

## Harrisburg University of Science and Technology Digital Commons at Harrisburg University

---

Dissertations and Theses

Project Management (PMGT)

---

2-2017

# Implementation of Agile Methodology in Public Sector

Kajal Patel

*Harrisburg University of Science and Technology*

Follow this and additional works at: [http://digitalcommons.harrisburgu.edu/pmgt\\_dandt](http://digitalcommons.harrisburgu.edu/pmgt_dandt)



Part of the [Management Information Systems Commons](#), and the [Management Sciences and Quantitative Methods Commons](#)

---

### Recommended Citation

Patel, K. (2017). *Implementation of Agile Methodology in Public Sector*. Retrieved from [http://digitalcommons.harrisburgu.edu/pmgt\\_dandt/18](http://digitalcommons.harrisburgu.edu/pmgt_dandt/18)

This Thesis is brought to you for free and open access by the Project Management (PMGT) at Digital Commons at Harrisburg University. It has been accepted for inclusion in Dissertations and Theses by an authorized administrator of Digital Commons at Harrisburg University. For more information, please contact [drunyon@harrisburgu.edu](mailto:drunyon@harrisburgu.edu), [ereed@harrisburgu.edu](mailto:ereed@harrisburgu.edu).

**IMPLEMENTATION OF AGILE METHODOLOGY IN PUBLIC SECTOR**

**THESIS**

**FOR**

**MASTER OF SCIENCE IN PROJECT MANAGEMENT**

**FEBRUARY 2017**

**KAJAL PATEL**

Table of Contents

Abstract..... 3

Keywords..... 3

Relationship to CPT..... 4

Acknowledgements..... 4

INTRODUCTION..... 5

1. Problem Statement and Justification ..... 6

2. Literature Review -- Analysis of Related Work..... 9

3. Proposed Solution Approach (methodology)..... 15

4. Results & Findings ..... 19

5. Discussions ..... 29

## **ABSTRACT**

The purpose of this thesis is to identify the drawbacks and positives of agile methodology in public sector projects. This paper will help provide the business groups the solution to overcome any issues with agile for any of the development processes within the Public sector. This assignment will help us see the results of adoption of agile by various business groups within the public sector where it is been implemented. The idea of fast paced development with set goals and deadlines have transformed how the implementation works as compared to traditional methods in Public sector. Agile methodology has always focused on product and quality but at the same time compromising on security and risks.

The other factors such as continuous development of the product lead to minimized efforts in testing.

This paper will explain the various methods of how the information was collected, how the team transitioned into an agile environment, what were the results of this transition amongst the team within the public sector. Thus, the idea of adoption of agile v/s traditional model for software projects in the Public sector will be explored.

## **KEYWORDS**

Agile, Public Sector, Traditional VS Agile application, hybrid method, Quality Analysis, Security, Continuous Development, Iterations, Aggressive Time line, Scrum, Elicitation techniques, Data Analysis, Communication & Collaboration, Iterative Development, Working Model, Working Prototype, Security, Risks

## **RELATIONSHIP TO CPT**

My current CPT involves being a part of a PMO office and effectively managing projects from initiation to implementation. The organization is in transition phase to become an Agile shop thus the reason for selection of this topic as we have various factor that hinders the delivery of project, these reasons vary from take holder buy in, security issues, risk assessments overlooked, weak communication and collaboration. This will help me understand the problems that are being researched and how the future is paved for these perceived issues and how these can be addressed for a successful delivery of the project.

This thesis and my on job real time experience can blend together and give me an upper hand at delivering projects as part of CPT. This study or project is going to strengthen my concepts of agile development and make me believe in the concept. This will help me and my coworkers as I would impart my knowledge about the pros and cons of agile, identify what works and what does not work for the organization thus applying my practical and theoretical knowledge towards the betterment of the projects assigned to me and my team. Knowledge sharing will also help amongst various other PM's thus benefiting me and the organization.

## **ACKNOWLEDGEMENTS**

Immense support and inputs from my Professor have been carefully incorporated into the paper. His guidance to narrow down a vast topic and steer me towards the best results is appreciated.

## **INTRODUCTION**

In recent years agile methodologies has been widely accepted in IT and non IT related projects.

Agile method has number of benefits as compared to the traditional development methods in software development lifecycle. Majorly Agile is used for software development and hence more suited to iterative development of solutions in small working prototypes. The adoption of agile in other areas have been increasing but it may not be suitable for other fields such as civil reason being there are more physical hindrances due to the nature of the projects undertaken. Thus, analyzing agile strength, identifying the best practices, short comings and future research opportunities will be addressed and explored in this thesis. Agile has major benefits such as providing a quick working prototype and quick delivery of products. At the same time have drawbacks with respect to security requirements, compromising on risks to provide products at a fast-paced cycle. Agile methodology is a widely accepted method of software development in the fast paced industry, where the business/stakeholders are result driven and they like to see the products sooner than later. Agile has catered to these needs by providing the idea of iterative development and then integrating the iteratively developed solutions into one functional solution as compared to traditional development method of requirements gathering for the whole system and then development.

The major concerns that are pointed out while delivering products in sprints and quick development cycles are that the organizations tend to not include the requirements gathering for security of the project or risks assessment activities related to the project. The constant change in requirements also results in issues with the security. In agile due to iterative and continuous changes to the code to enhance the solution the teams compromise on the testing and quality aspect.

The major motivation in choosing this subject as my thesis is my current work environment and the challenges faced by the team in implementing agile methods. Our team has been following traditional development methods, which have been successful but the rate at which the business expects the results have constantly driven the idea of transitioning to agile. The traditional method gave us the opportunity to identify all the security issues and risks assessment modules. This was done as a team by discussing all the risks that could and occur and the mitigation techniques to be applied to make sure the project does not fail. With smaller sprints and fast timelines, the risk assessment meetings have been reduced thus affecting the quality of the project.

All these factors have motivated me to choose this subject as it will help me learn new concepts and industry challenges and understand how these are being addressed and how to minimize the drawbacks for agile in public sector.

## **1. PROBLEM STATEMENT AND JUSTIFICATION**

Agile methodology has a consistent set of guidelines which it follows for implementation of the project and successful delivery. Agile methodology has been widely accepted and adopted in various sectors. Each sector is different with respect to resources, culture, goals, ideas, size of the company, thus adapting agile method varies for each team as all of these factors influence the success of agile implementation.

