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Mero Institute

CC7169N1 Software Project Management

Level 7 – Software Project Management

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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

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1. Memorandum

To: Info Web Solutions Inc, USA

From: Info Web Solutions Inc, Nepal

Date: 31 Jan, 2024

Subject: Regarding Online Training Web Platform

Greetings of the Day!!

Dear Sir/Mam,

This is a memorandum written to report on developing an Online Training Web Platform "Mero Institute" to extend our business. This platform will be used for learning different IT courses for different students living in Nepal and America. Our Nepal management team will be studying and preparing for the development of the platform and will start development from 22nd Feb 2024.

We will be following the project management methodology as Prince2 and the software development methodology as Scrum. The Product backlog is achieved through 2 weeks sprint, 3 sprint cycle, 3 sprint planning, 42 daily meetings and associated review and retrospective meetings. Mero Institute functional features are prioritized using MoSCow prioritization. Our Project Senior User Mr. Manish Thapa, CEO of our Nepal branch office will be focal point of contact for Nepal and USA and he will be directing other 9 members for the product launch in Nepal.

The platform requires an investment of €331,388.48 for the initial year for a concurrent student enrollment of 100,000 and development starting from the 22nd of Feb and completing the 4th of April. This investment will bear all the resources used in the development of Mero Institute including systems, human talents, development and operation, marketing and call centre. We will be using AWS Serverless for content network distribution for each student from every part of Nepal and USA to access our resources. Our latent time and response time will be less than 5 seconds. If there is any network issue, we will address it through call centre. We have managed 5 members to service call centre.

From April to June (3 months), we will be focusing on marketing our product to penetrate the market and admit students. From July, we have estimated to enroll students for the course and by the end of the fiscal year 2024/25, we should have at least students 39,830 to earn a profit percentage is 20.19% and a profit amount is €66,911.52. From the break-even analysis, it is concluded that we can reach break-even on Feb 2025.

2. Various Approaches and Software Development Methods

Software development methodology refers to structured processes involved when working on a project. It is a blend of design philosophies and pragmatic realism that stretches back to the early days of computing. The goal is to provide a systematic approach to software development.

Software development methodology provides a platform for developers to work together more efficiently as a team. It formalizes communication and determines how information is shared within the team.

Selection of software Development Methodologies:

It's crucial to choose a software development methodology and apply it with discipline throughout the project.

- It helps to understand clear objectives and concentrate on the project
- It helps to plan realistically so that it can be delivered on time.
- It utilizes resources for efficient planning and lowers the cost.
- It supports to maximize quality.
- It manages stakeholders' requests to update.
- It minimizes risks and develops the reputation.
- It aligns with organization strategies.

Without structured guidance, developers can suffer from customers' ever-changing requests, and even more so when there are miscommunications. This leads to frequent revision in the software without considering the overall implications of the project. Result can be wastage in time, money, and risk of producing the application.

Software development methodologies are developed to benefit both the development team and customers. Choosing the right one ensures that discussions are conducted on proper channels, and decisions are made after evaluating all factors.

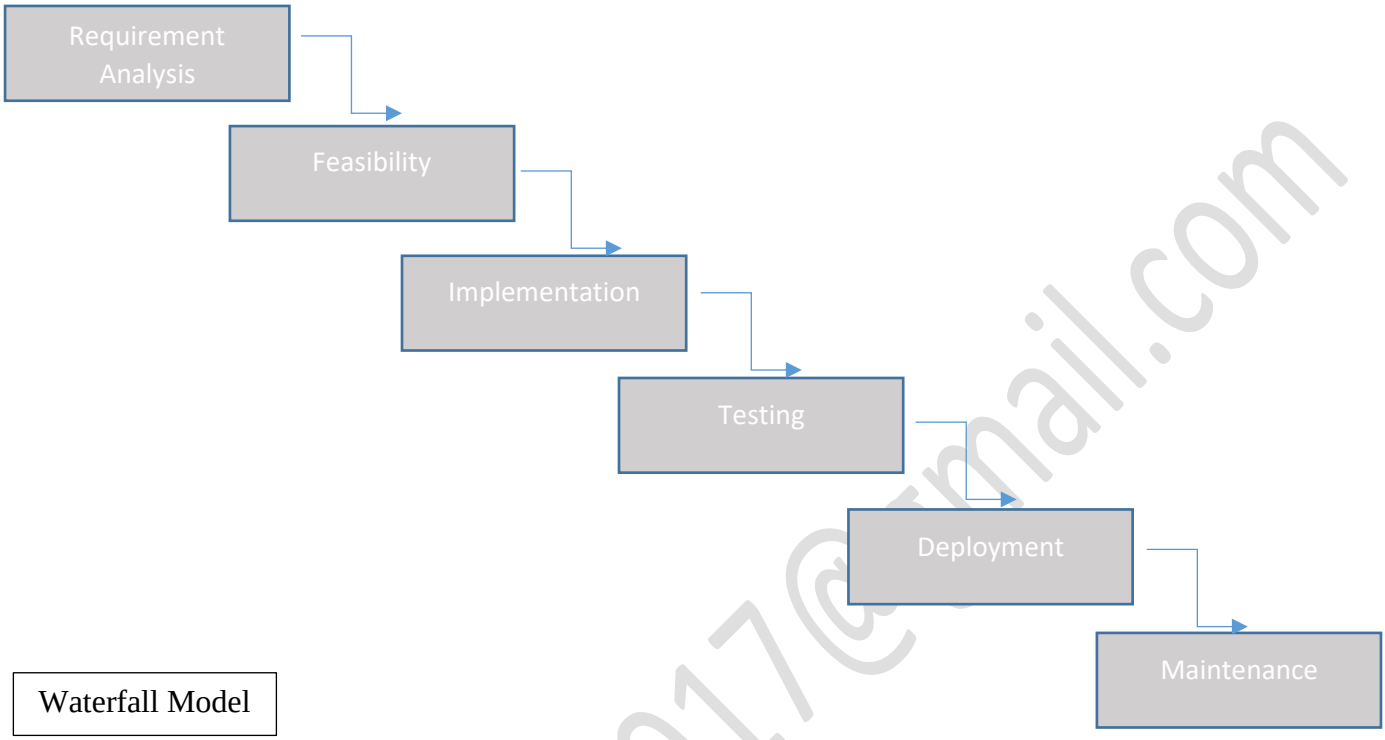
2.1 Traditional methods

2.1.1 Waterfall Model:

Waterfall is one of the most traditional software development methodology that follows sequential approach. There are at least 6 phases of development.

- Requirement analysis
- Feasibility
- Implementation

- Testing
- Deployment
- Maintenance



Waterfall Model

Figure 1 Waterfall Method

Most important things is each phase is completed before moving to next and could not be revised in previous phase.

Advantages:

- It is easy to understand and manage.
- Requirements are clear and stable.
- It does not need great experience among team.
- It works when team members are in different locations.

Disadvantages:

- If requirements are changes, waterfall does not suit.
- It is rigid in nature.
- It is slow and costly.
- It shows management inefficient.
- Once application is in testing phase, it is not advisable to go back and do any amendments.

- Can't add client's valuable feedback within ongoing development phase.
- Documentation occupies a lot of time for developers and testers.

2.1.2 Spiral Model:

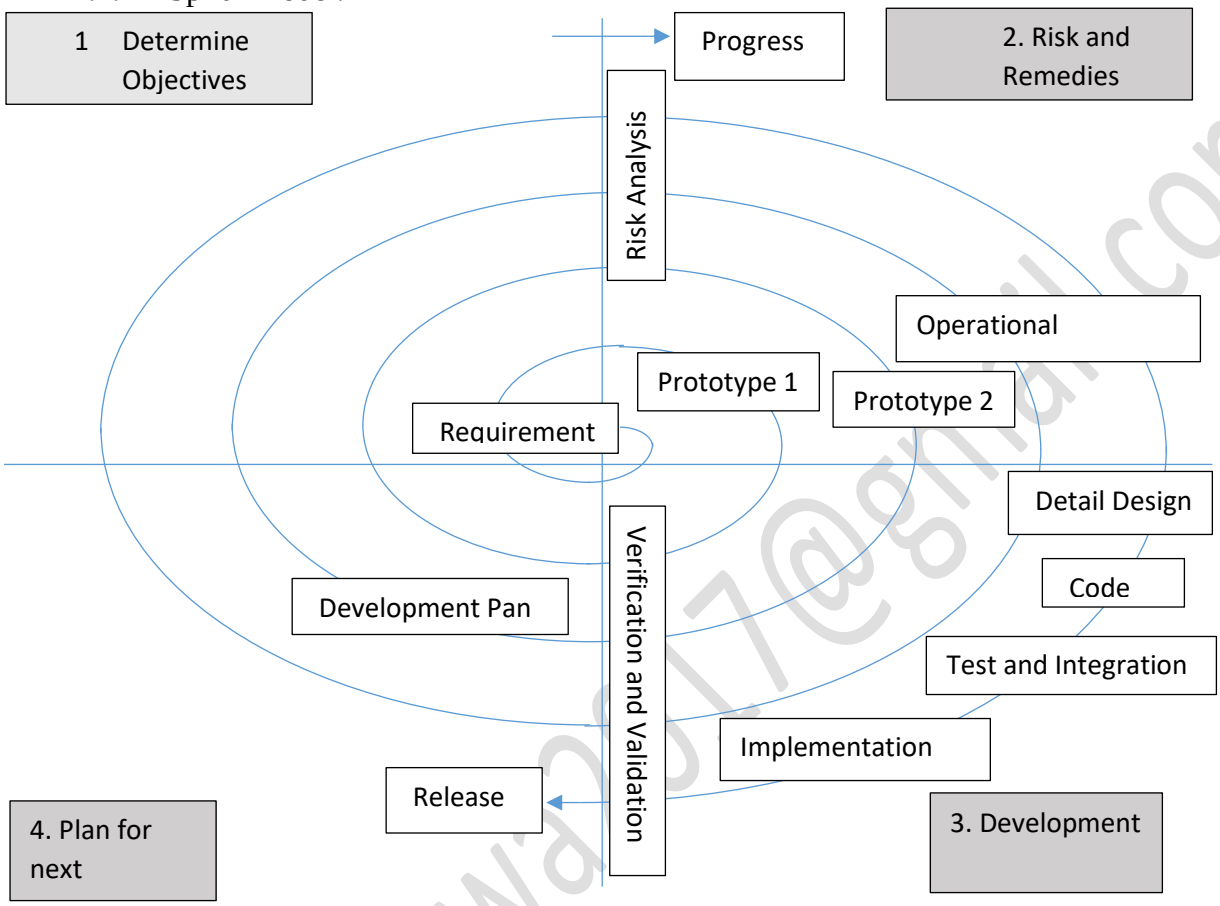


Figure 2: Sprial Model

Spiral Model is a risk driven model, it manages risk through multiple iterations of the development process. Mainly it has following phases.

- Planning

The scope of the project is determined and plan is made for the next phase or iterations.

- Risk

Associated risk within the project are identified and evaluated.

- Engineering

Development is based on requirements and followed best suited engineering principles for the next iterations.

- Evaluation

In this phase, it is determined that project meets the customers' requirements of high quality.

- Planning

Based on results of evaluation, next iteration begins with new planning.

Each phase of the Spiral Model is divided into four quadrants as shown in above figure 2. The functions are as follows.

- Determine Objectives: Requirements are gathered from customers and objectives are identified and analyzed at every phases. Alternative solutions are presented in this quadrant.
- Identify Risk and Remedies: All possible solutions are evaluated on the basis of risks. The risks associated with that solutions are identified and resolved with best suited strategies. At the end, Prototype is built for best solution.
- Development: The identified features and prototype are developed and verified though testings. At the end, next version of the project is available.
- Review and next plan: Customers evaluate the developed version of project and at the end planning for next phase is started.

Advantages:

- It is best method for risk analysis and risk handling.
- It is recommended for large and complex projects.
- Change request can be incorporated accurately.
- Customers can feel and view development of product at early phase.
- It produces quality product.

Disadvantages:

- It is complex method
- It is expensive and not suitable for smaller projects
- Experts are necessary
- It is time consuming
- It is resource-intensive.

2.2 Agile Frameworks

Under the Agile framework, following few approaches are dealt here. They are

- Lean
- Kanban

- Scrum
- DSDM

Agile is a very buzzword in software development methodology which emphasizes fast delivery and value driven by the continuous involvement of stakeholders and, the development team for the adaptation of changes. By following Agile, it focuses on the customer's satisfactions and technical team through intensive collaborations.

