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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 marks of zero will be awarded.

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1. Project Memorandum:

To: Click Interactive Inc, USA
Form: LDS Private Ltd.
Date: 1st May 2021
Subject: Regarding the Project Management Team

Greetings Sir/Madam,

This memorandum has been made with the sole purpose to define your enterprise regarding the various steps and process which will be taken to make the online web portal name OneClick Training. The document also attempts to introduce you to the Project Management Team, who will be making the online web portal named OneClick Training. The main goal of the project is to develop a training platform that has several features to provide users with a satisfying training experience, with online as well as offline usages and feedback mechanisms to continuously improve the training. The web portal will allow students to make accounts, enroll in courses, purchase their desired course, search for courses, view courses, download material, take a test, submit an assignment, post in the course forum and provide feedback. Similarly, it will also allow trainers to create course content, edit them, upload videos and material, and create forums. For cases of emergency, the portal will also have a disaster recovery plan. The main target audience for this project is the various students and trainers who will be using this platform.

The Project development will be conducted using the Scrum methodology of project management. The project requires the team to self-managing as there are high chances that multiple errors might occur during integration as there are quite a lot of requirements. The project also needs constant involvement of customers as there are varieties of designs, integration methods, and user experience that can be used to develop this project. So, in such case ensuring the chosen attributes are to customer liking involving them is necessary. There is also a need to provide a functional product in the early stages of the product development so that areas improvement and needs of the user can be determined.

All the aforementioned criteria are a must for the project and these criteria can be fulfilled using Scrum project development methodology. Scrum is based on the concept of using and forming a team which are self-organising and self-managing. At the same time, Scrum focuses on rectifying errors that occur with the active involvement of consumers. Scrum also uses the concept of Sprint which is a short fixed interval of time under which the product development must be completed. The concept of Scrum is to quickly make multiple iterations of product where each iteration is an improvement of the previous. In the context of integration with other frameworks such as PRINCE2 and using prioritisation method such as MoSCoW using Scrum seems to be the best method. Hence because of all these reasons Scrum was deemed the best method for this project.

The project development will be fully handled by the project manager which in our case will be the Scrum master. I will work together with the Technical lead and Quality Assurance Lead to monitor and drive the entire project. The product owner will be the Director of Project Management. He will also be representing the Project Board and will be coordinating very closely with the project manager that is me.

The project will begin from the 1st of May, 2021 is expected to continue until the 8th of August, 2021. The total duration of the project will be 95 days. The 95 days of project development will include activities such as team creation, selection of project manager, UI design, Front and back-end development, quality testing, and quality assurance. The development of the web portal will be commenced in Sprints where each Sprint will last up to 30 days. There will be a maximum of two Sprints. For role definition and communication, the RACI matrix will be used which is provided in the document. The requirement prioritisation will be done using the Moscow prioritization technique. The total budget for the entire project including all resources required will is around $14890.

With Regard,
Pravash Karki,
Project Manager,
LDS Private Ltd.

2. Software Development Approach

2.1. Waterfall model:

'The Waterfall Model, also known as the Linear-Sequential Life-cycle Model, is one of the first process models introduced for software development. As the name implies, this model's process of downward mechanism is similar to that of a waterfall. The whole process is divided into sequential stages, and it is imperative to complete each phase successfully to move onto the next one' (Zulqadar, 2018). According to the International Software Testing Qualifications Board, the Waterfall Model consists of 6 phases:

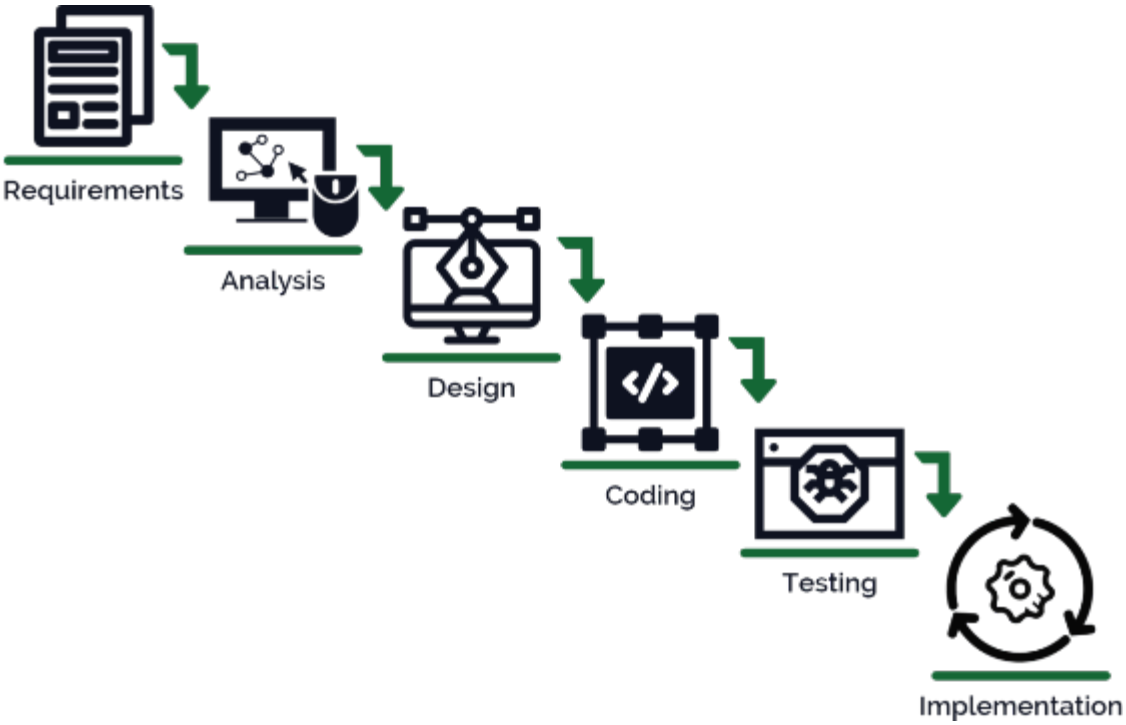

Figure 1: Waterfall Model (Zulqadar, 2019)

2.1.1. Requirements Analysis:

'In this phase, all requirements of the project are analysed and documented in a specification document and a feasibility analysis is done to check if these requirements are valid. It is essential to consider any limitations and constraints (e.g., time, budget constraints) which can affect the development process. After thorough analysis, a Requirements Understanding Documents (RUD) is created' (Zulqadar, 2018).

2.1.2. System Design:

'In this phase, the system design is prepared which specifies hardware and system requirements, such as data layers, programming languages, network infrastructure, user interface, etc' (Zulqadar, 2018). It helps define the overall system architecture, which is further divided into:

- **High-level design phase:**

‘This is the first stage of system design and architecture. It includes a list and functionality of modules, correlation between these modules, architecture diagrams, and database tables. This phase ends with the creation of a High-level Design document’ (Zulqadar, 2018).

- **Low-level design phase:**

‘This involves designing actual software components. The High-level Design created in the previous phase is disintegrated into separate modules. The Low-level Design document describes each module (pseudo-code), which enables the programmer to code directly from the document. It also contains interface details, error-message listings, dependency issues, inputs and outputs for each module’ (Zulqadar, 2018).

2.1.3. Implementation

‘As the name implies, in this phase the source code is written as per requirements. The physical design specifications are turned into a working code. The system is developed in small programs called units, after which these units are integrated. Sometimes, the functionality of each unit is tested before integration, which is called Unit Testing’ (Zulqadar, 2018).

2.1.4. Testing:

‘The code is then handed over to the testing team. Testers check the program for all possible defects, by running test cases either manually or by automation. The client is involved in the testing phase as well, to ensure all requirements are met. All Flaws and bugs detected during this phase are fixed to ensure Quality Assurance’ (Zulqadar, 2018).

2.1.5. Deployment:

‘In this phase, the software is deployed into a live environment (client’s server) to test its performance. Once the software is deployed, it becomes available to end-users. Sometimes, this phase also includes training of real-time users to communicate the benefits of the system’ (Zulqadar, 2018).

2.1.6. Maintenance:

‘After the deployment phase, the next step is to provide support and maintenance for the software, making sure it runs smoothly. If the client and users come across errors/defects/bugs during use, fixing them is the main purpose of this stage’ (Zulqadar, 2019).

2.2. Advantages and disadvantages of Waterfall:

The following are the major advantages and disadvantages of waterfall model:

2.2.1. Advantages of the Waterfall Model:

The advantages of waterfall development are:

- It allows for departmentalization and control. A schedule can be set with deadlines for each stage of development and a product can proceed through the development process model phases one by one.
- The waterfall model progresses through easily understandable and explainable phases and thus it is easy to use.
- It is easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process.
- In this model, phases are processed and completed one at a time and they do not overlap. The waterfall model works well for smaller projects where requirements are very well understood (Sharma, 2016).

2.2.2. Disadvantages of Waterfall Model:

The disadvantages of the waterfall model are:

- It is difficult to estimate the time and cost for each phase of the development process in the waterfall model.
- Once an application is in the testing stage, it is very difficult to go back and change something that was not well-thought-out in the concept stage.
- Not a good model for complex and object-oriented projects.
- Not suitable for the projects where requirements are at a moderate to high risk of changing (Sharma, 2016).

2.3. Roles in Waterfall model:

There are four typical roles within the teams, which is listed according to the stages of the project below:

2.3.1. Project Manager:

'The central part of every Waterfall team. Their principal responsibility is to ensure the project execution respecting its scope, cost and time. As the title indicates, their duties are delegating and team management' (SoftwareHut, 2019).

2.3.2. Business Analyst:

This individual ensures the all the business requirements of the software are considered and transformed into artifacts of the functional specification of the system.

2.3.3. Developers:

'This member lays down the railroad tracks of the entire project, as the code creator. Their role is integral in that their presence warrants in several separate instances. Such a situation becomes apparent upon bug detection in the software' (SoftwareHut, 2019).

2.3.4. Testers:

'The last line of defence of the project report for duty during the projects' final stages. Their task is to identify bugs and defects within the software – prompting its possible return to developers' (SoftwareHut, 2019).

2.3.5. Other Roles:

'Not all IT projects are created equal, with some requiring additional support. Depending on the size of the project and organisation, that list may be extensive' (SoftwareHut, 2019). The following positions listed here are likely to play a part as well:

2.3.6. Technical Architect:

They are also known as a Solutions Architect, their role entails designing the structure of IT systems, and oversight of business-optimizing programs.

2.3.7. System Administration and Helpdesk:

'These individuals are responsible for the day-to-day operations of networks. Their job is to organise, install, and support an organisation's hardware and computer systems, including LAN and Intranet' (SoftwareHut, 2019).

2.3.8. Quality Manager:

'Role is responsible for the final quality of software and ensures that the project is performed according to defined processes. It is worth noting that they are not directly a project team member' (Softwarehut, 2019).

2.4. Scrum Methodology:

Scrum is an agile development methodology used in the development of Software based on iterative and incremental processes. Scrum is an 'adaptable, fast, flexible and effective agile framework that is designed to deliver value to the customer throughout

the development of the project. The primary objective of Scrum is to satisfy the customer's need through an environment of transparency in communication, collective responsibility and continuous progress. The development starts from a general idea of what needs to be built, elaborating a list of characteristics ordered by priority (product backlog) that the owner of the product wants to obtain' (Digite, 2019).