Implementing agile methodology in public sector has its own challenges some of the reasons being resistance to change, laid back environment where the team is not used to working in a fast paced environment, long wait times because the team is not used to meeting deliverables in small iterations and then integrating the final deliverable. Additional challenges while implementing agile was lack of proper training, lack of direction, lack of support from upper management. Understanding the benefits

of implementing or transitioning to agile methodology was not clearly explained causing confusion amongst the team members.

Even though public sector has all these mentioned challenges the best way to transition into agile would be to do the following:

- **Study the effect of Agile without the dependence on organizational goals or culture**

Agile has various methods of implementation like XP programming, prototyping, spiral, Test driven approach etc., we would need to study how the group or business can adopt one of these methods and customize these methods to suit and tailor the objective of the business and see if it is suitable for public sector. Also, make sure that transitioning to agile adheres to the company goals and strategic initiatives to deliver successful projects in public sector.

- **Study the effect of the applied agile method in the organization and document the results**

Make sure the goals were achieved using agile implementation and see if all the business groups still support the implementation or the culture and business processes are causing a hindrance from producing results.

- **Study the methodology independent of organization and solely based on project delivery**

Study the suitability of agile by examining the characteristics independent of the organization, to see how they were successfully implemented in the solution irrespective of the culture of the organization.

- **Adopt a module for Agile v/s Traditional Methodology**

Implement a module using the agile method and see the results, see how the iterations affect the overall success and delivery, what are the issues faced in public sector using agile and then try to implement same module using the traditional method and see its positives and negatives.



Suggest the best suitable method, clarify the results with the team and see which they support and see if there are things that could be improved using agile or traditional.

- **Understand the negatives or positives of Agile in public sector**

One of the issues with agile implementation have been related to mitigation of security and risks, in public sector the idea is that enough time and energy is not invested to identify security needs as per company's security policies, the teams have been moving ahead without proper analysis. The aggressive time line of the sprint is often considered another reason for issues. The business groups often try to meet the sprint goals overlooking the various security aspects in the long run or any adverse effects of the changes being implemented.

The other prominent issue or problem that has been brought up is risks analysis, with adoption of agile the idea is to sprint though the activities in fix number of days, a two week sprint has lot of activities incorporated which leads to the delivery of the product, the major concentration is on the requirements and implementation of the given needs into a working solution, the risks associated are at times ignored with this fast paced development.

Quality Assurance activities are also considered as a probable issue because iterative development results in constant changing of code and with new development, resulting in overlooking the regression test/quality analysis aspect of it. Another issue in public sector is over engineering as the team is constantly trying to build and deliver.

Thus adoption of agile in public sector needs to be thoroughly studied for its good and bad, properly understand how the success or failure of the project is dependent on all these factors and provide the comparison of traditional development method in public sector, the idea is to study both methods and either propose the best suited method or go further and suggest a hybrid of both method for Public sector if that is the best way to move forward.

## 2. LITERATURE REVIEW -- ANALYSIS OF RELATED WORK

There are various methodologies in place within Agile and Traditional software development, each entity use respective methods to implement and deliver products. Various methods are classified as

Plan Driven Method: As the name suggests it mainly caters to extensive planning up front in the initial phase before getting into core development. This type of method is mainly suitable for well-established domains that are not bound to change, have all the possible risks identified upfront before venturing into the development phase. Through elicitation of all aspects is completed before moving to next phase with point of no return. The most common type and widely used plan driven methodology is waterfall. Waterfall mainly has a step by step process in linear/sequential manner.

The below is a representation of the sequential process for waterfall , as the picture depicts water flowing down with each step never having a way to flow back, the waterfall method also uses the same concept.

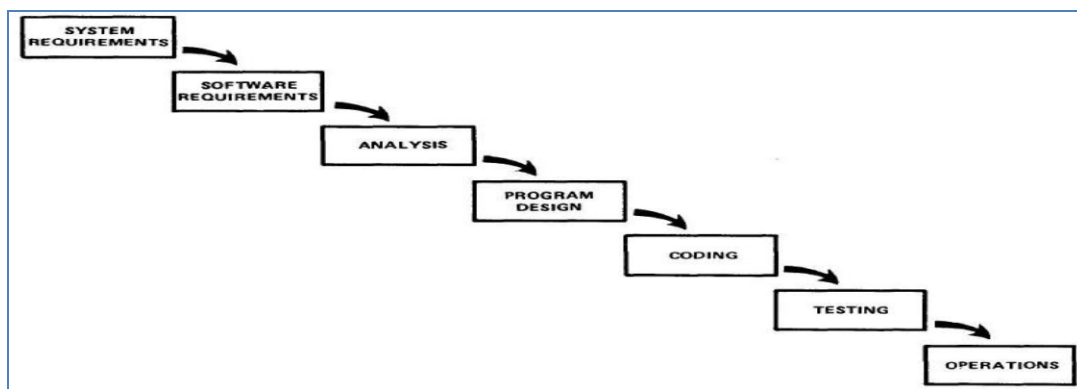


Figure 2.1

The process mainly starts with an initiation of request for the project, after the initial business case and approval process, the project is assigned to begin requirement gathering, where the

analyst is responsible for the requirements for the entire system, from start to finish. Majorly the process is already known and well flushed out with minor additions which is well thought and analyzed before finalizing. Once the requirements phase is completed it moved to design and development, where the design and actual development is completed, followed by testing and finally the product is released

Agile: This methodology thrives on a changing environment, more suitable for organizations where the requirements change or are bound to change frequently with new policies and guidance. Thus in comparison to plan driven where everything is done up front, this thrives on the idea of iterative development, where smaller parts are built and released for use. This helps with rapid development and release of products. This helps the users also as they have the knowledge of the working system, how it functions, how it looks and helps provide better and more accurate requirements in the next phase. It drives the users to think and helps them visualize.

Agile in itself has various methods to achieve the same results, the methods of development are spiral model, Rapid Development, Extreme Programming all based on the same concept of iterative development.

Agile mainly follows its own guidelines widely known as Agile manifesto, which says interaction with the users is more important than the process and various tools, a working prototype works better than extensive documentation, collaborating with users/business is important than contractual discussions and obligations, and to respond to change than just going by the plan.