2.2.1 Kanban:

"Kanban" is a combination of two Japanese words: 看 (Kàn), meaning "sign," and 板 (Bǎn), meaning "board." Kanban framework—also referred to as the "Just-in-Time" (JIT) system—produced and re-supplied products as a result of consumer demand.

Kanban is especially popular with product, engineering, and software development teams. But they can be used by any team that's interested in building a more dynamic, flexible workflow.

Kanban Principles

1. Start with what you do now

Kanban can be applied to any current workflow or process. Unlike more defined Agile management processes like XP, Kanban is flexible enough to work within your team's core practices.

2. Agree to pursue incremental, evolutionary change

Big changes can be disruptive to the team, new system may not work. Kanban knows this, so the Kanban framework indexes continuous improvement and incremental change. Instead of changing everything all at once, start by pursuing incremental change to truly evolve your team's processes over time.

3. Respect the current process, roles, and responsibilities

Unlike other lean methodologies, Kanban doesn't have any built-in team roles, so it works within current team structure and process.

4. Encourage acts of leadership at all levels

In the spirit of continuous improvement, the Kanban method recognizes that change can come from anywhere—not necessarily just "top-down." With Kanban, team members are encouraged to chime in, brainstorm new ways for processes to evolve, and take the lead on new work initiatives.

Kanban Metrics (Atlassian)

KPI metrics are the lifeblood of any Agile project management strategy, and four key metrics can make or break your workflow. These metrics are lead time, cycle time, work-in-progress, and throughput.

Lead time

Lead time measures the time from when you add a new software development task to the Kanban board to the point where the team marks the task as complete. In essence, it gauges the total time a task takes to travel through the entire Kanban workflow.

This metric is pivotal for project managers because it offers a comprehensive view of how long tasks take within the system, allowing for more precise planning and effective resource allocation.

Cycle time

Cycle time zooms in on the “active work" phase of the Kanban system, measuring the time between when a team member starts a task and when they complete it. It doesn’t matter if nobody started the task until months after creation; cycle time only starts when the task moves into the active workflow.

Cycle time can indicate whether your team is working efficiently or if you need to make any adjustments in the active phases of tasks.

Work-in-progress

Work-in-progress represents the number of tasks currently in the "active" or "in-progress" stages within the Kanban system. It measures the volume of ongoing work at any given time, providing a snapshot of tasks that are neither in the backlog nor complete.

Monitoring work-in-progress is crucial because it helps to balance the team's workload and identify bottlenecks—ideally, your team is working but not multitasking.

Throughput

Throughput quantifies the number of tasks or work items your team successfully completes within a specific time frame, such as a day or a week. It measures the team's output or productivity over that period.

This metric is essential because it directly indicates your team's productivity levels, allowing you to make informed decisions for future task assignments and project timelines.

2.2.2 Scrum

Scrum is an empirical process, where decisions are based on observation, experience and experimentation. Scrum has three pillars: transparency, inspection and adaptation.

Transparency

(Scrumalliance)To make decisions, people need visibility into the process and the current state of the product. To ensure everyone understands what they are seeing, participants in an empirical process must share one language.

Sprint Reviews Provide Transparency.

Scrum's frequent reviews give team members and stakeholders a clear view into the state of the project.

Inspection

To prevent deviation from the desired process or end product, people need to inspect what is being created, and how, at regular intervals. Inspection should occur at the point of work but should not get in the way of that work.

Sprint Reviews & Retrospectives Offer Inspection Opportunities.

Scrum teams inspect their completed work and their process at the end of every iteration during the sprint reviews and sprint retrospectives.

Adaptation

Adaptation means that when deviations occur, the process or product should be adjusted as soon as possible. Scrum Teams Can Adapt the Product at the End of Every Sprint. Scrum allows for adjustments at the end of every iteration.

Scrum Is Iterative & Incremental

Scrum is also both iterative and incremental.

Iterative

Iterative processes are a way to arrive at a decision or a desired result by repeating rounds of analysis or a cycle of operations. The objective is to bring the desired decision or result closer to discovery with each repetition (iteration). Scrum's use of a repeating cycle of iterations is iterative.

Incremental

Incremental refers to a series of small improvements to an existing product or product line that usually helps maintain or improve its competitive position over time. Incremental innovation is regularly used within the high technology business by companies that need to continue to improve their products to include new features increasingly desired by consumers. The way scrum teams deliver pieces of functionality into small batches is incremental.

The Scrum value of The Five Scrum Values

A team's success with scrum depends on five values: commitment, courage, focus, openness, and respect.

Commitment

The scrum value of commitment is essential for building an agile culture. Scrum teams work together as a unit. This means that scrum and agile teams trust each other to follow through on what they say they are going

to do. When team members aren't sure how work is going, they ask. Agile teams only agree to take on tasks they believe they can complete, so they are careful not to overcommit.

Courage

Courage is critical to an agile team's success. Scrum teams must feel safe enough to say no, to ask for help, and to try new things. Agile teams must be brave enough to question the status quo when it hampers their ability to succeed.

Focus

The scrum value of focus is one of the best skills scrum teams can develop. Focus means that whatever scrum teams start they finish--so agile teams are relentless about limiting the amount of work in process (limit WIP).

Openness

Scrum teams consistently seek out new ideas and opportunities to learn. Agile teams are also honest when they need help.

Respect

Scrum team members demonstrate respect to one another, to the product owner, to stakeholders, and to the Scrum Master. Agile teams know that their strength lies in how well they collaborate and that everyone has a distinct contribution to make toward completing the work of the sprint. They respect each other's ideas, give each other permission to have a bad day once in a while, and recognize each other's accomplishments.

One critical Scrum Team characteristic that binds all of the elements together is Trust. If Trust is not present on a Scrum Team, there will likely be tension and bottlenecks in the way of getting work done. The Scrum Values are also critical for Scrum Teams to adhere to as they help to guide how you work and drive trust. The Scrum Values of Courage, Focus, Commitment, Respect, and Openness, are all important elements that Scrum Team members must consider when working together. The Scrum Values are particularly important in environments where experimentation is core to making progress.

2.2.3 DSDM

DSDM is a proven framework for Agile project management and delivery, helping to deliver results quickly and effectively and, over the years, has been applied to a wide range of projects - from small software developments all the way up to full-scale business process change.

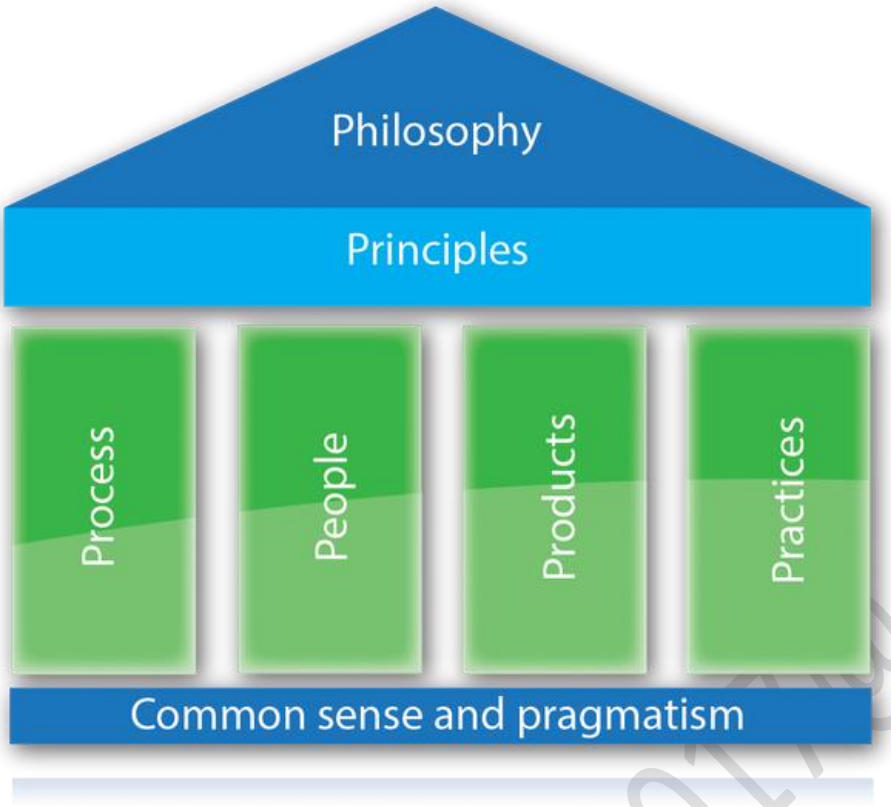


Figure 3: DSDM Principle

The DSDM philosophy is supported by a set of eight principles that build the mindset and behaviors necessary to bring the philosophy alive. The principles are themselves supported by people (with defined roles and responsibilities), an Agile process (enabling an iterative and incremental lifecycle to shape development and delivery), clearly defined products and recommended practices to help achieve the optimum results.

From the project perspective, DSDM advocates that projects should do just 'Enough Design Up Front' (EDUF) within a Foundations phase in order to understand and clarify the structure of the overall solution and to create an Agile plan for delivery of the project. This puts in place the foundations for successful development and delivery, and is seen as a key differentiator for DSDM. It is important to understand that the Foundations phase of a DSDM project is very different from the analysis and design steps used in a traditional 'Waterfall' approach.

It is also designed to complement Agile product delivery approaches such as Scrum that do not already have a full project focus.

A fundamental assumption of the DSDM approach is that nothing is built perfectly first time, but that as a rule of thumb 80% of the value of the solution can be delivered for 20% of the effort that it would take to produce the total solution (Pareto's Principle).

Understanding Project Variables

Projects have to balance conflicting demands, and the four most common demands are: time, cost, features and quality.

For this reason, it is important at the start of a project to ask the question "If we hit a problem, what do we protect (fix) and what can we negotiate (vary) if necessary?"

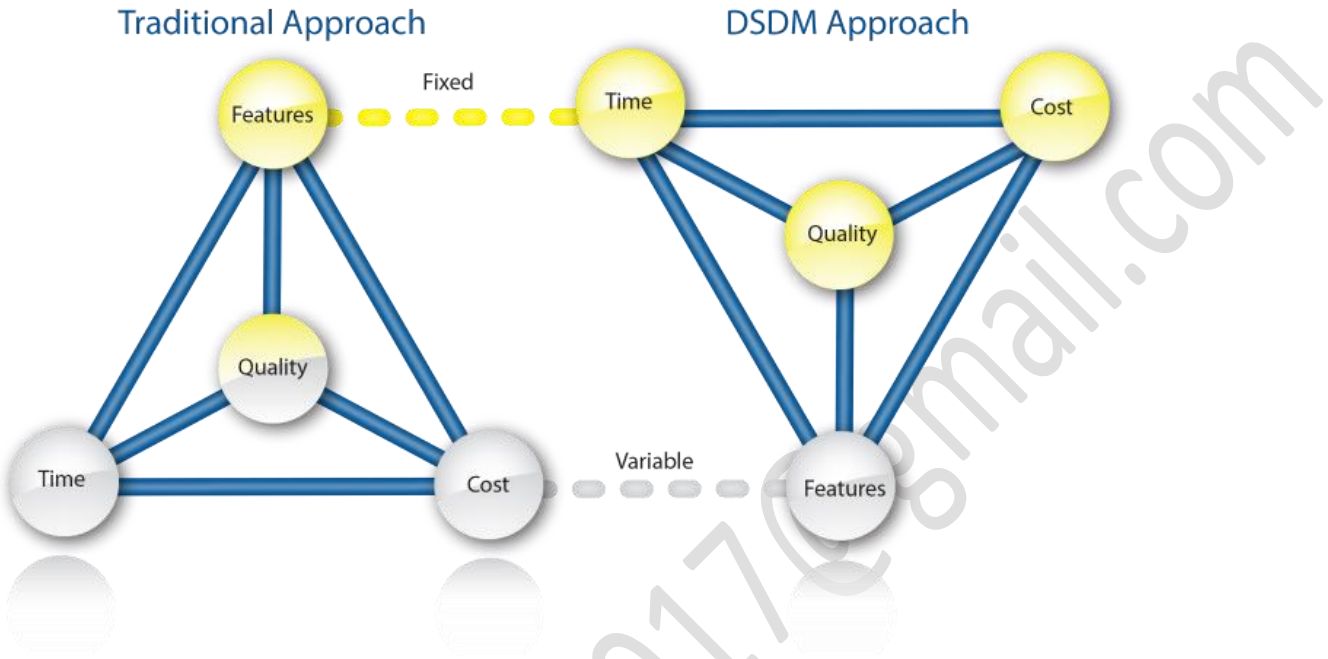


Figure 4: DSDM Variables

In the traditional approach to managing a project (left-hand diagram), the features content of the solution is fixed whilst time and cost are subject to variation.