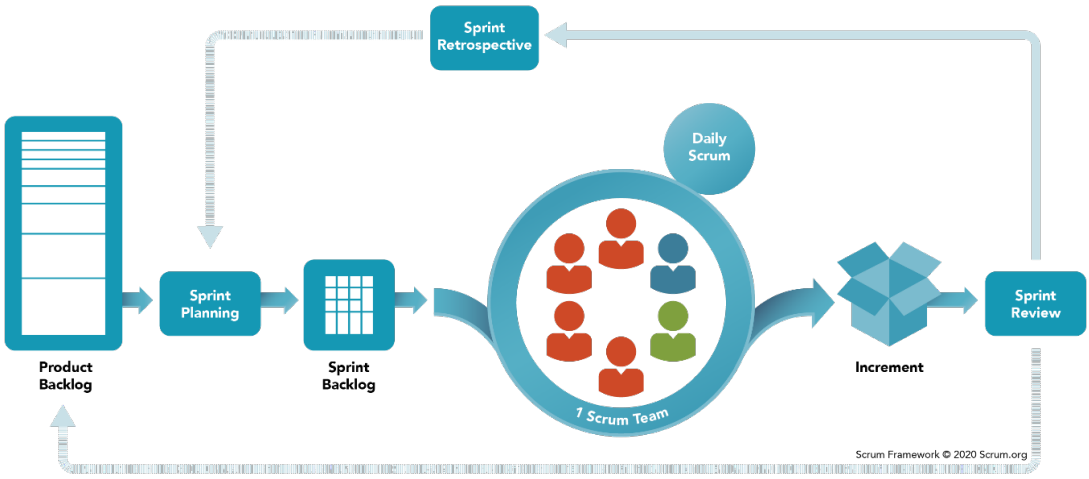

Figure 2: Scrum Methodology (Scrum, 2021)

2.4.1. Phases in Scrum methodology:

2.4.1.1. Initiate:

This phase includes the processes related to the 'initiation of a project: Create Project Vision, Identify Scrum Master and Stakeholder(s), Form Scrum Team, Develop Epic(s), Create Prioritized Product Backlog, and Conduct Release Planning' (Scrumstudy, 2021).

2.4.1.2. Plan and Estimate:

'This phase consists of processes related to planning and estimating tasks, which include Create User Stories, Approve, Estimate, and Commit User Stories, Create Tasks, Estimate Tasks, and Create Sprint Backlog' (Scrumstudy, 2021).

2.4.1.3. Implement:

'This phase is related to the execution of the tasks and activities to create a project's product. These activities include creating the various deliverables, conducting Daily Standup Meetings, and grooming (i.e., reviewing, fine-tuning, and regularly updating) the Product Backlog at regular intervals' (Scrumstudy, 2021).

2.4.1.4. Review and Retrospect:

This phase is concerned with 'reviewing the deliverables and the work that has been done and determining ways to improve the practices and methods used to do project' (Scrumstudy, 2021).

2.4.1.5. Release:

'This phase emphasizes on delivering the Accepted Deliverables to the customer and identifying, documenting, and internalizing the lessons learned during the project' (Scrumstudy, 2021).

The following is the complete list of 19 Scrum processes, as described in SBOK® Guide:

Phase	Processes
Initiate	1. Create Project Vision 2. Identify Scrum Master and Stakeholder(s) 3. Form Scrum Team 4. Develop Epic(s) 5. Create Prioritized Product Backlog 6. Conduct Release Planning
Plan and Estimate	7. Create User Stories 8. Approve, Estimate, and Commit User Stories 9. Create Tasks 10. Estimate Tasks 11. Create Sprint Backlog
Implement	12. Create Deliverables 13. Conduct Daily Standup 14. Groom Prioritized Product Backlog
Review and Retrospect	15. Convene Scrum of Scrums 16. Demonstrate and Validate Sprint 17. Retrospect Sprint
Release	18. Ship Deliverables 19. Retrospect Project

Table 1: Different Phases of Scrum (Scrumstudy, 2021)

2.4.2. Roles in Scrub:

The Scrum methodology consists of the following roles:

2.4.2.1. Scrum master:

'The person who leads the team guiding them to comply with the rules and processes of the methodology. The scrum master manages the reduction of impediments of the project and works with the Product Owner to maximize the ROI. The Scrum Master is in charge of keeping Scrum up to date, providing coaching, mentoring and training to the teams in case it needs it' (Digite, 2021).

2.4.2.2. Product owner (PO):

He/she is the representative of the stakeholders and customers who use the software. They focus on the business part and are 'responsible for the ROI of the project. They Translate the vision of the project to the team, validate the benefits in stories to be incorporated into the Product Backlog and prioritize them regularly' (Digite, 2021).

2.4.2.3. Team:

'A group of professionals with the necessary technical knowledge develops the project jointly carrying out the stories they commit to at the start of each sprint' (Digite, 2021).

2.4.2.4. Events in Scrum:

'Each of the Scrum events facilitates the adaptation of some of the aspects of the process, the product, progress or relationships' (Digite, 2021). These events include:

2.4.2.4.1. Sprint:

'Sprint is the basic unit of work for a Scrum team. This is the main feature that marks the difference between Scrum and other models for agile development' (Digite, 2021).

2.4.2.4.2. Sprint Planning:

The goal of 'Sprint Planning is to define what is going to be done in the Sprint and how it is going to be done. This meeting is held at the beginning of each Sprint and is defined how it will approach the project coming from the Product Backlog stages and deadlines. Each Sprint is composed of different features' (Digite, 2021).

2.4.2.4.3. Daily Scrum:

'The objective of the Daily Scrum is to evaluate the progress and trend until the end of the Sprint, synchronizing the activities and creating a plan for the next 24 hours. It is a brief meeting that takes place daily during the Sprint period. Three questions are answered individually: What did I do yesterday? What am I going to do today? What help do I need? The Scrum Master should try to solve problems or obstacles that arise' (Digite, 2021).

2.4.2.4.4. Sprint Review:

'The goal of the sprint review is to show what work has been completed with regard to the product backlog for future deliveries. The finished sprint is reviewed, and there should already be a clear and tangible advancement in the product to present to the client' (Digite, 2021).

2.4.2.4.5. Sprint Retrospective:

'The team reviews the completed goals of the finished sprint, writes down the good and the bad, so as not to repeat the mistakes again. This stage serves to implement improvements from the point of view of the development process. The goal of the sprint retrospective is to identify possible process improvements and generate a plan to implement them in the next Sprint' (Digite, 2021).

2.4.3. Scrum Artifacts:

Scrum Artifacts are designed to guarantee the transparency of key information in decision-making. These include:

2.4.3.1. Product Backlog (PB):

'The product backlog is a list that collects everything the product needs to satisfy potential customers. It is prepared by the product owner and the functions are prioritized according to what is more and less important for the business. The goal is for the product owner to answer the question "What should be done"' (Digite, 2021).

2.4.3.2. Sprint Backlog (SB):

' It is a subset of items of the product backlog, which are selected by the team to perform during the sprint on which they are going to work. The team establishes the duration of each Sprint' (Digite, 2021). Usually, the sprint backlog, is displayed on physical boards called Scrum board – which makes the development process visible to everyone who enters the development area.

2.4.3.3. Increment:

'The Increment is the sum of all the tasks, use cases, user stories, product backlogs and any element that was developed during the sprint and that will be made available to the end-user in the form of Software' (Digite, 2021).

2.5. Comparison between the Scrum and the waterfall model:

The following is the comparison between Scrum and the waterfall model:

Basis	Waterfall model	Scrum model
Model Basis	It is based on a traditional software development approach.	It is based on an agile software development approach.
Working approach	It has a linear and sequential working approach.	It has an iterative working approach.
Customer Involvement	The involvement of customers is very less towards the end phases.	There is the full involvement of the customer in each phase.
Time Consumption	It takes more time for product creation as all the reviewing is done in the end phases.	It uses reviews products in each sprint and saves valuable time.
Project Complexity	It works best for a small project which is not very complex.	It works best for difficult and complex projects.
Stages Separation	It has a fixed and clear number of stages.	The number of working stages may vary depending upon the product and organisation.
Support for changes	It supports changes only in the early requirement stage.	It supports changes in both the early and late stages of project development.
Support for concurrent stages	Work needs to be done one stage at a time.	Work can be done concurrently in multiple stages.
Work Division	Development work is divided into fixed stages.	Development work is divided into Sprints.
Deadline	The work is bound with a tight deadline.	The work is not bound to a tight deadline.
Communication style	The communication style is formal.	The communication style is informal.
Documentation	It requires heavy documentation.	It requires minimal documentation.

Table 2: Comparison between Scrum and Waterfall model (EDUCBA, 2019).

2.6. Reason for choosing the Scrum model:

The following are the major justification for choosing the Scrum model over water fall:

Justification 1:

Case study Scenario	The one-click training which is an online learning and training platform requires quick release of a product as there is multiple functional and non-functional requirement which can be verified only by through testing. Furthermore, the requirements are interlinked with each other in such a way that both individual and integration testing is required. Therefore, the only option to ensure that all these tests can be performed in time is by a quick release of the product.
Attribute	Quicker release of usable product.

Justification	The Scrum methodology is best for the project as it supports simultaneous development of software. It enables product development to be started just based on minimum requirements. For our project, it means that there can be a quicker release of the product which can be tested using multiple approaches and improvements can be done to it.

Table 3: First reason for choosing Scrum

Justification 2:

Case Study Scenario	The functional requirement for one click training needs to be versatile enough to support frequent changes. The User Interface Design may need to be changed based on the market trend. At the same, there may be a need to add new features to satisfy the growing market needs.
Attribute	Support for adaptability.
Justification	This project has a high chance of requiring changes to be made. Most other software development methodology requires an increase in the cost and time when changes are made. Scrum on the other hand supports adaptability and changes can be made to an ongoing project based on the requirement without making changes to cost and time. Therefore, for ensuring versatility for changes the Scrum is the most appropriate model for this project.

Table 4: Second reason for choosing Scrum

Justification 3:

Case Study Scenario	The project has different requirements for students, trainers and system. These requirement needs to be prioritised as it helps decrease the overall development time and cost. At the same time, there is also a chance that a situation arises where finishing one requirement before the other is necessary.
Attribute	Task Prioritisation based on the order of importance.
Justification	For this project task prioritisation is necessary to ensure that the product development is done in time and within the cost allocated. One of the major features of Scrum is task prioritisation. Scrum allows planning of overall tasks to be performed on a priority basis. This ensures that the prioritized tasks of this project are performed first. So, ultimately when these prioritised tasks are performed first, it helps in decreasing overall development time and cost.

Table 5: Third reason for choosing Scrum

Justification 4:

Case Study Scenario	The chances of errors occurring in design, codes, and integration are highly possible for this project due to the high number of requirements. Also, having productivity is always a good thing for any project including this one.

Attribute	Increased productivity and higher chances of error detection.
Justification	The key to the completion of this project is its development team. It necessary that development is agile enough to find errors and at the same time the team must ensure productivity. Scrum ensures all these needs by using a concept called sprint. A sprint is a fixed period under which defined set of tasks takes place which results in the creation of iteration of product. For sprint to be successful a very productive team is necessary. Also, product iteration created as a result of sprint helps in checking errors and finding faults which is one of the needs for this project.

Table 6: Fourth reason for choosing Scrum

Justification 5:

Case Study Scenario	The possibility of an increase in the cost of the overall development is an issue for this project. Especially, since there are numbers of requirements both functional and non-functional the possibility of cost increasing is high.
Attribute	Lowering overall cost
Justification	Scrum helps in decreasing development time by using the concept of sprints this reduces the work hours of coders, developer, designer, etc. and thus decrease the cost. It also makes it easier to detect errors by using iterations and finding errors easily means cut of cost for error hunting. Scrum also helps start projects just based on minimum requirements. This removes the need for requirement analysis which would be quite costly. All these factors add up and result in a significant decrease in the overall cost of development of this project.

Table 7: Fifth reason for choosing Scrum

Justification 6:

Case Study Scenario	The online learning and training platform has various known and unknown risks that can occur during development. These risks include management-related risks, production-related risks, quality management-related risks and so on. This effect of these risks ranges from a slight delay in product launch to an absolute inability to create a finished product.
Attribute	Risk Avoidance
Justification	For this project, Scrum helps in risk avoidance which can be a major issue of this project as many unknown risks may appear during the development of this project. The Scrum helps in mitigating this uncertainty

	by pulling the overall risk related to the project upstream and addressing it in the earlier phases of the product development. This ensures that all the risks that are related to products are eliminated while coming to the time of product launch. It also avoids the scenario where a problem impossible to mitigate arises during product launch as seen with other software development models.

