Case Study: National Employment Service Implementation Project Analysis

Muzaffar Kosimov
Clark University, mkosimov@clarku.edu

Capstone Report

Carpe Diem

Capstone Project Name: National Employment Service

Student Name:

Muzaffar Kosimov

Manish Kumar

Zainab Idowu

Sanjay Chauhan

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Instructor – Mary Piecewicz

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It had been a great pleasure to work as a team and to learn skill which we will be able to use in our profession life.

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Executive Summary

The case study was a comparison between the two methodologies waterfall and agile. These are the most widely used methods and have their pros and cons and the selection purely depends on the project requirements.

The detailed study shows that waterfall is a great way for project management if the requirements are available upfront and there is not much change envisaged during the execution. As the name suggests this method follows one phase after the other and has a lot of interdependencies. The team configuration is also such that they are engaged as per the requirement of each phase.

Agile on the other hand is a lot of change welcoming as the process is iterative and there is constant feedback from the customer side. It is also ready to adapt the changes on regular basis. The team is multifunctional, so a single team handles all the aspects of the project.

In the National Employment Service Project, the requirement was to develop a web portal where both job seekers as well as the recruiters can interact, and the overall process is smoothened.

In the case study, we compared both the philosophies and evaluated them. The result was that the Agile method would have been well suited for the project with a considerable saving in cost and time.

Section 1: Method

The business problem at hand here was to create a website such that both recruiters and job seekers can have a common platform to interact. The project was initially done in the waterfall method and we after much deliberation decided to work on the requirements and find out if there was any better method to do the task.

The thorough research based on the value generation of the project convinced us that Agile was a better option as compared to waterfall for achieving the better outcomes.

Section 2: LITERATURE REVIEW

Literatures have written about the Waterfall and Agile Methodology, compared them and in this, we will be starting literatures on waterfall, followed by Agile then we will move to literatures that compared the two looking at their advantages and disadvantages

The waterfall model is a static model, and it approaches systems development in a linear and sequential manner, completing one activity before the other. (Adenowo & Adenowo, 2020). The waterfall methodology is a formal process, with each phase comprising a list of detailed tasks with accompanying documentation and exit criteria. Larger enterprises often require the use of SDLC methodology products, particularly in larger IT application projects. This is also the approach that Software Developers use when building IT applications for their customers, since budget, resources, deliverables, and scope have to be managed on a very disciplined basis (Sherman,2015). A traditional software development methodology, typically referred to as waterfall, is a linear approach to development that has distinct project life cycle phases that are completed in sequence, assumes events affecting the project are predictable, all tools and activities are understood, and stresses the importance of upfront requirements gathering (Hass, 2007). Waterfall tends to work best for bigger projects, when team members are distributed and fluctuate frequently, and when system criticality is high (Špundak, 2014)

Agile software processes are an iterative and incremental based development, where requirements are changeable according to customer needs (Sheetal Sharma et al, 2012). Agile process is an

iterative approach in which customer satisfaction is at highest priority as the customer has direct involvement in evaluating the software. Fowler and Highsmith (2001) present the purpose of the agile methodology as a way of developing software by 'just doing it' and helping others with these values:

• Individuals and interactions over processes and tools.

• Working on software over comprehensive documentation.

 • Customer collaboration over contract negotiation; and

• Responding to change over following a plan.

The agile methods do require some upfront planning, significant communication, and collaboration with customers to provide project requirements for the first release, recognizing that more planning overall is performed in agile projects but is spread across the entire development cycle rather than performed up front (Serrador & Pinto, 2015).

ADVANTAGES AND DISADVANTAGES OF WATERFALL

The key advantages of traditional project management are the fixed processes with clear roles and responsibilities, and stable, systematic, and documented planning. Also, the ability to predict the capacities of the team members (based on the planning) and the measurability of the project progress (by planned milestones) are perceived as beneficial (Thesing et al., 2021)

The advantages of the waterfall methodology as stated by (Sheetal Sharma et al, 2012):

Requirements are completed early in the project, enabling the team to define the entire project scope, create a complete schedule, and design the overall application.

It improves resource utilization because tasks can be split to be worked in parallel or grouped to leverage resource skills.

It is a better application design because there is a more complete understanding of all the requirements and deliverables.

The project status is more easily measured based on a complete schedule and resource plan.

The disadvantages of the waterfall methodology are that:

The largest disadvantages of classical project management are abstract and misinterpreted

initial requirements which lead to mistaken assumptions in the planning process, as these can have a great impact on the future project process. This shortcoming is closely related to the equally significant disadvantage that customers are often overburdened with the need to specify all requirements clearly and in detail at the very beginning of the project, which means that planning is fraught with uncertainty. (Thesing et al,2021). (Sheetal Sharma et al, 2012) explained the disadvantages of waterfall as follows

It is often difficult, particularly in business intelligence, to get complete business requirements up front in a project, because businesspeople have not really thought through in detail what they need, and business requirements can change during the project.

It requires a very detailed breakdown of the tasks and deliverables for the overall BI application, which may be beyond the project team's capability or experience at the start of the project.

Although waterfall projects do not inherently have to span lengthy periods of time, it is very common for these projects to span months or quarters because of the emphasis on trying to get everything done at one time, i.e., the "big bang" approach. The likelihood of projects being late, over budget, and failing to meet expectations rises as the timeframe for an IT project significantly increases.

ADVANTAGE OF AGILE

According to the experts, the greatest advantage of agile project management is the ability to recognize changed requirements in a very short time due to regular feedback from the customer. Also, the benefit of quickly identifying errors based on the short feedback-and-development cycles is considered a major advantage. This goes hand-in-hand with the third great advantage: the ability to react flexibly and quickly to dynamically changing customer requirements with regards to project scope (Thesing et al,2021)

DISADVANTAGES OF AGILE

The most important constraint of an agile approach is that the iterative approach may not fit the corporate culture, in terms, for example, of planning, reporting, hierarchical structures, and

leadership. Furthermore, project success depends strongly on the team's skills and its members' ability to organize. (Thesing et al,2021)

KEY PROJECT MANAGEMENT SKILL DEVELOPED BY AGILE

According to (Alexander, 2018) he stated the key skills that will be developed by teams using Agile as follow.

- An ability to cut through unnecessary work and focus only on essential work
- Sound judgment under pressure and the ability to remain calm under stress
- Strong motivation and coaching skill to guide and support teams throughout a project
- Exceptional organizational abilities to keep everything straight and prioritize
- The ability to think and make decisions quickly as circumstances change rapidly
- A high level of adaptability in order to accept change and reduce unnecessary confusion and risk
- Communication

KEY PROJECT MANAGEMENT SKILL DEVELOPED BY WATERFALL METHODOLOGY

According to (Sheetal Sharma et al, 2012) the following are skills developed when project managers use waterfall methodology

Change Management

Documentation

Budgeting

Planning

Time Management

Forecasting

Section 3: Background Information

NES: National Employment Service was a project on which I had worked as a developer. It is a job portal which we had developed for KSA clients. It is a job portal with below common services as other job portal.

•   Employer and job seeker both can register on this and manage their profile.

•   Create and manage different recruitment and specifications.

•   Manage membership.

•   Also provide help desk service.

This project was developed on waterfall methodology with a leaner approach, and it provides a common platform where both job seekers and employers deal with their job vacancies.

Technology stack: JAVA, J2EE, SPRING, HIBERNATE, WEBSERVICES.