If the project goes off track, more resources are often added (which varies the cost) and/or the delivery date extended (which varies the time). However, adding resources to a late project often makes it even later and a missed deadline can be disastrous from a business perspective and often damages credibility. Under such pressure, quality often becomes a variable, as a result of introducing compromises which have not been thought through, by reducing essential quality control steps or by cutting back on testing.

2.3Comparison between Traditional and Agile approach

Both traditional and agile approaches have numerous advantages however selection of the software methodology depends upon the selection of complexity, functionality and nature of projects. Following are similarities and differences between Traditional and Agile approaches.

Serial	Traditional	Agile
1	Focus on documentation	Focus on working software or modules
2	Focus on contract negotiations	Focus on collaborations

3	Clear requirements	Fuzzy requirements
4	Plan driven	Value driven
5	Leadership command and control	Master servant concept
6	Heavy investment	Normal investment
7	Resource utilization is imperfect.	Resource utilization tends to perfect.
8	Lack of flexibility	Flexibility
9	Delivery slow	Delivery fast
10	Less security	High security

Table 1: Traditional and Agile Comparison

From table1, it is obvious that currently agile software development methodology is selected rather than traditional.

Our goal is to produce training app and we follow agile methodology. On agile, we will consider two of the approaches to follow.

2.4Scrum

The Scrum framework is fairly simple being made up of a **Scrum Team** consisting of a **Product Owner**, a **Scrum Master** and **Developers**, each of which have specific **accountabilities**. The Scrum Team takes part in **five events** and produces **three artifacts**.

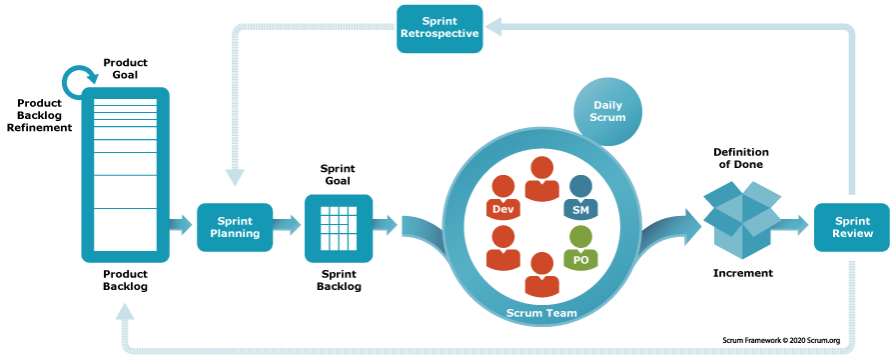


Figure 5: Scrum Overview

2.4.1 Scrum Roles

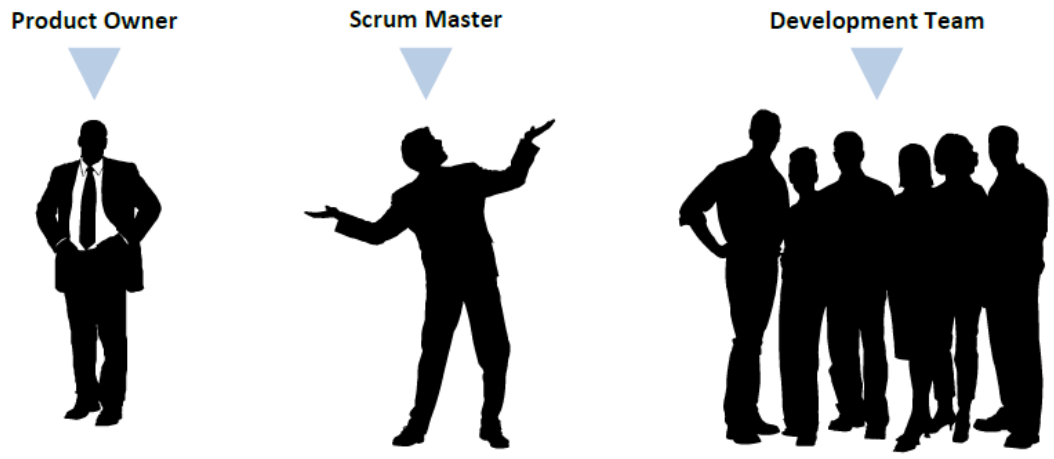


Figure 6: Scrum Roles

(Khaire, 2023) Scrum consists of three roles responsible for ensuring a Scrum project's success. The three roles are:

Product Owner

The Product Owner is responsible for defining the product vision, maintaining the product backlog, and ensuring that the development team is working on the highest priority items in the backlog.

Scrum Master

The Scrum Master is responsible for ensuring that the Scrum framework is followed and the team is able to deliver a high-quality product. The Scrum Master facilitates the Scrum events and helps the team remove any impediments.

Development Team

The Development Team is responsible for delivering the product increment at the end of each Sprint. The Development Team is cross-functional and self-organizing and is responsible for estimating and planning the work required to deliver the increment.

All of them together are called Scrum Team. A Scrum Team should have two essential characteristics,

1. Cross-Functional means that the team has all the necessary skills and expertise to deliver a potentially shippable product increment at the end of each Sprint. A cross-functional team typically consists of developers, testers, designers, and other specialists as needed for the specific project.
2. Self-Organized means that the team has the autonomy to decide how to accomplish the work and how to manage their own process. The team members collectively decide how to break down work items, how to approach problem-solving, and how to improve their processes.

Having these two characteristics helps to ensure that the Scrum Team is empowered to deliver high-quality, valuable products in a timely manner. Cross-functional teams bring diverse perspectives and expertise to the

table, allowing for more efficient and effective problem-solving. Self-organizing teams are better able to adapt to changing requirements and deliverables, which is essential in an Agile environment.

They have all the expertise and competencies needed to get the job done without any help from outside the team.

2.4.2 Scrum Events

Figure 7: Scrum Events

A Scrum project is done through a number of Sprints. Each Sprint is a time box of no more than one month, during which an Increment of a potentially shippable product will be delivered. A Sprint is a container for the following events:

Sprint

A Sprint is a time-boxed period, usually two to four weeks, during which the Development Team works to deliver a potentially releasable product increment. Sprint Planning is a time-boxed event where the Development Team collaborates with the Product Owner to define the Sprint Goal and select the items from the Product Backlog that will be worked on during the Sprint.

Daily Scrum

Daily Scrum is a time-boxed event that occurs every day during the Sprint. During Daily Scrum, the Development Team meets to discuss their progress towards the Sprint Goal and identify any impediments that need to be addressed.

Sprint Review

Sprint Review is a time-boxed event that occurs at the end of each Sprint. During Sprint Review, the Development Team presents the increment to the stakeholders and receives feedback.

Sprint Retrospective

Sprint Retrospective is a time-boxed event that occurs at the end of each Sprint. During Sprint Retrospective, the Development Team reflects on the Sprint and identifies areas for improvement.

The Sprint itself and all other events are time-boxed: they have a maximum duration, and Scrum Team tries to achieve a certain goal during that period.

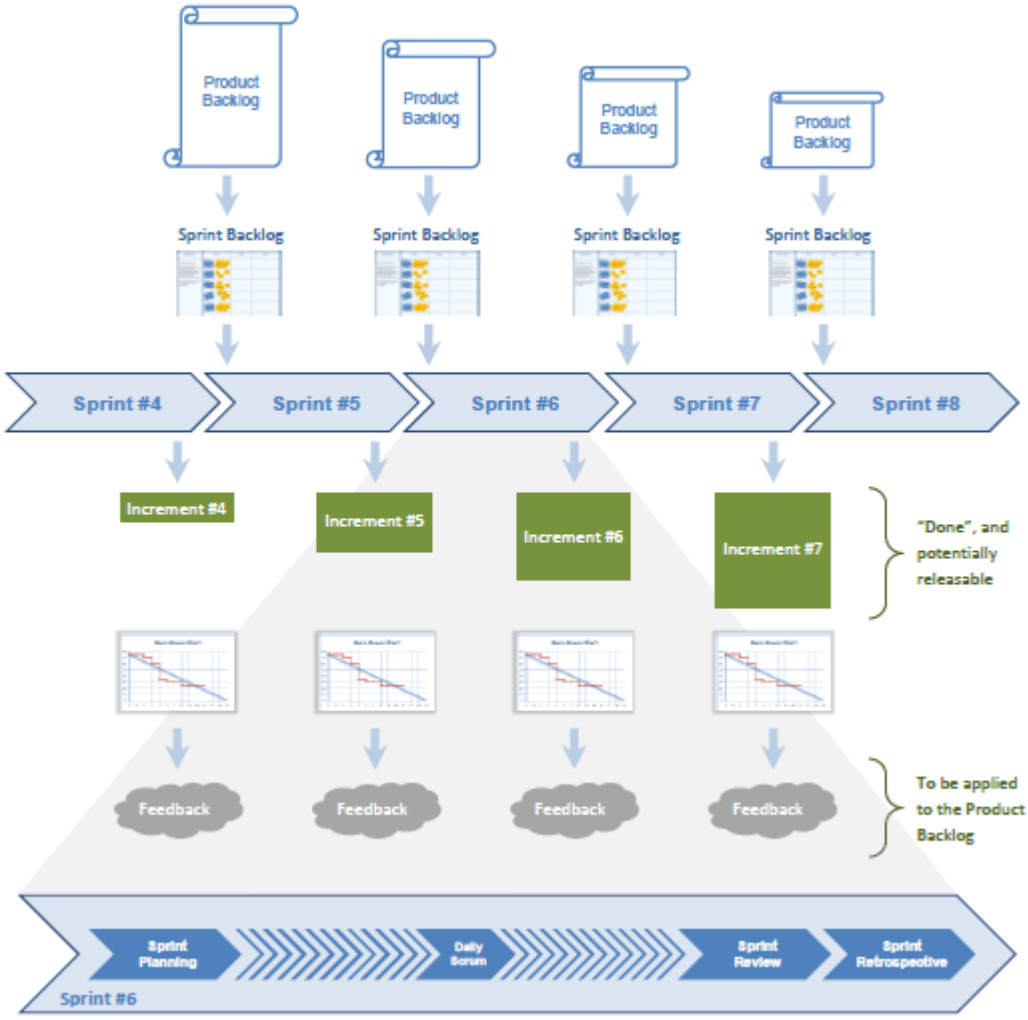


Figure 8: Scrum Artifacts

They are all designed to enable critical transparency, inspection, regularity, and adaptation.

2.4.3 Scrum Artifacts

Scrum framework consists of three artifacts, which are:

Product Backlog

The Product Backlog is a prioritized list of items the Product Owner maintains. The Product Backlog items represent the work that needs to be done to achieve the product vision.

Sprint Backlog

The Sprint Backlog is a list of items from the Product Backlog that the Development Team has committed to completing during the Sprint.

Increment

The Increment is the sum of all the Product Backlog items completed during the Sprint and all previous Sprints. The Increment must be in a releasable state and meet the Definition of Done.

2.5Kanban

Kanban is an Agile methodology built on a philosophy of continuous improvement, where work items are made visible in a steady flow of work. The framework is applied using Kanban boards—a form of visual project management. In a Kanban board, tasks—represented as cards—move through stages of work—represented as columns. That way, team can view where work is in real-time.

2.5.1 Elements of a Kanban Board

The basic elements of a Kanban board are as follows:

- Lanes, which represent defined steps in the process
- Cards, which represent work items that move through the process

Using sub-lanes on a Kanban board allows you to more precisely reflect your process digitally.

Kanban systems are simple by design, and flexible by nature. By simply defining process steps into lanes, and documenting your work items with cards, we can begin to experience the benefits of Kanban.