Table 8: Sixth reason for choosing Scrum

Justification 7:

Case Study Scenario	The given project must achieve user satisfaction. To do so all requirements of the project both functional and non-functional requirements must be met flawlessly. There must not be any compromise in the overall quality of the final product.
Attribute	Quality management
Justification	To maintain the overall quality of the product principle of Scrum defines the customer must be aware of any problems in the project's early stages. This helps them know if the project will work or not and what improvements need to be made in the project. This ultimately helps in the overall maintenance of the quality of the product that will be made which is very essential for this project.

Table 9: Seventh reason for choosing Scrum

Justification 8:

Case Study Scenario	The online learning and training platform requires maximum work efficiency to ensure project completion. This is due to fact that there are quite some requirements that need consideration to be given to ensure that overall project development will be completed without a hitch.
Attribute	Increase in work efficiency and employee morale
Justification	The Scrum model doesn’t have the concept of a boss to tell what to and how to do it. The employees need to figure out themselves what to do and how to do it. This helps to boost the morale of employees as they are working on their own and at the same time makes them more responsible ultimately leading to an increase in work efficiency. Also, one of

	the inseparable components of the Scrum model is Scrum Master. Scrum masters protect the employees from outside negative pressure. Therefore, for this project as well Scrum model ensures that there is an increase in efficiency of work along with an increase in employee morale.

Table 10: Eight reason for choosing Scrum

1.1. Reason for not choosing waterfall model:

Justification 1:

Case Study Scenario	The given project requires the ability to work in multiple phases simultaneously as there are quite a few requirements and software which is to be made has multiple entities such as trainers and students who are going to use the software. Due to the presence of multiple requirements and entities, there is a high chance that the condition arises where it is needed to jump between phases.
Attribute	Inability to switch between phases.
Justification	The overall waterfall model doesn't allow the feature of jumping between phases which is crucial for this project. Unlike Scrum, the waterfall requires a phase to fully completed and backtracking between phases is not possible. Therefore, using the waterfall for this project is not adequate for the overall completion of the project.

Table 11: First Reason for not choosing Waterfall Model.

Justification 2:

Case Study Scenario	The waterfall model doesn't allow the client's feedback to be included during the ongoing development. Only during the testing phase does the consumer get a glimpse of the product. This has high chances to lead to consumer dissatisfaction as often software that is made and software that the customer want will not be the same.
Attribute	Inability to include client feedback.

Justification	The waterfall model is fundamentally designed in such a way that it doesn't allow client feedback to be included in the earlier phases of development. However, for this project, there are several variables when it comes to the requirement because the requirement has multiple options. For instance, the UI design for students and trainers can be made in multiple ways and the consumer may demand some other UI than the one that is being designed currently. Thus, using the waterfall model is not suitable for this project.

Table 12: Second Reason for not choosing Waterfall Model

Justification 3:

Case Study Scenario	The overall project requires testing to be done in the early phases. This is due to the reason that multiple requirements are correlated with one another. The functional requirement for students and teachers is interrelated with one another. So, there a number of these that can go wrong if testing is done from the early stages.
Attribute	Lack of testing during early phases
Justification	The principle of the waterfall model only allows testing to be done in the testing phase. This phase comes quite later in the development period and testing all the requirements is done in this phase. Hence, often there may not be enough time to rectify all the errors and bugs. This causes a huge problem for our project as each requirement is closely related to one another. For instance, one of the functional requirements of this project is that trainers must be able to create course content. Therefore, when a course is created by the trainer the student must also be able to view that course. Similarly, there are other multiple requirements of the same nature. So, when testing is done from earlier phases like in the waterfall model the required time for testing will not be sufficient.

Table 13: Third Reason for not choosing Waterfall Model

Justification 4:

Case Study Scenario	The project has a large number of both functional and non-functional requirements and each requirement has high chances of requiring separate planning.
Attribute	Large duration for planning
Justification	The waterfall model requires all the planning for all requirements to be done initially before proceeding with the project. But, due to the diverse nature of the requirement for this project the planning for each phase might require time. Furthermore, waiting for plans for each requirement to complete wastes valuable time which could be used for product development. However, if Scrum is used just by knowing a plan for a single requirement project development can proceed saving valuable time. Therefore, another reason for not using the waterfall model is the time it consumes for planning.

Table 14: Fourth Reason for not choosing Waterfall Model

3. RACI Matrix

The RACI matrix 'is a 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 is 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' (Kantor, 2018).

'No matter what project size, job descriptions should be clearly defined. Whether it's a small team or an international collaboration, everyone needs to understand their role: the tasks and activities each person must complete. To do so the best possible way is to use a RACI matrix. The responsibility assignment matrix shows the expense at the lowest level of work to manage cost and duration. It is a charting system that illustrates the task's goal and the required action for each person. This assists with reducing confusion on expectations, in turn, increasing project efficiency' (RACI Solution, 2021).

3.1. Roles and Responsibility in RACI matrix:

'The RACI model brings structure and clarity to describing the roles that stakeholders play within a project. The RACI matrix clarifies responsibilities and ensures that everything the project needs done is assigned someone to do it' (Kantor, 2018).

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

3.1.1. 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’ (Kantor, 2018).

3.1.2. 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"’ (Kantor, 2018).

3.1.3. 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 (Kantor, 2018).

3.1.4. 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 (Kantor, 2018).

3.2. RACI matrix for PRINCE2 process:

In accordance with the PRINCE2 framework process, the following is the insight to the setup of the entire team along with the roles of each member:

	ROLES	Director of project management	Director of marketing	Presidents	Chief Technology Officer	Chief Executive Officer	Chief Operating Officer	Chief Financial Officer	Chief HR officer	Project Manager		Technical Lead	Team Lead	Full Stack Developer	Front end developer	Backend developer	UI designer	UX designer	QA lead	QA Engineer	Tester
	Task	Status	Project Board								Project Development Team								Other Resources		
1	Directing a Project		A	C	C	C	R	I	C	C												
2	Starting up a Project		A	C	C	C	R	C	C	C	C											
3	Initiating a Project		A	I	I	C	C	C	C	C	R		C	C	I	I	I	I	I			
4	Managing Stage Boundaries		A	C	C	C	C	C	C	C	R		C	C	I	I	I	I	I			
5	Controlling a Stage		I	I	I	I	I	I	I	I	R	A	C	C	I	I	I	I	I			
6	Managing Product Delivery		C	C	C	C	C	C	C	C	R	A	C	C	I	I	I	I	I	C	C	C
7	Closing a Project		A	C	C	C	C	C	C	C	R		C	C	I	I	I	I	I	C	C	

D	Driver	Assists those who are responsible for a task.
R	Responsible	Assigned to complete the task or deliverable.
A	Accountable	Has final decision-making authority and accountability for completion. Only 1 per task.
S	Support	Provides support during implementation.
C	Consulted	An adviser, stakeholder, or subject matter expert who is consulted before a decision or action.
I	Informed	Must be informed after a decision or action.

Figure 3: RACI matrix based on PRINCE2 framework.

3.2.1. Directing a project

Directing the project is a process that '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 many decision points' (ILX Group, 2021). When it comes to directing this project, the person who will be held accountable is the director of project management. He/she will be responsible for initiating the project, delivering its product and closing the overall project. He/she will also need to offer direction during the entire project process and will be one controlling the project throughout the entire process. For doing so he/she will need to consult with the director of marketing, all of the presidents of different countries, CEO, CTO, CFO and chief of the HR office. The person who will be responsible for directing the project on the other hand will be the CEO as he/she is the person who acts as the main point of communication between the board of directors and the overall development team. It also necessary that the COO be informed of every activity regarding the direction of the project as he/she may need to intervene in the later phases.

3.2.2. 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' (ILX Group, 2021). Based on the project mandate the first thing that needs to be done is ensuring that information regarding the project team is available. For this, the project manager will be consulted and information will be provided to him/her regarding the overall member and construction of the project. The overall designing and hiring of the project will be the responsibility of the CEO. The person who will be consulted is the director of marketing, presidents of all countries, CTO, COO, CFO, chief of HR office and project manager. The person who will be held accountable for the entire phase is the director of project management.

3.2.3. Initiating a project:

In this process, it is necessary to determine what are the things that need to be done in the project. The reason for conducting the project must also be clear. It required to defined the risk and benefits regarding the project and their identification method. It is also necessary to define the project scope, including when the products can be delivered without compromising quality. Another aspect that must be defined is the project's progress and people who must be defined about the project progress (Malsam, 2018). For this project the CTO, CEO, COO, CFO, chief of HR, technical lead and the team lead are the person who will be consulted to know whether it is justifiable to proceed with the project or not. The CFO will also be consulted to ensure there is a stable finance for initiating the project. The sponsor and leaders who are consulted will be once who will be provide commitment for necessary resources to initiate the project. The manager will the responsible person for the overall process and will provide baseline for the decision to be made by providing information regarding the project development. All the members of Project Board who are not consulted will be informed about various decision and activities being performed. The members of the project development team who are not consulted will be provide necessary information regarding the project. The director of project management will be accountable for this overall process like the other previous process.

3.2.4. Managing stage boundaries:

'This process provides the project board with key decision point using which it will be decided whether to continue the project or not' (ILX Group, 2021). The project manager will consult with both technical lead and the team lead and will ensure the Project Board which in our case are the sponsors and the leaders that current stage plan has completed as defined in the previous processes. The project manager will assess the viability of the project and consult with the Project Board. Similarly, the task of determining and recording factors that may useful in the coming process will also be done by the manager. The manager will also circulate relevant information to the members of the project development team who are not consulted. In this process the director of project management team will represent the entire board and after consulting with necessary board members approve the current stage's completion and authorise the start of the next stage, together with its delegated tolerance level. Therefore, the person accountable for this particular stage is director of project management.

3.2.5. Controlling a stage:

'In this process the monitoring and control activities is done by the Project Manager. It involves ensuring that the process is on course and proper action is take in case of any unexpected events' (ILX Group, 2021). For our project in this stage the project manager will be one both responsible and accountable. He/she will also have to authorize the work being done by the

project development team. The project manager will also be gathering progress information about the overall work being done by the development team, watching for deviation or changes from the plans made in the previous stage and review the situation and take the necessary steps. Another very important role that the project manager will perform in this stage is reporting to the Project Board and keeping them informed of the various task that is being done. In order to make informed and suitable decision the project manager will consult with the technical lead and the team lead. The project manager will also be responsible for assigning task to the project development team and providing them necessary information required.

3.2.6. Managing product delivery:

The main objective of this process is to ensure that the planned product is created and delivered in time without any problems. In case of our project the project manager is the one who will be both accountable and responsible for this stage. The project manager will have to make sure that the activity of creating the product allocated to team is authorised by the Project Board. He/she will need to ensure that the interfaces, design and functionality are as decided in the previous stage and are agreed by the Project Board. The manager will have to assess the day-to-day activities associated with product delivery and provide regular forecast and consult with Project Board regarding these activities. The project manager will also have to consult the Technical Lead and Team Lead and make sure that the necessary information is being passed to the team. One of the major tasks that the project manager will have to perform in this stage is confirming that the product is tested. For this first He/she will need to consult with product tester to ensure that product doesn't have any errors. Next He/she will have assure the quality of the product for which He/she will need to consult the Quality Assurance Lead and Quality Assurance Engineer. After consulting with them the project manager will also need to get the approval from the Project Board.

