreme Programming, Adaptive Software Development, Agile modeling, Internet-speed development

Table 1: Key methodologies used for information systems development since the 1960s (Parsons and Lal, 2006)

In the table 1, authors have given a quick overview of evolution of traditional methodologies over the years. Also to complement that they have shown how agile family was developed in table 2.

Method name	Year
Lean Development (LD)	1980s
Dynamic Systems Development Method (DSDM)	1995
Scrum	1995
Crystal Methods	1998
Extreme Programming (XP)	1999
Internet-speed development (ISD)	1999
Adaptive Software Development (ASD)	2000
Feature-Driven Development (FDD)	2002
Agile modeling (AM)	2002

Table 2: Methods that are part of the agile family (Parsons and Lal, 2006)

The authors then get into details of how agile and traditional methodologies are different how agile is better suited with software projects with uncertain requirements. They make very good points suggesting moving to Agile does not compromise on quality.

Agile methods emphasize that any process used should be effective and efficient and needs to change as an organization's needs change (Parsons and Lal, 2006). Using these beliefs organizations can adapt certain principles from agile instead of the whole methodologies. There are cases where organization have adopted test-first development and integrated it into their existing process. The benefits can be that none of the existing value of the current methodology is lost, but that new value may be added (Parsons and Lal, 2006). The authors have explained how these hybrid approaches don't compromise on quality if product.

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Authors Lozo and Jovanovic (2012) have given a compelling case for adopting flexible – hybrid approach instead of traditional approach. It also covers how this transition can be made by an organization. They emphasize on how there needs to be an organizational changes before adopting the hybrid method.

The IT Department of the FSQM Financial Services went through substantial organizational transition. Earlier this department was divided into application specific teams comprising of Service desk, Periodic Processing, Bureau Reporting, Information Requests, and Application Support, Design, Development and Implementations folks per application team. Later the transition resulted in functional teams like:

Service Team: Service desk, Periodic Processing, Bureau Reporting, Information Requests, and Application Support personnel.

Implementations Team: Design, Development and Implementations personnel.

Systems Team: Desktop Support, Server Support and Network personnel.

These organizational changes were required to be implemented before switching to the new hybrid (TPM/APM) method in managing their IT projects (Lozo and Jovanovic, 2012). The proposed flexible approach is a combination of two methodologies where High level beginning and end elements of the project are always done in Traditional way:

Beginning elements: Initiation of the project, Initial team, Initial Requirements, Schedule and Scope.

End elements: Approval and Production.

Elements of the projects that can be executed either with an Agile or Traditional methods (depending on the type of the project) are: Detailed Design, Implementation, Modified

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Requirements, Team Adjustment, Schedule Adjustment, Unit Testing, Integration Testing, System Testing and Communication between stakeholders.

Rahmanian (2014) has provided a brief overview of Traditional Waterfall model and Agile-Scrum project management. While Waterfall model provides an iterative sequential software development process, it lacks the capability of accepting frequent changes and flexibility. Also it follows traditional ideology of focusing on heavy documentation which is time and resource consuming. Scrum on the other hand involve various types of meetings like the daily Scrum meeting, daily the Scrum of Scrums meeting, the Sprint planning meeting, and the Sprint review meeting. One of the major positives of Scrum method is that it allows developers to run the team and have more ownership on the projects that they are working on, Cho (2009).



Fig 1: Waterfall Model (Rahmanian 2014)

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These traditional phases of a Waterfall model can be blended with Scrum by dividing processes into two parts, one that need high level of planning and one that needs high level of agility. Fig 2, gives a perfect example of how it can be done using "Waterfall-UpFront" and "Waterfall-At-End".

