ASSIGNMENT 1 FRONT SHEET

Qualification	BTEC Level 5 HND Diploma in Computing		
Unit number and title	Unit 9: Software Development Life Cycle		
Submission date	January 8, 2021	**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	
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Class	GCC0701	**Assessor name**	NGUYEN THAI NGHE

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

		Student's signature	NGUYEN CHI HAI

Grading grid

P1	P2	P3	P4	M1	M2	D1	D2
✔	✔	✔	✔	✘	✘	✘	✘

☐ **Summative Feedback:**	☐ **Resubmission Feedback:**

2.1

Grade: 2.3	**Assessor Signature:** 2.2	**Date:** 2.4

IV Signature:

ASSIGNMENT 1 BRIEF

Qualification	**BTEC Level 5 HND Diploma in Computing**
Unit number	Unit 9: Software Development Life Cycle
Assignment title	Planning a software development lifecycle
Academic Year	2019 – 2020
Unit Tutor	
Issue date		**Submission date**	
Name and date	

Submission Format:	
Format:	The submission is in the form of 1 document.
	You **must** use the *Times font* with *12pt size*, turn on *page numbering*; set *line spacing to 1.3* and *margins* to be as follows: left = 1.25cm, right = 1cm, top = 1cm, bottom = 1cm. Citation and references must follow the Harvard referencing style.
	Word limit: 2000 words
Submission:	You **must** submit the assignment **by the due date** and follow the submission method specified by the Tutor. The submission form is **soft copy**, which is to be uploaded to the following URL: http://cms.greenwich.edu.vn.
Note:	Your assignment *must* be your own work, and not copied by or from another student or from other sources, such as book etc. If you use ideas, quotes or data (such as diagrams) from books, journals or other sources, you must reference the sources, using the Harvard style. Make sure that you know how to reference properly and that you understand the plagiarism guidelines. **Plagiarism is a very serious offence**, which will result in a failing grade.

Unit Learning Outcomes:

LO1 Describe different software development lifecycles.

LO2 Explain the importance of a feasibility study**.**

Assignment Brief and Guidance:

System Scenario

Tune Source is a company headquartered in southern California. Tune Source is the brainchild of three entrepreneurs with ties to the music industry: John Margolis, Megan Taylor, and Phil Cooper. Originally, John and Phil partnered to open a number of brick-and-mortar stores in southern California specializing in hard-to-find and classic jazz, rock, country, and folk recordings. Megan soon was invited to join the

partnership because of her contacts and knowledge of classical music. Tune Source quickly became known as the place to go to find rare audio recordings. Annual sales last year were $40 million with annual growth at about 3%–5% per year. Tune Source currently has a website that enables customers to search for and purchase CDs. This site was initially developed by an Internet consulting firm and is hosted by a prominent local Internet Service Provider (ISP) in Los Angeles. The IT department at Tune Source has become experienced with Internet technology as it has worked with the ISP to maintain the site.

System Request

Project Sponsor: Carly Edwards, Assistant Vice President, Marketing

Business Need: This project has been initiated to increase sales by creating the capability of selling digital music downloads to customers through kiosks in our stores, and over the Internet using our website.

Business Requirements: Using the Web or in-store kiosks, customers will be able to search for and purchase digital music downloads. The specific functionality that the system should have includes the following:

- Search for music in our digital music archive.
- Listen to music samples.
- Purchase individual downloads at a fixed fee per download.
- Establish a customer subscription account permitting unlimited downloads for a monthly fee.
- Purchase music download gift cards.

Business Value: We expect that Tune Source will increase sales by enabling existing customers to purchase specific digital music tracks and by reaching new customers who are interested in our unique archive of rare and hard-to-find music. We expect to gain a new revenue stream from customer subscriptions to our download services. We expect some increase in cross-selling, as customers who have downloaded a track or two of a CD decide to purchase the entire CD in a store or through our website. We also expect a new revenue stream from the sale of music download gift cards.

Conservative estimates of tangible value to the company include the following:

- $757,500 in sales from individual music downloads
- $950,000 in sales from customer subscriptions
- $205,000 in additional in-store or website CD sales
- $153,000 in sales from music download gift cards

Special Issues or Constraints:

- The marketing department views this as a strategic system. The ability to offer digital music downloads is critical in order to remain competitive in our market niche. Our music archive of rare and hard-to-find music is an asset that is currently underutilized.
- Many of our current loyal customers have been requesting this capability, and we need to provide this service or face the loss of these customers' business.
- Because customers have a number of music download options available to them elsewhere, we need to bring this system to the market as soon as possible.