3.2.7. Closing a Project:

The purpose of this process is to execute a controlled and proper close to the project. This 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 (ILX Group, 2021). For our project the manager will be the person responsible and will need to check the extent to which the aims and objectives set out in the Project Initiation Document (PID) have been met. He/she will consult with the Project Board, the Technical Lead and the Team Lead and will find out to what extent the activities in Project Initiation Document have been fulfilled. He/she will also be consulting with the Quality Assurance Lead and Quality Assurance Engineer to ensure the satisfaction of the consumer. The manager will inform the Project Board to what extent the product has been handed over to the consumer. The manager will also be responsible for making reports such follow up action report, Lesson Learnt report and End Project report. Finally, the manager will have to notify the Project Board regarding the intention to disband the product. The person who will accountable for this final stage will be the Director of Project Management and will take decision by consulting with the Project board.

3.3. Team Structure

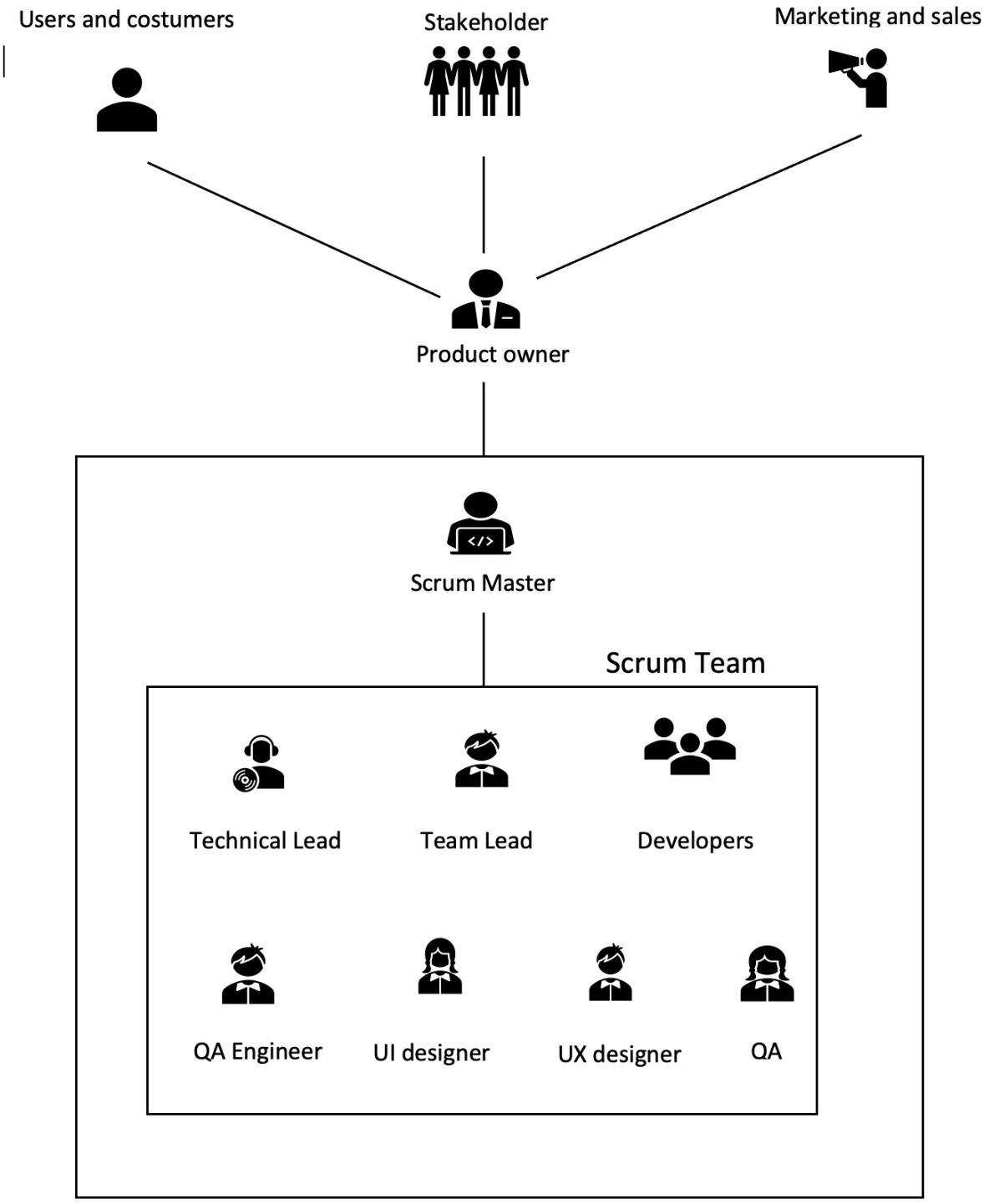

Figure 4: Structure of the overall team for the project.

3.4. Teams Roles Description:

The following are the roles and description of the Project Board as well as the Scrum team:

3.4.1. Project Board Member Role description:

The following are the names of the members of the Project Board along with their assumed respective roles in the project:

Name	Organisation Role	Project Role	Description
Robert Benedict	Chief Executive Officer	Stakeholder	He will be responsible for hiring and firing the team member depending upon the condition. Despite not being the scrum master, he will need to closely monitor the project progress and intervene if project is not going in the direction, it should.
Michael Robbins	Chief Operating Officer	Stakeholder	He will have to make sure that all the operation regarding the project is proceeded without any hitch. Outside the scrum team if any problem arises regarding project operation, he will be the responsible person and the man to consult. Even inside the scrum team if problem regarding the project operation arise, he will be the man to consult to.
Ben Kasper Chief	Financial Officer	Stakeholder	He will be responsible for managing the finance of the overall project.
Shane O'Neil	Chief HR officer	Stakeholder	He will be one providing the required human resource for the project. In case of condition were more than one scrum team needs to be made he will be one responsible for searching for potential candidate to form the new Scrum team.
Anne Keller	Chief Technology Officer	Stakeholder	She will be the person who will provide information to the CEO regarding technological interest. He will be consulting with the product owner regarding the project and provide the details to the CEO.

Eddie Howles	President – USA	Stakeholder	He will be providing valuable information needed for project development based on the context of USA.
Parmeet Singh	President - Canada	Stakeholder	He will be providing valuable information needed for project development based on the context of Canada.
Ankit Bista	President - Nepal	Stakeholder	She will be providing valuable information needed for project development based on the context of Nepal.
Bernard Bolsei	President – Germany	Stakeholder	He will be providing valuable information needed for project development based on the context of Germany.
Kyle Jones	Director of Project Management	Product Owner	He will the communication channel between the Scrum team and the project board. He will be relating information of manager to the Project Board and vice versa. In critical condition he will have the power to order the project manager to get a certain task done by consulting with the Project Board. He will also be making the project backlog which is a to do list for the Scrum team.
Helen Walsch	Director of Marketing	Marketing and Sales	He will be person who will be marketing the finished product to the user or consumers after completion of the product. He will also be the one who will prioritizing task making product backlog

Table 15: Role Description of Project Board.

3.4.2. Scrum Team Member Role Description:

The following are the assumed named of the overall project development team and quality assurance team along with the description of their roles in the project:

Name	Project Role	Description
Smantha Hacher	Technical Lead	She will be the one who will oversee the company's technical part of scrum team and all projects they undertake, analyse briefs, write progress reports, identify risks, and develop work schedules. She will be one who will provide expertise regarding the integration. She will not design the product but rather she will help in integrating the designed product.
Brooke Laura	Team Lead	She will responsible for communication between the team members. She will also be one of the members in the team who will be responsible for observing the performance of the team and preventing and resolving conflict between the team members.
Sikandar Ali	Full Stack Developer	He will be responsible for providing his expertise in both front and back end. He will also be responsible for integrating both the back end and the front end.
Norrin Radcliff	Front End Developer	He will be the one who will be manging all the activities regarding the front end.
Suresh Joshi	Back End Developer	He will be the one who will be managing all the task related to the back end.
Harris Johnson	UI designer	He will be preparing and designing the user interface that will be used by the user or consumers.
David Blaine	UX designer	He will be responsible for ensuring that the client or consumer has the best possible user experience without experiencing any problems.
Marry Stewart	QA lead	He will be the person in charge for all the activities related to quality assurance. If the need arises, he will have the authority to form multiple quality assurance team to ensure the quality of the product made.
Matthew Clerk	QA Engineer	He will be making tools which will help automate the process of quality assurance. He will also be testing the software used for quality assurance so that it can be verified that features and quality checking provided by the software is up to date.
Mark Wein	Tester	He will be the person who will test the product thoroughly once the product is made. He will work in coordination with the quality assurance team.
Pravash Karki	Scrum Master	I will be the person who will be responsible for guiding and managing the entire project

		development team. I will be working closely with the development team will be observing reports from different members of the project development team. I will be working closely with the product owner as well and if the need arises along with the project owner, I will also be answering the question of the Project Board on behalf of the entire project development team.

Table 16: Role description of Scrum team members.

The following is outline for the development plan based on Scrum model with justification:

3.4.2.1. Defining the roles of team:

The first step that will be done in the project is defining the roles of Project Board. Then the Scrum team will be made based on the analysis of project requirements. Based on the nature of the project it is necessary to define the developers, testers, support, designers, business analysis, etc. (Kayser, 2020).

Based on the analysis of the functional requirement and non-functional requirement it can be concluded that the product that is being made is a mid-scaled product. So, a Scrum team of 12 member was made and their roles and responsibility were defined which can be observed in Table 2. Also, roles of each and every Project Board member was defined which is defined Table 1. The total time allocated for forming and explaining the roles to each member will be one week.

3.4.2.2. Defining the Sprint Length:

The second step that will be done in the project is defining the Sprint length. A sprint is a time-box that lasts between 7 and 30 days, and typically it remains the same length for the duration of a project (Kayser, 2020).

For this project sprint planning meeting will be conducted where plan for the Sprint will be discussed. It will be ensured that the team commits to completing the work tasked to them. Based on the discussion the overall length of the Sprint will be discussed. The duration for our sprint planning will be 1 week. For our case we will assume that the sprint length based on the discussion was one month as the product to be made is mid scaled product.

3.4.2.3. Choosing the Scrum master:

The Scrum Master is the catalyst of the scrum group. They ensure that the scrum group is effective and progressive. In the event of any impediment, the Scrum Master follows up plus resolves the issues for the group (Kyser, 2020).

For our case the Scrum Master will be the project manager itself which me. The Scrum team will need to familiarized with the Scrum Master and become comfortable working with me. So, a duration of 1 week will be allocated for this.

3.4.2.4. Choosing the product owner:

The next step is to choose the project owner for the entire project. In our case it will be the Director of Project Management. This is due to the reason that the Project Board is one who is sponsoring this entire project. The Director of Project Management will be best option as he not only is the member of the board but also has skills required for project management. He will also need to familiarise with the project team especially the project manager so duration of 1 week will be given for it.

3.4.2.5. Creating the Initial Product Backlog:

The Product backlog is a wish list of all of the user stories (requirements) that is expected to be completed in the project. The most important story should be in the top of the list, so the entire backlog is continuously ranked in order based on story importance.

A backlog will typically contain 2 types of work items:

- Epics - High level stories that are very roughly sketched out without much detail.
- Stories - More detailed requirements for what should be done (be possible to do). An epic can typically be broken down into several stories (Kyser, 2020).

For this project the product owner will have the responsibility to make the Product Backlog. Since, he is the man who represents the Project Board he will be able to understand all the user requirement represent it clearly so that Project Development Team can understand it. The product owner will be given a time duration of 1 week to make the Product Backlog.

The backlog will be made based on the following user stories:

- **User stories based on student's perspective**

S. No	User Stories
1	As a student I want to be able to create own account.
2	As a student I want to be able to view and choose courses from multiple categories.
3	As a student I want to be able to buy a paid course.
4	As a student I want to be able to join a free course.
5	As a student I want to be able to search for courses.
6	As a student I want to be able to view Ongoing and Completed Courses.
7	As a student I want to be able to watch videos within the course.
9	As a student I want to be able to download videos, materials, and transcripts from a course.
10	As a student I want to be able to do offline viewing of downloaded materials.
11	As a student I want to be able to take tests.
12	As a student I want to be able to submit assignments.
13	As a student I want to be able to post in the course forum and reply in others' posts.
14	As a student I want to be able to provide feedback on the course and recommend course to a friend.