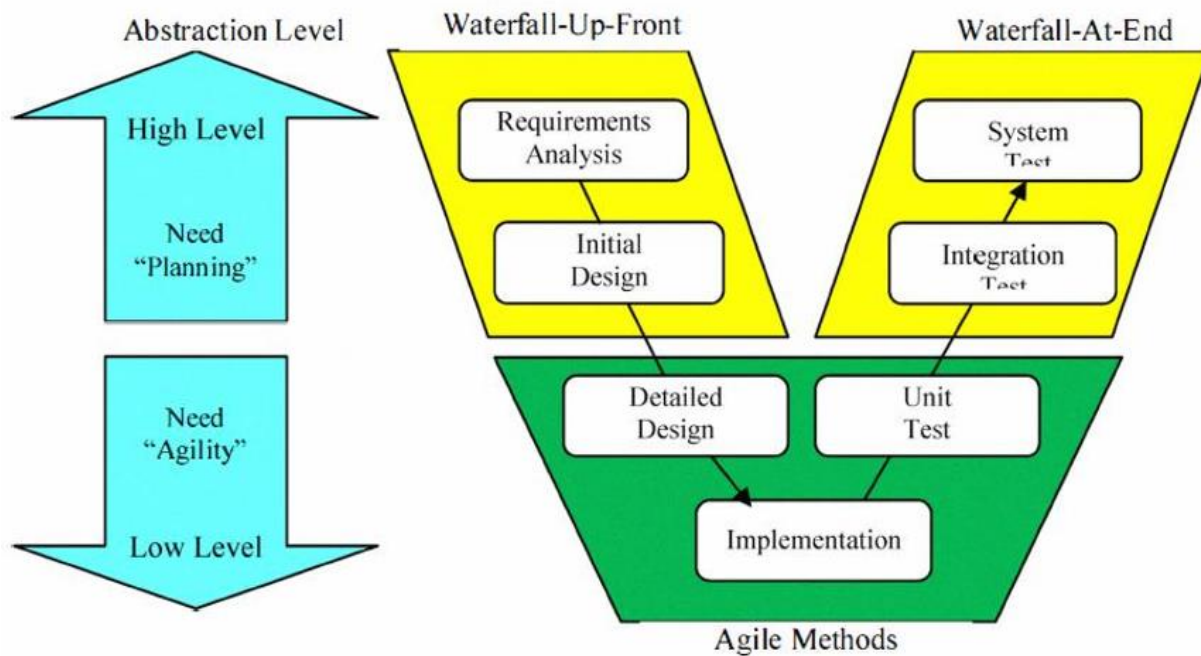


Fig 2: A Hybrid Model for Software Development and Project Management (Rahmanian 2014)

The benefits of this Hybrid Model are that during initial stage, project team and the client can apply a "waterfall-up-front" to specify detailed requirements and link them together. Also Agile methods in design, implementation and unit testing phases can be applied by the team speed up the process and reduce the risk of rework, delays and rescheduling that we often see in the traditional development of project, Rahmanian (2014). Lastly, client can request a "waterfall-at-end" for high level testing and acceptance.

Cho (2009) has given a nice insight into one of the options of developing a hybrid agile approach. He has chosen a combination of Rational Unified Process (RUP) and Scrum process and how it can be combined successfully to derive positives from both the processes. RUP is of the versions of The Unified Process (UP) developed by Booch, Rumbaugh and Jacobson. It has a two dimensional structure with phases and disciplines. The phases represent the four major stages that a project goes through over time i.e. inception, elaboration, construction, and transition. The disciplines represent the logical activities that take place throughout the project. The below table provides us list of different Phases and Disciplines. Each discipline can stretch over one or more phases. The below Table 3, provides us list of different Phases and Disciplines. Each discipline can stretch over one or more phases.

Dimensions		RUP
Phases		Inception, Elaboration, Construction, Transition
Disciplines	Main Disciplines	Business Modeling, Requirements, Analysis and Design, Implement, Testing, Deployment
	Support Disciplines	Configuration & Change management, Project Management, Environment

Table 3: Two Dimensions of RUP (Cho, 2009)

As Cho (2009) documents, the combination of RUP and Scrum is a good idea since Scrum is suitable for any size of projects and RUP is relatively easy to streamline. Fig 3, provides an idea

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of how this combination would work. The skeleton if this hybrid method is built upon the four RUP phases. The nine principles of RUP are reduced into seven disciplines to streamline the process. All the meetings, roles and artifacts of Scrum can be embedded into a RUP phases without causing any trouble. The Hybrid method will lose some degree of predictability, stability, and high assurance because of the agility of Scrum embedded into RUP, Cho (2009).