Tasks

Complete the following tasks:

Task 1 – SDLC model

You are a project manager of a company named ABC. Your company has been hired by Tune Source to carry out a project that helps them develop a software for the requirements specified in the system request. As the first step, you need to:

1. (P1) Describe the following SDLC models: waterfall, v-model, prototyping, agile and spiral. Choose one that you think suitable for the project and explain why.

    - 350 - 500 words for each model

    - Explanation: 400 – 600 words

    (M1) Discuss the suitability of each of the SDLC models for the project. For each model, specify whether it is most, moderately or least suitable.

    - Discussion and arguments: 800 - 1000 words

    (D1) Discuss the merits of applying the waterfall model to a large software development project.

    - Discussion: 800 – 1200 words

2. (P2) Identify some risks and discuss an approach to manage them.

    - You will have the present what is Risk Management process with clear illustrations and explanations

    - Then you will create a Risk Management Plan to manage risks of Tune Source project

Task 2 – Feasibility study

1. (P3) Discuss the purpose of conducting a feasibility study for the project.

- Discussion: 400 – 1600 words

2. (P4) Discuss how the three feasibility criteria (technical, economic, organizational) are applied to the project. Discuss whether the project is feasible.

   Discuss alternative technical solutions using the alternative matrix.

   Discussion: 1200 – 1500 words

3. (M2) Explain the components of a feasibility report.

   - Discussion economic feasibility study: 350 – 500 words

   - Discussion organizational feasibility study: 350 – 500 words

4. (D2) Assess the impact of each feasibility criterion on a software investigation.

   - Discussion and represent as feasibility alternatives matrix for: 700 – 900 words

Learning Outcomes and Assessment Criteria		
Pass	**Merit**	**Distinction**
LO1 Describe different software development lifecycles		
P1 Describe two iterative and two sequential software lifecycle models. **P2** Explain how risk is managed in the Spiral lifecycle model.	**M1** Describe, with an example, why a particular lifecycle model is selected for a development environment.	**D1** Assess the merits of applying the Waterfall lifecycle model to a large software development project.
LO2 Explain the importance of a feasibility study		
P3 Explain the purpose of a feasibility report. **P4** Describe how technical solutions can be compared.	**M2** Discuss the components of a feasibility report.	**D2** Assess the impact of different feasibility criteria on a software investigation.

Contents

I.   The purpose of a feasibility report

1.   What is the Feasibility Study?

To define five overarching aims of feasibility studies that concentrate on social and behavioral approaches, we synthesized the literature of study methods applicable to feasibility studies. To address the overall question, feasibility tests are intended: Does it work? The key feasibility objectives include the evaluation of the recruitment potential and the resulting sample characteristics, data collection procedures and outcome measures, the acceptability of the intervention and research procedures, the resources and capacity to administer and execute the study and intervention, and the preliminary assessment of the response to the intervention by the participants (Orsmond and Cohn, 2015).

2.   Types of Feasibility Study

2.1. Technical Feasibility

This appraisal focuses on the organization's available technological resources. It allows companies to determine whether the technological resources are capable of meeting the potential and whether the technical team is capable of translating the concepts into working systems. Functional viability also includes the assessment of the proposed system's hardware, software, and other technical specifications (Simplilearn, 2020).

2.2. Economic feasibility

This review usually requires a project cost/benefit analysis, helping organizations assess the feasibility, cost, and benefits associated with a project before allocating financial resources. It also acts as an unbiased appraisal of the project and increases the integrity of the project, allowing decision-makers to assess the organization's positive economic benefits (Simplilearn, 2020).

2.3. Scheduling Feasibility

This test is the most critical for the success of the project; a project would, after all, fail if not completed on time. A company calculates how much time the project will take to complete while scheduling viability (Simplilearn, 2020).

When all of these areas have been explored, the feasibility review helps recognize any limitations that might be faced by the proposed project, including:

- Constraints of the internal project: technical, technological, budgetary, money, etc.
- Financial, marketing, export, etc. Internal corporate constraints:
- Logistics, climate, laws and regulations, etc. External constraints:

3. Importance of Feasibility Study

A feasibility analysis could discover new concepts that could alter the direction of a project entirely. Rather than jumping in and finding that the project will not succeed, it's best to make these determinations in advance. It is often beneficial for the project to perform a feasibility study as it gives you and other stakeholders a good picture of the project proposed (Simplilearn, 2020).