Table 17: User stories form based on the perspective of students.

- **User stories based on the perspective of trainer:**

S. No	User Stories
1	As a trainer I want to be able to create course content.
2	As a trainer I want to be able to edit course content.
3	As a trainer I want to be able to upload videos and materials in a course.
4	As a trainer I want to be able to create forums.

Table 18: User stories form based on the perspective of trainers.

- **User stories based on the perspective of product owner:**

S. No	User Stories
1	As a product owner I want the website system to be able to send email to relevant users upon posts and submissions.
2	As a product owner I want the platform's website to be able to handle 50,000 users at a time without affecting its performance.
3	As a product owner I want the website to have maximum 5 seconds of response time.
4	As a product owner I want the website system to have disaster recovery.
5	As a product owner I want the system to be able to enrol students and teacher in free or paid courses in different categories.
6	As a product owner I want the system to be able to support student and teacher interaction.
7	As a product owner I want the system to be able to offer recommendation and feedback.

Table 19: User stories form based on the perspective of product owner.

3.4.2.6. Starting the sprint:

In this step based on the backlog prioritization, the team now picks items from the list (typically from the top). The team brainstorms and decides on what and how much they can complete in the upcoming sprint. This is called the sprint planning meeting (Kyser, 2020). For our project Scrum team which was made in the previous sage will be responsible for starting the Sprint. The Sprint will have duration of one month as assumed during the Sprint planning instead of the typical 2 weeks as the product is mid-scale product.

3.4.2.7. Closing the current Sprint and starting the next Sprint:

When the end of the time box is reached it is the end of the current Sprint and if all the task are not done the team will decide whether the remaining work is transferred to the next sprint or put back in Product Backlog (Kyser, 2020). For our case chances for task of Sprint not being complete is low as the project requirement seems doable in a month. However, if the task is not completed task will be shifted to the second sprint. The second sprint like the first will be of one month. The major focus of the second sprint will be improve the product obtained from

the first sprint and rectify all the issues that is present in the product. Once the sprint is complete the final product will be made which will be ready for delivery to the user or consumer.

3.5. Prioritisation based on estimation:

In order to make sure that the project goes without any problems it is necessary we prioritise things. The aims of the Scrum model are to provide the quality product within the bare minimum amount of time. To do it is necessary to determine which task are of higher priority and will affect the overall project if not completed. Similarly, the concept prioritisation will also help us measure the quality of the product based on the number of tasks completed (Keenan, 2019). Hence to ensure that the project development is a success we will be using MoSCoW prioritisation technique.

4. MoSCoW prioritisation techniques:

When managing a project, it is important to develop a clear understanding of the customers' requirements and their priority. Many projects start with the barest headline list of requirements, only to find later the customers' needs have not been fully understood.

Once there is a clear set of requirements, it is important to rank them. This ranking helps everyone (customer, project manager, designer, developers) understand the most important requirements, in what order to develop them, and what not to deliver if there is pressure on resources. In order to solve this problem, we use MoSCoW.

MoSCoW stands for must, should, could and would:

- **M** - Must have this requirement to meet the business needs.
- **S** - Should have this requirement if possible, but project success does not rely on it.
- **C** - Could have this requirement if it does not affect anything else on the project.
- **W** - Would like to have this requirement later, but delivery won't be this time.

The o's in MoSCoW are added to make the acronym pronounceable and are often in lowercase to show they don't stand for anything. MoSCoW as a prioritisation method is used to decide which requirements to complete first, which must come later and which to exclude. The must requirements need to provide a coherent solution, and alone lead to project success. The must requirements are non-negotiable. Failure to deliver even one of them will likely mean the project has failed. The project team should aim to deliver as many of the should requirements as possible. Could and would requirements be nice to have and do not affect the overall success of the project. Could requirements be the first to go if the project timeline or budget comes under pressure (Haughey, 2021).

Based on the assumption and requirements of the project the following are the must have, should have, could have and won’t have for this project:

4.1. Must Have:

The Must Have for this project are:

Priority	ID	User Stories	Story Point

Must Have	M01	As a student I want to be able to create own account.	5
	M02	As a student I want to be able to view and choose courses from multiple categories.	8
	M03	As a student I want to be able to buy a paid course.	3
	M04	As a student I want to be able to join a free course.	3
	M05	As a student I want to be able to search for courses.	4
	M06	As a student I want to be able to view Ongoing and Completed Courses.	3
	M07	As a student I want to be able to watch videos within the course.	2
	M08	As a student I want to be able to download videos, materials, and transcripts from a course.	3
	M09	As a student I want to be able to do offline viewing of downloaded materials.	2
	M010	As a student I want to be able to take tests.	6
	M011	As a student I want to be able to submit assignments.	5
	M012	As a student I want to be able to provide feedback on the course and recommend course to a friend.	3
	M013	As a student I want to be able to create own account.	5
	M014	As a trainer I want to be able to create course content.	4
	M015	As a trainer I want to be able to edit course content.	5
	M016	As a trainer I want to be able to upload videos and materials in a course.	3
	M017	As a product owner I want the system to be able to enrol students and teacher in free or paid courses in different categories.	2
	M018	As a product owner I want the system to be able to support student and teacher interaction.	10
	M019	As a product owner I want the system to be able to offer recommendation and feedback.	6
	M020	As a product owner I want the website system to be able to send email to relevant users upon posts and submissions.	5

Table 20: Must have priority for the project.

4.2. Should Have:

The Should Have for this project are:

Priority	ID	User Stories	Story Point
Should Have	S01	As a student I want to be able to post in the course forum and reply in others' posts.	3
	S02	As a trainer I want to be able to create forums.	4

Table 21: Should have priority for the project.

4.3. Could Have:

The Could Have for this project are:

Priority	ID	User Stories	Story Point

Could Have	C01	As a product owner I want the platform's website to be able to handle 50,000 users at a time without affecting its performance.	15
	C02	As a product owner I want the website system to have disaster recovery.	10

Table 22: Could have priority for the project.

4.4. Won't Have this time:

The Won't Have for this project are:

Priority	ID	User Stories	Story Point
Won't Have	W01	As a product owner I want the website to have maximum 5 seconds of response time.	25

Table 23: Won't have priority for the project.

4.5. Project Plan:

Based on the assumption the project started at the 1st of May, 2021 overall plan for the project with its duration are as follows:

S. No	Activity	Deliverable	Start Date	End Date	Duration (Working Days)	Resource
1	Defining the roles of the team		01/05/2021	07/05/2021	7	Project Board Members
2	Defining the sprint length	Duration of the sprint	08/05/2021	15/05/2021	7	Scrum Team Members and Project Board Members
3	Choosing the Scrum master		16/05/2021	23/05/2021	7	Project Board Members
4	Choosing the product owner		24/05/2021	31/05/2021	7	Project Board Members
5	Creating the Initial Product Backlog	Product Backlog	01/06/2021	07/06/2021	7	Product Owner
6	Starting the sprint	First iteration of One Click	08/06/2021	08/07/2021	30	

		Training product				
6.1	Creation of the Front-end design	Front End Design	08/06/2021	15/06/2021	7	UI designer, Front End Developer, Full Stack Developer
6.2	Creation of Back-end design	Back End Design	16/06/2021	21/06/2021	7	Back End Developer, UX Designer, Full Stack Developer
6.3	Integration of Front End and Back End	One Click Training web portal	22/06/2021	28/06/2021	7	Front End Developer, Back End Developer, Full Stack Developer, UI Designer, UX Designer
6.4	Testing of One Click Training Web Portal	Tested One Click Training product	29/06/2021	03/07/2021	4	Tester
6.5	Quality Assurance of One Click Training Web Portal	Improved One Click Training product	04/07/2021	08/07/2021	5	QA Lead, QA Engineer
7	Closing the current Sprint and starting the next Sprint	Second Iteration of One Click Training product	09/07/2021	08/08/2021	30	Scrum Team
Total Days						**95**

Table 24: Overall activities of the project.

4.6. Project Budget Plan:

For the given budget plan, we will take the assumption that the Project Board Member will get a $100 for their participation in planning activities and team formation. For participation on the initial phases of planning before the actual project development has started, we will assume that the Scrum team member will get $50.

So, based on this assumption the overall budget plan for the entire project is as follows:

S. No	Task/Phase	Duration (Days)	Human Resource Number	Human Resource Cost	Other Cost	Total Cost
1	Defining the roles of the team	7	11	$1100 (assumption each board member gets $100 for participation.)	$40	$1140
2	Defining the sprint length	7	22	$1650 (assumption each board member gets $100 for participation and Scrum team gets $50 each.)	$60	$1710
3	Choosing the Scrum master	7	12	$1150 (assumption each board member gets $100 for participation and Scrum Master gets $50.)	$50	$1200
4	Choosing the product owner	7	11	$1100 (assumption each board member gets $100 for participation.)	$40	$1140
5	Creating the Initial Product Backlog	7	1	$1000	$0	$1000
6	Starting the sprint	30	11	$2850	$0	$2850
6.1	Creation of the Front-end design	7	3	$700 (assumption UI designer gets $250; Front End Developer gets $200 and	$0	$700

				Full Stack Developer gets $250.)		
6.2	Creation of Back-end design	7	3	$900 (assumption Back End Developer gets $400, UX Designer gets $300 and Full Stack Developer gets $200.)	$0	$900
6.3	Integration of Front End and Back End	7	2	$400 (assumption Front End Developer gets $200 and Back End Developer gets $200.)	$0	$400
6.4	Testing of One Click Training Web Portal	4	1	$350	$0	$350
6.5	Quality Assurance of One Click Training Web Portal	5	2	$500 (assumption QA Lead gets 200 and QA Engineer gets $300.)	$0	$500
7	Closing the current Sprint and starting the next Sprint	30	11	$3000 (assumption based on previous sprint cost.)	$0	$3000
Total Cost						**$14890**

Table 25: Budget estimation of overall project.

5. PRINCE2 Project Brief for OneClick Training:

PRINCE2™- Project Brief

Project Name:	OneClick Training	
Date: 10th May, 2021	**Release:** 8th August, 2021	Draft/Final
Author:	Pravash Karki, Project Manager	
Owner:	Kyle Jones, Director of Project Management	
Client:	Click Interactive Solutions Inc.	
Document Number:		

This document is only valid on the day it was printed.

Table 26: Project Brief table for project description

Approvals

This document requires the following approvals. A signed copy should be placed in the project files.

Name	Signature	Title	Date of Issue	Version

Table 27: Approval Table for Project Brief

Distribution

This document has been distributed to:

Name	Title	Date of Issue	Version

Table 28: Distribution table for project brief

5.1. Project Definition

5.1.1. Background

Click Interactive Solutions Inc. is a fairly large multi-national company having its development centres in US, Canada, Germany, and Nepal. The administrative departments: Finance, Human Resources Management, and Marketing are based at the Corporate Office in California, USA.

Each development Centre has its local president along with a pool of Managers and other required Development Team members. Each country, region has their own management, engineering team. The company is planning to add a new product "OneClick Training", an online web Learning and Training Platform. This training platform will have several features to that will provides its users with a satisfying training experience, with online as well as offline usages and feedback mechanism to continuously improve the training.

5.1.2. Project objectives

The main objectives of the project are as follows:

- To develop the project that satisfies the overall consumer needs based on the estimation of Project Board and Project Development team.
- To make sure to commence the project from 1st May 2021 and is completed by 8th August 2021.
- To complete the overall project within the budget of $14890.
- To make sure the student, trainer, teacher any other user using the project has the satisfactory user experience.
- To make the project based on the various requirement defined.