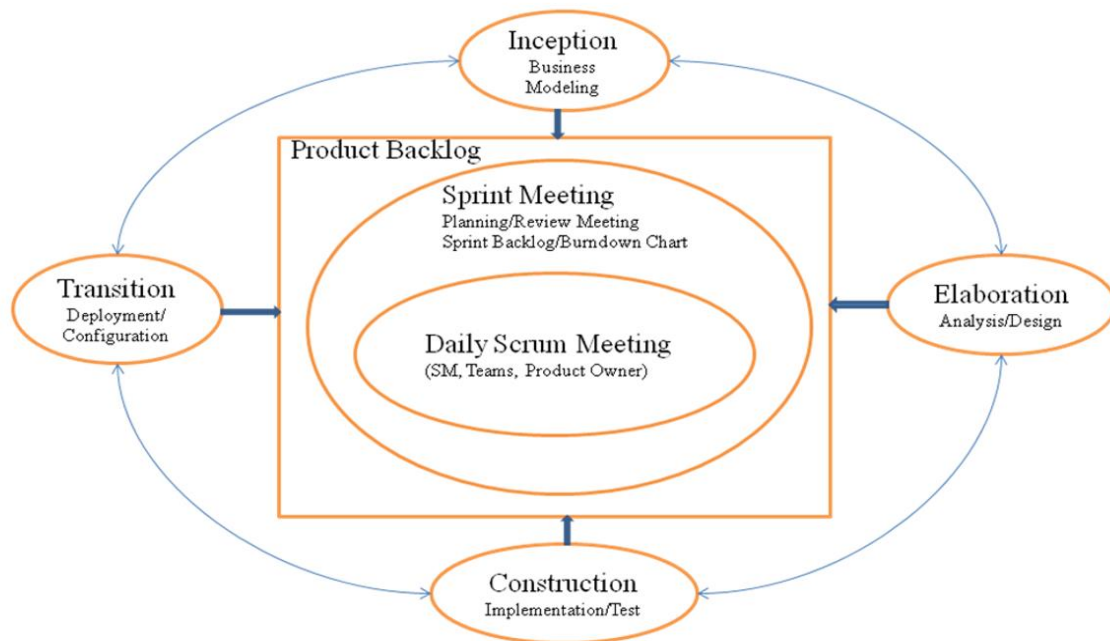


Fig 3: A RUP-Scrum Hybrid Model (Juyun, 2009)

The option of organization using both agile and traditional development on different projects faces will result into several challenges. Agile and traditional systems development have conflicting organizational cultures, management styles, organizational forms, and reward systems, Vinekar, Slinkman, and Nerur (2006).

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Quantitative analysis done by West and Grant (2010) show how waterfall and iterative approaches are giving ground to much lighter, delivery-focused methods based on the principles of the Agile Manifesto. According to the 2009 survey by Forrester/Dr. Dobbs Global Developer Technographics, Fig 4, 35% participants chose Agile as the process that most closely reflects the process they use currently. This number is increasing every year and though traditional methods are still being used, they is a general consensus among the newer developers that Agile is the future. Agile being more collaborative development model, has been widely accepted by many that do not believe in traditional formal development.

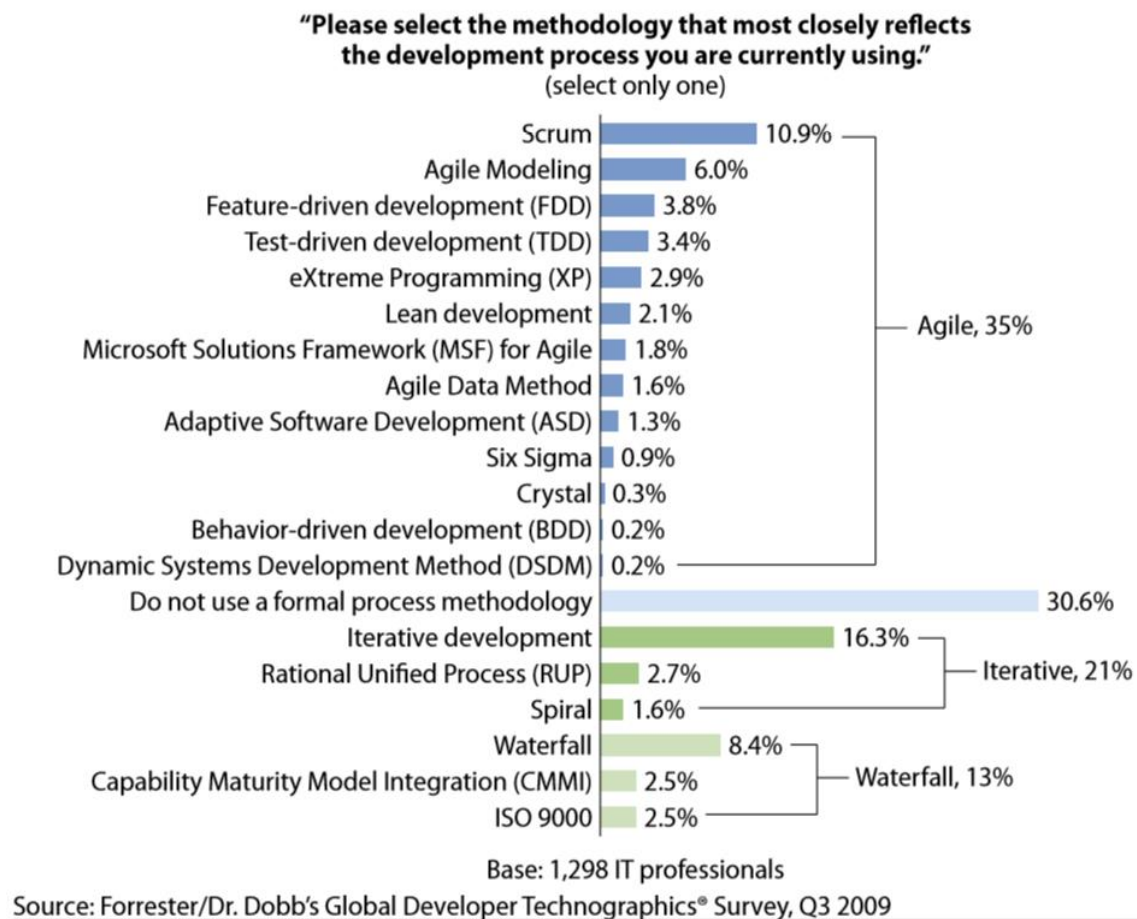
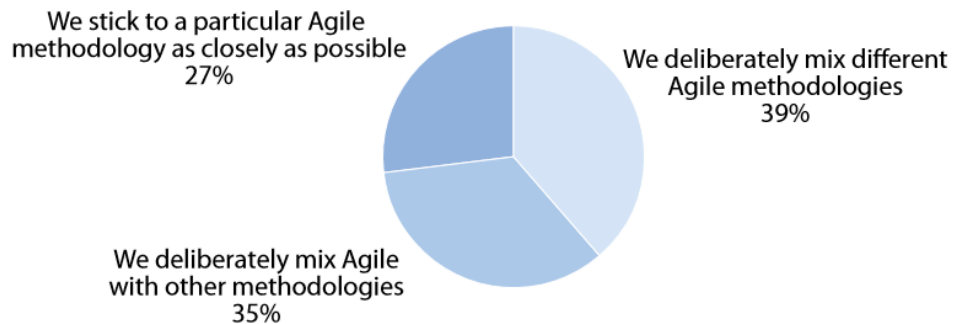