Team Size: 8
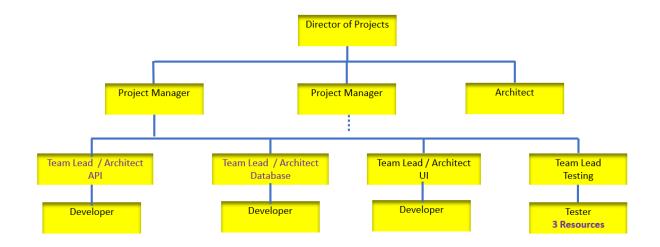
Duration: 15 months

Waterfall

Organizational chart for the Project

Organizational structure followed for the selected project was of Team Structure type. A team-based organizational structure creates small teams that focus on delivering one product or service. These teams are capable of solving problems and making decisions without bringing in third parties. Find the organizational chart as below –

Responsibility Matrix

Project Tasks	Project Manager	Team Lead	Developers	Testers	Architect	Project Director
PROJECT CONCEPTION AND INITIATION						
Set Kickoff Meeting	R/A	I		I	C/I	C/I
Project Charter	R/A	C/I	I	I	C	I
Research and gather requirement	R/A	C/I	I	C/I	C	I
Identify Stakeholders	R/A	C/I			C	I
Agree on Objectives	R/A	C/I			C	I/C

Project Tasks	Project Manager	Team Lead	Developers	Testers	Architect	Project Director
Project Definition and Planning						
Scope & Goal Setting	R/A	C/I	I	I	C/I	I
Design & BRD Document	A	R	I	I	C/I	I
Budgeting	R/A	C/I	I	I	C/I	I
Communication Planning	R/A	C/I	I	I	C/I	I
Timeline setting	R/A	C/I	I	I	C/I	I
Risk Management	R/A	C/I	I	I	C/I	I
Detailed Requirements	A	R	I	I	C/I	
Hardware and Software Requirements	A	R	I	I	C/I	
Final Resource Plan	R/A	C/I	I	I	C/I	I
Technical Requirements	A	R	C/I	I	C/I	
Project Execution						
Resource allocation	R/A	I	I	I	C/I	I
Status Report	A/I	R	I	I	I	I
Development meeting	A	R	I	I	I	
DB/API/UI Development	I	A	R	I	C/I	
QA/UAT Testing	I	A	C/I	R	C/I	
Bug Fixes	I	A	R	C	C	
System Integration Testing	I	A	C/I	R	C/I	
Project Performance / Monitoring						
Project Objectives Review	R	C/I	I	I	C/I	A
Project Performance	R/A	C/I	I	I	C/I	I
KPI's	R/A	C/I	I	I	C/I	I
Effort & Cost Tracking	R/A	C/I	I	I	C/I	I

Project Schedule -

PROJECT NAME	National Employment Service		PROJECT MANAGER	John K.
PROJECT DELIVERABLE				
SCOPE STATEMENT				

Capstone (Team Carpe Diem) - National Employment Service Project

START DATE	03/01/2014	END DATE	07/15/2015	OVERALL PROGRESS	100%

TASK NAME	ASSIGNED TO	START DATE	END DATE	DURATION in days	STATUS	COMMENTS
PROJECT CONCEPTION AND INITIATION		03/01/2014	05/01/2014	60		
Set Kickoff Meeting	Alex B.	03/01/2014	03/15/2014	15	Complete	
Project Charter	John U.	04/16/2014	04/25/2014	10	Complete	
Research and gather requirement	Nancy R.	03/16/2014	04/05/2014	20	Complete	
Identify Stakeholders	Piya H.	04/06/2014	04/16/2014	10	Complete	
Agree on Objectives	Frank C.	04/25/2014	05/01/2014	5	Complete	
Project Definition and Planning		05/01/2014	08/30/2014	128	Complete	
Scope & Goal Setting	Mona K.	05/01/2014	05/20/2014	20	Complete	
Design & BRD Document	Shyla J.	05/20/2014	06/05/2014	15	Complete	
Budgeting	John U.	06/05/2014	06/15/2014	10	Complete	
Communication Planning	Tezz R.	06/15/2014	06/25/2014	10	Complete	
Timeline setting	Vilo O.	06/25/2014	07/05/2014	10	Complete	
Risk Management	Alex B.	07/05/2014	07/25/2014	20	Complete	

Detailed Requirements	Jacob S.	07/25/2014	08/01/2014	5	Complete	
Hardware and Software Requirements	Jacob S.	08/01/2014	08/10/2014	10	Complete	
Final Resource Plan	Jacob S.	08/10/2014	08/20/2014	10	Complete	
Technical Requirements	Frank C.	08/20/2014	08/30/2014	10	Complete	
Project Execution		08/30/2014	06/05/2015	275	Complete	
Resource allocation	Alex B.	08/30/2014	09/05/2014	5	Complete	
Status Report	Liyo K.	09/05/2014	09/10/2014	5	Complete	
Development meeting	Alex B.	09/10/2014	09/15/2014	5	Complete	

|						
DB/API/UI Development	Shari W.	09/15/2014	04/15/2015	210	Complete	
QA/UAT Testing	Kennedy K.	04/15/2014	05/15/2015	30	Complete	
Bug Fixes	Jacob S.	05/15/2015	05/25/2015	10	Complete	
System Integration Testing	Kennedy K.	05/25/2015	06/05/2015	10	Complete	
Project Performance / Monitoring		06/05/2015	07/15/2015	40	Complete	
Project Objectives Review	Satyam L.	06/05/2015	06/15/2015	10	Complete	
Project Performance	Rahul J.	06/15/2015	06/30/2015	15	Complete	
KPI's	Bob O.	07/01/2015	07/05/2015	5	Complete	
Effort & Cost Tracking	Ted L.	07/05/2015	07/15/2015	10	Complete	
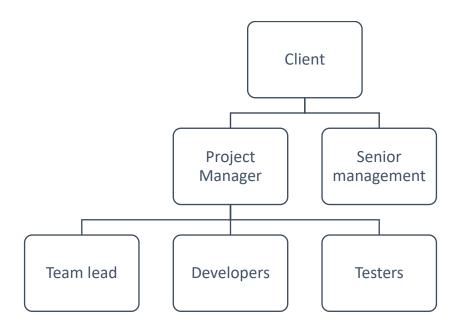
Customer/ Stakeholder Interaction in Waterfall

This is the process the team/organization communicates with each other and their clients/customers.

This involves listening, collaborating, informing amongst themselves. The first thing to do is identify who the actual stakeholders are, their stake in the project, prioritizing them to know the best way to communicate with them. It helps teams and organizations proactively consider the needs and desires of anyone who has a stake in their organization, which can foster connections, trust, confidence and buy-in for your organization's key initiatives. When done correctly, stakeholder and client interaction can reduce potential risks and conflicts with stakeholders, such as uncertainty, dissatisfaction, misalignment, disengagement, and resistance to change.

In this project, there was minimal stakeholder and customer interactions between the team members, senior management, and the client. The development team met with the team lead

frequently but less frequently with the project manager. The project Manager was the one that met with the senior management, clients and communicated changes and requirements to the team lead who in turn reverted to the development team.

The development team didn't meet with the client until deployment and production support when the software was deployed.