5.1.3. Desired outcomes

The overall outcome of the project is to make a web portal which will provides its users with a satisfying training experience, with online as well as offline usages and feedback mechanism to continuously improve the training. The following are the list of those outcomes desired:

- The product must allow students to creation of student account.
- The product must allow students to view and choose courses from multiple categories.
- The product must allow students to buy a paid course.
- The product must allow students to join a free course.
- The product must allow students to search for courses.
- The product must allow students to view Ongoing and Completed Courses.
- The product must allow students to watch videos within the course.

- The product must allow students to download videos, materials, and transcripts from a course.
- The product must allow students to do offline viewing of downloaded materials.
- The product must allow students to take tests.
- The product must allow students to submit assignments.
- The product must allow students to provide feedback on the course and recommend course to a friend.
- The product must allow students to create own account.
- The product must allow trainer to be able to create course content.
- The product must allow trainer to edit course content.
- The product must allow trainers to upload videos and materials in a course.
- The product must allow product owners to be able to enrol students and teacher in free or paid courses in different categories.
- The product must allow product owners to be able to support student and teacher interaction.
- The product must allow product owners to be able to offer recommendation and feedback.
- As a product owner I want the website system to be able to send email to relevant users upon posts and submissions.
- The product must allow student to post in the course forum and reply in others' posts.
- The product must allow trainers to be able to create forums.
- The product must ensure platform's website is able to handle 50,000 users at a time without affecting its performance.
- The product must have disaster recovery.
- The website has maximum 5 seconds of response time.

5.1.4. Project scope and exclusions

The projects aim is to create a training platform will have several features that will provides its users with a satisfying training and learning experience, in both online as well as offline usages. It will also have feedback mechanism to continuously improve the training. The product must ensure all the desired outcomes are met mandatorily except for the website response time being within five second.

The following are the deliverables required for the project to be considered complete:

Deliverables	**Description**
First iteration of One Click Training Product	An initial iteration of the One Click training product with complete functionality which has gone through quality assurance and testing must be delivered.
Front End Design	A front-end design including the total front-end functionality must be delivered.
Back End Design	A back-end deign including the total back-end functionality must be delivered.
Second iteration of One Click Training Product	A final iteration of the One Click training product with complete functionality which has gone through quality assurance and testing must be delivered.

Table 29: Deliverable table for Project Brief

5.1.5. Constraints and assumptions

The entire project is constraint on the cost, time and scope which is previously defined. If any changes are made to these constraints the entire project will be affected. Therefore, the development team must make sure that they perform their activities following these constraints. The following is details regarding the constraint and assumption for this project:

5.1.5.1. Scope:

The scope of the project has already been defined so project team must work based on the details mentioned in the scope. If any changes have made to the predefined scope, then the entire project can be affected. So, in order to make even minor changes in scope of the Project Board must be consulted. The changes in scope will also result in changes being made to project budget, time and cost.

5.1.5.2. Cost:

There is a total of 11 member in the Project Board and 11 members in the Project Development Team. So, under the assumption that the Project Board member are involved in initial stages of project development they will be paid the total of $6190 for their participation in the project development. The project development team will be paid the total of $5850 for their participation. This includes the payment for all necessary members of the team such designer, developer, tester, quality assurers, managers and other members of project development team.

5.1.5.3. Time:

The project development will start from 1st of May, 2021 and will be concluded in 8th of August, 2021. This is based on the assumption that no employee mishaps, external influence, full availability of resources and no changes to the requirement occur.

The major assumption made during the planning of the project are:

- It is assumed the workstations, electricity with backup, high speed internet, workspace and other minimal necessity are readily available for this project.
- It is assumed that the project team members are fully motivated for this project and are already available.
- It assumed the team is self-sustaining and self-organising.
- It is assumed that both product owner and project manager are competent at their jobs.

5.1.6. Project tolerances

For this project there is some degree of tolerance need to be set for cost, time, quality, scope and

risk of the project. Beside these aspects if any other aspects need to be changed it is necessary to held a meeting in Project Board to decide whether the proposed change is justifiable or not. Also, for the given aspect as well if the changes exceed the threshold set a board meeting must be held to decide the viability of the proposed change.

The following are description of each tolerance criteria:

5.1.6.1. Cost:

Since the project development is based on Scrum model it is possible to make changes in the cost. However, it must be ensured that the changes to the cost is as minimal as possible.

5.1.6.2. Time:

There can also be consideration regarding minor changes in deadline of the project. But it should be set to bare minimum and must not exceed seven days.

5.1.6.3. Scope:

There can be minor changes in scope of the project as there are large of number of requirement and some requirements may need more time than planned.

5.1.6.4. Quality:

When it comes to the quality of the product which comes as the result of the project there can be no compromise. Even slight changes for the project will not be acceptable

5.1.6.5. Risk:

In case of unforeseen circumstance such as large-scale disaster of any nature there will be consideration.

5.1.6.6. The user(s) and any other known interested parties:

For this project the interested parties include the stakeholder which is the Project Board. The Project Board includes Chief Executive Officer, Chief Operating Officer, Financial Officer, Chief HR officer, Chief Technology Officer, President – USA, President - Canada, President - Nepal, President – Germany and Director of Project Management. The end consumers such as students and trainers are user of the product which will be developed by this project. The Project Board will be informed periodically about the progress of the project. The user on the other hand will informed once the product is ready for use.

5.1.6.7. Interfaces

Upon completion of the project the following things must be done to ensure there is no negative impact of any kind:

- Firstly, user manuals will have to made detailing the steps to use the product.
- Demos will have to be shown to user and consumer by the marketing department.
- Product launch plan will have to made by the sales and marketing department.

5.1.7. Outline Business Case

Click Interactive Solutions Inc. is a fairly large multi-national company having its development centres in US, Canada, Germany, and Nepal. The administrative

departments: Finance, Human Resources Management, and Marketing are based at the Corporate Office in California, USA. However, in order to grow further it requires to launch new product which can create an impact and the same time increase the business of the company. The product that satisfies this requirement of the company is the OneClick Training. The portal for online learning is one of the most growing as well as the most effective services throughout the world. The demand for this among the young generation is also very high due to its effectiveness, ease of use, universal accessibility and cost effectiveness (Josep, 2021). The product for this reason has huge market and is sure to bring a good chunk of revenue and support the company for further growth. Also, the product is a service-oriented platform so it can support long term revenue as student are likely to enrol in new course once they complete their course. So, due to the huge financial gain and long term sustainability the creation of OneClick Training is a need for the company.

5.1.8. Project Product Description

The following is the project product description of the project:

Title	OneClick Training
Purpose	Complete Online and Offline learning and teaching experience.
Composition	Student Portal, Trainer Portal, System Portal
Derivation	• Product Backlog • First iteration of One Click Training product • Front End Design • Back End Design • One Click Training web portal

	• Second Iteration of One Click Training product	
Development Skills Required	Project Management skill Front end development skill Backend development skill UI designing skill UX designing skill QA skill Quality Testing skill	
Customer's Quality Expectations	All the requirement mentioned in the User Stories Forms mentioned in Product Backlog.	
Acceptance Criteria	The product must meet all the requirements mentioned in objectives, outcomes, scopes, exclusion, constraints, assumptions, tolerances and interfaces mentioned in this Project Brief.	
Project-Level Quality Tolerances	The product meet all the tolerance criteria mentioned in the Project Tolerance section of the Project Brief.	
Acceptance Method	User Stories Forms mentioned in Project Brief.	
Quality Responsibilities	Role	Responsible Individuals
	Product Reviewer(s)	Product Manager
	Product Approver(s)	Product Owner

Table 30: Project Product Description table in Project Brief.

5.1.9. Project Approach

The client for this project is Click Interactive Solution Inc. which is a fairly large company with operation spread across multiple countries. Since, the countries are spread in different continents types of user who will use the product will be different. So, the board members of the company will have to be involved in this project. Again, the product that is to be made must be thoroughly tested and must pass all the steps of quality control. Also, since no clear deadline for the project creation is mentioned the best approach to use for this product is the Scrum approach.

Using the Scrum methodology for the project will allow product to go through all the quality testing phase it requires. It will be flexible enough to support minor changes in time to ensure the product is as per the requirement of the consumer. The concept of Sprint will allow accurate tracking of time and product will be created in iteration where each iteration will be improvement of the previous one. The Scrum model

also allows impeccable communication between the project team and the border which is requirement for this project. At the same time the client will also be very much involved in the product creation as it is one of the advantages of using Scrum model. So, for all these reasons the approach we will be using for this project is Scrum.

5.1.10. Project Management Team Structure

The following chart shows the overall project team structure:

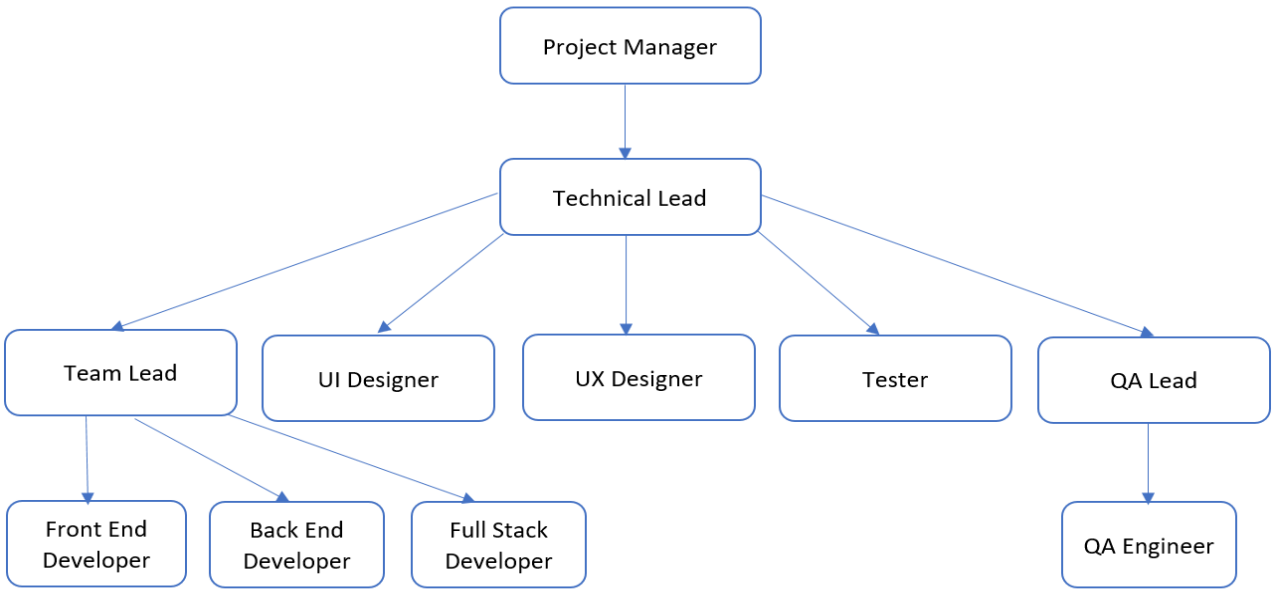

Figure 7: Project Management Team Structure

5.1.11. Role Descriptions

The following are the roles of team member of the project:

5.1.11.1. Project manager:

The project manager will be the one responsible managing the overall task in this project. He will have to communicate with the product owner and relay information of team and the product. He will also be responsible for relaying the information of the product owner to the overall team. He will monitor day to day activities of the entire project development team and if there is a need will be able enforce decision upon the members of the project development team.

5.1.11.2. Technical Lead:

The technical lead is the person who will be responsible entire project integration. She will be responsible for ensuring the front and back end are integrated properly. She will have to ensure that the UI design and the UX design as per the specification of the client. He will have to ensure that proper testing in conducted and quality assurance activities are done properly.

5.1.11.3. Team Lead:

The team lead will be the person responsible for providing expertise regarding the integration of front end and back end of the project. She will be monitoring the activities of the front-end developer, back-end developer and the full stack developer. She will one of the senior developers and will be person who will provide information to other developer regarding the integration.

5.1.11.4. UI designer:

The UI designer is responsible for designing the user interface of the product based on the requirement and instruction by the project manager.