Kanban board can be designed to reflect each of these steps:

To Do – Unprioritized

> To Do – Prioritized

> Plan > Develop > Test > Launch > Done (Pending Approval) > Done – Done

2.5.2 Kanban Cards

Each card on your Kanban board represents a work item. On the "face" (front) of the card, you'll include details that make it easy for everyone on the board to understand the key details of that piece of work, such as:

- Title – what is this work item?
- Card assignment – who is working on this work item?
- Card type – what kind of work is it? (usually designated by color)
- Due date – is there a defined due date for this work item?

Kanban cards allow for easy access to key information about specific work items on your Kanban board.

2.5.3 Kanban Practices:

1. Visualize work

One of the biggest advantages of Kanban is that you can physically see work "move" through stages. Not only does this practice give you a broad sense of how work moves through stages, but you can also get real-time, at-a-glance insight into the stage of work.

2. Limit work in progress

As an Agile methodology, Kanban is built on a principle of early delivery—which means tasks should move quickly between columns instead of languishing with an ambiguous "in progress" status. There's no set requirement for how many tasks should be "in progress" at any given time, but in general, encourage your team to reduce multitasking and focus on the production of individual work.

3. Manage flow

Practice #2 states that you want to limit work in progress—and the best way to do that is to optimize the flow of tasks within your Kanban board. Managing and improving your flow will decrease your lead time (the amount of time spent between starting on a task and moving it to the "Done" column on your Kanban board), and ensure you're delivering tasks or shipping new products while they're still relevant.

4. Make process policies explicit

Because tasks move so quickly in Kanban, make sure your team has established and clearly communicated conventions. Your process policies should guide how your team implements the Kanban methodology.

Additionally, everyone on your team should be encouraged to participate and innovate on your Kanban policy, in accordance with the fourth Kanban core principle: Encourage acts of leadership at all levels.

5. Implement feedback loops

In Kanban, you want to gather feedback from two distinct groups: your customers and your team.

Customers: Gather feedback from customers on the quality and effectiveness of the solution your team produced. Was it the right thing to produce? Were there any problems? If there were problems (like bugs in code or defects in a product), revisit your Kanban flow and add more time for review and evaluation.

Team: Check in frequently with your team on the process of running a Kanban framework itself. How do they feel about their output? Here you have another opportunity to encourage acts of leadership at all levels and improve your team's process policies.

Feedback is an integral part of continuous improvement and therefore the Kanban framework.

6. Improve collaboratively, evolve experimentally

Kanban, at its core, is about continuous improvement. But this also means other systems might work well in conjunction with Kanban. Whether it's Scrum or something else, always be willing to collaborate, experiment, and evolve your processes if necessary.

2.6Recommendation for Selecting Scrum

From these two methodologies, I will suggest to choose Scrum and selection criteria explanation are as follows.

2.6.1 Explanation 1.

Given Setup	Info Web solutions Inc. has company strategy to define positions to take accountability
Attribute	Each department has distinct positions to take accountability.
Reasoning	Scrum has defined positions to take responsibilities and accountability. However Kanban do not explain about roles.

2.6.2 Explanation 2.

Given Setup	Online training app has three functionalities requirements as Mero institute, users and trainers
Attribute	Attribute: Three functionalities requirements as Mero Institute, Users and Trainers. Their stories can be created for them.
Reasoning	Scrum has defined stories and Mero institute app has functional requirements which are compatible with Scrum. Kanban do not define stories

2.6.3 Explanation 3.

Given Setup:	Mero Institute has distinct features to incorporate
Attribute	One of the principle of Scrum is Transparency in which Mero institute has clear objectives.
Reasoning	Mero institute has clear features in which Scrum's principle addresses.

2.6.4 Explanation 4.

Given Setup	feedback is updated through forum
Attribute	adaptation is principle of Scrum
Reasoning	Since adaptation is principle of Scrum, it is compatible with Scrum

2.6.5 Explanation 5

Given Setup	Training needs continuous increments
Attribute	Increments are possible in Scrum rapidly.
Reasoning	Kanban is slow in increments.

2.6.6 Explanation 6

Given setup	to make an Online Web learning and training app

Attribute	The product owner is responsible for requirements and stories. Development is responsible for the development team and the Scrum Master is guiding the Project
Reasoning	Since Product Mero Institute is managed by Scrum

2.6.7 Explanation 7

Given Setup	Stakeholders can be called in the meeting
Attribute	Scrum provides collaboration meetings with stakeholders as the retro meeting.
Reasoning	Since it is a blending among stakeholders and development teams in which Scrum plays a good medium for collaboration, Mero Institute will be a good product.

2.7Reasons for rejecting Kanban

2.7.1 Justification 1

Given Setup	Mero Institute has complex features that need to be broken down.
Attribute	Kanban does not provide breakdown mechanisms.
Reasoning	Scrum defines sprint backlog where complex features are broken down to solve quickly without errors

2.7.2 Justification 2

Given Setup	The team needs to structure and manage properly for the development of the product
Attribute	Kanban does not guide team structure and feedback
Reasoning:	Scrum provides team structure and feedback mechanisms for product development.

Justification 3

Given Setup	Nonfunctional criteria should be incorporated into the product
Attribute	Kanban only guides about visualization of the product but not about nonfunctional requirements.
Reasoning:	Since Kanban does not guide about nonfunctional requirements, Scrum guides about the quality and adaptation of the product.

3. RACI Matrix

3.1RACI introduction

(Staff, 2023)The RACI matrix is a project role and responsibility assignment chart that maps out every task, milestone, or key decision involved in completing a project and assigns which roles are Responsible for each action item, which personnel are Accountable, and, where appropriate, who needs to

be Consulted or Informed. The acronym RACI stands for the four roles that stakeholders might play in any project.

3.2RACI Matrix

	Info Web Solutions Inc.						
		Project Name: Mero Institute					
	Roles / **Phases of Mero Institute**	Senior User/ Product Owner Mr. Manish Thapa	Scrum Master Mr. Sundar Manandhar	Development Team	Project Manager Mr. Uddab Singh	Senior Supplier Mr. Dev Tamrakar	Project Assurance Mr. Rajeev Joshi
	Initiate Phase						
	Feasibility Study	**R/A**	**C/I**	**I**	**C/I**	**I**	**C/I**
	Develop Business Case	**R/A**	**I**	**I**	**C/I**	**I**	**C/I**
	Project Requirements Sign on	**R/A**	**I**	**I**	**C/I**	**I**	**C/I**
	Plan Phase						
	Project Schedule	**A**	**R**	**R/I**	**R/I**	**R/I**	**R/I**
	Additional plan	**C/I**	**R/I**	**R/I**	**A**	**R/I**	**R/I**
	Execute Phase						
	Build Deliverables	**I**	**R**	**R**	**A**	**I**	**R/I**
	Build Artifacts and Reports	**I**	**R/I**	**R/I**	**A**	**I**	**R/I**
	Closing Project						
	Retro Lessons	**I**	**R**	**R**	**A**	**I**	**R/I**
	Create Closure Reports	**I**	**I**	**I**	**R/A**	**I**	**I**

R	Responsible
A	Accountable
C	Consulted
I	Informed
C/I	Consulted and Informed
R/I	Responsible and Informed
R/A	Responsible and Accountable

Table 2: RACI Matrix

The four roles that stakeholders might play in any project include the following:

Responsible: People or stakeholders who do the work. They must complete the task or objective or make the decision. Several people can be jointly responsible.

Accountable: Person or stakeholder who is the "owner" of the work. He or she must sign off or approve when the task, objective or decision is complete. This person must make sure that responsibilities are assigned in the matrix for all related activities. Success requires that there is only one person Accountable, which means that "the buck stops there."

Consulted: People or stakeholders who need to give input before the work can be done and signed-off on. These people are "in the loop" and active participants.

Informed: People or stakeholders who need to be kept "in the picture." They need updates on progress or decisions, but they do not need to be formally consulted, nor do they contribute directly to the task or decision.

3.3Project Champions

Project Management Team

Serial	Positions and Names
1	Senior User/CEO / Product Owner
a	Manish Thapa
2	Project Manager
a	Uddab Singh
3	Senior Supplier
a	Dev Tamrakar
4	Project Assurance
a	Rajeev Joshi
5	Scrum Master
a	Sundar Manandhar
6	Development Team (QA included)
a	Hari Shakya
b	Suman Kayastha
c	Nog Bhattarai
d	Raj Karki
e	Mohan Rai

Table 3: Project Champions

4. Project Pan

4.1Budget

Mero Institute Initial Year Budget

Jan-24

Profit/Loss initial year(B-A) **€ 66,911.52**

A Expense

	Items	Quantity	Resource Cost	Initial Month Cost	Monthly Cost	Yearly Cost

1	**System Resource Cost**					**468.48**
a	Serverless Web(1 million requests)			39.04	39.04	
b	Monthly computing charge		30.83			
c	Monthly request charge		0.4			
d	Monthly bytes streams on 976 GB		7.81			
e	Server	1	5000	5000	0	**5,000.00**
f	System	14	1000	14000	0	**14,000.00**
g	Call center	1	1000	1000	0	**1,000.00**
2	**Admin Cost**					**17,400.00**
a	Rent	1	700	700	700	
b	furniture	12	300	3600	0	**3,600.00**
c	Internet	2	300	600	600	
d	Electricity	1	150	150	150	
3	**Salary Cost**					**225,600.00**
a	call center salary	5	500	2500	2500	
b	Development Salary	10		16300	16300	
	Trainers cost	15	4000	60000	0	**60,000.00**
	Digital Marketing	1	40	40	40	**480.00**
4	**Legal Consult Cost**	1	150	150	150	**1,800.00**
5	**Audit Consult Cost**		150	150	150	**1,800.00**
6	**Miscellaneous**	1	20	20	20	**240.00**
	Total			**104,249.04**	**20,649.04**	**€ 331,388.48**

B **Income**

	Income Item	Quantity	Fee	no. of users	Monthly Income	Month
	Course free					
	Course free					
	Course free					
	Course 1	1	10	30	300	July

	Course 2	1	10	100	1000	Aug
	Course 3	1	10	700	7000	Sep
	Course 4	1	10	3000	30000	Oct
	Course 5	1	10	5000	50000	Nov
	Course 6	1	10	7000	70000	Dec
	Course 7	1	10	7500	75000	Jan
	Course 8	1	10	8000	80000	Feb
	Course 9	1	10	8500	85000	March
	Total			**39830**	**398,300.00**	

Table 4: Expense and Income Budget

4.1.1 Development Salary Details and Team Structure

S.No.		Salary		Main Responsibilities
1	Senior User/CEO of Nepal/Product Owner	5000		Laison between head office and local office
a	Manish Thapa			and accountable for all projects in Nepal
2	Project Manager	2000		Project bid, contracts, proposals,
a	Uddab Singh			schedule, risks and human resources of projects in Nepal
3	Senior Supplier	1500		Quality and reliable products
a	Dev Tamrakar			needed to operate all projects in Nepal
4	Project Assurance	1500		Software quality and benchmark
a	Rajeev Joshi			
5	Scrum Master	1800		Facilitating projects are operating following Scrum Principles
a	Sundar Manandhar			and Values
6	Development Team	4500		
a	Hari Shakya			Developing the projects , Testing projects, skills development and coordinating with team members and seniors
b	Suman Kayastha			
c	Nog Bhattarai			
d	Raj Karki			
e	Mohan Rai			
	Total	**18300**		

Table 5: Project Development

4.1.2 ServerLess Expense

	Resource Cost per month(a+b+c)		**€ 39.04**
	AWS monthly compute		0.000016/GB-s
	Total compute seconds	3 million *500ms	1,500,000 seconds

	Total compute GB-s	1,500,000*1536MB/1024MB	2,250,000GB-s
	Total compute-Free tier compute=monthly billable compute GB-s		185,000GB-s
	2,250,000GB-s-400,000 GB-s=1850,000GB-s		
a	Monthly compute charges	185,000*0.000016	30.83
b	Monthly Request charges	2 M*.2/M	0.4
	Processed Bytes Charges		
c	Monthly bytes streamed charges	976.56GB*0.008	7.81