II. Software lifecycle models

1. Iterative models

1.1. Spiral model

Spiral Model (Figure 1) is a risk-driven software development process model. It is a mixture of the model and the iterative model of the waterfall. Spiral Model helps to adopt software development elements of several process models for the software project based on specific risk trends ensuring the efficient development process (guru99, n.d.).
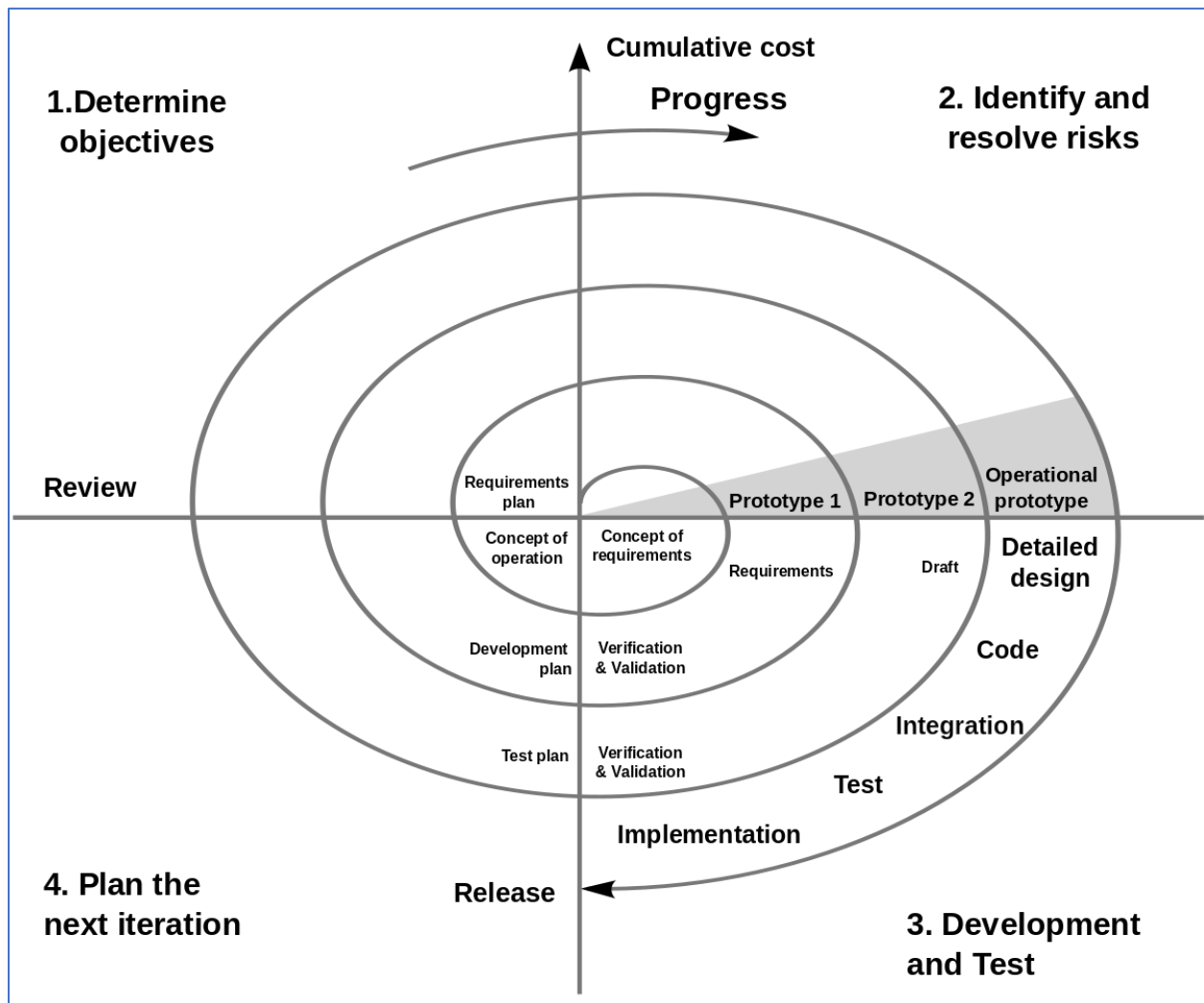

Figure 1: Spiral model

Advantages and Disadvantages: (Figure 2)