Fig 4: Quantitative analysis of possibility of accepting Agile Methods (West and Grant, 2010)

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A study of both developers in both large and small organizations came to conclusion that around 30% have adopted Agile. While development managers in large organizations are using measurement-based and iterative approaches more often than Agile approaches, in smaller organizations Agile approaches are most popular with managers, followed by no methodology and then iterative, West and Grant (2010). This explains the need for coming up with a proper and efficient Hybrid approach to satisfy needs of both mindsets.

“How would you characterize your adoption of Agile?”



Base: 52 development professionals who have adopted Agile
(percentages do not total 100 because of rounding)

Source: Q3 2009 Global Agile Adoption Online Survey

Fig 5: Quantitative analysis of adopting Agile Methods (West and Grant, 2010)

Fig 5, gives an idea of how majority of survey participants agreed with mixing Agile with another Agile or Traditional methodologies. As Agile adoption has moved into the mainstream, the processes have evolved, resulting in a process that accepts and adapts to an organization’s context and constraints, West and Grant (2010).

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Griffiths (2004) provides very useful survey results of The Shine Technologies Agile survey which makes compelling case for companies to move to agile methodologies. Out of 131 participating organizations 93% teams said their productivity increased. While 88% found an increase in quality of their applications along with 83% business satisfaction experience. I completely agree with Griffiths (2004) that when undertaking projects with high execution risks, agile methods should be used alongside the appropriate traditional project management techniques to provide execution and control mechanism.

This has puts a lot of emphasis on how to blend methodologies together so the transition is smooth and also efficient for the company and its teams. It is very difficult for companies and especially teams that are used to working in traditional model for year to jump to pure agile model. This fear of huge gap works as a resistance and generally companies and higher management are hesitant to take this leap of faith. Providing a Hybrid model which is not completely new to the team gives certain kind of assurance and the positives of Agile provide good motivation for making this move. For these particular reasons, I will research and try to address the issue of successfully blending Agile and Traditional methodologies in future.

Majority of newer companies and some older or traditional companies that have made a move to Agile, believe that there is an increase in productivity and quality. Also, the people in education field have a consensus with this belief. On the other hand there is also a general consensus on the struggles of moving from traditional to agile. The culture within a particular organization needs to change in order to adopt agile practices and this could be hard or almost impossible change to implement in some cases.

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The structured planning methods of traditional approach is beneficial at initial stages of the project to give a disciplined infrastructure. The iterative and adaptive developmental cycles of agile will give fast turnaround and increase productivity. Again a formal signoff at the end gives a full proof and peace of mind approach to the organization. This is a combination of waterfall and agile methodology is very efficient and highly preferred by many organizations.

Raval and Rathod (2014) have very nicely compared different methodologies to determine what suits best for a small client based projects like medical inventory system. After applying theories of various process models like pure waterfall, iterative waterfall, spiral, pure agile and hybrid agile on same scenario for medical inventory system.