Table 6: Serverless Expense

4.1.3 Yearly Balance

Yearly Balance			Expense	Income	Profit/Loss	Balance
		April	104,249.04	0	(104,249.04)	**(104,249.04)**
		May	20,649.04	0	(20,649.04)	**(124,898.08)**
		June	20,649.04	0	(20,649.04)	**(145,547.12)**
		July	20,649.04	300	(20,349.04)	**(165,896.16)**
	2024	August	20,649.04	1000	(19,649.04)	**(185,545.20)**
		September	20,649.04	7000	(13,649.04)	**(199,194.24)**
		October	20,649.04	30000	9,350.96	**(189,843.28)**
		November	20,649.04	50000	29,350.96	**(160,492.32)**
		December	20,649.04	70000	49,350.96	**(111,141.36)**
		January	20,649.04	75000	54,350.96	**(56,790.40)**
		February	20,649.04	80000	59,350.96	**2,560.56**
	2025	March	20,649.04	85000	64,350.96	**66,911.52**

Table 7: Yearly Balance

Fig Yearly Income Expense and Balance sheet

4.1.4 Break Even Analysis

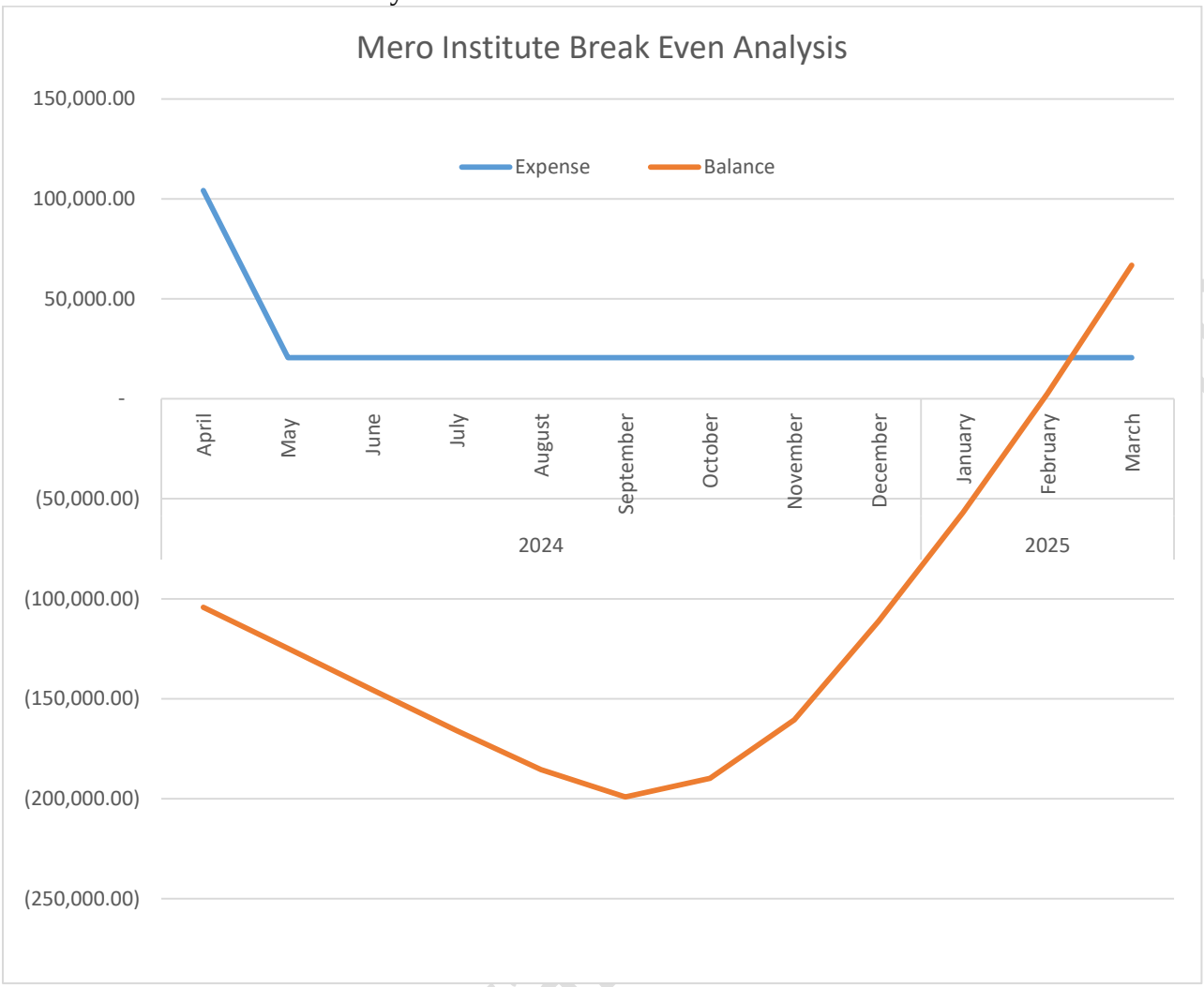


Figure 9: Breakeven Analysis

From our analysis, the total investment for one year is **€ 331,388.00** and the total revenue is **€398,300.00** and our Break Even Point will be on February 2025 and it will start profit and by the year end, we can have profit to **€66,911.52** by the fiscal year end of 2024/25. We have made our system more robust and if we can provide the same quality of training course it is viable business.

4.2Detail Plan on Scrum

Serial	Activity	Duration Days	Date Start	Date End	Resource	Milestone	Dependancy
1	Requirement Analysis and Create Project Vision	2	15-Feb	16-Feb	PM	Project Goal	Board Minute, BCP
2	Create Scrum Team	3	17-Feb	19-Feb	HR, SM	Role Summary	Project Goal
3	Create Product Backlog and user Stories	2	20-Feb	21-Feb	PO		Project Goal

4	**Iteration 1**	**15**	**22-Feb**	**7-Mar**	**Scrum Team**		Product Backlog
a	sprint planning	1	22-Feb	22-Feb	Scrum Team		
b	Development	10	23-Feb	3-Mar	Developers		
c	Testing	4	4-Mar	7-Mar	QA		
5	**Iteration 2**	**15**	**8-Mar**	**22-Mar**	**Scrum Team**		
a	sprint planning	1	8-Mar	8-Mar	Scrum Team	Register Account and Sign In	
b	Development	10	9-Mar	18-Mar	Developers		
c	Testing	4	19-Mar	22-Mar	QA		
6	**Iteration 3**	**15**	**23-Mar**	**7-Apr**	**Scrum Team**		
a	sprint planning	1	23-Mar	23-Mar	Scrum Team		
b	Development	10	24-Mar	3-Apr	Developers		
c	Testing	4	4-Apr	7-Mar	QA		

Table 8: Detailed Plan on Scrum

4.3Moscow Prioritization

MoSCow Prioritization			
Must Have	**Should Have**	**Could Have**	**Wouldn't Have**
M01. Enroll in free and paid courses in multiple categories	S01. View and choose courses from multiple categories	C01. Provide feedback on the course and recommend the course to friends	W01. Create forums
M02. Add a course in wishlist and view the list	S02. Search multiple courses	C02. Offline viewing of downloaded materials	W02. Post in the course forum and reply to others' posts
M03. Buy and pay the course	S03. Download videos, materials and transcripts from course	C03. View ongoing and completed courses	W03. Recommendation and feedback
M04. Watch videos, materials and transcripts from the course	S04. Submit assignments		W04. Join a free course
M05. Create and edit course contents	S05. Design test and upload results		
M06. Upload videos and materials for course	S06. Take tests		
M07. Send email to relevant users registrations, posts and submissions	S07. Student and teacher interaction		

Table 9: MoSCow Prioritization

5. Prince2

Introduction:

Prince2 is a structured project management method which relies on its 7 principles, 7 themes and 7 processes. It emphasizes dividing projects into manageable and controllable stages.

5.17 Principles

5.1.1 Executive summary of the product

Our parent company Info Web Solutions Inc. is preparing to make Mero Institute, an online Learning and Training Platform. In board we have following members.

President USA	Robert Howles
Chief Executive Officer	Joseph Clinton
Chief Operating Officer	Kelvin Williams
Chief Technology Officer	Kevin Wilson
Chief Financial Officer	Brad Kasper
Chief HR Officer	Julia Stephenson
Director of Project Management	Alan Jones
Director of Marketing	Sunny Walsch
President Nepal	Manish Thapa

We have two development centre that is in the USA and Nepal. According to Board Minute, Mero Institute will be developing in the Nepal Development Centre and accountability will be the local president and reporting to the board members every month end.

Mero Institute Overview:

This online learning and training platform has several features for users and trainers so that they can communicate with each other from the forum about training. Users can share their comments on the forum. Similarly users can send their feedback and free training offline as well.

Mero Institute Admin Panel

- Enroll in free and paid courses in multiple categories
- Student and teacher interaction
- Recommendation and feedback

Students Panel

- View and choose courses from multiple categories
- Add a course in wishlist and view the list
- Buy and pay the course
- Join a free course

- Search multiple courses
- View ongoing and completed courses
- Watch videos, materials and transcripts from the course
- Offline viewing of downloaded materials
- Take tests
- Submit assignments
- Post in the course forum and reply to others' posts
- Provide feedback on the course and recommend the course to friends

Trainers Panel:

- Create and edit course contents
- Upload videos and materials for course
- Create forums
- Design test and upload results

System:

- Send email to relevant users registrations, posts and submissions

Non Functional Requirements

- The platform should handle 100,000 users at a time without affecting its performance.
- Maximum 5 seconds of response time.
- Disaster recovery.

Asset Classification and policy

Categorize assets of the development centre and create policy for its physical and remote access and security alignment with our company policy.

Physical Location of our local office:

Office is located in Kathmandu Nepal. Its main contact number is +977-01-44XXXX and its point of contact is local president, Mr. Manish Thapa, contact number is +977-98510XXXXX and its email is meroins@infowebsolutions.com. Our employees rely on their private vehicles or public transportation to travel to the office. After entering, employees take attendance with their thumbs and store their all belongings (including their mobile) on the office rack before entering the development department.

For lockdown, Nepal strike or similar cases, will follow company policy to remote access resources and time stamp for login and logout.

Communications among our employees will be using our company chat server for short messages. For formal communications, we will be using our official email address.

Financial operations will be carried out with the budget plans aligned with the Chief Finance Officer and its department.

Critical Business constituents

Any changes in our Mero Institute related to devices, resources, funds, and accounts, should be correspondingly communicated with critical business parties.

Services/Product	Suppliers/Vendors Name, Address, contact	Alternative Suppliers/Vendors Name, Address, Contact
Servers, routers, laptop	ABC Trading, New Road, *Tel:+977* 01 4423XXX email: sales@abc.com	XYZ trading , Putalisadak Tel: +977 01 4423XXXX Email: sales@xyz.com
Serverless Web Application	Amazon, contact details	Microsoft Azure, Google Cloud

Table 10: Critical Business Constituents

Banks

Banks Name
Standard Bank
Nabil Bank

Table 11: Banks

Counter Party

Online Payment
Esewa (Local)
Khalti (Local)
Payoneer (International)

Table 12: Counter Party

Regulator Reporting and communication

Regulator	Contact
ETA 2008	Ministry of communications and Information Technology
NRB IT Guidelines	Nepal Rastra Bank
Company Act	Company Registrar
Labor Act	Department of Labor and Occupation Safety
Income Tax Act	Inland Revenue Department

Table 13: Regualotory Reporting

Board Approval

Approve Info Web Solutions Inc. BCP by signing below.

The board has signed BCP as reasonable designed to extend the business meeting all the requirements.

Signed:

Title:

Date:

5.1.2 Business Continuity:

According to ISO 22301:2019, business continuity is defined as "capability of an organization to continue the delivery of products and services within acceptable time frames at predefined capacity during a disruption".

Mero Institute will be following transference risk control strategy. As we take service from AWS serverless web application, it will take following risks control mechanisms

- Online data backup and recovery mechanisms
- Low latency time
- Data security and prevention mechanisms
- Data integrity and availability
- Secure Access mechanisms
- Disaster Recovery

Offline Backup and recovery:

Take hard copies back up from our head office and local office in Nepal and store them in secure place.

5.1.3 Learn from Experience:

We have board meeting every end of month and board member will share past experience for the new product advancement and will learn and update from their and own experience.

(Henny Portman)Lessons Log

The Lessons Log is a project repository for lessons that apply to this project or future projects. Possible composition of the log: - Lesson type (to be applied to this project, or to be passed on to management) - Lesson detail (event, effect, causes/trigger, whether there were early-warning indicators, recommendations, whether the triggered event was previously identified as a risk) - Date logged - Logged by - Priority

Lessons Report

The Lessons Report is used to pass on any lessons that can be usefully applied to other projects. Composition of the report: - Executive summary - Scope of the report (stage or project) - A review of what went well, what went badly and any recommendations - A review of useful measurements such as: how much effort was required to create the products, how effective was the quality management strategy and statistics on issues and risks - Any useful knowledge gained regarding the tailoring of PRINCE2 - For significant lessons it may be useful to provide additional details

5.1.4 Managed by Exceptions

(Your Project Manager, 2017)If the project board were to become involved in every decision, it would distract their time and effort from other projects and their day-to-day work. Managing by exception is a supervisory principle which is used everywhere to avoid such a situation.