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                    ┌─────────┐
                    │ Client  │
                    └────┬────┘
            ┌────────────┴────────────┐
     ┌──────┴──────┐          ┌────────┴────────┐
     │   Project   │          │     Senior      │
     │   Manager   │          │   management    │
     └──────┬──────┘          └─────────────────┘
      ┌─────┴──────┬──────────────┐
┌─────┴─────┐ ┌────┴─────┐  ┌─────┴─────┐
│ Team lead │ │Developers│  │  Testers  │
└───────────┘ └──────────┘  └───────────┘
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STAKEHOLDER ENGAGEMENT MATRIX

Stakeholder	Risk	Influence	Interest	Project Phases					Engagement level
				Initiation	Planning	Execution	Control	Close	
Senior Management	High	High	low	R	I	I	C	C	low
Project Manager	High	Medium	High	R	A	C	R	C	High

Team Lead	Medium	Medium	Medium	C	R	R	A	R	High
Developers	Low	Low	Low	I	C	A	R	I	High

Budget Allocation -

WBS Code	Name	Group	Est Hours	Est Cost 101829
1.1	**Organizational Needs Assessment**		120	$30,000.00
1.1.1	Define organizational objective	Organizational Needs Assessment	22	$5,500.00
1.1.2	Develop a plan for collecting information	Organizational Needs Assessment	12	$3,000.00
1.1.3	Identify and hire project team members	Organizational Needs Assessment	34	$8,500.00
1.1.4	Implement the data gathering plan	Organizational Needs Assessment	40	$10,000.00
1.1.5	Interpret and report findings	Organizational Needs Assessment	12	$3,000.00
1.2	**Identify Consultants**		80	$20,000.00

WBS Code	Name	Group	Est Hours	Est Cost 101829
1.2.1	Determine the level of training required	Identify Consultants	16	$4,000.00
1.2.2	Perform initial screening of applicant pool	Identify Consultants	24	$6,000.00
1.2.3	Interview potential candidates	Identify Consultants	40	$10,000.00
1.3	**Hire Consultants**		120	$30,000.00
1.3.1	Gather required information from the consultants	Hire Consultants	40	$10,000.00
1.3.2	Create a bid package	Hire Consultants	40	$10,000.00
1.3.3	Negotiate and close contract	Hire Consultants	40	$10,000.00
1.4	**Design / Configure System**		180	$45,000.00
1.4.1	Identify necessary hardware	Design / Configure System	30	$7,500.00
1.4.2	Configure software	Design / Configure System	80	$20,000.00
1.4.3	Configure system for Internet access	Design / Configure System	40	$10,000.00
1.4.4	Test software	Design / Configure System	30	$7,500.00
1.5	**System Planning**		850	$212,500.00
1.5.1	Design & BRD document	System Planning	200	$50,000.00
1.5.2	Develop risk assessment	System Planning	100	$25,000.00

WBS Code	Name	Group	Est Hours	Est Cost 101829
1.5.3	Develop implementation plan	System Planning	100	$25,000.00
1.5.4	Communication plan	System Planning	40	$10,000.00
1.5.5	Budgeting	System Planning	50	$12,500.00
1.5.6	Scope & Goal setting	System Planning	160	$40,000.00
1.5.7	Final resource plan	System Planning	80	$20,000.00
1.5.8	Timeline setting	System Planning	80	$20,000.00
1.5.9	Develop test plan	System Planning	40	$10,000.00
1.6	**Implementation**		2200	$550,000.00
1.6.1	Create internet/email usage policy	Implementation	80	$20,000.00
1.6.2	Create a pilot test group	Implementation	4	$1,000.00
1.6.3	Develop training manual	Implementation	120	$30,000.00
1.6.4	Purchase materials required for project	Implementation	80	$20,000.00
1.6.5	Sign contracts for office connectivity	Implementation	40	$10,000.00
1.6.7	Install hardware	Implementation	24	$6,000.00
1.6.8	Install server software	Implementation	16	$4,000.00
1.6.2.3	Test Hardware	Implementation	16	$4,000.00
1.6.2.4	Deploy the software for the company	Implementation	16	$4,000.00
1.6.2.5	DB Development	Implementation	348	$87,000.00
1.6.2.5	UI Development	Implementation	400	$100,000.00

WBS Code	Name	Group	Est Hours	Est Cost 101829
1.6.2.6	API Development	Implementation	600	$150,000.00
1.6.2.7	QA/UAT/Production Testing	Implementation	200	$50,000.00
1.6.2.8	Test Security System	Implementation	16	$4,000.00
1.6.2.9	System Integration Testing		40	$10,000.00
1.6.3.1	Test Server Software	Implementation	16	$4,000.00
1.6.3.2	Monitor users	Implementation	160	$40,000.00
1.6.3.3	Train All Users	Implementation	24	$6,000.00
1.7	**Post Evaluation and Maintenance**		320	$80,000.00
1.7.1	Finalize system documentation	Post Evaluation	80	$20,000.00
1.7.2	Project objective review	Post Evaluation	100	$25,000.00
1.7.3	Project performance review	Post Evaluation	100	$25,000.00
1.7.4	Post implementation evaluation	Post Evaluation	40	$10,000.00
1.7.4	Post implementation development changes	Post Evaluation	200	$50,000.00
1.7.4	Post implementation testing	Post Evaluation	100	$25,000.00
1.7.4	Create post implementation documentation	Post Evaluation	40	$10,000.00
Total		**Hours**	**4040**	**$1,010,000**

Risk Management

Risk management is a "method of managing that concentrates on identifying and controlling the areas or events that have a potential of causing unwanted change… it is no more and no less than informed management" (Caver 1985). Risk management is an integral part of project management, and it should also be part of every project to allow the smooth sailing of that project

Five steps that are part of Risk Management -

- **Identify the Risk**

Risks are unavoidable in a project be it the positive and negative, that Is why it needs to be planned for to mitigate or enhance it. Before any risk can be managed, it needs to be first identified. This initial activity encourages/improves communications and expectations of the project

- **Analyze the Risk**

After the different risks have been identified by the team, each risk must be analyzed to understand it, it severity, its probability and how it can affect the project.

- **Evaluate the Risk**

In this stage, we prioritize these risks, ranking them by putting into consideration their probability and severity. They are different methods to do this, it can be quantitative or Qualitative dependent on what the team decides to use. With these, the risks are ranged by urgency or importance and it provides a holistic view of the risk, where efforts should be channeled to.

At the point, response strategies would have been built, budgets set aside, and risk assigned to owners. This way the project won't be stalled when these risks happen

- **Treating the Risk**

Treating the risk is where we attack any risk that shows up

- **Monitoring and Reviewing the Risk**

The risk management process is an ongoing process till the end of the project and the risk register is a living document that should be monitored and updated periodically, after some risks have happened it should still be monitored and reviewed.

Five Steps of Risk Management Process   Risk

Management process for this project -

The risk management process in this project was done by the project manager in conjunction with the team lead. The team lead and the project manager created a list of risks that they thought could affect/impact the project. Then they analyzed and evaluated the risk to come up with mitigation / enhancement techniques and assigned that list to the respective people who will be in charge of it

RISK REGISTER

DESCRIPTION OF RISK	PROBABILITY	SEVERITY	OWNER	LOSS SIZE	MITIGATION
INSUFFICIENT QA TIME	65%	High	QA	10 days	Adding buffers to the testing time
INAVALIABILITY OF SAMPLE DATA TO VALIDATE SOFTWARE	35%	Low	Project Manager	6 days	Ordering for the data a month before using
INAVAILABILITY OF STAFF DUE TO VARIOUS REASONS	25%	High	Project Manager	2 days	Pairing resources up to work
LACK OF CLEARLY DEFINED SCOPE	20%	High	Team Lead	20days	Having weekly status meeting where expectations and concerns are communicated

Change Management

Change control is an important part of the project wherein we define the process required to monitor and control changes in the project. As per PMBOK 'In predictive projects, the project team actively manages changes to the work to ensure only approved changes are included in the scope baseline. Any changes to the scope are then accompanied by appropriate changes to the people, resources, schedule and budget. Scope changes can add to uncertainty; therefore, any change request should be accompanied by an evaluation of secondary risk that may get introduced due to change.