Agile development has various pros and cons associated, the pros mainly discuss the importance how adapting to the change, iterative development is encouraged where small working models are built based on the current elicitation and analysis. This product then goes

through the same software development life cycle for analysis, design, development, testing before being presented to the business. The benefit being the users get to see some version of what they are requesting instead of extensive documentation, diagrams and mock ups. Agile provides the visual representation in form a working product where the users are comfortable using the system and getting to learn at the same time. It gives the audience a way to relate to their daily work and how the system supports or will support when it is fully developed.

This development method encourages feedbacks, constructive criticism and opinions from the users as that would drive the next development cycle or sprint towards achieving what is requested. Agile encourages short term goals, continues delivery in incremental fashion. With each release the previous release is integrated. The system grows with each release where the users are already learning how to use the system and getting use to moving away from the current method. As compared to a plan driven where the elicitation for requirement can happen now but the build out may only begin after the whole exercise is completed, in this case the user may lose interest or may not remember exact details of what was discussed or decided unless they go through the documents.

Agile while having its positives have negatives as well; though the projects or solutions are delivered on regular interval, with each release the system may grow but the overall quality assurance and risk identification and mitigation may be over looked. The methodology mainly drives customer over any process and products over documentation. This tends to overlook aspects like quality assurance, as with the change in code or constant development and integration the quality assurance team has to make sure the new modules are functioning as per the need but also make sure that the integrated modules also work with no effect on each other. This testing may overlook certain pieces that were delivered in a prior sprint and how the

current sprint item affects that. With plan driven approach since all modules are finalized and then moved into development all the scenarios and alternatives are discussed and thus while building the team knows all the possible use cases to be built and can address them. In case of agile since only a certain piece has been discussed and implemented it may not capture its dependence on other modules or vice versa which may affect the testing and providing a through product which must work seamlessly from start to end.

The agile manifesto caters to a positive reaction to changes, as compared to plan driven approach. Agile is driven by the idea of incorporating the changing environment into the incremental development and addressing the business concerns right away instead of following a structured approach of a change control process where the initial module is built and then the changes are discussed, prioritized and then goes through the same analyses cycle from start to end, determine the impact on the module, determine the benefits, risks of not doing the change and only then proposal to change is provided with multiple methods to choose from. Since agile is iterative this change can be quickly implemented and integrated without much thought or analysis on its overall effect on the business process or how beneficial is the change. Agile looks at a short term plan and how to achieve maximum productivity, this results in risk assessment being over looked or entirely skipped, the risk play a major role in all projects. Risks are best identified and accounted for upfront, as certain risks may completely result in the failure of the project or result in audits or findings in the long run. Risk Assessment is one of the major steps in all projects where the analyst is responsible to make sure that the change in requirement or how the requirement is being implemented meets the program needs and adheres to all the possible laws and regulations depending on the nature of the business. Agile being a fast paced method the focus is majorly on delivering as compared to analysis how the

delivered product meets the goals and objectives, does it adhere to all the policies. This aspect of agile has been researched and various attempts have been made to make sure the major risks are identified and mitigated or at least identify it and take an approval of this imminent risk in future.

Agile has another pitfall which is scope creep, which results in projects getting delayed or sprints getting missed. This is a result of constantly accepting the changes and making sure it's incorporated. Scope creep may result in addition of new items to the scope which wasn't previously asked or discussed but due to the nature of development a small change gets incorporated which when integrated into the bigger picture may raise further concerns which again might result addition to the scope. Thus it falls into the vicious cycle of analysis and development which results in delay, loss of time, and sometimes end up with the product which may not be what is needed and scrapped.

The reviews further categorize these challenges/cons of agile into following categories

#### SDLC Challenges

- Security requirements elicitation is not included as an activity within agile development
- Risk assessments activity is also at times not included in agile development
- Security related activates to be applied for every sprint/iteration
- Aggressive iterations are not suitable to security and risk assessment activity

#### Security Assurance Challenges

- Security supports in detailed documentations
- Tests are normally insufficient for implementation of security requirements
- Continuous change of code fails to adhere to the audit rule of stable process

#### Incremental Development Challenges

- Failure to make sure breaks into security constraints
- Changes of requirements and design of the system will break any security requirements

identified

- Continues code changes will result in lack of quality assurance/testing activities or result in low quality of assurance

- Constant change results in difficulty of traceability of requirements and security items

Management Challenges

- Lack of incentive to build security requirements into the system in early iterations
- Cost of the product increases with inclusion of extensive security requirements
- Compromise security for aggressive time line

### **3. PROPOSED SOLUTION APPROACH (METHODOLOGY)**

In order to analyze how Agile works in the public sector, the following approach will be used.

The first step was to conduct a thorough literature review that provided me insight into how the public sector agile implementation is different from a private sector implementation. In addition, the author will study their own company's current processes in different departments and how the organization implements traditional waterfall, hybrid and agile methodology. To accomplish this, interviews, surveys, and shadowing, will be conducted with the team. The author will make sure to observe the pros and cons, do and don'ts for the project and methods adopted by the team. Also, a implementation of two approaches between Agile and waterfall, the plan is to select a module/function in the software project implementation. First try to accomplish the function using the traditional water fall method, look at the good and the issues that were raised. The methods suitability to the project, team etc. and document the findings. Apply agile method using sprints to do the same module and see what are the issues that come up, the positives about the method, see if both methods have similar performance and risks or one is more suitable than the other. The final step would be to compare the results from both, the questionnaires', the questions answered drawing conclusions and recommendations on how the public sector is more suited to one method than the other or if it is more receptive to hybrid model if any.

The approach or methodology for the thesis would be to understand and validate the results of applying agile methodology in public sector. The first step would be appropriately identifying the known issues with agile methodology, properly analysis which one applies the public-sector



project. Public sector project that I will be concentrating is a project that caters to reengineer the student information system; the project has been scheduled and is currently kicked off.

The plan is to first do further review of existing literature reviews which addresses the issues with agile and the suggested solutions for each of the issues. The literature reviews mainly based on the application of agile methodology on various sectors and see how it co relates to public sector. Find out which issues majorly affect public sector and document how it in turn affects the delivery of the project. The analysis might also help determine that the application of agile method to the project might result in negatives in one project but necessarily have the same effect on public sector. If there are difference in results, then that will be captured on how it adversely affected some other project but it has a positive effect on my project.