In order to manage by exception, each level of project management must be confident in the ability of the level below it to play its part. However, there also has to be limits to provide guidance and protect the integrity of the project. These limits are set by reference to six tolerances.

The delegated authority at each level is set by establishing a tolerance against:

- Time
- Cost
- Quality
- Scope
- Risk
- Benefit
- Time tolerance

These are limits on the amount of time by which delivery can exceed expectation − for example, no more than 30 days beyond the agreed delivery date.

Cost tolerance

The amount of deviance to budgeted costs. An example may be no more than 4% above budget without scaling.

Quality tolerance

- Availability of the training courses
- Response time 5 secs

Managed by exception provides a framework for delegation and project management that allows each management layer to manage the layer below without the need for constant supervision and interruption. It helps to keep the project on track, within the set constraints of budget, time, cost, etc. while giving each member of the team pre-defined scopes of autonomy.

Management by authority reduces the need for meetings, reporting, monitoring and measuring. It saves hours (even days) of bureaucracy that in itself can hamper project delivery.

5.1.5 Managed by stages

This will be dealt on Chapter 6

5.1.6 Focus on Product

Prince 2 defined the following points.

- (Litten, 2023)Ensures that the project only performs work that directly contributes to the delivery of a product. Mero Institute must deliver the training course online and offline.
- Reduces the risk of user dissatisfaction and acceptance disputes by agreeing (at the start of the project) what will be produced by the project. Mero Institute will be providing forum for the course available and students can post their opinions and comments among them which will raise their satisfactions. This will accepts disputes if any and can be solved by concerned members.
- Assists a pause or closure of the project. Agreements can be more easily met to pause or close a project after completing certain products. It also allows a more manageable and controlled resumption of the project. If any course needs to update or change course or add new course, Mero Institute can update it.
- An output-oriented project agrees and defines the project product before undertaking the activities required to produce it. The set of approved products establishes the scope of a project and provides the basis for planning and control. Mero Institute will be providing tests of the training course and provide results which is output of the project.

5.1.7 Tailoring to the project

- Adapting the Themes
- Increasing Budget and opening branch office in different country for the business extension.
- Use specific terminology or language
- Adding local language in the Mero Institute along with English.
- Revise management Product Descriptions
- Adding related books so that users can buy it
- Revise Role Descriptions of project
- Adding and changing roles in the product development and management.

5.2Project brief

Project Name	Mero Institute
Date	31 Jan 2024
Owner	Manish Thapa
Author	Krishna Ram Puri
Client	Head office Info Web Solutions Inc., USA
Document Code	MeroIns2024
Version	1

Table 14: Project Brief

5.2.1 Project definition

The development centre of InfoWeb Solutions Inc. Florida, USA branch office Nepal is expanding business by developing a new product "Mero Institute" to contribute to the growth of the company. Mero Institute is an Online Learning and Training platform where users can have training online and offline usages and feedback mechanisms to continuously improve the training.

5.2.2 Project objectives

To expand business by adding new product "Mero Institute" whose main objective is to make online training and learning platform where students can enroll and take free course and paid

- Time

  Mero Institute will be released by the first week of April 2024

- Cost

  To complete the project within the cost of € 331,388.00

- Quality

  To ensure that the quality standards defined by the company is met, along with the quality expectations of the customer.

- Scope

  To deliver the product based on the functional and non-functional requirements defined in the project plan.

- Risks

  To complete the project within the defined tolerance from the pre-defined risks with plan A and plan B.

Benefits

Increase in company profit by 20.19% and increase market share by 5%

5.2.3 Desired outcomes

- Students from Nepal and US can enrol in our platform to learn course
- Students can pay through online for payment of course
- Students can download study materials and can read or view offline.
- Trainers can upload study materials and videos.
- Trainers can organize Tests and submit the result.
- Trainers can create forum to post and discuss about the topic.

5.2.4 Project scope and exclusions

Project scope

The project scope will be in Nepal and America and courses are related to Information Technology.

Exclusions

- Other than Nepal and USA are excluded.
- Product is in English language only.

5.2.5 Constraints and assumptions

Project Assumptions

To find the cost and income, we have some assumptions.

- Serverless AWS
- Call centre for customer support
- Champions of Mero Institute 5 persons and 5 persons in development (See Table 3)
- Development and Test Period 3 months (2024 Jan, Feb and March)
- Launch Program April 2024
- 3 months (April, May and June) Market Penetration duration
- From 4th month July slowly starts business from 30 students
- Training fee €10 per each course

By the end of one year March 2025, target students 39,830

5.2.6 Project tolerances

- Cost: + 5%
- Timeline: +10%
- Response time: 5 seconds
- Risk: The cost due to threat to be limited to 3% of total budget
- Disaster recovery: Data backup in Nepal and America

5.2.7 Benefits:

- To extend business growth of company
- To increase market share
- To increase profit.
- Expected profit is about 20.19% of investment.
- To utilize our resources

5.2.8 Composition

Mero Institute web app will be created with the Serverless Web Application which has following characteristics.

- Cloud-based solution AWS
- Load balancing across multiple servers
- Nosql database:
- Content Delivery Networks: for low latency and content availability
- Amazon Cognito User Pool: for user directory and authentication

5.2.9 Development skills required

The skills required are as follows.

- Cloud Architecture
- Amazon AWS, Google Cloud Platform and Microsoft Azure

Front end

- HTML, CSS, JavaScript, React, Node.js

Back end

- RESTFUL, AWS Lambda, API Gateways
- Database: Nosql

5.2.10 Customer's quality expectations

- Students can enrol course online from every parts of Nepal and US.
- Course contents should be genuine and verified by InfoWeb Solutions Inc.
- Technologically there should not be any issue like, video quality, access time etc

5.2.11 Acceptance criteria

- Acceptance criteria are as follows.
- Complete course module
- Online payment method
- Tests and evaluation system
- Forum
- Accessibility and usability of platform
- Browser compatibility

5.2.12 Acceptance method

- Student forum response

- Student feedback
- Student course completion rate

5.2.13 Acceptance responsibilities

Acceptance responsibilities: Product Owner

5.3Project management team structure

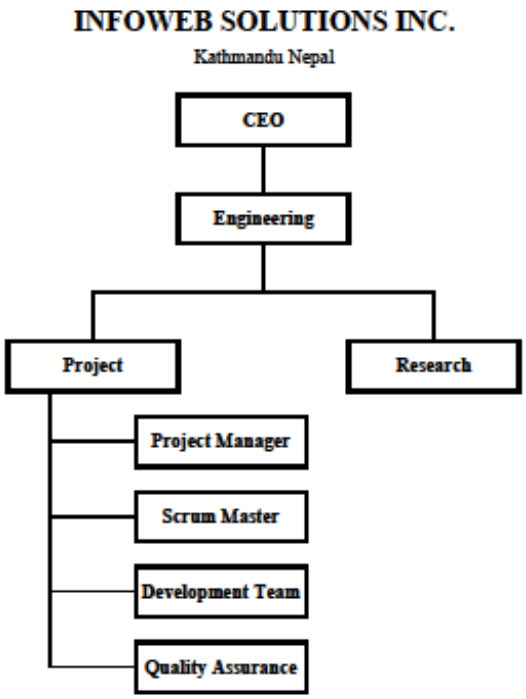


Figure 10: Team Chart

5.4Role descriptions

We have selected SCRUM methodology to as presented before. The roles and responsibilities are according to SCRUM aligned with Prince 2.

Product Owner

The Product Owner (PO) is the Agile team member primarily responsible for maximizing the value delivered by the team by ensuring that the team backlog is aligned with customer and stakeholder needs. As a member of the extended Product Management function, the PO is the team's primary customer advocate and primary link to business and technology strategy. This enables the team to balance the needs of multiple stakeholders while continuously evolving the Solution.

Roles and Responsibilities

- Connecting with the customer
- Contributing to the vision and roadmap of product

- Managing and prioritizing the team backlog
- Supporting the team in delivering value
- Getting and applying feedback.

5.4.1 Scrum Master

(Scaled Agile Framework, 2023) The Scrum Master/Team Coach (SM/TC) is a servant leader and coach for an Agile team who facilitates team events and processes, and supports teams and in delivering value. They help educate the team in Scrum and ensure that the agreed Agile processes are followed. They also help remove impediments and foster an environment for high-performing team dynamics, continuous flow, and relentless improvement.

Roles and Responsibilities

- Facilitating PI Planning
- Prepare for PI Planning
- Draft PI Plans
- Coordinate with other teams
- Create team PI objectives
- Review final plans and business value
- Supporting Iteration Execution
- Facilitate Team Events
    - Backlog Refinement
    - Team Planning
    - Team Sync
    - Review
    - Retrospective
- Work with Development Team
- Collaborate with PO

Improving Flow

- Establish board
- Measure and optimize flow

- Build quality in

Building High Performing Teams

- Foster and support Agile team attributes
- Encourage high performing team dynamics
- Become a more effective Scrum Master/Team Coach
- Serve as lean Agile Leaders
- Coach with powerful questions
- Resolve team conflicts
- Develop team skillsets

Improving Development Performance

- Facilitate cross team collaboration
- Alignment PI objectives, Strategic themes during PI planning
- Attending team's evens and demos with relevant team members
- Build trust with stakeholders
- Help the team inspect and adapt
- Facilitate the problem solving workshop

5.4.2 Development Team

The Development Team forms an integral part of a Scrum team. It is comprised of professionals who deliver a potentially releasable Increment of "Done" product at the end of every Sprint. At the Sprint Review, a "Done" increment is required. Typically, only the members of the Development Team create this Increment.

Roles and Responsibilities

- Perform Sprint Execution
- During sprint execution,
- Designing, building, integrating and testing product backlog items into deliverable functionality.

Inspect and Adapt

- Participate in daily Scrum meeting.
- Collectively inspect their progress toward sprint goal and adapt the plan for current day work.

Groom the Product Backlog

- Must dedicate ample of time preparing next sprint
- Focused on product backlog grooming
- Include creating and refining, estimating and prioritizing backlog items.
- Should allocate time to assist the PO

Plan the Sprint

- Participates in each sprint planning
- Establish goal of sprint in collaboration with PO, facilitated by SC
- Once goal is set, prioritize subset of product backlog
- Makes a series of granular, more certain and more detailed plans at the start of each sprint.

Inspect and Adapt Product and Process

- Development team involves two inspect and adapt activities, sprint review and sprint retrospective.
- In sprint review, development team, PO, SC, stakeholders, sponsors, customers and interested members participate. They review completed features of current sprint and discuss how to progress in next sprint.
- In sprint retrospective, Scrum team inspects and adapts its Scrum process and technical practices to improve the way is uses Scrum to deliver the best business value.

Extending Scrum to Prince 2 we have following roles and responsibilities.

5.4.3 Project Manager

(Donato, 2023)A project manager in software is responsible for leading a team of software developers and ensuring that software projects are completed on time, within budget, and to the satisfaction of the stakeholders. They are responsible for planning, executing, and closing projects. This involves defining project scope, creating schedules, allocating resources, managing risks, and monitoring progress.

Roles and Responsibilities

- Preparing project proposals and discussing potential projects with clients and stakeholders
- Facilitating project initiation by defining project scope and requirements, and preparing the necessary documents and requirements
- Developing project plans and timelines to ensure the timely submission of project deliverables
- Managing project budgets and resources to ensure the timely completion of milestones
- Tracking and documenting progress and communicating project status updates to key stakeholders

- Identifying and managing project risks
- Responsible for analyzing customers feedback via call centre
- Facilitating team meetings and collaboration
- Liaising for changes and negotiations with relevant stakeholders
- Ensuring software quality standards are met and requirements are submitted within budget and on time
- Closing the project and ensuring proper documentation

5.4.4 Senior User

(PMHUT, 2009)The Senior User is the representative on the Project Board of all users of the project output. If one exists he or she will chair meetings of the User Group. The Senior User is responsible for ensuring that users agree Acceptance Criteria against which the output of the project will be measured and for ensuring that these will meet the needs of the users. In our case, Senior User is Mr. Manish Thapa.