Advantages	Disadvantages
• Additional functionality or changes can be done at a later stage	• Risk of not meeting the schedule or budget
• Cost estimation becomes easy as the prototype building is done in small fragments	• Spiral development works best for large projects only also demands risk assessment expertise
• Continuous or repeated development helps in risk management	• For its smooth operation spiral model protocol needs to be followed strictly
• Development is fast and features are added in a systematic way in Spiral development	• Documentation is more as it has intermediate phases
• There is always a space for customer feedback	• Spiral software development is not advisable for smaller project, it might cost them a lot

Figure 2: Advantages and Disadvantages about Spiral model (guru99, n.d.).

1.2. Agile Model

The agile model (Figure 3) assumes that every project needs to be done differently and that current strategies need to be adapted to fit the requirements of the project best. The activities in Agile are split into time boxes (small time frames) to include unique release features (tutorialspoint, n.d.).

After each iteration, an iterative approach is taken and the development of working software is given. In terms of functionality, each build is incremental; the final build holds all the customer's necessary features (tutorialspoint, n.d.).

The Agile thought process began early in the development of software and began to become popular over time due to its versatility and adaptability (tutorialspoint, n.d.).
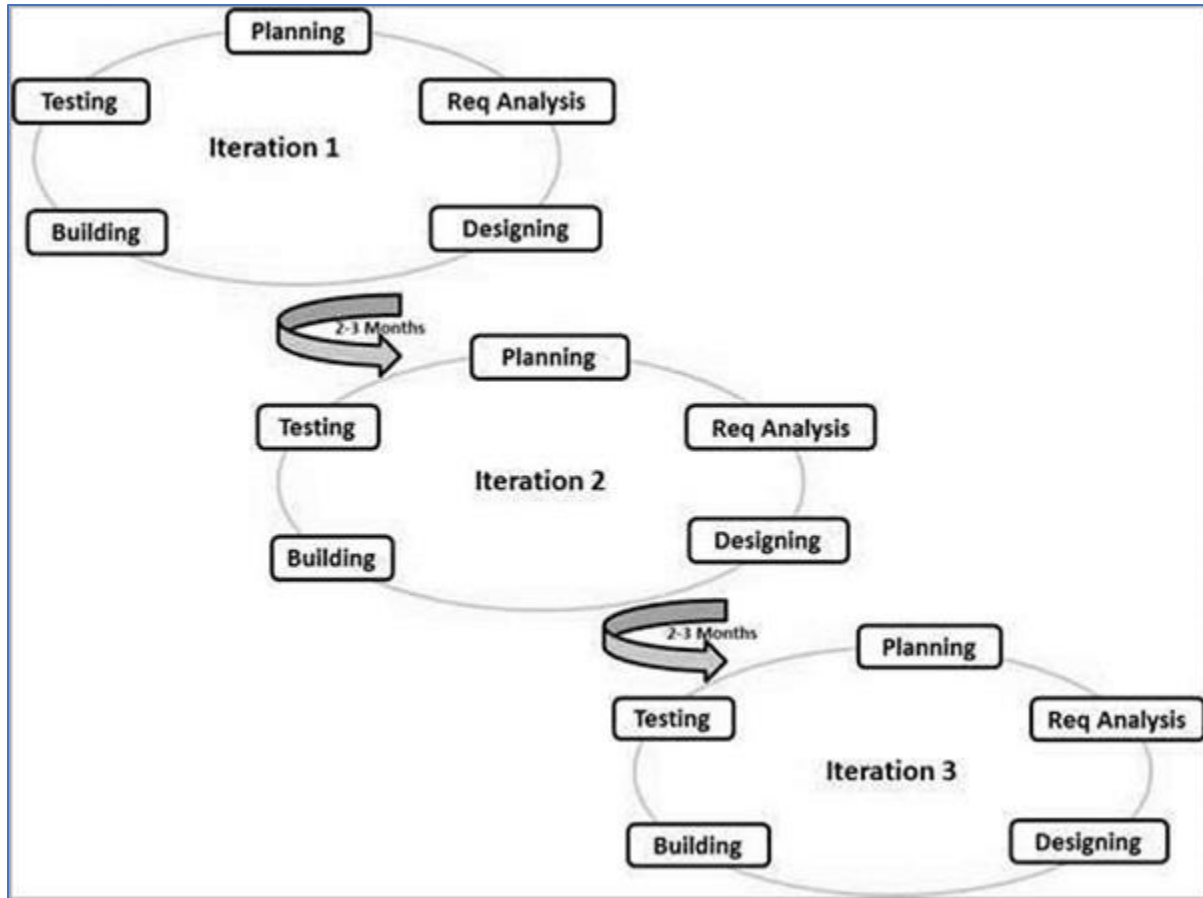
Figure 3: Agile Model