Thus, the plan is to do more systematic review of literatures in addition to the already chosen ones for the course work which are mentioned in the reference section. The idea would be to plan the review, conduct the review and report the results and outcomes of the study or review. This review will be extensively concentrating on how agile methodology differs from other sectors with respect to Public sector.

The second step for the thesis would be to research about the successful implementations of agile, study the method, the ways the applied it to their projects, how they prepared for the project, what were the precautions or measures they took to make sure the transition is smooth. Analyze the lessons learned from their project and see if those can be applied to the public sector for better results.

There would be projects that could have used a hybrid model as compared to a pure agile – study those projects/ read about them and see if it is better for a Public Sectors to apply a hybrid model if needed and how it may or may not better suited for them.

In all projects the most important thing is to identify the right stakeholders or subject matter experts to make sure the right information is shared or received. I would be identifying some subject matter experts or key stakeholders from the project based on my current knowledge and interactions within the organization. The identified stake holders will be approached and requested to help with the information on their experiences with the current and previous projects that they have been part of both agile and otherwise.

The very next step would be to prepare well for the interview, make sure I research my questions particularly concentrating on the issues, methods, lessons learned from other projects and how they addressed those in their project or plan to address them. Understand their thinking process on how would they tackle the issues with proper planning or at least understand on how they would reduce/ mitigate the risks.

This step will be followed by scheduling an in-person interview or discussion session. In person, would be the most suited and preferable as it would help me understand the interviewee better, it will help me have the stakeholder's total attention as compared to other methods where they could be multitasking.

This will help me not only gather information on experiences or steps that they undertook for the project verbally but also help me understand how they get excited or express things with passion that they might be proud of or things or methods they implemented which resulted in success

Alternate methods to gather information would be through questionnaire, where the questions would be simplified and easy to understand. Prepare a survey of questions with possible solution methods to the issue and gather the thoughts or information on it.

Other Research Methods: I would also further search by key words for issues related to agile applications in public sector see if I could also contact any member or support team with a questionnaire or survey to further understand their experience

Study any existing documentations or guidelines that they might have already have and infer from it. Research any previous projects that were implemented with agile or other method and understand the issues they faced and see if anything applies to agile method.

Once the various methods to gather information is completed, or close to complete the idea would be to be first put together notes based on each interview or session. Understand the common issues or solutions. Understand if any new issues particular to Public sector that was raised and see if there are alternate methods to mitigate those.

Based on all the meetings and information gathering session, I would prefer to draft requirements or detailed document stating what were the different questions asked, how they relate the public sector project, the risks associated with them and how the sessions help mitigate or address them.

I would further gather any data related to application of agile methodology to project to see the benefits in terms of productivity, ease of use and better customer satisfaction results as compared to following a traditional method.

As part of the public sector team – the experiment I would like to conduct is to follow the agile sprint and try to work accordingly with the sprint length and see how a working product is delivered in short time. I would plan to request an application of traditional method on another module and understand how they two differ in terms of time, effort, user involvement. Understand how in agile v/s traditional the issues are addressed and how the end result affects the customer satisfaction.

The results of the experiment will be drafted, it will show the issues faced by each application method, how agile fared compared to the traditional. What ere the benefits of agile over the traditional method, what were the issues that I personally faced and how those issues were addressed? Understand the issues raised in the literature reviews and see if they apply to my project. If they do apply try to mitigate them with precautionary actions to make sure the project succeeds.

#### 4. RESULTS & FINDINGS

In order to perform the analysis and the study to find the suitability or application of Agile in public sector the author first decided to start with a basic survey with 6 business users from the team. The team was adapting agile as their methodology and has since then successfully implemented the transition. Based on the survey the results were first formulated and divided into various categories and how each of those categories was seen to be supporting or how it could have been better. Following are survey questions and how they were answered by each user, this helped understanding the general understanding towards agile.

##### Survey/Questionnaire – User 1 – Resource: Darryl Menezes (Senior Director - Business)

1. Are you happy that your projects are moving towards using Agile Methodology?

User	Answer
Darryl Menezes (Senior Director - Business)	Yes - The adaption of agile method has given the group an added benefit of delivery products and increasing business value in short amount of time.
Darryl Frazer (PMO)	Projects have been undertaken mostly using traditional waterfall method, where all the needed requirements were finalized for the whole nine yards

	as compared to iterative development, where we found difficulty in adjusting to the culture of only doing piece meal delivery
Ram Krishna Atalla (Business Analyst)	No – The projects with traditional method gave the whole picture – entire process as compared to small processes
Stalin Espinosa (Senior Developer)	No – I would like to say yes but with the amount of rework and how the functions were divided it resulted in recoding a lot of times as compared to re using
Erica Wade (SME)	Agile has been a great addition, we can actually see our inputs and concerns answered quickly

2. Was proper training provided?

User	Answer
Darryl Menezes (Senior Director - Business)	Yes – Hired an Agile coach to brief up and guide the employees
Darryl Frazer (PMO)	Training was provided but was more training room rather than a more hands-on training would help

Ram Krishna Atalla (Business Analyst)	No – Training was very short and the members were not too confident about the whole process and the intricacies
Stalin Espinosa (Senior Developer)	Training was enough for more technical users as compared to non-technical users in understanding and adapting to the change
Erica Wade (SME)	Training was good enough to start and get your feet wet but little more concentration and time would help

3. Would you say that your productivity and efficiency as a team has increased?

User	Answer
Darryl Menezes (Senior Director - Business)	Yes – The productivity has increased in terms of the timely delivery of products
Darryl Frazer (PMO)	Productivity has increased in terms of modules delivered more frequently
Ram Krishna Atalla (Business Analyst)	No – The agile method in practical sounds exciting but with the sprint and the amount to achieve we stretched the resources
Stalin Espinosa (Senior Developer)	The productivity in terms of functions and deliverables have increased

Erica Wade (SME)	Productivity has increased from our side as we can see the changes and help make it better when you see a working model as compared to traditional method
------------------	---

4. What is the biggest issue while implementing Agile?

User	Answer
Darryl Menezes (Senior Director - Business)	Change in culture and how the teams have been working Short time sprints Management of uncompleted items – within the sprint
Darryl Frazer (PMO)	Sprint length and the items to be implemented were the biggest issues Constant re coding and enhancing would be other
Ram Krishna Atalla (Business Analyst)	Constant updates/enhancements were impediment for development and re use of existing methods
Stalin Espinosa (Senior Developer)	Constant rework of modules in iterative model Risk analysis Quality Analysis
Erica Wade (SME)	Time frame /Sprint Time was the biggest downfall – the time was short for

	a team who is transitioning
--	-----------------------------

5. If given a choice would you suggest upper management to provide proper training or resources to help implement Agile to be more productive?