Roles and Responsibilities

- Ensure that the desired outcome of the project is specified
- To co-ordinate the agreement of users of a set of Acceptance Criteria containing measureable and tangible descriptors
- Organize and chair meetings of the project User Group
- Organize and monitor user testing of project outputs, ensuring that any issues arising are adequately recorded and communicated
- Monitor the project's progress from a user requirements point of view
- Manage two-way communications with the users
- Resolve any issues or conflicts including conflicts of priorities of users
- Monitor and manage user-related risks

5.4.5 Senior Supplier

The Senior Supplier is responsible for the quality of products supplied. Where there are multiple external suppliers it may be necessary to have more than one person in this role.

Roles and Responsibilities

- Approval of supplier specifications – this may be by approving product descriptions
- Ensure that supplier resources are made available for project work
- Resolve any supplier conflicts

- Advise the project on design and development strategies
- Monitor potential changes for impact on the quality of products from suppliers
- Monitor and manage risks from a supplier viewpoint
- Ensure adequate quality control procedures are adhered to by suppliers

5.4.6 Project Assurance

(Your Project Manager, 2017) Project assurance is undertaken to help protect the interests of the customer, the user and the supplier.

Roles and Responsibilities

- Liaison between stakeholders
- Control of risks
- Ensuring that preparation of product descriptions is undertaken by the right people
- Ensuring that staff are properly trained in quality methods, and that these methods are applied correctly.

6. Product Development using Prince2 and Scrum

According to our Business Continuity and Development plan, now I will present different stages following Prince2 and Scrum methodology.

6.1Managed by Stages

(Prince2.com)Prince 2 is process based approach for project management and we will be following the processes.

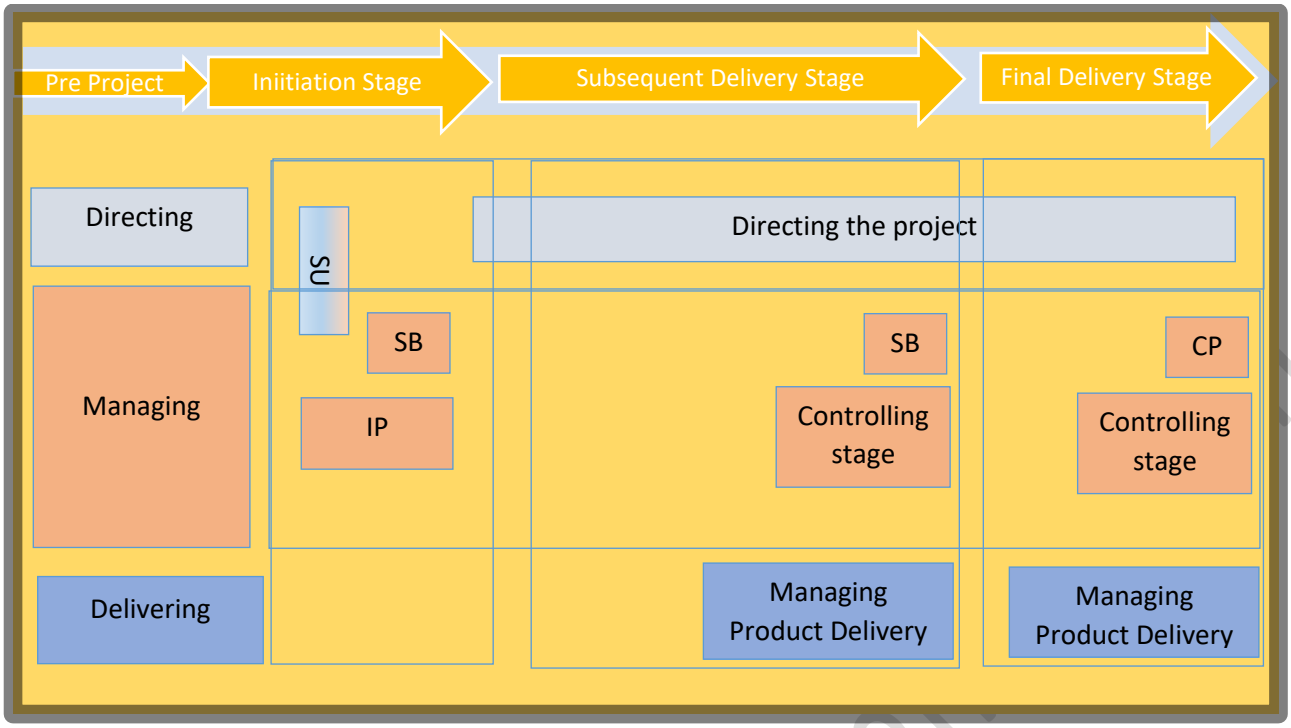


Figure 11: Process managed by stages Prince2

Key

SU: Starting Up

IP: Initiation Project

SB: Managing Stage Boundary

CP: Closing Project

6.2Mapping Scrum in Prince2

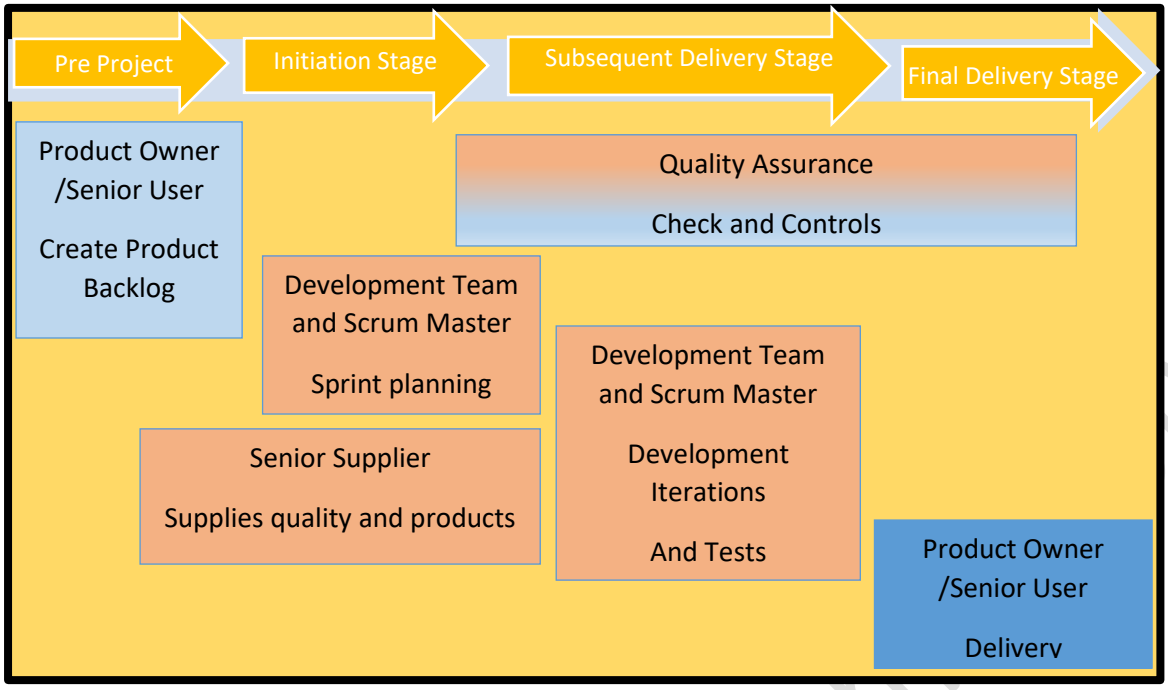


Figure 12: Mapping Pince2 and Scrum

Fig Mapping Prince2 with Scrum Methodology

6.2.1 Directing a Project

Directing a Project runs from the start-up of the project until its closure. This process is aimed at the Project Board. The Project Board manages and monitors via reports and controls through a number of decision points.

The key processes for the Project Board break into four main areas:

- Initiation (starting the project off on the right foot)
- Stage boundaries (commitment of more resources after checking results so far)
- Ad hoc direction (monitoring progress, providing advice and guidance, reacting to exception situations)
- Project closure (confirming the project outcome and controlled close).
- This process does not cover the day-to-day activities of the Project Manager.
- In our case, Senior User or CEO of Nepal or Product Owner is sole responsible to convince the Project Board to initiate the Mero Institute in Nepal Development Centre.

6.2.2 Starting up a Project

This is the first process in PRINCE2. It is a pre-project process, designed to ensure that the pre-requisites for initiating the project are in place.

The process expects the existence of a Project Mandate which defines in high level terms the reason for the project and what outcome is sought. Starting up a Project should be very short.

The work of the process is built around the production of three elements:

- Ensuring that the information required for the project team is available. (Senior User, Scrum Master and Project Manager ensures all the resources are available. If any talents, or system or resources are unavailable, then they will manage for the initiation of the project)
- Designing and appointing the Project Management Team

In our case, we have appointed as following Project Management Team

6.2.3 Initiating a Project

The objectives of Initiating a Project are to:

- Agree whether or not there is sufficient justification to proceed with the project
- Establish a stable management basis on which to proceed
- Document and confirm that an acceptable Business Case exists for the project
- Ensure a firm and accepted Foundation to the project prior to commencement of the work
- Agree to the commitment of resources for the first stage of the project
- Enable and encourage the Project Board to take ownership of the project
- Provide the baseline for the decision-making processes required during the project's life
- Ensure that the investment of time and effort required by the project is made wisely, taking account of the risks to the project.

6.2.4 Managing Stage Boundaries

This process provides the Project Board with key decision points on whether to continue with the project or not.

The objectives of the process are to:

- Assure the Project Board that all deliverables planned in the current Stage Plan have been completed as defined
- Provide the information needed for the Project Board to assess the continuing viability of the project
- Provide the Project Board with information needed to approve the current stage's completion and authorise the start of the next stage, together with its delegated tolerance level
- Record any measurements or lessons which can help later stages of this project and/or other projects.

6.2.5 Controlling a Stage

This process describes the monitoring and control activities of the Project Manager involved in ensuring that a stage stays on course and reacts to unexpected events. The process forms the core of the Project Manager's effort on the project, being the process which handles day-to-day management of the project.

Throughout a stage there will be a cycle consisting of:

- Authorizing work to be done
- Gathering progress information about that work
- Watching for changes
- Reviewing the situation
- Reporting
- Taking any necessary corrective action.

This process covers these activities, together with the on-going work of risk management and change control.

6.2.6 Product Backlog

Product Owner creates Product Backlog as follows.

Serial	Product Backlog
1	AS MERO INSTITUTE Admin, I WANT to enroll free and paid courses in multiple categories SO THAT I can view numbers of students enrolled in paid and free courses
2	AS STUDENT, I WANT to add course in Wishlist SO THAT I can view my list course and prioritize them learning first
3	AS STUDENT, I WANT to pay the course SO THAT I can get login details for study the course and get access for course materials.
4	AS STUDENT, I WANT to watch videos, materials and transcripts SO THAT I can progress my training course
5	AS TRAINER, I WANT to create and edit course contents SO THAT course contents are available while training and students can download them.

6	AS TRAINER, I WANT to upload videos and materials SO THAT these materials are available while training and students can download them.
7	AS SYSTEM , I WANT to send email relevant users upon posts and submissions SO THAT students feels prompt response like student registration, course selection, payment etc.
8	AS STUDENT, I WANT to view and choose courses from multiple categories SO THAT I can take training course.
9	AS STUDENT, I WANT to search multiple courses SO THAT I can take multiple courses
10	AS STUDENT, I WANT to download vedios, materials and transcripts from course SO THAT I can read offline.
11	AS STUDENT, I WANT to submit Assignments SO THAT trainer can check it.
12	AS TRAINER, I WANT to take tests SO THAT I can check student tests and evaluate marks.
13	AS TRAINER, I WANT to design tests and upload results SO THAT I can provide different types of questions to students and submit certificates to student.
14	AS MERO INSTITUTE Admin, I WANT to view students and Teachers interaction SO THAT I can plan for future.
15	AS STUDENT, I WANT to provide feedback about course and recommend the course to friends SO THAT my friends can visit and select the course
16	AS STUDENT, I WANT to view downloaded materials SO THAT I can study on offline
17	AS STUDENT, I WANT to view ongoing courses and completed course SO THAT I can plan for next course.
18	AS TRAINER, I WANT to create forum SO THAT I can communicate among students

19	AS STUDENT, I WANT to post in forum and reply to others posts SO THAT every students and trainers can read and response it
20	AS MERO INSTITUTE Admin, I WANT to recommend and feedback SO THAT students and trainers can get guidance about courses
21	AS STUDENT, I WANT to join free course SO THAT I can join for other paid course.