Advantages and Disadvantages: (Table 1)

Advantages	Disadvantages
Customer satisfaction, they can check software release and revert feedback	Documentation could get lengthy.
In an agile process mostly meeting arranged before product release.	It is not useful for small projects.
More interaction maintained within developing and testing team in this agile process.	It required expert persons to take important decisions in the meeting.

Customers can change or add requirements at any stage.	Cost more as compare to the waterfall or interactive model.
It concentrates on every process with expert team members.	

Table 1: Advantages and Disadvantages about Agile model (softwaretestingbooks, n.d.)

2. Sequential Models

2.1. Waterfall model

The first process model to be implemented was the Waterfall Model (Figure 4). It is really easy to comprehend and use. Every step must be completed in a Waterfall model before the next phase can begin and there is no overlap in the phases. The model of the waterfall is the earliest SDLC technique used for software development (toolsqa, n.d.).
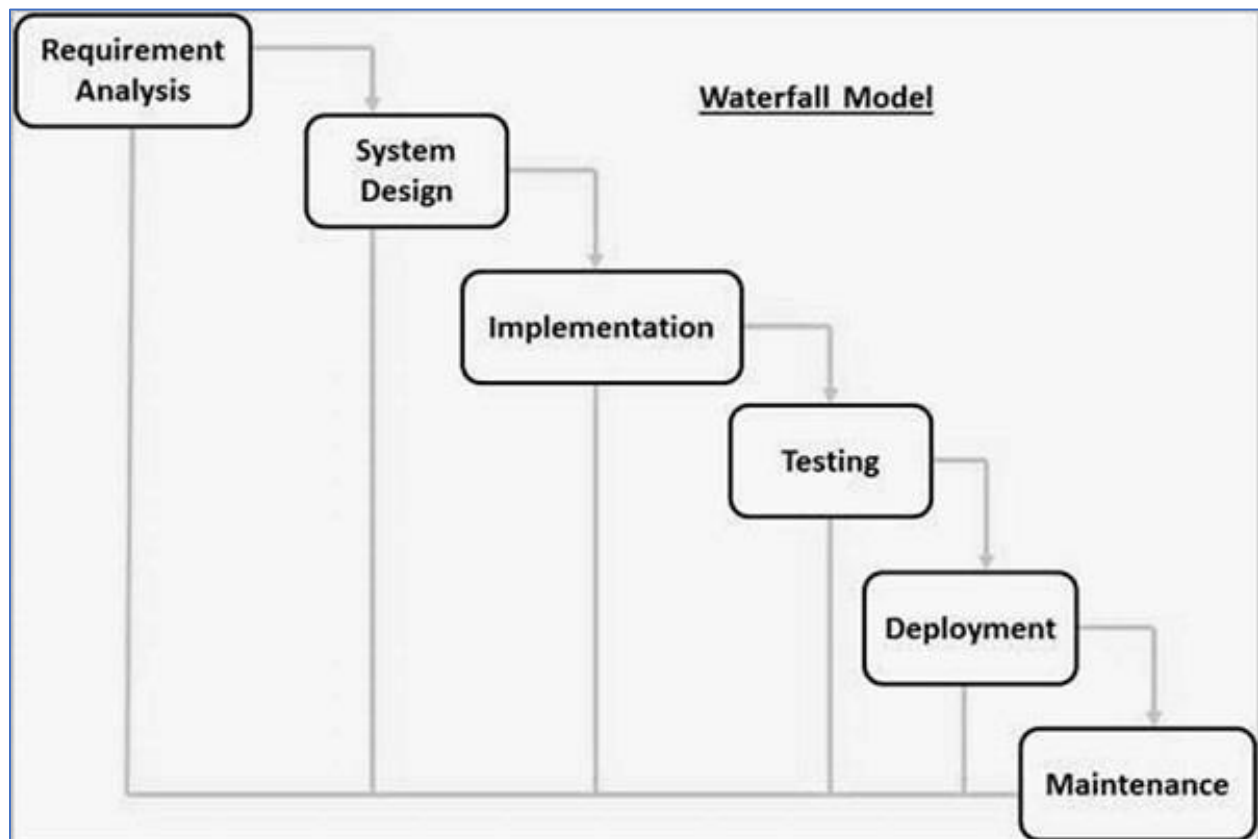