User	Answer
Darryl Menezes (Senior Director - Business)	Yes– an agile coach and appropriate training must be provided; the project was intensive and time consuming which compromised the training effort upfront
Darryl Frazer (PMO)	Yes, training was compromised to an extent with the time line more preparation is the way to go
Ram Krishna Atalla (Business Analyst)	Yes, Training and time to understand the concepts and how to overcome difficulties
Stalin Espinosa (Senior Developer)	Yes, training was not enough and the time for which the teams were trained for
Erica Wade (SME)	Yes, training and the agile coach to be more approachable would work more



### Summary for the questionnaire

Majorly the users supported Agile – but the difference in culture and method, adopting changes were one of the major roadblocks. The major concerns were the need for training, upper management support.

Name - Methodology	Happy - Agile	Training Good	Increase P/E	Issues	Training
User 1	Yes	Yes	Yes	Yes	Yes
User 2	Yes	Yes	Neutral	Yes	No
User 3	No	No	No	No	Yes
User 4	No	No	No	Yes	Yes
User 5	Yes	Yes	Yes	Yes	Yes

**Table 1**

### Traditional v/s Agile Implementation

The other major method used was to be part of the implementation of modules in traditional methodology and the same module in agile. The idea was to compare and analyze the good and bad of each, how it is suited for the Public Sector and how they differ from one another. Majorly Agile was weighed on how various factors affect the success for the same.

### Agile Use – Factors /Conditions and Scenarios

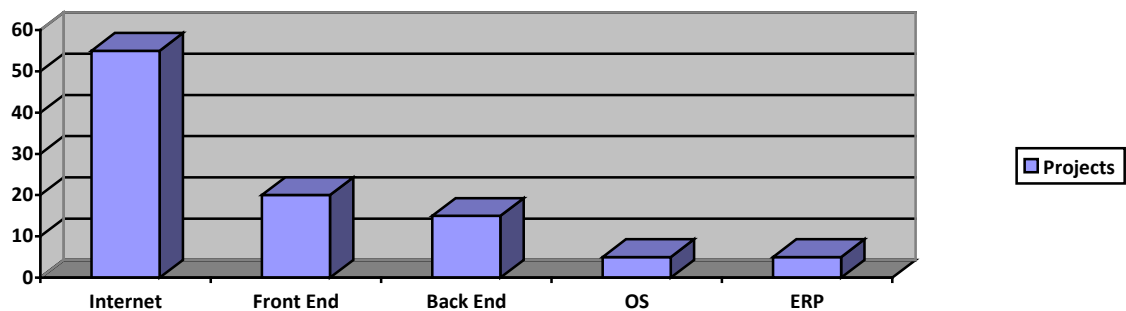
The exercise was then divided into categories to see how agile methodology was accepted and what were the various factors that influenced it, the users were interviewed based on follow parameters to derive to a conclusion how agile is suitable or not. The categories are as follow

- Project Types using Agile
- Currently using Agile & Why
- Agile Adoption – Influenced by

- Problems Face in adopting Agile
- Positives of Agile
- Issues/Problems with Agile
- Agile Training

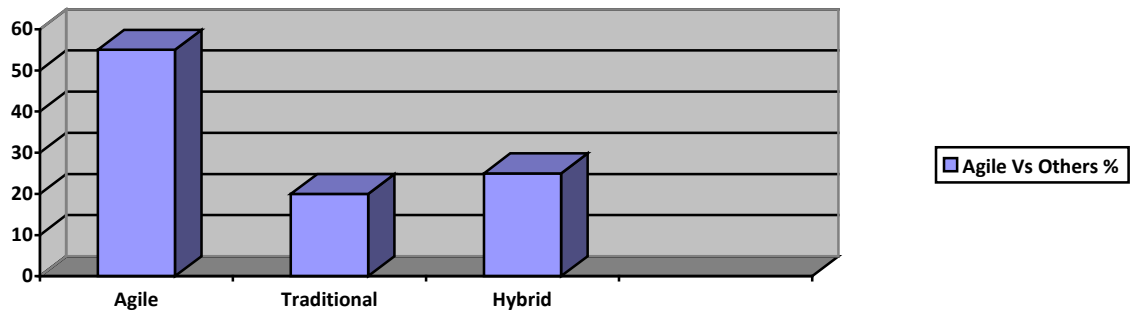
### 1. Types of Project :

Majorly all the users who responded mainly stated that the agile methodology was mainly being used for internet based software's, very rarely used for operation system or legacy programming projects. In addition to the bifurcations we also received agile being used for front and back end projects equally, another one third using it for CRM/ERP systems. Thus based on it the conclusion could be that agile is more suitable within internet based products where the changes are more often and thus using agile will help aid the same. But agile is not solely limited to software projects



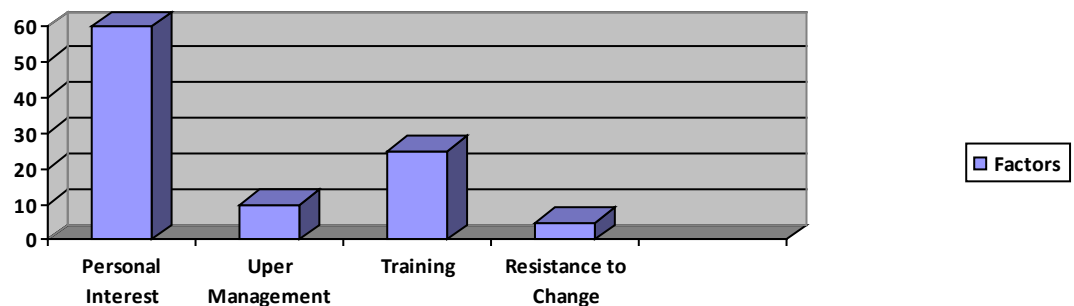
### 2. Currently using Agile Use

Most of the users (60%) responding they say they have adopted agile for more half of their own projects. Very few users approx. 5% said they use agile as one in four projects they undertake. More so approximately 35 % used a hybrid model for their projects