Table 15: Product Backlog

Now Scrum Master, Product Owner and Development Teams sit meeting for Sprint Planning.

6.2.7 Sprint Planning

After Sprint Planning, Product Backlog gets Story points for each backlog. Story points is a baseline for estimation and gives a team clear idea about the estimation. Story points are relative numbers used to denote estimate the amount of effort required to complete a user story in product backlog. Story points take into account three factors that can impact a tasks scope and effort and the story points value increases accordingly. Three Factors are

Risk:

It is amount of total risk or uncertainty associated with the task. For example, if any involved development team member resigns job, it increases amount of risk.

Complexity

It is task's level of difficulty.

Repetition

It is team's experience with similar tasks.

Story points are given with different methods like Fibonacci series, T shirt size or planets size etc.

The most popular one for Story points is using Fibonacci series like 1, 2, 3, 5, 8, 13, 21, 34, 55…

Story Points Info

Story Points	Amount of Effort	Duration	Task Complexity	Task Risk
1	Minimum effort	one day	Little complexity	None
3	Little Effort	2-4 days	Low complexity	None
5	Medium	5 to 10 days	Medium Complexity	Medium
8	Medium	11 to 15 days	Medium Complexity	Medium
13	High effort	16 to 30 days	Medium Complexity	Medium
21	High effort	more than 30 days	High Complexity	High

Table 16: Story Points Info

After Sprint Planning Meeting, we get new Product Backlog as follows.

Serial	Product Backlog	Story Points
1	AS MERO INSTITUTE Admin, I WANT to enroll free and paid courses in multiple categories SO THAT I can view numbers of students enrolled in paid and free courses	5
2	AS STUDENT, I WANT to add course in Wish list SO THAT I can view my list course and prioritize them learning first	1
3	AS STUDENT, I WANT to pay the course SO THAT I can get login details for study the course and get access for course materials.	3
4	AS STUDENT, I WANT to watch videos, materials and transcripts SO THAT I can progress my training course	1

5	AS TRAINER, I WANT to create and edit course contents SO THAT course contents are available while training and students can download them.	3
6	AS TRAINER, I WANT to upload videos and materials SO THAT these materials are available while training and students can download them.	1
7	AS SYSTEM , I WANT to send email relevant users upon posts and submissions SO THAT students feels prompt response like student registration, course selection, payment etc.	3
8	AS STUDENT, I WANT to view and choose courses from multiple categories SO THAT I can take training course.	1
9	AS STUDENT, I WANT to search multiple courses SO THAT I can take multiple courses	1
10	AS STUDENT, I WANT to download vedios, materials and transcripts from course SO THAT I can read offline.	1
11	AS STUDENT, I WANT to submit Assignments SO THAT trainer can check it.	1
12	AS TRAINER, I WANT to take tests SO THAT I can check student tests and evaluate marks.	1
13	AS TRAINER, I WANT to design tests and upload results SO THAT I can provide different types of questions to students and submit certificates to student.	3
14	AS MERO INSTITUTE Admin, I WANT to view students and Teachers interaction SO THAT I can plan for future.	1
15	AS STUDENT, I WANT to provide feedback about course and recommend the course to friends SO THAT my friends can visit and select the course	3
16	AS STUDENT, I WANT to view downloaded materials SO THAT I can study on offline	1

17	AS STUDENT, I WANT to view ongoing courses and completed course SO THAT I can plan for next course.	3
18	AS TRAINER, I WANT to create forum SO THAT I can communicate among students	3
19	AS STUDENT, I WANT to post in forum and reply to others posts SO THAT every students and trainers can read and response it	3
20	AS MERO INSTITUTE Admin, I WANT to recommend and feedback SO THAT students and trainers can get guidance about courses	1
21	AS STUDENT, I WANT to join free course SO THAT I can join for other paid course.	1

Table 17: Product Backlog with Story Points

6.2.8 Managing Product Delivery

For managing product delivery, we follow Gantt chart with involvement of Scrum activities.

6.2.9 Gantt chart

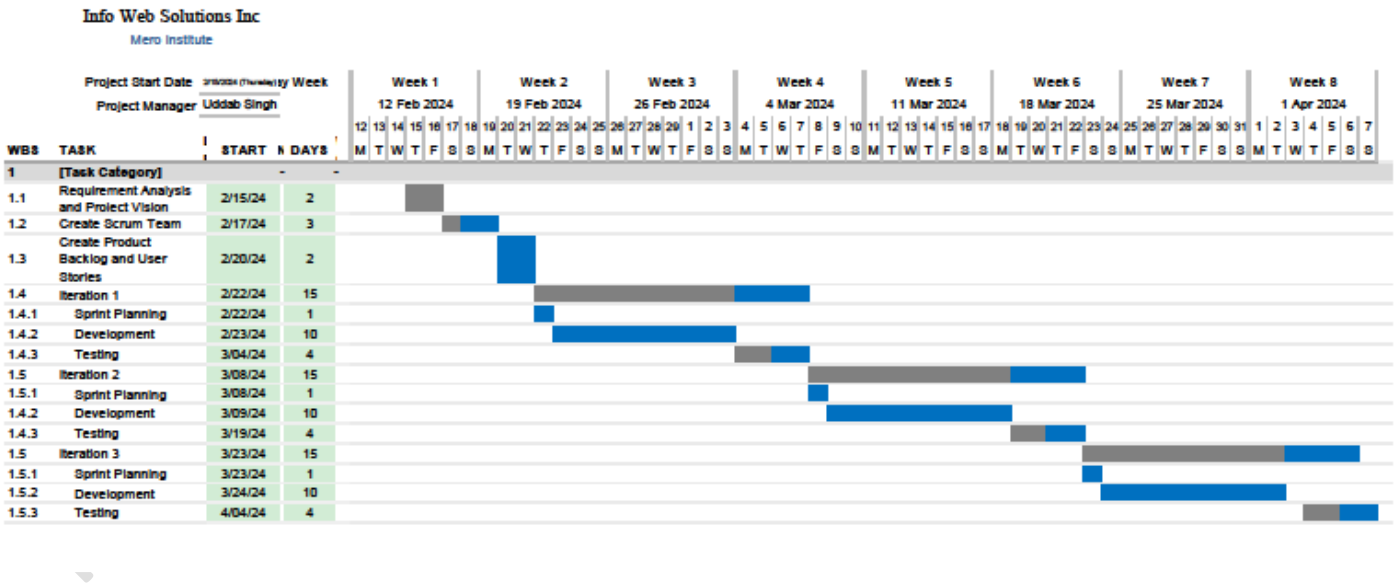


Figure 13: Gantt chart

Our Sprint is 2 weeks i.e. 15 days. Sprint goal is to make an online training platform.

Sprint Velocity = sum of story points of done stories.

Serial	About	Sprint Planning	Daily Meetings	Sprint Reviews	Retrospective

1	No. of Meetings	3	42	3	3
2	When	Before Development	Daily	After testing	After Sprint Reviews
3	Participants	i. Product Owner	i. Scrum Master	i. Scrum Master	i. Scrum Master
		ii. Development Team	ii. Development Team	ii. Development Team	ii. Development Team
		iii. Scrum Master		iii. Product Owner	iii. Product Owner
				iv. Stakeholders	
4	Purposes	i. Sprint Goal	i. what did you yesterday?	i. Review delivered increment	i. Identify what went wrong
		ii. Sprint Backlog	ii. What are you going to do today?	ii. Update Product Backlog	ii. Identify what can be improved
			iii. Any issue about delivery of product?	iii. Prepare for next sprint	iii. Improve culture
					iv. Energize team

Table 18: Scrum Chart

The objective of this process is to ensure that planned products are created and delivered by:

- Making certain that work on products allocated to the team is effectively authorized and agreed accepting and checking Work Packages
- Ensuring that work conforms to the requirements of interfaces identified in the Work Package
- Ensuring that the work is done
- Assessing work progress and forecasts regularly
- Ensuring that completed products meet quality criteria
- Obtaining approval for the completed products.

6.2.10 Closing a Project

The purpose of this process is to execute a controlled close to the project. The process covers the Project Manager's work to wrap up the project either at its end or at premature close. Most of the work is to prepare input to the Project Board to obtain its confirmation that the project may close.

The objectives of closing a Project are therefore to:

- Check the extent to which the objectives or aims set out in the Project Initiation Document (PID) have been met
- Confirm the extent of the fulfilment of the Project Initiation Document (PID) and the Customer's satisfaction with the deliverables
- Obtain formal acceptance of the deliverables
- Ensure to what extent all expected products have been handed over and accepted by the Customer
- Confirm that maintenance and operation arrangements are in place (where appropriate)
- Make any recommendations for follow-on actions
- Capture lessons resulting from the project and complete the Lessons Learned Report
- Prepare an End Project Report
- Notify the host organization of the intention to disband the project organization and resources.

6.3Scrum and Prince2 Process Level Comparison

Prince2	Scrum
There are 7 processes in Prince2 1. Starting up project • Project brief • Project Approach • Appoint Project Execution 2.Directing stage • Requirement of the project execution is determined by the Board. 3.Initiating Project	Scrum has not defined processes however it has defined ceremonies 1.Sprint Planning • Product Backlog • Commitment of Retrospective • Definitions of Done • Sprint goal • Sprint Backlog 2.Daily Meeting • Progress towards Sprint goal.

• Project Plan • Project Controls • Define Risk 4.Controlling stage • Breaking the project into fragments and assigning to team members 5..Managing project Delivery Stage • Project Manager guarantees that project is operating under plan. It will be linked with board for evaluation. 6.Managing Stage Boundaries • Project Manager reviews all the stages and evaluated and recommended for board either to go or not. 7.Closing Project • Formal project closing document is prepared.	• Sprint Backlog • Daily Plan 3.Sprint Review • Product Increment • Product Backlog (Release) • Market Trends 4.Retrospective • Team Collaboration • Technology and Engineering • Definitions of Done • Lessons learnt

6.4Scrum and Prince2 Role Level Comparison

Prince2 Role	Scrum Role
Primary stakeholders are represented in as follows. 1. Project Board • Executive: business oriented person • Senior User: final user's requirements in board • Senior Supplier: who represent the interest of suppliers 2. Project Assurance:	Scrum has defined roles as follows. 1. Product Owner • Responsible for requirements and making product backlog. • Contributing vison to the roadmap of product. • Defining definitions of done. 3. Scrum Master Responsible for team following Scrum principles.

• Assures the interests of primary stakeholders 4. Change: Authority: • Decides on some of the request for changes in behalf of board. 5. Project Manager: • Responsible for day to day activities and operation according to plan. 6. Project Support: • Helps project management activities. 7. Team Manager: • Responsible for ensuring the quality and other constraints of production in team.	Facilitating for team members Drafting and guiding for product increments 3.Development Team • Perform Sprint Execution • During sprint execution, • Designing, building, integrating and testing product backlog items into deliverable functionality.

6.5Scrum and Prince2 Product Deliverables Level Comparison

Prince2 Deliverables	Scrum Deliverables
management products Baselines: Products that are approved and subject to change control. Eg Project Plan, Project Brief etc Records: Products that are continuously updated, such as issue register, risk register, attendance etc Reports: Products that are snapshots of project status at a specific point of time. Such as Weekly report.	management deliverables Product Backlog: A prioritized list of features enhancements and other requirements created by Product Owner. Sprint Backlog: A list of tasks committed during a sprint to achieve sprint goal. Product Increment: The sum of all completed product backlog items at the end of a sprint.

Project Deliverables: Benefits Review Plan Describes the review plan for benefit analysis. Business Case: Describe the cost to benefit analysis of undertaking the project considering the cost, time and risk factors. Checkpoint Report Progress report provided by the Team Manager to the Project Manager after each development stage.	Definition of Done: The criteria that must be met for a product increment to be considered complete. Product Deliverables: Sprint Review Explains about each sprint processes, issues solved Business Case: There is no cost benefit analysis. Checkpoint Report: Each Sprint is reviewed by all stakeholders. Also there is Retrospective meeting which is for lessons learnt for next sprint.

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