Figure 4: Waterfall Model

The entire process of software development is split into different phases in "The Waterfall" approach. The product of one stage acts sequentially as the input for the next step. This implies that every stage in the phase of growth starts only if the previous stage is complete. The waterfall model is a sequential design process in which progress through the phases of Conception, Initiation, Study, Design, Development, Testing, Production/Implementation, and Maintenance is seen as continuously flowing downward (like a waterfall) (toolsqa, n.d.).

Advantages and Disadvantages: (Table 2)

Advantages	Disadvantages
The advantage of waterfall development is that it allows for departmentalization and control.	It is difficult to estimate time and cost for each phase of the development process in the waterfall model.
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.	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.
The waterfall model progresses through easily understandable and explainable phases and thus it is easy to use.	Not a good model for complex and object-oriented projects.
The waterfall model works well for smaller projects where requirements are very well understood.	Not suitable for the projects where requirements are at a moderate to high risk of changing.

Table 2: Advantages and Disadvantages about Waterfall model

2.2. V-Model

The V-model is an SDLC (Software Development Life Cycle) model where process execution takes place in a V-shape sequentially. It is also known as the model of Verification and Validation.

The V-Model is an extension of the waterfall model and is based on a testing process association for each subsequent stage of growth. This means that there is a specifically related testing process for any single phase in the development cycle. This is a highly-disciplined model and only after the completion of the previous phase does the next phase begin (tutorialspoint, n.d.).
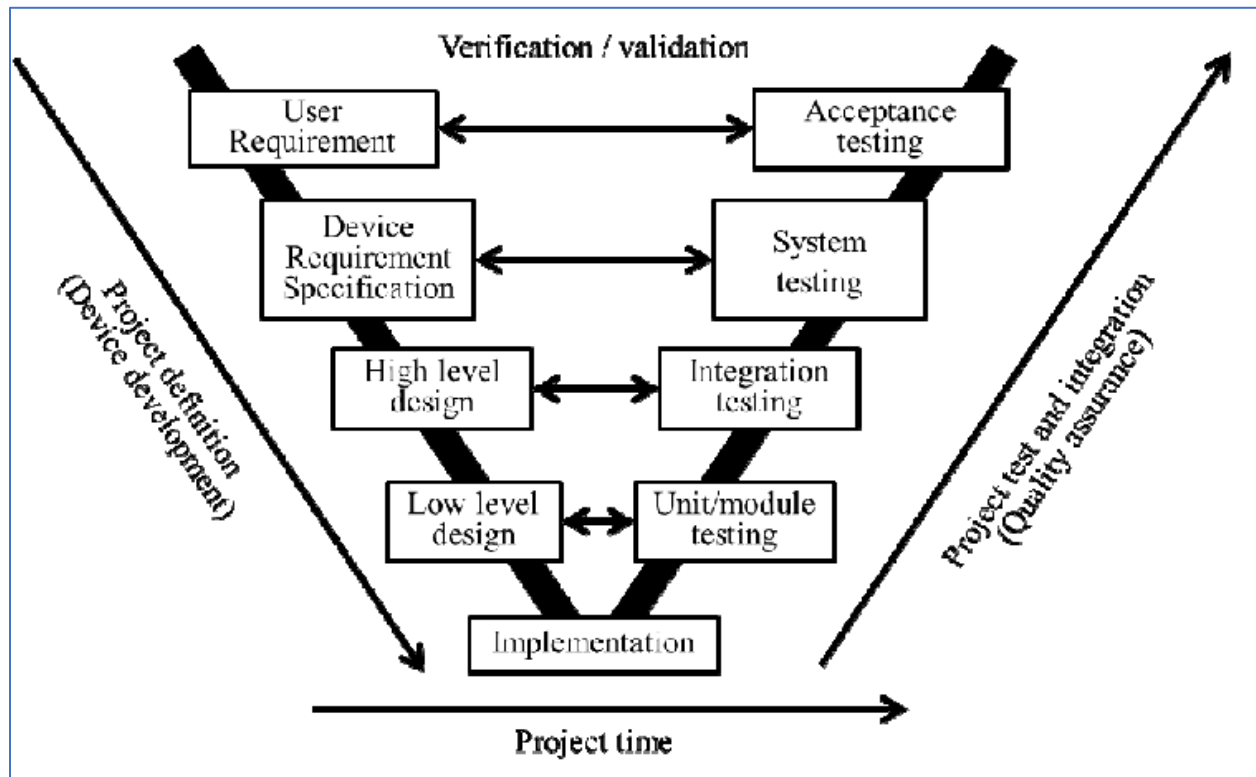
Figure 5: V-Model