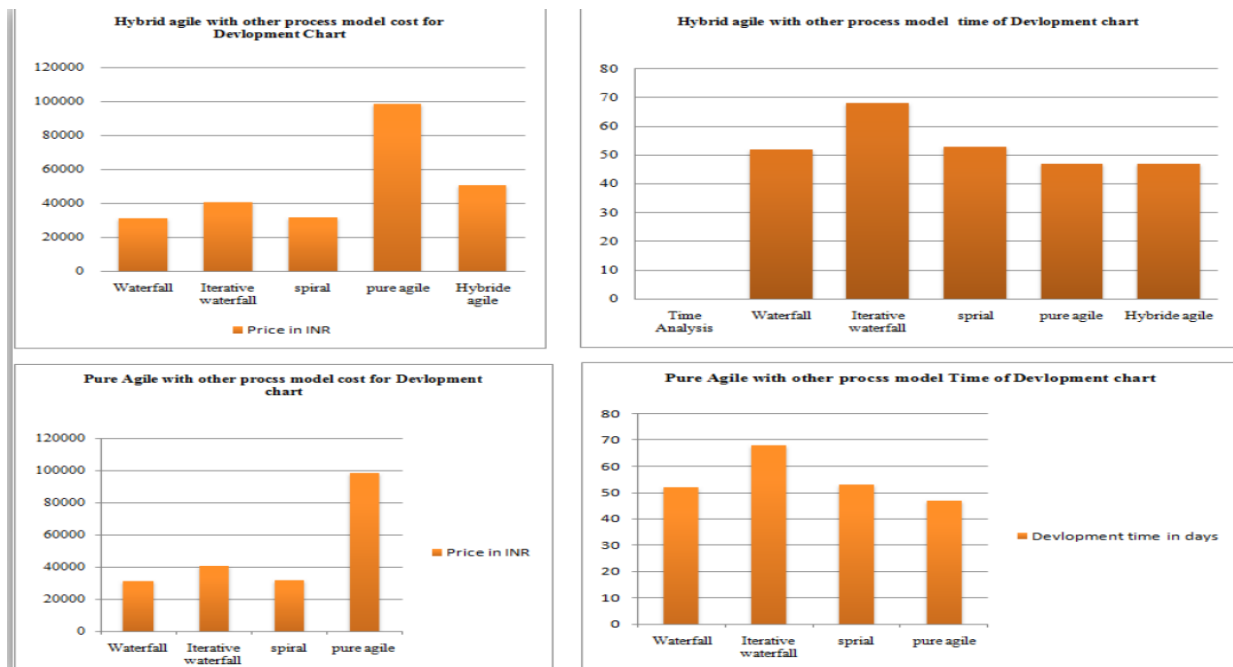


Fig 5: Comparison chart of before hybrid agile & after hybrid agile (Raval and Rathod, 2014)

After comparing the results, they came to conclusion that hybrid agile scores better than others and have many benefits too. Hybrid provides more customer satisfaction, low cost and less development time.

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Quist (2015) has mentioned how different models are applicable in different business sectors. E-service sector and companies with large customer base require agile methodology's rapid value and traditional methodology's high assurance. This is where blending of both methods into a hybrid method comes into picture. E-service sector can be categorized into two parts as business-to-business (B2B) and business-to-consumer (B2C) both of which demand hybrid methods. I agree with Quist (2015) that both agile and traditional methods positive and negative values so it becomes little difficult to state one is superior to another. Blending both of them to extract maximum positives ensures better results.

Jenny Slade's blog has covered how agile is the newest choice in Financial sector. Financial services have started facing lot of cut throat competition and expanding across the world. Complying with regulatory requirements, enhance customer experience, increase business agility and improve cost management and efficiency are some of the benefits that financial industry can get by moving to agile methods. This can be a big jump for many companies who have legacy systems and also workforce that is not trained in agile processes. To make this transition easy it is always recommended that they can move to a blended method of agile and traditional. This also allows a safe transition with minimum efforts.

Eva Johnson in her blog has covered advantages and disadvantages of agile-waterfall hybrid model. While this method has many positives it's not a perfect solution that fits all. Both sides should remember that they have to give up on few things that they are used to. Waterfall development must give up on concept of fixed expectation for flexibility. While Agile must sacrifice some of its creativity and get used to working with fixed timeline and costs. Keeping

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these things in mind if companies implement hybrid model with proper plan, the benefits can overshadow its drawbacks.

David A. Powner and Dr. Nabajyoti Barkakati (2012) in their Government Accountability Office report have recognized 32 practices and methodologies as successful for applying Agile programming advancement techniques to IT anticipates. The practices by and large adjust to five key programming advancement venture administration exercises: strategic planning, organizational commitment and collaboration, preparation, execution, and evaluation. Authorities who have utilized agile strategies on government extends for the most part concurred that these practices are successful. In particular, every practice was utilized what's more, discovered successful by authorities from no less than one organization, and ten practices listed below were utilized and discovered successful by authorities from each of the five organizations.