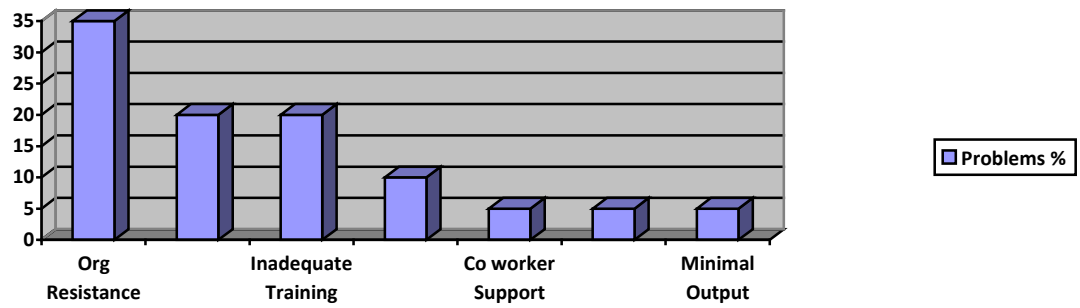
### 3. Agile Adoption – Influenced by

The most important factor here was the awareness of agile and how it works and understanding its manifesto. The users agreed that the organization lacked a structure and group or PMO to lead the teams to maximum efficiency. The lack of support from upper management and the ability to influence the subordinates to use and adapt agile was the biggest factors. The change in culture, resistance to change, lack of training to users



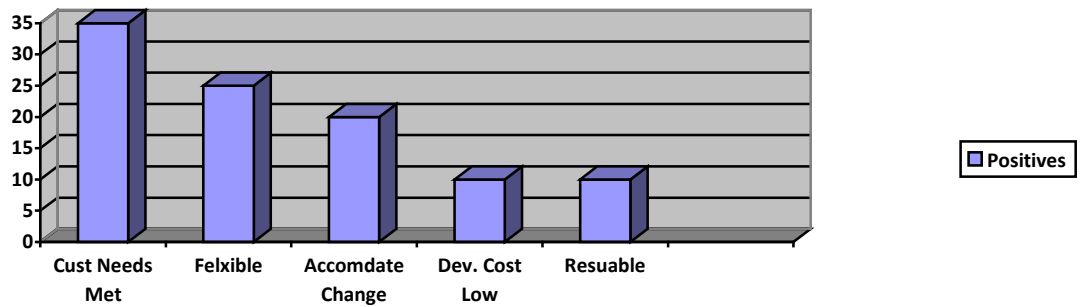
### 4. Problems in adopting Agile

Based on the response the users didn't think there is one particular reason for or any limitations but a varied factors affect and create issues or problems in adopting or transitioning to agile. Most users viewed the acceptance of agile was more dependent on company culture, upper management involvement, lack of support for so workers, no guidelines to follow, minimal benefits or output



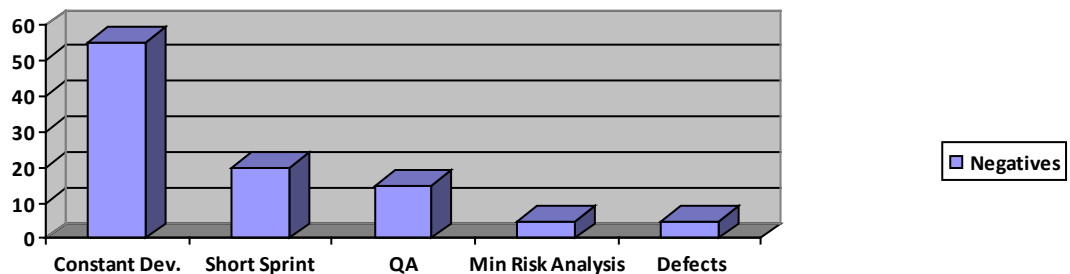
### 5. Positives of Agile

By following the agile guidelines and manifesto the users were happy with the end result as compared to the overall process to reach its goal. The ability to be flexible and accommodate changes, meet the user needs quicker and more time saving manner, low cost of development, reusable code to an extent. The user could see the overarching positives of agile as compared to other methods that were being followed



## 6. Issues/Problems with Agile

Major issues like we discussed in literature reviews were more or less reported by the users, issues like redevelopment, short sprint time, constant back log items rejig, maintaining back log items, quality assurance, risk analysis, bug or defects tracking. Thus over all even though the users did raise these concerns the agile method did provide the results that were expected of it. With proper planning and training and encouragement it could be an apt fit for public sector



**Anonymous Survey Online:** There was another small survey that was conducted through a forum on the intranet site for the other business groups in the public-sector organization that follow traditional agile or type of agile methods. The result was that we received 23 responses in total. The people who responded have an average of 15 years of experience with software development approximately 3 to 4 years of agile. Majorly the users who responded were developers 48%, Manager 34% and other employees 11%. Thus, traditionally waterfall was most used but each passing moment the organizations are transitioning into Agile.

Name - Methodology	Extent of Use (%)
Water Fall	55%
Agile	35%
Pair Programming	5%
XP	5%

## 5. DISCUSSIONS

### 1. Questionnaire survey with Team Members:

During this activity, what I noticed was that most of the team members were happy with the transition from waterfall methodology to agile methodology. The following points were addressed in the survey questions

#### A. Major Issue was lack of training:

Every single member or subject matter expert who participated in this survey was of the view that there was lack of training. The issue they discussed was the limited amount of time that was invested in training the employees and the fast pace at which the change occurred. The discussion comprised of how there was lack of planning done to implement the change.

Members also believed that the training provided to the upper management should also have been provided to the team members for proper implementation of agile methodology. The discussion also covered how agile was not suitable for all projects and how the team or the PMO office should conduct proper research and analysis before trying to implement agile for each project.

#### B. Agile increased the productivity and efficiency:

This was a very interesting discussion that I had with the team. With the implementation of agile the turnaround time of the products has increased. This gives the team a quick feedback of the accurateness or efficiency of the product. It also gives them a better understanding of the user's expectations which in turn produces product more as per requirements and the user's needs. Agile being fast paced also helps in work going on in parallel, which has increased overall efficiency of the team.