Advantages and Disadvantages:

Advantages	Disadvantages
Simple and easy to use.	Very rigid and least flexible.
Testing activities like planning, test designing happens well before coding.	Software is developed during the implementation phase, so no early prototypes of the software are produced.
This saves a lot of time.	If any changes happen in midway, then the test

	documents along with required documents have to be updated.
Proactive defect tracking – that is defects are found at an early stage.	
Works well for small projects where requirements are easily understood.	

Table 3: Advantages and Disadvantages about V-model

3. Conclusion

We choose the waterfall model for this project. The first one is the ease of use of the waterfall model. Next, our project must follow a certain order from talking to customers, planning the project, implementing the project until it is completed. All work in this project must be done successively, with no overlap in phases. With the above requirements, we decided to choose the waterfall model to implement this project.

III. Risk is managed in the Spiral lifecycle model

Each spiral loop is called a step of the process of software development. The project manager will vary the exact number of phases necessary to produce the product depending on the project risks. Since the project manager decides the number of phases dynamically, the project manager has an important role to play in the creation of a product using the spiral model (geeksforgeeks, 2018).

1. Risk Handling

The projects with many unknown risks that arise as the construction progresses, in that case, the Spiral Model is the best development model to implement due to the risk analysis and risk handling at every point (geeksforgeeks, 2018).

2. Risk Handling in the project

Overtime

In this project, we will finish on time. In case risks are affecting the completion of the project, we have solutions to overcome.

A further technique for shortening a project timetable is to expect people to work more hours. They will accomplish tasks in fewer days by operating outside the ordinary day. The project price tag would not go up if individuals earn a wage and don't earn any money for working longer hours. This sort of overtime violence, however, won't work for long.

Cost Overrun

Cost overrun is often referred to as a rise in costs or budget overrun. It is an additional expense, due to an underestimation or some cause during the budgeting process. There are three types of cost overruns: Technical-This is due to bad calculations, or when formulating the budget, not enough data is collected.

Comprehensive project planning: The more detailed and precise your forecasts are, the more likely you are to be within the budget. Risks exist, but with a robust risk management strategy, they can be handled. If the plan has been detailed, sign it with the project's stakeholders, so everyone is on the same expectations page.

Personnel change

If the project's progress depends on the time and abilities of a single member of the team or group of team members, what will happen if they leave.

Of course, through incentives and reward schemes, it is nice to keep talent happy, but it might also be prudent to consider requiring non-competition contracts as a prerequisite for involvement in very sensitive projects.

Regulatory changes

If, because of a change in legislation or regulations, the result of the project is no longer economically feasible.

Many business contracts contain clauses relating to adjusting the risks of the law. These modifications, however, are seldom unexpected. One of the advantages of working with a firm of lawyers who are familiar with a specific industry is that they often control future developments in the law.

A cautious and detailed risk assessment is the best defenses against risk, but it is not realistic to

ask even the best project manager to be prescient. Contractual provisions and insurance may reduce the financial impact of the unexpected in those circumstances where the process of evaluating and assigning likely risk is not adequate.

IV.   Cost Management

1.   The three feasibility criteria (technical, economic, organizational) are applied to the project.

Once the number of projects has been reduced following the requirements previously discussed, it is still important to assess if the projects selected are feasible. Our definition of feasibility goes far deeper than the term's common usage since the feasibility for systems projects is evaluated in three key ways: operationally, scientifically, and economically. The feasibility study is not a study of full-blown systems. Instead, the feasibility study is used to obtain large data for management members, which in turn helps them to determine whether to continue with a system study (w3computing, n.d.).

1.1. Technical

The analyst must figure out if, given current technological resources, it is possible to implement the new method. If not, can it be upgraded or added to the system in a way that satisfies the request under consideration? If it is not possible to incorporate or update existing systems, the next issue is whether there is technology in nature that meets the requirements.