The project being discussed had no proper change control method and hence the changes were being managed in a very centralized way and the project manager solely used to take decisions about the changes to be implemented. No proper workflow was in place nor was the team was involved in evaluating the change in a detailed way. Mostly the team lead was informed about the changes to be made and it was his responsible to implement it with the help of the team.

Constraints

As a project manager, we find triple constraint is every project because it consists of three elements that are essence of each project: Time, Scope, and Cost. Project managers should carefully manage the triple constraint since it is ultimate source of project success. These three constraints – Time, Scope, and Cost- are interrelated (**Figure 1**), meaning that any change in one of the constraints can affect the remaining one or two elements. For example, any change in scope might affect the timeline/cost of a project. Let`s say, we decided to increase the scope of our project which means our project`s timelines will ultimately be increased as well since additional work is added to our project or if our project is time-sensitive and we have to complete it on time then we will require extra fund to complete our project within projected timeline, in other words:

Scope change = change in time and/or cost

Cost change = change in time and/or scope

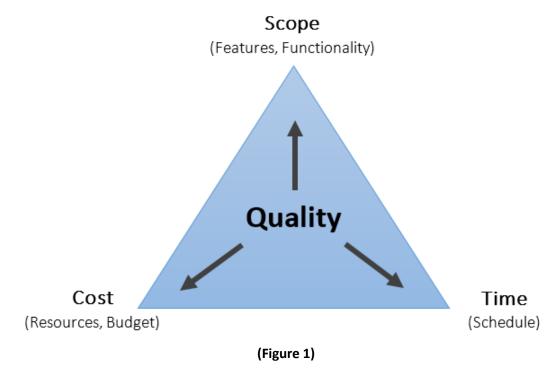**Time change = change in scope and/or cost**

Constraints in the NES Project -

As for our National Employment Service project, the primary constraint for the project was – Time because it was completed in 14 months instead of 12 months. Some of the employees had to come
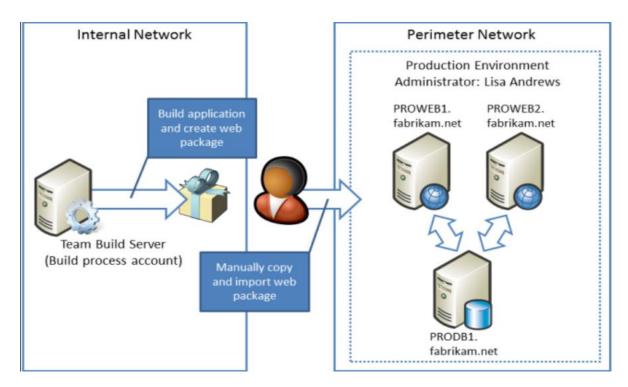
to the office during the weekends and work overtime to complete the project as soon as possible due to mistakes in the initial project planning. Time constraint resulted in an increase in the project`s budget. Costs increased because the company had to pay overtime for its employees who were working during weekends and additionally the 3rd party company was employed to help them in the completion of the project.

(Figure 1)

Source: Iron Triangle — Triple Constraints of Project Management | by Harpreet Dhillon | Medium

Delivery of the project

For delivery of project first a deployment plan was created which covers specific aspects such as how to build a deployment plan, our deployment aim, a list of all potential risks that can arise during deployment, a deployment timetable, deployment requirements, and a communication strategy and last package creation and copy the package into production server were prepared prior to deployment.

To prevent deployment-related ambiguity, the deployment procedure on the product server was carefully planned, with each step being logged in the process notes to be follow. Prior to deployment, a risk mitigation measures plan was prepared. Before deployment, the production server was properly set up and operational. A manager, a few developers, and the team leaders were on-site for the project's delivery to support the deployment process. The deployment process included fixing defects and issues on a critical basis. All team members consistently strived to provide a stable atmosphere and results that were as anticipated. Throughout the deployment
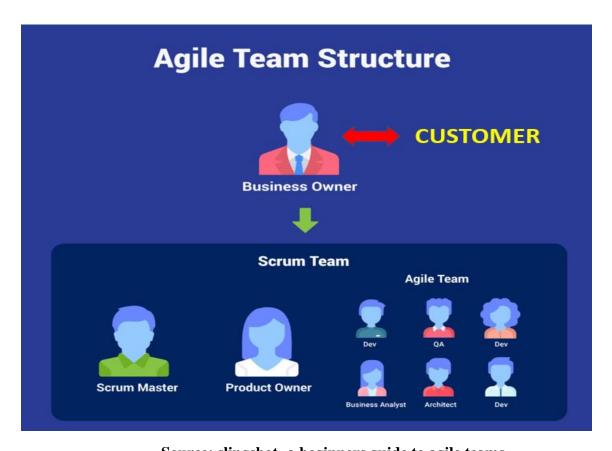
process, the customer was actively involved in each and every step of the deployment and project delivery. The entire deployment procedure, along with ongoing testing and monitoring, took about a month to stabilize the production environment.

Once it has stabilized, the client has received the appropriate instruction and knowledge transfer so that they are familiar with the system to use. To hand over the project, all supporting documentation was created, reviewed, and approved by the client.

AGILE

Organizational Structure for project

The organizational chart followed in Agile is defined in a way to manage the ever changing evrionment. The 'National Emloyment Service' project was done in SDLC and hence separate teams for development and testing were identified, however in Agile we could have same team with cross-functional skillset. There has to be a constant dialogue with the customer and the releases will be planned in smaller sprints of two weeks. Instead of Project Manager who is responsible for the output of the team, Agile has Scrum Master who is more of a coach than a manager. Scrum master makes sure that the team in working in sync and with maximum efficiency to deliver the best output.