- Agile guidance and an Agile adoption strategy.
- Enhance migration to Agile concepts using Agile terms and examples.
- Continuously improve Agile adoption at both project and organization levels.
- Seek to identify and address impediments at the organization and project levels.
- Obtain stakeholder/customer feedback frequently and closely.
- Empower small, cross-functional teams.
- Include requirements related to security and progress monitoring in your queue of unfinished work (backlog).
- Gain trust by demonstrating value at the end of each iteration.
- Track progress using tools and metrics.
- Track progress daily and visibly.

Methodology

Overview of methodologies and approaches for the thesis work:

Conducting further Literature review:

Conduct in-depth study of various literature reviews and understand what the experts in the field have already mentioned about this. This would help understand the problems faced currently in the industry and give me a better foundation to come up with a solution. During further research and readings many current industry literature reviews have been studied that have helped in understanding the current situation. Also literatures related to Financial and E-commerce sectors have given me a clear idea on how industry experts are thinking about traditional, agile and hybrid approaches. Agile being the newest favorite has been the first choice of most of the companies but the difficulties in moving from traditional to agile have to be addressed.

Conducting interviews:

Conducting semi-formal interviews within the company will help get some real time information and also relate to it deeply.

Conducting experiments:

This will also give me a chance to get good suggestions and put forth some minor changes in current approach and try out my theories under controlled environment. All the steps above will help to come up with a prototype for a typical large scale scenario. Studying the scenario in detail and come up with a blend of traditional and agile methodologies. Results section of this paper have a plan based on the most suited approach using tools like Scrummage will be used to track/log the

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progress of agile sprints and create release documents by following meetings, roles and artifacts of Scrum and experiment if the hybrid approach can be easily utilized in practical conditions.

Generating conclusions:

This section will focus on certain important aspects that affect the organization's growth such as time for transition from pure waterfall to hybrid, cost effectiveness of hybrid. This section will also focus on how embracing agility in a business may require basic movements in an association's internal workings, from the way senior administrators team up with each other to how workers at the ground level execute on an advancing vision. Yet, the prizes are clear, as some early adopters have realized.

Result and Findings

Based on the below certain survey questions asked to some experts in the technology sector, the answers only validated the theories studied on how the blending of agile and other traditional methodologies. It also helped understand the practical aspects on adapting to the agile and bending it to fit the organization's needs. Here are some of the questions asked as part of gathering statistical data and applied study.

What type of methodology is currently in use?

Advantage of Methodology in use?

How much blending of Agile and traditional is in use and what methods of each are used?

If company does not use agile approach or hybrid, how much knowledge does the employees have about Agile or Hybrid?

One of the most practical and interesting findings during this research on how hybrid approach was considered and utilized when dealing with public sector projects was from senior consultant Brian Myers in their Development Delivery Center for 5 years. These practical findings validate that there is one fit all solution and the managers not being satisfied with their current processes made an effort to incorporate the agile methodologies to improve the development process. Therefore, this approach is the combination of traditional and agile where the crucial elements of the project such as beginning and end elements were carried out using the traditional approach such as writing the contracts and closing of the projects. These steps were necessary and unavoidable as the public sector clients demand these.

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For the majority of their development ventures they utilized traditional waterfall. The principle reason being that is much less demanding to compose an agreement for. The clients (public sector agencies at the state or federal level) needed deliverables on specific dates. That is the means by which they got paid, in the event that deliverable conveyed they got paid. The senior and mid management at the delivery center figured a need for a superior way. They acquired a coach to give the project managers scrum master training. All the managers got certified. At that point they began a hybrid approach. The prerequisites and design work was normally done by on location groups working straightforwardly with the client composing conventional deliverables. The conveyance focus would then take the prerequisites and outline and begin a scrum life cycle. Then the sprint 0 was executed where they transitioned learning from the on location groups to the improvement groups. From that point they would arrange sprints into a release based on the delivery schedule dictated by the contract. There were no user stories and they didn't hold sprint arranging sessions as per agile methodology. They had an everyday stand up meeting and close joint effort (regularly day by day gatherings) with the on location groups by means of telephone or video. This newly formed hybrid approach was utilized for two projects. Till date as per the contacts with the Consulting Firm, it is as yet taking after those procedures since their clients will demand set deliverables as a feature of their agreements. The agile ceremonies versus traditional processes followed by this firm gives a general idea on the overlap of the ceremonies used in hybrid approach. The firm is a professional service provider so they reacted to Request for Proposal's in which the client being a public sector entity would direct how activities should be possible.

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The Project Management Office carries out most part of the conventional waterfall forms. There is one project manager assigned to each project along with a team lead (scrum master). The project manager chief deals with the regulatory work, for example, status reporting and the greater part of the conventional records that are still utilized and listed below.