With waterfall, while gathering requirements development was not taken care of whereas with agile requirements, development and testing all work hand in hand making the team more efficient and productive.

#### C. Team /Product Issues:

The following issues were brought to the table with the implementation:

##### **Security:**

Since agile is so fast paced and new to the organization, a lot of times the security rights of the team are either not implemented or not provided correctly. Since we are dealing with very important and crucial information about students this seems to be a big issue.

Since implementation a lot of tickets have come in saying that the rights are compromised. This is an issue that needs to be resolved immediately because if not the efficiency and quality of the product will be compromised.

##### **Lack of cooperation:**

A lot of users have been working with the waterfall methodology for a very long time. To have them accept this change and cooperate with the change was also a task on its own.

They understood the benefits of the change but still had a lot of learning to do.

Having a good participation from everyone required an open communication. Since users were so used to the old methodology the implementation with the new required training, open communication, constant motivation and follow ups to the work done. This caused in sprints being delayed or overlapping each other. A user now who was working on only 1 task at a time was now working on multiple with tight deadlines causing a lot of resistance and displeasure on the kind of work.

#### D. Training Requirement:

A lot of training should be provided to everyone at any level to implement any change. An agile coach must have been hired to help train and transition to agile smoothly. Lack of planning and poor training made implementation of agile more difficult than it could have been.

Training at every level could have helped achieve a smooth transition and increased productivity and efficiency overall.

#### E. Happy with agile:

This was a question which received both positive and negative feedback. A lot of upper management was very happy with the implementation of agile since the work was getting done in small sprints and then all these sprints were overall connected to make sure the product was as requested. The turnaround time from the users with the small iterations helped make a better functioning product than issues or bugs were detected earlier than waiting till the end thus making a superior quality product with less issues.

The rework time on the final product has dropped dramatically, thus allowing better resource utilization and less time in reworking the product. The only issue brought up again was lack of training and security measures overlooked overall.

Even though a lot of users were not happy about the change, the overall involvement and productivity of the company has increased a lot. All that needs to be now taken care of is analyzing the implementation procedure, lessons learned and working on pain points found to make it work better.



**Anonymous Survey Online:**

The major respondents for this survey were team members from different organizations in the public-sector company. The idea was to see how wide spread is the use of agile or other methods in other teams. Waterfall/traditional method was most commonly used methodology in other teams, with the culture in the public sector with upfront requirements gathering of the whole system, rather than giving the users a piecemeal or iterative products. The users found it difficult to see the bigger picture or the product with all functions needed as compared to small working products. Some users were already using agile for their projects as they transition had already taken place and found it beneficial in long run after the initial resistance. The other inputs were that agile was used based on the type of project and team, for example agile was more frequently and successfully used for projects related to software development and or front end based functional projects, it was also more prevalent on data base/back end projects as compared to infrastructure or networking projects. Some of the users suggested usage of hybrid model for the projects as that was more suited for the existing work force and was easy to understand and less resistance to transitioning away from pure waterfall.

**Agile VS Waterfall Module Implementation:**

With the help of my team, I had the opportunity to implement a very small module using both waterfall and agile methodology. The whole team showed a lot of enthusiasm and excitement in helping me implement and write down the findings. While it was a project for me to understand the intricacies of both methods sometimes it would clearly show users support for one method over the other. There was a resistance while elicitation phase for both methods and how some members were active participant in one over the other.

From a PMO's point of view agile was the best thing that could have been implemented. He/team was very happy with the turnaround time and the overall efficiency of the team. The idea of working prototype as compared to the pages of writing or documents were appreciated. The idea was to promote the delivery of working products to the users so that they can use the solution in parts and be a better participant and voice their concerns early in the phase as compared to the traditional method.

From a developer's point of view working in small iterations was good but they also believed that proper analysis must be conducted to decide what would work better agile, waterfall or a hybrid methodology based on the type of task. They also believed that the security issues coming up could be taken care of if the sprint time of the iteration could be expanded. The reason they believed the time should be expanded temporarily is because it was a new implementation and with such fast pace and limited training there are going to be some areas that would be missed in turn decreasing the overall productivity and efficiency of the product. They also put forward the case where because it being such a fast-paced environment the interactions with the user have decreased i.e. the BA was the only one interacting as compared to the entire team being involved in the process.

From a business analyst's point of view, keeping up with the changing requirements was a little hard to adjust with. They were used to gathering all the requirements as compared to working on requirements and fixing them on the go. It was a change that required proper training and attention to every minute detail to make sure the overall delivery of the product was successful.

From a tester's/QA point of view, testing had become more difficult than before. This is the set of group where I saw the most resistance to change. For them testing required a lot of rework. Products that was tested and passed would change with the change in requirements thus causing retesting of the same work with a different requirement. A lot of training and motivation was

required with this group. They were just happy testing the whole product then testing the product in small increments and then overall again.

### **Summary of all the work**

The research found that the application of agile methodology in public sector was accepted widely with success, there were some resistance to the change and lack of support from the upper management but at the same time they were cooperative of the effort.

The team members who involved with the transition effort openly accepted the positive effect of agile on the project, how the agile method has helped increase the efficiency and output, how training or an agile coach will make the overall experience much better. The members through questionnaire expressed their satisfaction of agile and how they would prefer the members are educated more on the same.

The various factors that were analyzed and formulated in the results and findings show how each area affected the adoption of agile. The type of project played an important role with suitability and adoption of agile; the study showed that web based software projects or projects that deal majorly with the front-end functions use agile as compared to back end or networking related projects. The major resistance to adoption of agile was lack of training or support from upper management. Inadequate training and support for the members was the most important reason to not adapt to agile. The age-old norm of resistance to change, people set in their ways of working also was another factor

At the same time, we saw agile has helped teams in many ways some of the majorly highlighted was using the customer expectations were met, the users were more involved, being agile and iterative its more flexible, acceptance of change, lower development cost were one of the many

positives of agile. Some of the other concerns pointed was continues development, shorter sprint times and quality analysis

Additional research or study should be conducted after making sure the concerns are addressed and how the team reacts to agile and see if the members are comfortable or have concerns that could be solved for.