Source: slingshot- a beginners guide to agile teams

Responsibility Matrix (Agile)

Project Tasks	Business Analyst	Product Owner	Developers	QA	Scrum Master	Architect	Business Owner
Concept							
Project Charter	R/A	R	I	I	C/I	C/I	I
Research and gather requirement	R/A	C	I	I	C/I	C/I	
Identify Stakeholders	R/A	R/A	I	I	C/I	C/I	I
Agree on Objectives	R/A	C	I	I	C/I	C/I	I
Scope & Goal Setting	C	R/A	I	I	I	C/I	I
Inception/Requirement Identification							
Resource allocation and form team	I	R	I	I	R/A	C/I	I
Define system architecture	I	I	C	C	R/A	C	I
Budgeting	C	R	I	I	R	C/I	I
Plan the release	I	R/A	C/I	C/I	R	C/I	I
Develop test strategy	I	I	C	C	R/A	C/I	I
Risk Management	I	C/I	I	I	R/A	C	I
Create backlogs	I	R/A	I	I	R	C/I	I
Prioritize the task	I	R/A	I	I	C/I	C	I
Create sprint backlog	I	R/A	I	I	R	C/I	I
Project Execution							
Set Kickoff/Scrum Meeting	I	A	I	I	R/A	C	I
Status Report	I	I	C	C	R/A	C/I	I
DB/API/UI Development	I	I	R	R	R/A	C/I	I
Project Release							
QA/UAT/PROD Testing	I	I	R	R	R/A	C/I	I
Bug Fixes	I	I	R	R	R/A	C/I	I
System Integration Testing	I	I	R	R	R/A	C/I	I
User and Client Training	R/A	C	I	I	C	C	
Release signoff	A	R	I	I	C/I	C/I	I
Sprint review & Retrospective Meeting	I	R	I	I	R/A	C/I	I
Project Performance / Monitoring							

Project objectives review	R/A	R/A	I	I	R	C	I
Project Performance	R/A	R/A	I	I	R	C	I
KPI's	R/A	R/A	I	I	R	C/I	I
Effort & Cost Tracking	R/A	R/A	I	I	R/C	C	I

PROJECT SCHEDULE

PROJECT NAME	National Employment Service		PROJECT MANAGER	John K.
PROJECT DELIVERABLE				
SCOPE STATEMENT				
START DATE	03/01/2014	END DATE	07/15/2015	OVERALL PROGRESS	100%

TASK NAME	ASSIGNED TO	START DATE	END DATE	DURATION in days	STATUS	COMMENTS
CONCEPT		03/01/2014	05/01/2014	60		
Project Charter	John U.	04/16/2014	04/25/2014	10	Complete	
Research and gather requirement	Nancy R.	03/16/2014	04/05/2014	20	Complete	
Identify Stakeholders	Piya H.	04/06/2014	04/16/2014	10	Complete	
Agree on Objectives	Frank C.	04/25/2014	05/01/2014	5	Complete	
Scope & Goal Setting	Mona K.	05/01/2014	05/20/2014	20	Complete	
Inception/Requirement Identification		05/01/2014	08/30/2014	128	Complete	
Resource allocation and form team						
Define system architecture	Shyla J.	05/20/2014	06/05/2014	15	Complete	
Budgeting	John U.	06/05/2014	06/15/2014	10	Complete	
Plan the release	Tezz R.	06/15/2014	06/25/2014	10	Complete	
Develop test strategy	Vilo O.	06/25/2014	07/05/2014	10	Complete	
Risk Management	Alex B.	07/05/2014	07/25/2014	20	Complete	

Create backlogs						
Prioritize the task						
Create sprint backlog						

Project Execution		08/30/2014	06/05/2015	275	Complete	
Set Kickoff/Scrum Meeting	Alex B.	03/01/2014	03/15/2014	15	Complete	
Status Report	Liyo K.	09/05/2014	09/10/2014	5	Complete	
DB/API/UI Development	Shari W.	09/15/2014	04/15/2015	210	Complete	
Project Release		08/30/2014	06/05/2015	275	Complete	
QA/UAT/PROD Testing	Kennedy K.	04/15/2014	05/15/2015	30	Complete	
Bug Fixes	Jacob S.	05/15/2015	05/25/2015	10	Complete	
System Integration Testing	Jennedy D.	05/25/2015	06/05/2015	10	Complete	
User and Client Training						
Release signoff						
Sprint review & Retrospective Meeting						
Project Performance / Monitoring		06/05/2015	07/15/2015	40	Complete	
Project Objectives Review	Satyam L.	06/05/2015	06/15/2015	10	Complete	
Project Performance	Rahul J.	06/15/2015	06/30/2015	15	Complete	
KPI's	Bob O.	07/01/2015	07/05/2015	5	Complete	

AGILE SOFTWARE METHODOLOGY CUSTOMER AND STAKEHOLDER INTERACTION

One of the principles of agile is individual interaction over processes and tools. Agile projects

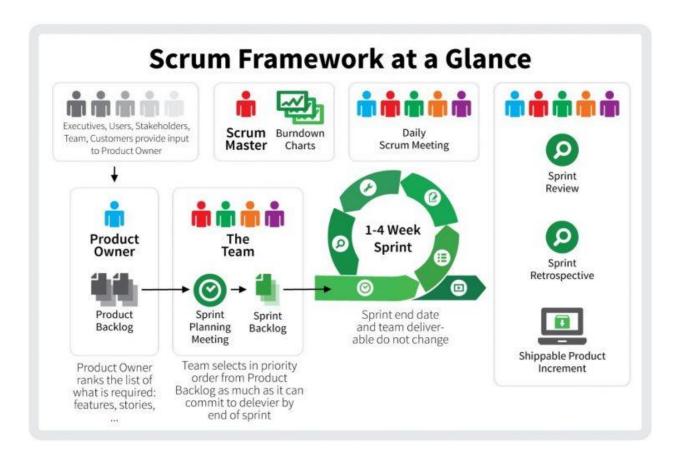encourage and automatically allow an increase in customer and stakeholder interaction. The

customer is a part of the team normally, but if they get too busy or can't get a representative they will be meeting regularly to agree on all decisions. This is essential to agile because everyone needs to be invested and included in all the project's decision.

Agile Projects are also built on change, the customer decides what they want, how the project progresses and they also in turn receives value in increments and fasters. This way they can address any problem the product has or most importantly, releasing the product faster eventually leading to more customer satisfaction.

Agile team also interact more with each other rather than working silo because they are typically a small number of cross-functional team, each one of them is expected to have all the competencies and skills required to complete any project they are undertaking. In Agile teams, titles are not necessary as everyone should be able to wear different hats and help each other towards the final goal of the project. The agile team meets daily for what is called a daily standup meeting where they discuss about how the project is going and how they should move forward.
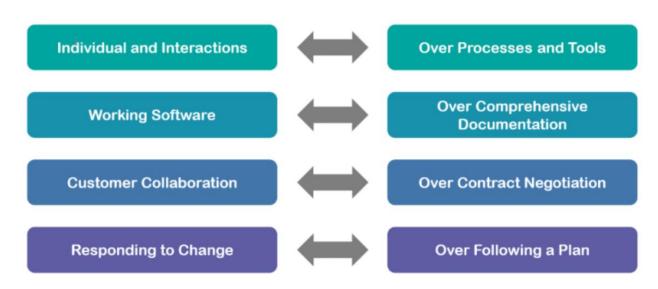
In this project, if we were to use Agile, we would have a composition of the Agile team member, the scrum master/ team lead, and the product owner. Together, they will be having a 15-minute daily standups which the scrum master anchors and ask how the project is going and if they are experiencing any roadblock.
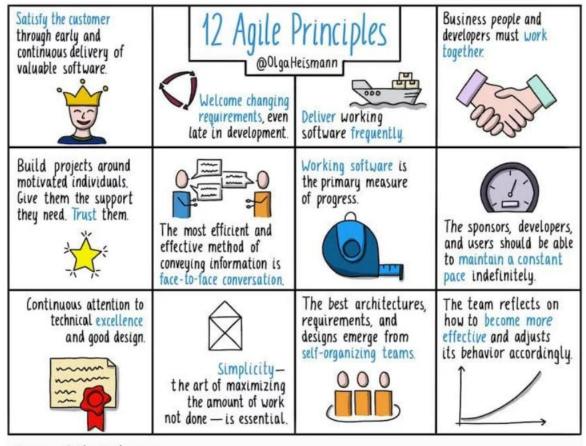
They also sit very close to each other to facilitate interactions.