1.2. Economic

The second aspect of resource determination is economic viability. Your time and that of the system research team, the cost of conducting a complete system report, the cost of the time of the company employee, the estimated cost of hardware, and the estimated cost of software or software creation are the basic resources to consider.

Before committing to an entire systems analysis, the company concerned must be able to see the importance of the investment it is pondering. If short-term losses are not overshadowed by long-term benefits or do not result in an immediate decrease in operating costs, the system is not economically viable and no further progress should be made on the project.

1.3. Organizational

For a moment, imagine that all technological and economic capital are deemed sufficient. The operational viability of the requested project must also be considered by the systems analyst. Operational viability relies on the human capital available for the project and includes planning whether, once built, the device can work and be used. Resistance to introducing the new system would be high if users are practically married to the current system, see no issues with it, and usually are not interested in demanding a new system. There are poor chances of it ever being operational.

2. Costs Management

We have analyzed and planned this project. The detailed plan is shown in Table 4.

No.	Task action lists	Scheduled	
		Times (Date)	Costs($)
1	Project plan	7	1500
2	Calculate the risks	5	900
	Cloud provider	30	200
3	Hire workers	2	3000
4	Building system	25	10000
5	Testing	5	750
6	re-evaluate the system	3	500
Total		74	16850

V. Costs Management

Table 4: Cost Manage

Besides, we evaluate and estimate system maintenance costs during operation and development. We have calculated all costs and profits when implementing the system (Table 5).

Payback Analysis For Client-Server System						
Cash flow description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development costs ($)	$16,850					
Operation and maintenance cost ($)		$1,500	$1,700	$2,500	$2,700	$2,900
Discount factors for 10%	1	0.893	0.797	0.712	0.507	0.42
Time adjusted costs ($)		$1,339.50	$1,354.90	$1,780	$1,368.90	$1,218
Cumulative time adjusted costs over ($)	$16,850	$18,189.50	$19,544.40	$21,324.40	$22,693.30	$23,911.30

Benefits Derived from operation of new	0	$1,500	$1,700	$2,500	$2,700	$2,900
Discount factors for 10%	1	$0.89	0.8	0.71	0.51	0.4
Time adjusted costs ($)	0	1335	$1,360	$1,775	$1,377	$1,160
Cumulative time adjusted benefits costs over ($)	0	1335	$2,695	$4,470	$5,847	$7,007
	1	2	3	4	5	6
Cumulative time adjusted costs over	$16,850	$15,515	$12,820	$8,350	$2,503	$4,504

Table 5: Payback Analysis

ROI = ($7,007- $23,911.30) / $23,911.30 ≈ 70.69%

Computing the payback period: $2,503/ ($4,504+ $2,503) = 0.35

Therefore, the payback period is approx. 4.3 years.

3. Alternative Technical Solutions

We have 2 options (Table 6) for developing this system. The first option is to rebuild the entire system from scratch. The second option is to use the built-in framework to redeem the interface and functionality that is appropriate for the system.

Feasibility Criteria	Optional	
	Making the system from scratch	Use the framework available
Advantage	The advantage of rebuilding the system from scratch and without applying an existing framework is that it will build an optimized system for all functional parts, layout-independent layouts, and anything else. available.	Simplify the interface design and construction process. Reduce/eliminate repetitive tasks. Increased application flexibility through abstraction. Code reuse. Supports and simplifies the use of new and complex technologies. It binds together a series of discrete objects/components into one more useful system. Everyone can easily inspect and debug code, even code

		for which they are not part of the project. The closed process from interface design, code and software testing.
Disadvantage	Building systems without frameworks will take a lot of time and staff to do everything. Accompany it is a lot of costs to pay high costs to build the system.	The disadvantage of using a framework is that it depends on the version it provides. In which features we need to implement the project it will not be appropriate. The features of the system depend a lot on the version it offers.
Cost	$35000	$16850

Table 6: Analysis board

Conclusion

We will choose to use the framework to build the system instead of building everything for the system from scratch. The advantages that we have when using the framework will save us time and a lot of money. All will be shown in Table 6.

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Index of comments

2.1   Strong points:
        - Discussing the models with advantage/disadvantage
        - Having comparison for alternatives in feasibility study
        - Having cost, befenits and risk discussion
        Weaknesses:
        - Please clearly define which part is for P1, for P2,..
        Tasks for improvements:
        - Presentation for each P1, P2,..

2.2   Nguyen Thai Nghe

2.3   Pass

2.4   11/01/21