Waterfall /Traditional Processes	Part of current Processes? Yes/No	Reason to include or exclude the Processes / Role
Business Case	No	All projects in the portfolio should be finished, the staying point is need
Statement of Work	Yes	Clearly define what is in and out of scope at a high level
Project Charter	Yes	Traditional waterfall process before and carried over by PMO
Scope baseline	Yes	Once the initial set of user stories are created they are signed off on by the customer. The reason is not a legally binding thing like customary waterfall, it is more to ensure we are all in agreement that the client stories are precise. This doesn't counteract changes going ahead and any further changes don't require closed down.
Schedule baseline	Yes	The Higher Management needs to know the best figure of when a task will wrap up. This depends on the apparent size of the project in view of the current framework. All anticipates at this moment are to supplant a current programming stage with another one so we know the size and many-sided quality, when all is said in done, of the product being supplanted.
Cost baseline	No	Cost not being the driving factor.
Work breakdown structure	Yes	Used for the portions of the project that are NOT scrum. So this would be the preparation of project management plan at the beginning and User Acceptance Testing to Production deployment after
Status Reports	Yes	CIO and PMO want weekly status reports including red, yellow, or green.

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		These are handled by the assigned project manager. The Higher Management want to make sure projects are still on course and have not seen enough of these projects to know they do not need the status reports.
Risk Register	Yes	PMO wants to make sure all risks are identified and mitigated
Budget	No	Cost not being the driving factor.
Project Manager	Yes	The Higher Management want to continue some of the waterfall practices as they are new to scrum. Anticipate to transition out of it.
Executive/Project Sponsor	No	All projects are originated from CIO and Secretary currently
Steering Committee	No	No progressions require endorsement and as of now no characterized procedure for deciding the following activities.

It is anticipated that the firm might get rid of these traditional documentation as after being in the scrum transition for about a year and a half most of the traditional processes are replaced with scrum. Another reason is that the higher officials like CIO and Secretary still not being comfortable enough with the process to take away these documents.

As the firm is going through the scrum transition the ceremonies that are not directly client facing are all done in agile way. This gives the firm to have agility where needed and follow documentation that is a crucial part in public sector projects. The scrum ceremonies used by the firm are as follows.

Hybrid Agile Approach

Agile Ceremony & Roles	Part of the current Processes? Yes/No	Reason to include or exclude the Ceremony / Role
Sprint Planning	Yes	Fully using scrum process
Daily Stand up	Yes	Fully using scrum process
Sprint Demo	Yes	Fully using scrum process
Burndown Chart	Yes	Fully using scrum process
Sprint Retrospective	Yes	Fully using scrum process
Product Owner	Yes	Fully using scrum process
Scrum Master	Yes	Fully using scrum process
Scrum Team	Yes	Fully using scrum process

One more hybrid approach from the senior consultant Brian Myers where the customer's participation is very crucial and the processes are adjusted to involve customers as much as possible. These are the very first enterprise level projects using scrum. Few pilot scrums projects are being worked on using the process to demonstrate the advantages and refine them. They are taking after a scrum procedure which depends on the scrum guide with a couple of changes. The greatest change is that they are not releasing toward the end of each sprint. Toward the end of the greater part of the sprints for an arrival of a particular task they will set timeframe user acceptance testing. They are getting great client involvement however to get client testing amid the sprints is not working out. Rather testers inside the scrum groups are doing the testing and the end clients are doing casual testing after the sprint review. However, they have just been doing scrum for around a year and the present development ventures have just been going ahead since the start of this current year. They are additionally investigating Disciplined Agile Delivery (DAD) to enhance their processes.

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Based on the above questions seasoned leader Ryan Lockard in application development field explains his agile journey as follows:

Combination of methodologies used: Blend of Scrum/Kanban/XP/Lean, Scrum/Kanban, Scrum/Kanban/Lean.

Advantage of using hybrid approach: The hybrid nature of delivery allows for the shortest value stream, quickest learning, and tightest feedback loops because of the nimble nature, Simplest approach for a relatively junior and immature team, Stable approach for an emerging product line staffed by agile newbies. While there are other advanced concepts layered in, the primary focus is on the simplest method to deliver value while training a small team on agile practices.

Ways in blending the methodologies: There are 4 teams, 3 practicing Scrum/XP /Lean, the 4th practicing traditional Kanban. For the 3 teams, they use scrum as the base framework, but leverage TDD and Pair Programming from XP and value stream mapping and lean principles.

At first this didn't work as expected then the expert was brought in to help right the ship, so they leaned most heavily on scrum fundamentals, but for a smaller team they implemented Kanban to remove the need for time boxed iterations.

With the junior team, they implemented a basic scrum process, however did not have a dedicated Product Owner (traditional symptom of poor transformation), so they tried to leverage lean practices to augment as much as possible.