Source :Agile and scrum for project management- sneakbug8

Manifesto

Source: @OlgaHeismann

Budget Allocation

WBS Code	Name	Group	Est Man-hours	Est Cost
1.1	**Organizational Needs Assessment**		86	$9,749.00
1.1.1	Define organizational objective	Organizational Needs Assessment	22	$5,500.00
1.1.2	Develop a plan for collecting information	Organizational Needs Assessment	12	$3,000.00

WBS Code	Name	Group	Est Man-hours	Est Cost
1.1.3	Identify and hire project team members	Organizational Needs Assessment	20	$5,000.00
1.1.4	Implement the data gathering plan	Organizational Needs Assessment	20	$5,000.00
1.1.5	Interpret and report findings	Organizational Needs Assessment	12	$3,000.00
1.2	**Identify Consultants**		80	$20,000.00
1.2.1	Determine the level of training required	Identify Consultants	16	$4,000.00
1.2.2	Perform initial screening of applicant pool	Identify Consultants	24	$6,000.00
1.2.3	Interview potential candidates	Identify Consultants	40	$10,000.00
1.3	**Hire Consultants**		120	$30,000.00
1.3.1	Gather required information from the consultants	Hire Consultants	40	$10,000.00
1.3.2	Create a bid package	Hire Consultants	40	$10,000.00
1.3.3	Negotiate and close contract	Hire Consultants	40	$10,000.00
1.4	**Design / Configure System**		70	$17,500.00
1.4.1	Identify and configure necessary hardware	Design / Configure System	20	$5,000.00
1.4.2	Configure software	Design / Configure System	40	$10,000.00
1.4.4	Test hardware and software	Design / Configure System	10	$2,500.00
1.5	**System Planning**		480	$120,000.00
1.5.1	Design & BRD document	System Planning	150	$37,500.00
1.5.2	Develop risk assessment	System Planning	50	$12,500.00
1.5.3	Develop implementation plan	System Planning	50	$12,500.00
1.5.4	Communication plan	System Planning	20	$5,000.00
1.5.5	Budgeting	System Planning	20	$5,000.00

WBS Code	Name	Group	Est Man-hours	Est Cost
1.5.6	Scope & Goal setting	System Planning	50	$12,500.00
1.5.7	Timeline setting	System Planning	20	$5,000.00
1.5.8	Sprint plan	System Planning	20	$5,000.00
1.5.9	Create backlogs	System Planning	20	$5,000.00
1.5.10	Prioritize the task	System Planning	20	$5,000.00
1.5.11	Create sprint backlog	System Planning	20	$5,000.00
1.5.12	Develop test plan	System Planning	40	$10,000.00
1.6	**Implementation**		1778	$444,500.00
1.6.1	Kickoff/Scrum Meeting	Implementation	30	$7,500.00
1.6.2	Status Report	Implementation	10	$2,500.00
1.6.3	Create a pilot test group	Implementation	4	$1,000.00
1.6.4	Develop training manual	Implementation	40	$10,000.00
1.6.5	Install the software for the project	Implementation	16	$4,000.00
1.6.6	DB Development	Implementation	348	$87,000.00
1.6.7	UI Development	Implementation	400	$100,000.00
1.6.8	API Development	Implementation	600	$150,000.00
1.6.9	QA/UAT/Production Testing	Implementation	200	$50,000.00
1.6.10	Test Security System	Implementation	16	$4,000.00
1.6.11	System Integration Testing		40	$10,000.00
1.6.12	Monitor users	Implementation	50	$12,500.00
1.6.13	Train All Users	Implementation	24	$6,000.00
1.7	**Post Evaluation**		180	$45,000.00
1.7.1	Finalize system documentation	Post Evaluation	40	$10,000.00
1.7.2	Project objective review	Post Evaluation	50	$12,500.00
1.7.3	Project performance review	Post Evaluation	50	$12,500.00
1.7.4	Post implementation evaluation	Post Evaluation	40	$10,000.00
Total		**Hours**	**2794**	**$692,625**

Risk Management

Agile Risk Management

In Agile managing risk is all about transparency, collaborative planning and customer involvement that is analyzing and talking through everything we are going to do in the project to make sure we can envisage any risk that might occur early with the help of the knowledgeable team members. The customer is involved through out to mitigate customer risk.

Agile Risk Management Process

- Envisioning the product with the customer-

- Quantifying the value with the customer

- Estimation based on history

- Work reviewed at the feature level for more detailed risk evaluation
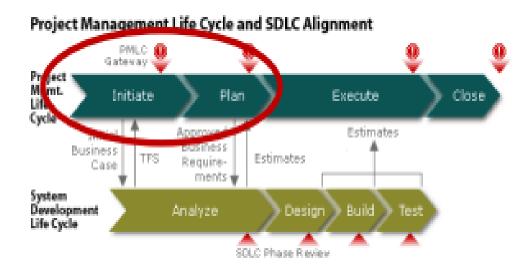
- Daily Standup Meetings where more risks are exposed

- Product demos every 2 to 4 weeks
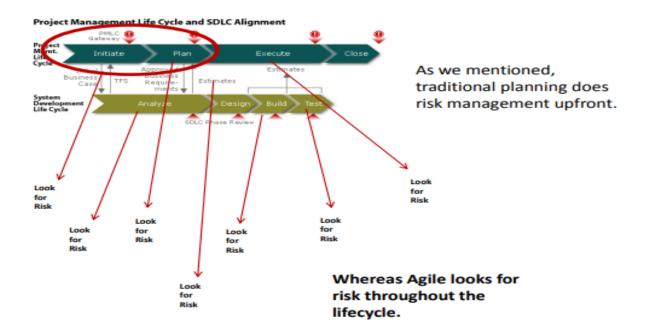
Risk Management in waterfall and Agile frameworks are complimentary just that agile risk management is done more by practices than envisioning, the risks are identified and mitigated throughout the project.

DIFFERENCE BETWEEN TRADITIONAL RISK MANAGEMENT AND AGILE

Source: Agile Alliance-Risk Management in an Agile lifecycle
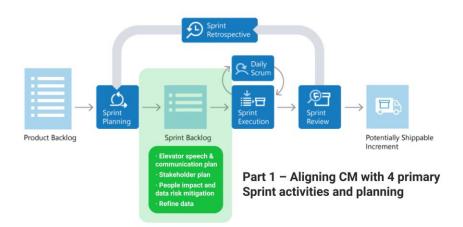
Source: Agile Alliance-Risk Management in an Agile lifecycle
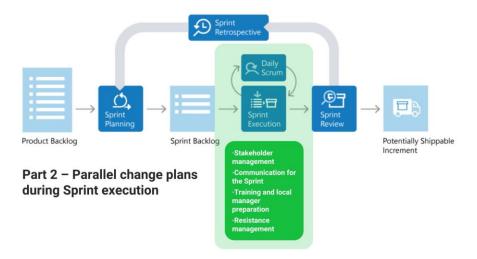
Change Management

In Agile change control is part of the sprint and the backlog goes under the refinement as per the feedback constantly at the start of the sprint. Scrum divides development up into iterations called sprints. Each sprint is 2 to 4 weeks and delivers an executable product increment of agreed upon functionality from the product backlog. Scrum maintains two formal backlogs of requests, a product backlog and a sprint backlog:

Below is the CM implementation in the Agile environment –
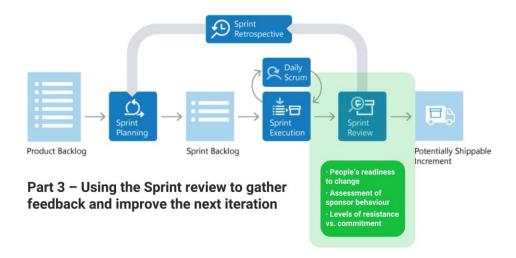
Spring Backlog is refined before the start of each sprint.