### **Recommendations**

The study found that, the most important factor that affected the acceptance of agile was resistance to change and lack of training. The recommendation is to provide proper information and have the employees involved right from the beginning so that they think that they are an integral part of change and accept it completely. Proper flow of information from upper management to lower management should be done so as transparency is maintained and the employees feel that they are well informed. This would also help in gaining trust and wider acceptance.

The employees must be provided with proper training to understand the importance of agile implementation and the benefits of how agile works and how it would support their day to day activities and help achieve goals. It would also help them understand how their cooperation would help the organization achieve its goal and help increase productivity.

The other major recommendation would be to hire an agile coach or provide training to members and make them confident enough to accept and work in an agile environment. Encourage the non-web based projects to adapt to agile and have teams record results for success or failure, provide the lessons learned that could be studied and used for future.

## **Limitations**

One of the limitation to this study was that the users chosen to interview the request was sent to a wider population especially the leads and they had to confirm their participation and assigning of resource to the study. This could thus be a biased sample where the members chosen could have been the one who were more accepting of agile methodology or they were a part of the training group.

The other limitation for this research was that there was a very small module where the comparison could be made. If an entire module was implemented using both the methodologies, the overall productivity, efficiency and quality of the product could have been compared. Also, no attention was provided in conducting analysis as to if every project that could be implemented could use agile or waterfall would be a better alternative or a hybrid model could be implemented.

The other limitation is from the anonymous survey, not knowing the exact users who took part; some of them may not have been part of the agile team but might have stated their opinion through it without application of agile in their projects. There is a possibility of users who were not at all happy with agile were never included or made part of this study.

The major limitation is that this study is about the group which was lightly trained for agile and how the team used the limited knowledge to implement in agile. The opposite of which would be to see how a team would perform if very good training and an able agile coach was provided and compare the results between these two and see which stands better and what are the benefits or negatives.

## **Future Work**

The results and discussion provides a clear picture of how agile methodology is applied and accepted. It also provides with alternatives and actions that could be conducted to help smooth transitioning and cooperation of all users.

One of the most important aspect that could be further studied upon is training. This appears to be one of the biggest issue that has risen in the organization I conducted surveys. A deeper analysis could be conducted to understand the reason how not being properly trained could cause a difficulty in implementation of agile.

One thing that was brought up in all discussions and meetings was the lack of proper training that was given to the lower management people. The training provided to upper management was not completely passed on to the lower management people. This created a lot of confusion and resistance from the lower management thus increasing the time for implementation and smooth transition.

Some of the future study to further enhance the results would be to conduct an in depth and detailed questionnaire to find all the issues faced with Agile in Public and Private sectors, compare the commonalties and see how each sector addressed those concerns, lessons learned could be the right way to start from each organization. The other research opportunity is to compare how the social factors affect in each organization and how it affects the success of agile. Another work that could be done is to research and find the agile training that fits for all teams.

## **Conclusion**

The decision to adapt Agile should be well informed for all users and well thought, by properly analyzing the best practices and suitable of it to the organization. The most common issue of managerial support or dis interest plays a major role in success or failure of any project. The resistance to change has been the most important reason for failure of major initiatives. Thus, proper education for all the members, immense support and interest from upper management should be cultivated right from the beginning. The members should be made passionate about the adoption by educating them about the benefits and constant training efforts to make them more comfortable with the concept. Addressing their concerns and making sure to have an environment where the members could openly approach the superiors with thoughts and concerns should be encouraged.

In the long run a continues effort to have the members realize the positive and benefits of agile over other methods will help win over the resistant users and wide acceptance of agile in public sector. The lessons learned from previous transitions efforts must be carefully studied, the good and bad must be accepted. See how the positives can be used for maximum output, at the same time use the known issues and mitigate them to make sure the transition or use of agile is promoted. Find the type of projects which are best suited for agile and other projects which may not be a fit would be fine to continue using the existing methods. As per the survey the major groups that used traditional methods are seeing the benefits of agile and are open to moving to agile and make sure to help others learn and succeed as a team.

## REFERENCES

Alnatheer, A. (2014). The investigation of security issues in agile methodologies. Southampton , 359.

AMBLER, S. Agile Modeling: Effective Practices for eXtreme Programming and the Unified Process. New York: Wiley Computer Publishing, 2002. 402 p.

Spundak M., (2104) "Mixed Agile/traditional project management methodology – reality or illusion?"

Procedia – Social and behavioral sciences 119 pp. 939-948.

C. Larman, and V. R. Basili, "Iterative and Incremental Development: A Brief History," *IEEE Computer Society*, vol. 36, no. 6 pp. 47-56, 2003.

Carlos, Garcia,( 2013) Overcoming the Limitations of Agile Software Development and Software Architecture, SE 371

The Agile Unified Process wiki pg. [Online]. [https://en.wikipedia.org/wiki/Agile\\_software\\_development](https://en.wikipedia.org/wiki/Agile_software_development)

<https://pdfs.semanticscholar.org/eb85/fe306e439d59c5556f7838df1f90c83a5455.pdf>



## Appendices

### Definitions

**Agile:** A framework of software development which uses iterative approach in building incremental solutions

**Iterative Development:** Developing the larger solution in phases or small increments and delivering it to the user for use or test

**Working Prototype:** The small incremental systems that works as per the requirements which are later integrated into a full-fledged system

**Burndown Chart:** Chart to depict the progress in implementation which shows time and the work that is yet to be completed

**Acceptance Criteria:** The criteria that is stated by the user for a given requirement, the user will accept the functional only if the given condition is met

**Acceptance Testing:** The steps to identify and determine if the acceptance criteria has met or not.

**Bugs:** The reason or fault that makes the implemented solution fail or give results that do not match the expectations

**Scope Creep:** This is additional features added to the initially decided functionality which complicates and compromises on ease use of use.

**Daily Scrum Meeting:** This meeting happens every day for short duration where each members shares the progress or any challenges they face in completion of the activities

**Sprint:** It is the length of time – fix cycles in which the team assures to deliver working products as per the requirements

**Product Backlog:** This stores all the requirements that need to be implemented, in each sprint the items in the product log is discussed and included into the development.

**Product Owner:** The Subject Matter expert who serves as the main point of contact from the business and is responsible for making sure that the team provides value for the money that is being invested

**Retrospective:** The session where the team goes through the lessons learned and discusses the positives and negatives and share ideas and view of how to make things better