5.1.11.5. UX designer:

The responsibility of the UX designer is to ensure that the users will have satisfactory user experience when using the product that is being made.

5.1.11.6. Tester:

The role of the tester is to test the product for any bugs and errors. He will have to perform all necessary test to ensure that user will not have any problem when using the product.

5.1.11.7. QA Lead:

The role of the QA lead is to ensure the quality of the product is as per the requirement that was mentioned. She will have the power to form a QA team should he deem it necessary. She will also be monitoring the activity of the QA team.

5.1.11.8. QA Engineer:

The QA Engineer will be responsible for automating the QA process by providing automated tools which will verify the software quality.

5.1.11.9. Front End Developer:

The front-end developer will be responsible for making the design for the front end and integrating the front-end design.

5.1.11.10. Back End Developer:

The back-end developer will be responsible for making the back-end design and integrating these back end design.

5.1.11.11. Full Stack Developer:

The full stack developer will have expertise in regards to both front end and back-end design and functionality. He will be responsible for integrating the front end and the back end made by the respective front-end developer and back-end developer.

6. Subsequent stages of Prince2 and Scrum

6.1. Introduction to Prince2 methodology:

PRINCE2 (PRojects IN Controlled Environments) is a process-based method for effective project management. PRINCE2 is a de facto standard used by the UK Government, widely recognised and practised in the private sector in the UK and internationally.

PRINCE2 derives its methods from 7 core principles. Collectively, these principles provide a framework for good practice (Prince2, 2017).

The 7-core principle of PRINCE2 are as follows:

6.1.1. Continued Business Justification:

This principle defines that ‘a project must make good business sense. There needs to be a clear return on investment and the use of time and resources should be justified’ (Rogers, 2021).

6.1.2. Learn from Experience:

This principle provide emphasis on learning form experience and states that ‘project teams should take lessons from previous projects into account. In order to do so a lessons log must be kept and updated for this purpose’ (Rogers, 2021).

6.1.3. Define Roles and Responsibilities:

This principle provides emphasis in clarity of roles of each member in project and defines that ‘everyone involved in a project should know what they and others are doing. This includes knowing who the decision makers are’ (Rogers, 2021).

6.1.4. Manage by Stages:

This principle defines that difficult tasks are better off broken into manageable chunks, or management stages.

6.1.5. Manage by Exception:

This principle provides emphasis in freedom of operation states and defines that ‘a project running well doesn’t need a lot of intervention from managers. The project board is only informed if there is or might be a problem’ (Rogers, 2021).

6.1.6. Focus on Products:

Its principle defines that focus of all members of the project should in product and everyone should know ahead of time what’s expected of the product. Product requirements determine work activity, not the other way around (Rogers, 2021).

6.1.7. Tailor to the Environment:

This principle emphasises PRINCE2’s flexibility and defines that ‘PRINCE2 can be scaled and tailored. Projects that adapt PRINCE2 to their needs are more likely to succeed than projects that use PRINCE2 dogmatically’ (Rogers, 2021).

The following figures shows the major principles of PRINCE2:

Figure 5: Core Principles of Prince2 (Gundavajhala, 2019).

6.2. Themes of PRINCE2:

PRINCE2 derives its methods from 7 core principles. Collectively, these principles provide a framework for good practice:

6.2.1. Continued Business Justification:

'A project must make good business sense. There needs to be a clear return on investment and the use of time and resources should be justified' (Rogers, 2021).

6.2.2. Learn from Experience:

'Project teams should take lessons from previous projects into account. A lessons log is kept updated for this purpose' (Rogers, 2021).

6.2.3. Define Roles and Responsibilities:

'Everyone involved in a project should know what they and others are doing. This includes knowing who the decision makers are' (Rogers, 2021).

6.2.4. Manage by Stages:

‘Difficult tasks are better off broken into manageable chunks, or management stages’ (Rogers, 2021).

6.2.5. Manage by Exception:

‘A project running well doesn’t need a lot of intervention from managers. The project board is only informed if there is or might be a problem’ (Rogers, 2021).

6.2.6. Focus on Products:

‘Everyone should know ahead of time what’s expected of the product. Product requirements determine work activity, not the other way around’ (Rogers, 2021).

6.2.7. Tailor to the Environment:

‘PRINCE2 can be scaled and tailored. Projects that adapt PRINCE2 to their needs are more likely to succeed than projects that use PRINCE2 dogmatically’ (ILX Group, 2021).

6.3. Introduction to Scrum:

“Scrum is an agile software development process to manage software projects.Scrum is based on three simple principles: visible progress, constant inspection, and adaptation. With Scrum, teams use an empirical approach to adapt to changing requirements and priorities. Teams using Scrum focus on delivering working software to their customers on a frequent basis. Scrum is not prescriptive on engineering practices, but rather is a lightweight framework based on a few (common sense) guidelines for managing projects .

‘Scrum is an agile process to manage software development projects. Scrum is not prescriptive on engineering practices, but rather it is a lightweight framework based on a few (common sense) guidelines for managing projects. Scrum follows an empirical process control in which the team adapts based on experience rather than following a rigorous set of steps or a very detailed plan. The word Scrum itself comes from rugby and refers to a way of restarting the game’ (Correa, 2020).

‘Scrum as we know it today is the result of the work and collaboration of Jeff Sutherland and Ken Schwaber, circa 1995. In 2001 Ken Schwaber and Mike Beedle wrote the book Agile Software Development with Scrum, which made the practices reach a broader audience and become a mainstream software development process’ (Correa, 2020).

6.4. Critical differences between PRINCE2 and Scrum:

The following are the major difference between PRINCE2 and Scrum:

S no	PRINCE2	SCRUM
1.	PRINCE2 is a process-driven project management methodology	SCRUM is a reactive project management methodology
2.	PRINCE2 employs a more predictive approach for project execution	SCRUM employs a more adaptive approach for project execution
3.	PRINCE2 can be implemented for any project regardless of its type, size, and field.	SCRUM is specially designed for complex and innovative project implementation.
4.	PRINCE2 provides a structured approach for project execution	SCRUM provides a flexible approach for project execution
5.	PRINCE2 methodology consists of PM principles, PM processes, PM Themes and Tailoring.	SCRUM methodology consists of Product Owner, Team, and Scrum Master.
6.	Members of a PRINCE2 project team do not need to meet face to face as the process can be carried out from different geographical locations.	Members of a SCRUM project team are expected to communicate face to face daily to ensure efficient project management.
7.	Changes that can be made when a project is under execution is limited	Changes can be easily implemented when a project is under execution
8.	To get certified in this field, you have to enroll for **Project Management Certification**.	To get certified in this field, you have to enroll for **Scrum Master Certification Training**.
9.	The project definition in PRINCE2 is clearly defined before execution	There is no clear project definition in SCRUM because of its versatility
10.	PRINCE2 is a generic project management methodology developed by the UK government.	SCRUM is a project management methodology developed by software engineers.

Table 31: ***Critical difference between PRINCE2 and SCRUM (Roger, 2021).***

6.5. Process level comparison of PRINCE2 and Scrum:

The following is the process level comparison of PRINCE2 and Scrum:

S. No	PRINCE2 Process	Scrum Process
1	Directing a project: This is the first process of the PRINCE2 model. The key processes for the Project Board break into four main areas:	There is no equivalent process in the Scram project management framework.

	• 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 (ILX Group, 2021).	
2	Starting up a project: This is the second process in PRINCE2 model of project management. The following are the activities conducted in this stage: • Creating a project mandate, which answers logistical questions about the project. It explains the purpose of the project, who will carry it out and how to execute it. • A project brief is derived from the mandate, lessons log and discussions with people involved in the project. • A team is assigned and with the brief, they should have all the information needed for next process (ILX Group, 2021).	The equivalent for this process in Scum is the first four stages of the Initiate phase. The following are the activities performed in four stages of this phase: • Creating Project Vision: In this process, the Project Business Case is reviewed to create a Project Vision Statement that will serve as the inspiration and provide focus for the entire project. The Product Owner is identified in this process. • Identifying Scrum Master and Stakeholder(s): In this process, the Scrum Master and Stakeholders are identified using specific Selection Criteria. • Forming Scrum Team: In this process, Scrum Team members are identified. Normally the Product Owner has the primary responsibility of selecting team members, but often does so in collaboration with the Scrum Master.

		• Developing Epics: In this process, the Project Vision Statement serves as the basis for developing Epics. The Epics are high level stories that are very roughly sketched out without much detail User Group Meetings may be held to discuss appropriate Epics (Scrumstudy, 2021).
3	Initiating the project: This stage is about realising what needs to be done to complete the project. The project manager outlines how the following performance targets will be managed:	The equivalent for this process in Scrum is the second last stage of the Initiate phase. The following activity performed in the second last stages of this phase: • Creating Prioritized Product Backlog: In this process, Epics are refined, elaborated, and then prioritized to create a Prioritized Product Backlog for the project. A product backlog is a list of the new features, changes to existing features, bug fixes, infrastructure changes or other activities that a team may deliver in order to achieve a specific outcome (Agile Alliance, 2021). The product backlog is the single authoritative source for things that a team works on The Done Criteria is also established at this point (Scrumstudy, 2021).
4	Managing product delivery: This is how the communication between the team manager and project manager is controlled. MP consists of these activities: • Accepting a work package. • Executing a work package.	The equivalent process for this process of PRINCE2 in Scrum is the last stage of the initiate phase. The following are the task done in this stage: • Conducting Release Planning:

	• Delivering a work package (ILX Group, 2021).	In this process, the Scrum Core Team reviews the User Stories in the Prioritized Product Backlog to develop a Release Planning Schedule, which is essentially a phased deployment schedule that can be shared with the project stakeholders. Length of Sprint is also determined in this process (Scrumstudy, 2021).
5	Managing stage boundaries: Project managers and the board review every stage. The board decides whether to continue the project. The project manager meets with the team to record lessons learned for the next stage. Stage boundaries consists of these activities: • Plan the next stage. • Update the project plan. • Update the business case. • Report the stage end or produce an exception plan (ILX Group, 2021).	The equivalent process for Scrum is implement phase. The Implement phase consists of following three processes: • Creating Deliverables: In this process, the Scrum Team works on the tasks in the Sprint Backlog to create Sprint Deliverables. A Scrumboard is often used to track the work and activities being carried out. Issues or problems being faced by the Scrum Team could be updated in an Impediment Log. • Conducting Daily Standup: In this process, everyday a highly focused, Time-boxed meeting is conducted referred to as the Daily Standup Meeting. This is the forum for the Scrum Team to update each other on their progress and any impediments they may be facing. • Grooming Prioritized Product Backlog: In this process, the Prioritized Product Backlog is continuously updated and maintained. A Prioritized

		Product Backlog Review Meeting may be held, in which any changes or updates to the backlog are discussed and incorporated into the Prioritized Product Backlog as appropriate (Scrumstudy, 2021).
6	Closing a Project: This is the last stage of the PRINCE2 model. The following are the major activates performed in this phase: • Decommissioning the project. • Identifying follow-on actions. • Preparing benefits and project evaluation reviews. • Freeing up leftover resources. • Handing over products to the customer (ILX Group, 2021).	There are two equivalent stage for this process of PRINCE2 in scrum model. These include Review and Retrospect phase and the Release phase. The order wise stages of these phases: • Review and Retrospect phase: a) Convene Scrum of Scrums: In this process, Scrum Team representatives convene for Scrum of Scrums (SoS) Meetings in predetermined intervals or whenever required to collaborate and track their respective progress, impediments, and dependencies across teams. This is relevant only for large projects where multiple Scrum Teams are involved. b) Demonstrate and Validate Sprint -In this process, the Scrum Team demonstrates the Sprint Deliverables to the Product Owner and relevant stakeholders in a Sprint Review Meeting. The purpose of this meeting is to secure approval and acceptance from the Product Owner for the Deliverables created in the Sprint. c) Retrospect Sprint -In this process, the Scrum Master and Scrum Team meet to discuss the lessons learned throughout the Sprint. This information is

		documented as lessons learned which can be applied to future Sprints. Often, as a result of this discussion, there may be Agreed Actionable Improvements or Updated Scrum Guidance Body Recommendations. • Release phase: a) Ship Deliverables: In this process, Accepted Deliverables are delivered or transitioned to the relevant stakeholders. A formal Working Deliverables Agreement documents the successful completion of the Sprint. b) Retrospect Project: In this process, which completes the project, organizational stakeholders and Scrum Core Team members assemble to retrospect the project and identify, document, and internalize the lessons learned. Often, these lessons lead to the documentation of Agreed Actionable Improvements, to be implemented in future projects.