Part 1 – Aligning CM with 4 primary Sprint activities and planning

Daily Scrum activities and the sprint execution are constantly checked for proper alignment.

Part 2 – Parallel change plans during Sprint execution

Scrum review or sprint retrospectives are implemented to improve the new sprint.

Part 3 – Using the Sprint review to gather feedback and improve the next iteration
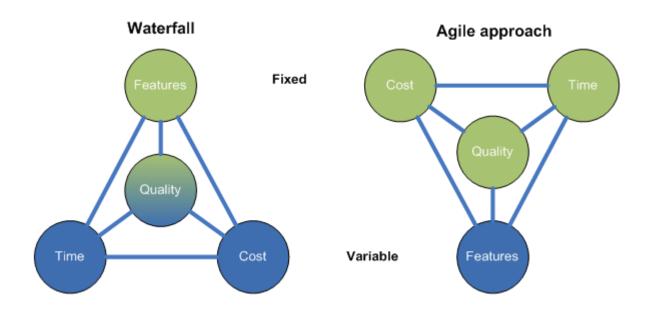
Hence, we can conclude that the Agile environment is aligned to implement the change more efficiently.

Constraints

As mentioned above, projects under waterfall methodology are built upon the basis of the triple constraints. Any change in one of those constraints ultimately affects the rest of the variables. Balancing these constraints is the key factor for successful project completion.
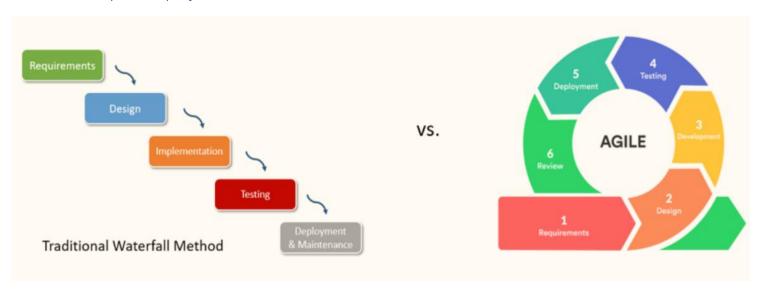
Typically, in a waterfall, the scope/features of a project are seen as being fixed at the beginning and the remaining two variables – time and cost – are adjusted accordingly to come up with an appropriate plan. However, the scope changes often throughout the project life cycle and this changes ultimately have impact on time and cost (**Figure 2**). In other words, as a project moves forward, all three constraints become variable, causing a delay in timeline and budget overruns.

On the other hand, in Agile, these triple constraints are reversed compared to waterfall. In other words, the time and cost are fixed, and scope can be adjusted to prioritize the most important tasks. It works under the assumption that scope is a variable that changes over time. As a result, delivering the most important requirements within the time and budget becomes the main goal. As the project progresses, Agile allows for the addition of new requirements or re-prioritization.

As for National Employment Service Project, this project would have Scope as its constraints and the remaining two variables would be fixed with the implementation of Agile, so that the project could be completed successfully within the timeline and budget by prioritizing the most important tasks accordingly.

(Figure 2)

Source: Agile vs Waterfall Project Management: The Definitive Guide (teamhood.com)

Delivery of the project

The Agile methodology calls for the continuous development, testing, and release to the client of

a minor project component after each sprint. Instead of waiting to finish the entire project over a

longer period as in the waterfall methodology, a component of the project is provided to the client each sprint in the agile technique. It is an ongoing procedure. Instead of being discovered at the end, problems can be addressed during numerous testing and design iterations. For increasingly complex and dynamic enterprises, an agile implementation gives the organization more possibilities to ensure that the software accurately represents the business both at the beginning of the project and at the end. A release plan is created at the start of each sprint, which will be followed and presented to the client. Since every team member can work as a developer or tester and works as a cross-functional team, testing for each sprint is made simple because the team as a whole has a thorough understanding of the product being developed in each sprint. As part of the agile technique, large projects are broken into smaller cycles or sprints, which offers flexibility and the capacity to handle problems as they arise. At the end of each Sprint, the development team deploys the product into the server, where it undergoes extensive testing before being reviewed by the client or customer. The review meeting's customer comments and suggestions were discussed, if any, and were either produced or addressed in following sprints. As the retrospective planning progressed, everyone on the team came to an understanding of what went well, what didn't, and what could be improved for this sprint as well as the action plan for the following sprint.

The Challenge

While doing the 'National Employment Service' Project with the waterfall philosophy, there were a lot of challenges that the team was facing.

- The feedback loops were such that it became sometimes impossible to implement them in the solution and kept for implementing in the next version of the software.

- Due to the phased approach the tasks planned were to be done in series and not in parallel and hence were time-consuming.

- The resources in the project had to be idle for some of the time due to the longer phases in waterfall and the dependencies of each phase on the previous phase.

These problems were majorly due to the framework of waterfall methodology and are inherent to the system itself.

Solution

The solution lies in the selection of a project management method which can address the issues that were being faced in waterfall methodology. Agile with its fast feedback loop and a cross-functional team would have served the purpose better. The case study is also focused on comparing the two methodologies and the benefits of using one over the other.

Comparison

As explained in the constraints about the factors impacting the project i.e., quality time and cost, we will compare the results of the two methods based on these pillars.

Time Required –

Methodology	Waterfall	Agile	Difference
Time (Manhours)	4040 Manhours	2794 Manhours	1246 Manhours
Cost (MUSD)	1.010 MUSD	.692 MUSD	.310 MUSD

Quality	Rework and new version had to be introduced to implement the features not incorporated in the first version due to delayed feedback.	Quality was inbuilt in the methodology and hence the project is assumed to have been completed in the first version.	

The table above clearly shows that the Agile would have been a better choice as both budget and schedule advantage and also the quality issues are addressed in the best possible way.

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Appendices:

Appendix 1 – Project Charter

1. Project Overview

1.1 Introduction:

This project is called National Employment Services and it was an employment site created for a KSA client in 2014. It is a job portal with below common services as other job portal.

- Employer and job seeker both can register on this and manage their profile.
- Create and manage different recruitment and specifications.
- Manage membership.
- Also provide help desk service.

This project was developed on waterfall methodology with leaner approach, and it provides a common platform where both job seekers and employers deal with their job vacancies.

This case study will provide benefits of using agile project development at that time as opposed to waterfall technique for this project.

1.2 Major Stakeholders

• Capstone Advisor	Mary Piecewicz
• Project Manager	Manish Kumar Zainab Idowu Sanjay Chauhan Muzaffar Kosimov
• Examiners of final presentation	Mary Piecewicz Brain LeBlanc Richard Aroian

2. Project Goal and Scope

2.1 Project Goal

To analyse the execution of the national employment service project in agile methodology instead of waterfall methodology and to provide recommendation based on the results of the analysis.