Knowledge about hybrid vs traditional: The expert discovered large organizations either have agile professionals or traditional specialists. While each know about the other, there is no

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enthusiasm to traverse. He would say the information of the other camp is moderately low (sub-20%), permitting the assumptive way of the human experience fill the staying eighty percent. He originated from the traditional world into agile. When he got wind he began a multi-year excursion to comprehend the intricacies of the outlook and proceed with day by day to take in more.

Also one of the approaches of hybrid methodology I studied included combining RUP and SCRUM to derive positives from both methodologies. RUP provides a backbone for the entire process whereas Scrum drives the day to day activities. Due to this, it allows companies an easy transition phase and strong structure for entire software development process. Also Scrum provides high adaptability to change in requirements at later stage. So RUP drives the initial stage of a project providing a framework for development team to work on. In this stage a foundation is laid by understanding business needs and setting project goals. Requirements are also finalized to derive a base architecture of the project. Scrum takes over after this and drive all day to day development cycles. Self-managing teams are responsible for achieving set goals and accommodating any last minute changes. Another benefit of Scrum is that the development team can listen to customer feedback and suggestion on regular basis and make changes accordingly in the plan. So, RUP takes care of the early risk mitigation and Scrum avoids delay in project due to change in requirement. The only drawback of this combination might be that traditionally RUP doesn't involve regular customer involvement during development but with Scrum that is very much needed. This conflict in mindset could act as a road block and cause delays until everyone is accustomed to this new idea. So the team's experience in these methodology plays an important part in smooth functioning of the process.

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Waterfall project management mainly originated and highly used in manufacturing industry. These organizations have a lot of legacy applications and also customers find it safer to follow traditional steps with defined deliverables at every stage. The major drawback of these projects are that they spend a lot of time in initial stage of planning and documentation and if something is not accounted for initially there is no scope for any change later on and a lot of time and money is wasted during the rework or the project itself gets decommissioned. Also a lot of time in traditional approach there is very little or none deliverables to show value of the project. So in case of budget cuts there is always a risk of project being shelved or put on hold. Agile can resolve many of these draw backs like less time in planning, accepting changes later on and short release cycles to show productivity and value. Most of the companies find it difficult to directly jump from age old traditional model to agile and this fear causes them to not make use of this modern approach. Mixing traditional waterfall model with agile processes can be less frightening jump and more companies will be motivated to adopt this.

Discussion

According to David A. Powner and Dr. Nabajyoti Barkakati (2012) from the report on the government accountability office and the challenges faced by federal agencies while transitioning and adapting agile are as the following: Teams had difficulty collaborating closely, Procurement practices may not support Agile projects, Teams had difficulty transitioning to self-directed work, Customers did not trust iterative solutions, Staff had difficulty committing to more timely and frequent input, Teams had difficulty managing iterative requirements, Agile guidance was not clear, Federal reporting practices do not align with Agile, Compliance reviews were difficult to execute within an iteration time frame, Traditional artifact reviews do not align with Agile.

As per the senior consultant working in the public sector these challenges were faced by the organizations no matter how much the employees demanded or resisted for changes in the current waterfall processes to deliver improved, faster and efficient solutions. The real life scenarios and challenges faced resembles that can be validated in this study conducted by the government accountability office.

Conclusion

After reviewing several combinations of methodologies, it can be concluded that the blending of waterfall and Agile methodology is the most efficient approach in terms of ease in transition and cost effectiveness. Executing a hybrid of agile and waterfall procedure was found to be ideal combination to accomplish successful projects as per the research. While the traditional processes were set up and in power in organization, it was likewise apparent toward the start of the projects that if the project teams did not convey successful outcomes rapidly, the project was in danger of being scratched off. In this regard, the traditional processes and methodology made it's the cause of its own problems.

Taking the waterfall processes to deal with projects would not have created the successful results sufficiently early to keep the projects from getting cancelled. The blending of agile and waterfall is the most practical way to keep the projects critical aspects untouched while transitioning the more agility required aspects towards adapting agile. It has also been noted that several organizations that using waterfall methodology tend to move towards adapting hybrid approach as this approach provides the way to still document and set the deliverables using waterfall methodology and makes the transition not overwhelming.

Recommendations for Future Work

The hybrid approaches are being practiced more and more in leading industries like finance, service providing consulting firms. This thesis mainly focuses on the hybrid approaches followed and adapted by the different kinds of organizations, future research can be done specifically on the agile transition and adoption by the government entities. This in the long run may lead to have enough observational proof that will help experts do their new usage all the more effectively. Some of the findings in this paper from the experts as well as the senior industry leaders state that the higher management are reluctant to move away from traditional documentations but are likely to change in course of time and by observing positive achievements during the hybrid approach, thus the further research may search for case studies that focus on the duration of the hybrid approach practiced by the organizations and if then they move towards following pure agile or else stay in hybrid mode.

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