Table 32: Process wise comparison of PRINCE2 and Scrum project development model.

1.2. Role level comparison between PRINCE2 and Scrum

The following are the comparison of Scrum and PRINCE2 based on roles and responsibility:

S. No	PRINCE2 (Roles and Responsibility)	Scrum (Roles and Responsibility)
1	Project Board: • In PRINCE2 'the project board is accountable to corporate or programme management for the	The roles and responsibility of the Project Board of PRINCE2 model is done by the product owner. These include:

	success of the project, and has the authority to direct the project within the remit set by corporate or programme management as documented in the project mandate' (Axelos, 2021). • 'The project board is also responsible for the communications between the project management team and stakeholders external to that team (e.g. corporate and programme management)' (Axelos, 2021). • 'According to the scale, complexity, importance and risk of the project, project board members may delegate some project assurance tasks to separate individuals. The project board may also delegate decisions regarding changes to a change authority' (Axelos, 2021).	a) Defining the vision: • 'The agile product owner is the point person on the product development team, using their high-level perspective to define goals and create a vision for development projects' (Lucid Software, 2021). • 'Product owners are responsible for communicating with stakeholders across the board, including customers, business managers, and the development team to make sure the goals are clear and the vision is aligned with business objectives' (Lucid Software, 2021). • 'Having a product owner with a higher perspective ensures that the team maintains a cohesive vision despite the flexible and often fast-paced nature of agile product development. Everyone needs to be on the same page in order for a project to work effectively' (Lucid Software, 2021). b) Managing the product backlog: • 'One of the most important responsibilities for a scrum product owner is managing the product backlog. This is the development team's project to-do list' (Lucid Software, 2021). • 'The product owner's responsibility is to create the list of backlog items and prioritize them based on the overall strategy and business objectives. Additionally, the product owner will need to map out project dependencies to inform the necessary sequence of development' (Lucid Software, 2021).

		c) Prioritizing needs: • 'Another key role of the product owner is to prioritize needs. In other words, they must juggle the triangle of scope, budget, and time, weighing priorities according to the needs and objectives of stakeholders' (Lucid Software, 2021). d) Overseeing development stages: • 'With the vision, strategy, and product priorities set, the product owner should spend a significant amount of time overseeing the actual development of the product. They are a key player throughout each event, including planning, refinement, review, and sprint' (Lucid Software, 2021). e) Anticipating client needs: • 'The successful scrum product owner will be an expert at understanding and anticipating the client's needs to more effectively manage the development process' (Lucid Software, 2021). • 'Their deep market knowledge and communication skills allow them to anticipate problems or needs and address them' (Lucid Software, 2021). f) Acting as primary liaison • 'The product owner is also the primary communicator and link between stakeholders and teams. As such, they have to be expert communicators, making sure there's buy-in from stakeholders on all major decisions and strategy and clear instructions and

		deliverables for the developers' (Lucid Software, 2021). g) Evaluating product progress at each iteration • 'The product owner is accountable for each stage of the development process and the final product. They take a primary role in inspecting and evaluating product progress through each iteration. The product owner makes the judgment call on the performance, deciding if the team needs to go back to the drawing board or if they can move on to the next steps' (Lucid Software, 2021).
2	Executive: • 'The executive is ultimately responsible for the project, supported by the senior user and senior supplier. The executive's role is to ensure that the project is focused throughout its life on achieving its objectives and delivering a product that will achieve the forecast benefits. The executive has to ensure that the project gives value for money, ensuring a cost-conscious approach to the project, balancing the demands of the business, user and supplier' (Axelos, 2021). • 'Throughout the project, the executive is responsible for the business case' (Axelos, 2021). • The project board is not a democracy controlled by votes. The executive is the ultimate decision maker and is supported in the decision-making by the senior user and senior supplier (Axelos, 2021).	There is not a similar role as the Executive in the Scrum model. But the activities done by the executive are done by Scrum Master, Product owner and Stakeholders combined.
3	Senior User: • The senior user 'is responsible for specifying the needs of those who will use the project's products, for user	While there are no direct equivalent of the senior user of PRINCE2 in Scrum model the product owner of Scrum does perform similar task.

	liaison with the project management team, and for monitoring that the solution will meet those needs within the constraints of the business case in terms of quality, functionality and ease of use' (Axelos, 2021). • 'The role represents the interests of all those who will use the project's products (including operations and maintenance), those for whom the products will achieve an objective or those who will use the products to deliver benefits. The senior user role commits user resources and monitors products against requirements. This role may require more than one person to cover all the user interests. For the sake of effectiveness, the role should not be split between too many people' (Axelos, 2021). • 'The senior user specifies the benefits and is held to account by demonstrating to corporate or programme management that the forecast benefits which were the basis of project approval have in fact been realized. This is likely to involve a commitment beyond the end of the life of the project' (Axelos, 2021).	
4	Senior Supplier: • 'The senior supplier represents the interests of those designing, developing, facilitating, procuring and implementing the project's products. This role is accountable for the quality of products delivered by the supplier(s) and is responsible for the technical integrity of the project. If necessary, more than one person may be required to represent the suppliers' (Axelos, 2021). • 'Depending on the particular customer/supplier environment, the	There is no equivalent to Senior Supplier in Scrum model.

	customer may also wish to appoint an independent person or group to carry out assurance on the supplier's products (for example, if the relationship between the customer and supplier is a commercial one' (Axelos, 2021).	
5	Project Manager: • 'The project manager has the authority to run the project on a day-to-day basis on behalf of the project board within the constraints laid down by them'(Axelos, 2021). • 'The project manager's prime responsibility is to ensure that the project produces the required products within the specified tolerances of time, cost, quality, scope, risk and benefits. The project manager is also responsible for the project producing a result capable of achieving the benefits defined in the business case'(Axelos, 2021).	The Scrum master in the Scrum model is similar to the project manager in PRINCE2 model. The responsibility of Scrum master to the Scrum team are: • Coaching the team members in self-management and cross-functionality. • Helping the Scrum Team focus on creating high-value Increments that meet the Definition of Done. • Causing the removal of impediments to the Scrum Team's progress. • Ensuring that all Scrum events take place and are positive, productive, and kept within the timebox. The responsibility of Scrum master in regards to project manager are: • Helping find techniques for effective Product Goal definition and Product Backlog management. • Helping the Scrum Team understand the need for clear and concise Product Backlog items. • Helping establish empirical product planning for a complex environment. • Facilitating stakeholder collaboration as requested or needed. The Scrum Master serves the organization in several ways, including: • The responsibility of Scrum master in regard to the organisation are:

		• Leading, training, and coaching the organization in its Scrum adoption. • Planning and advising Scrum implementations within the organization. • Helping employees and stakeholders understand and enact an empirical approach for complex work. • Removing barriers between stakeholders and Scrum Teams (Scrum, 2021).
6	Team Manager: • 'The team manager's prime responsibility is to ensure production of those products defined by the project manager to an appropriate quality, in a set timescale and at a cost acceptable to the project board. The team manager role reports to, and takes direction from, the project manager' (Axelos, 2021).	In Scrum model the responsibility of team manager corresponds to the responsibility of Team Lead of the Project Development Team. He/she performs all the function performed by the Team Manager of PRINCE2 model.
7	Project Assurance: • In PRINCE2 project assurance covers the primary stakeholder interests (business, user and supplier). • 'Project assurance has to be independent of the project manager therefore, the project board cannot delegate any of its assurance activities to the project manager' (Axelos, 2021).	Due to nature of the Scrum team being self-organising and self-managing there is generally no specific entity responsible for project assurance. However, the product owner is responsible for making sure the stakeholder interest are met (Schuurman, 2020).
8	Project Support: 'The provision of any project support on a formal basis is optional. If it is not delegated to a separate person or function it will need to be undertaken by the project manager' (Axelos, 2021).	In Scrum like PRINCE2 there is no support team in formal basis. However, if there is no specific team for support than the responsibility falls upon the Scrum master (Alexander, 2019).

Table 33: Role level comparison between PRINCE2 and Scrum (Axelos, 2021).

1.3. Deliverable Comparison between PRINCE2 and Scrum:

The following is the deliverable level comparison between PRINCE2 and Scrum:

S. no	PRINCE2 Deliverable	Scrum Deliverable
1	Project Brief: 'The purpose of the project brief is to provide the foundation upon which the project rests. It establishes the parameters under which the project is initiated, as well as the stakeholder inputs into the initiation phase. It is prepared by the project manager, reviewed by the senior users and suppliers, and approved by the executive' (Roseke, 2019).	Product Backlog: 'A product backlog is a list of the new features, changes to existing features, bug fixes, infrastructure changes or other activities that a team may deliver in order to achieve a specific outcome'. 'The product backlog is the single authoritative source for things that a team works on. That means that nothing gets done that isn't on the product backlog. Conversely, the presence of a product backlog item on a product backlog does not guarantee that it will be delivered. It represents an option the team has for delivering a specific outcome rather than a commitment' (Agile Alliance, 2021).
2	Checkpoint Report: 'The Team Manager will produce this to provide the Project Manager with details of progress reporting against the Work Package which will include the frequency of Checkpoint Reports required. The Project Manager will consolidate Checkpoint Reports and use these as part of the progress reporting and assessment when reviewing stage status and leading to the creation of Highlight Reports' (Project Academy Courses, 2021).	Sprint Backlog: 'The Sprint Backlog is a plan by and for the Developers. It is a highly visible, real-time picture of the work that the Developers plan to accomplish during the Sprint in order to achieve the Sprint Goal. Consequently, the Sprint Backlog is updated throughout the Sprint as more is learned. It should have enough detail that they can inspect their progress in the Daily Scrum' (Scrum, 2021).
3	Highlight Report: 'The Project Manager produces this progress reporting document on how the management of the stage and its progress is going for the Project Board. The Project Board will determine the frequency of Highlight Reports required for their progress reporting requirements, either for the whole project or stage by stage, and document how progress reporting is to occur in the Communication Management Strategy' (Project Academy Courses, 2021).	Burnt down chart: 'A burndown chart allows the team to see how far or near they are toward the project completion. Unlike the changes report, it includes all features and functionalities for development and not only those for the current Sprint' (Scrum Institute, 2021).

4	Benefit Review Plan: 'A Benefits Review Plan is used to define how and when a measurement of the achievement of the project's benefits, expected by the Senior User, can be made. Some benefits may be realised during the project lifecycle, but more commonly project benefits are realised after the project has delivered everything and been closed. The plan details what needs to be done for all project benefits, whenever they are realised. The plan covers the activities to find out whether the expected benefits of the products have been realized and how the products have performed when in operational use. Each expected benefit has to be assessed for the level of its achievement and whether any additional time is needed to assess the residual benefits. Use of the project's products may have brought unexpected side-effects, either beneficial or adverse. Time and effort have to be allowed to identify and analyse why these side effects were not foreseen' (Balance Global, 2021).	Benefit Realization Plan: 'A benefit realization plan helps to forecast contribution of individual project to the overall programme. The plan should be an integral part of any project from start to end. Benefit Realization plan helps to track the sustenance of intended benefits even after the end of a Scrum project' (59 Seconds Agile, 2021).

Table 34: Deliverables comparison between PRINCE2 and Scrum.

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