2.2 Project Scope

In Scope:

o Identifying bottlenecks during implication of waterfall methodology
o Contrasting waterfall methodology against the agile methodology
o Stating Advantages and disadvantages of waterfall methodology as regards this project
o Stating Advantages and disadvantages of Agile methodology as regards this project
o Analysing both methodologies and making recommendations based on findings

Out of Scope:

o Development of the job portal
o Testing of the job portal

3. Assumptions

- This being an IT project, agile methodology may suit better as it will enable frequent interaction with customer and the feedback will be much faster as compared to waterfall. This will help in delivering the right product within the shortest possible time by avoiding rework.
- Better change management handling in the agile methodology.
- The same project team could be used in the agile environment after providing training.
- Customer is willing to participate actively to provide the right feedback at the right time.
- By optimizing the schedule, the overall budget of the project will also be on the lower side.
- Proper tracking of the deliverables

4. Constraints

- Time is our main constraint since we only have three months to analysis this case study and come up with recommendations and such case studies might take longer than expected.

5. Risks

- Not being able to complete the case study by deadline
- Force majeure
- Absence of key team members due to illness, family circumstances or personal issues.

6. Measures of Success

Project Outcomes	Measure of Success
Implication of Agile methodology	Every team member has clear understanding of Agile and its aspects Complete analysis of agile methodology including its advantages and disadvantage
Teamwork	Team cooperation No conflict of interest Common goal and exchange of experience and knowledge Completion of case study analysis by deadline
Implication of Waterfall methodology	Complete analysis of waterfall methodology including its advantages and disadvantage Every team member has clear understanding of Waterfall methodology and its aspects

Project Status Report#1

Capstone Status Report

Capstone Project Name: National Employment Service

Student Name: Muzaffar Kosimov, Manish Kumar, Zainab Idowu, Sanjay Chauhan

Date: 10/6/2022

Accomplished to date:

- Created capstone planning
- Identified Project goal and scope
- Identified major stakeholders
- Discussed assumptions
- Identified possible constraints and risks associated with our capstone project
- Identified measures of success

Issues/Concerns: N/A

Plans for next 30 days:

- The first two weeks we are planning to analyze the performance of the project with waterfall method and identify what went wrong with waterfall. Additionally, following points will be analyzed:
  - Organizational chart followed by the company
  - Responsibility Matrix of the team members
  - How was the schedule maintained in the case of waterfall
  - Customer/ Stakeholder Interaction
  - Budget
  - Risk Management
  - Change Management
  - Constraints
  - Delivery of the project

- The next 2 weeks we will be analyzing how the performance of the project could be improved by using Agile methodology.

Project Status Report#2

Capstone Status Report

Capstone Project Name: National Employment Service

Student Name: Muzaffar Kosimov, Manish Kumar, Zainab Idowu, Sanjay Chauhan

Date: 11/11/2022

Accomplished to date:

- Created capstone planning
- Identified Project goal and scope
- Identified major stakeholders
- Discussed assumptions
- Identified possible constraints and risks associated with our capstone project
- Identified measures of success

Issues/Concerns: N/A

Plans for next 30 days:

- The first two weeks we are planning to analyze the performance of the project with waterfall method and identify what went wrong with waterfall. Additionally, following points will be analyzed:
    - Organizational chart followed by the company
    - Responsibility Matrix of the team members
    - How was the schedule maintained in the case of waterfall
    - Customer/ Stakeholder Interaction
    - Budget
    - Risk Management
    - Change Management
    - Constraints

   o Delivery of the project
- The next 2 weeks we will be analyzing how the performance of the project could be improved by using Agile methodology.

Worked on the SDLC methodology and the team meeting done to discuss the draft. Final file to be shared with professor for review on 15th of Nove, 2022.

Project Status Report#3

Capstone Status Report

Capstone Project Name: National Employment Service

Student Name: Muzaffar Kosimov, Manish Kumar, Zainab Idowu, Sanjay Chauhan

Date: 12/2/2022

Accomplished to date:

- Draft version of case study is completed
- Detailed description of how project was with Waterfall
- Detailed description of how project would look like with Agile
- Provided recommendation and conclusion on what is best to use in our project

Issues/Concerns: N/A

Plans for next 30 days:

- The next is formatting the case study according to case study requirements
- Creating PPT file for presentation

NATIONAL EMPLOYMENT SERVICE

Zainab Idowu, Sanjay Chauhan

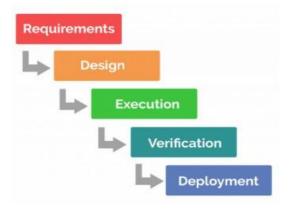Muzaffar Kosimov, Manish Kumar,

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UNIVERSITY

Introduction

- National Employment Service is a job portal that was developed for KSA client to streamline the job posting process.
- This project was developed on waterfall methodology with a leaner approach, and it provided a common platform where both job seekers and employers dealt with jobs and associated applications with well-defined user-specific controls.
- The focus of this case study is on the comparison between Waterfall and Agile, as well as the benefits realization of using the Agile development process for the NES service project.
- The basic framework for Waterfall comes from what was adopted in the real project and the Agile framework was developed based on our research and understanding
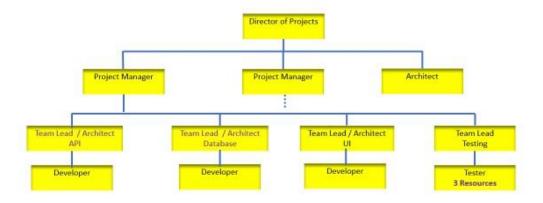
2

Methods and Outputs

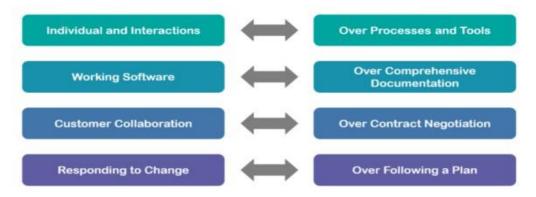- Waterfall Methodology–

https://www.datasciencepm.com/waterfall/

3

Methods and Outputs

- Waterfall Methodology–

4

Methods and Outputs
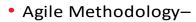
- Agile Methodology—

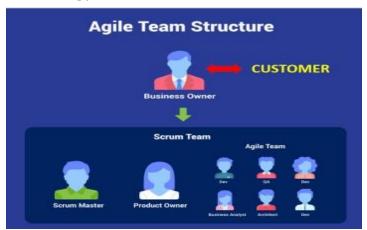https://www.datasciencepm.com/waterfall/

5

Methods and Outputs

- Agile Methodology—

https://kruschecompany.com/agilesoftware-development/

6

Methods and Outputs

- Agile Methodology—

Recommendations/Conclusion

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Methodology	Waterfall	Agile	Difference
Time (Manhours)	4040 Manhours	2794 Manhours	1246 Manhours
Cost (MUSD)	1.010 MUSD	.692 MUSD	.310 MUSD
Quality	Rework and new version had to be introduced to implement the features not incorporated in the first version due to delayed feedback.	Quality was inbuilt in the methodology and hence the project is assumed to have been completed in the first version.	

Professional Development

- Team Collaboration and working in a team with flat organization and talented partners.
- A thorough understanding of the Waterfall and Agile methodologies.
- Why we chose Agile for this project rather than Waterfall.
- Improved research and analytical skills by analyzing several articles and findings regarding the Agile and Waterfall Methodologies.

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Discussion

Any Question?

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THANK YOU

Use for subhead or
additional information