ASSIGNMENT 01 FRONT SHEET

Qualification	**BTEC Level 5 HND Diploma in Computing**		
Unit number and title	Unit 09: Software Development Life Cycle		
Submission date		**Date Received 1st submission**	
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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	

Grading grid

P1	P2	P3	P4	M1	M2	D1	D2

❒ **Summative Feedback:** ❒ **Resubmission** **Feedback:**		
Grade:	**Assessor Signature:**	**Date:**
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I. Introduction

This report is about the analysis of the development of software for Tune Source, a music store founded by John Margolis, Megan Taylor, and Phil Cooper. The analysis includes an SDLC model, risk assessment, and management along with feasibility studies. They began as an offline music business focusing on locating and collecting rare and high-quality vinyl; as a result, people consistently flock here to find their favorite recordings. Aside from a headquarters shop, they also offer a website where customers may buy and search records. Last year's recorded sales were $40 million, with an annual growth rate of 3% to 5%, and they wish to expand their business to earn more commissions. Their website had already been published and was given by a local Internet Service Provider in Los Angeles and the firm IT department; the website seemed to be functioning well. They also intend to establish modest kiosks to boost sales.

II. SDLC models

1. Definition

The Software Development Life Cycle (SDLC) is a software industry method for designing, developing, and testing high-quality software. The SDLC seeks to develop high-quality software that meets and exceeds customer expectations and is completed on time and within budget. (Tutorials Point, 2022)

SDLC is used inside a software organization to construct a software project. It is a thorough strategy that describes how to build, maintain, replace, and change or improve certain software. The life cycle outlines an approach for enhancing software quality and the development process. (Tutorials Point, 2022)

There are various types of SDLC models that a development team can choose to develop their project. Each model has its unique traits along with pros and cons. The following section discusses some of the most prevalent ones and the final verdict on which one suits the project the best is given followed by an explanation.

2. Waterfall

2.1.Definition

The Waterfall is considered the first SDLC model to be introduced and implemented. In a waterfall model, each phase must be finished before the next one can begin, and the stages must not overlap.

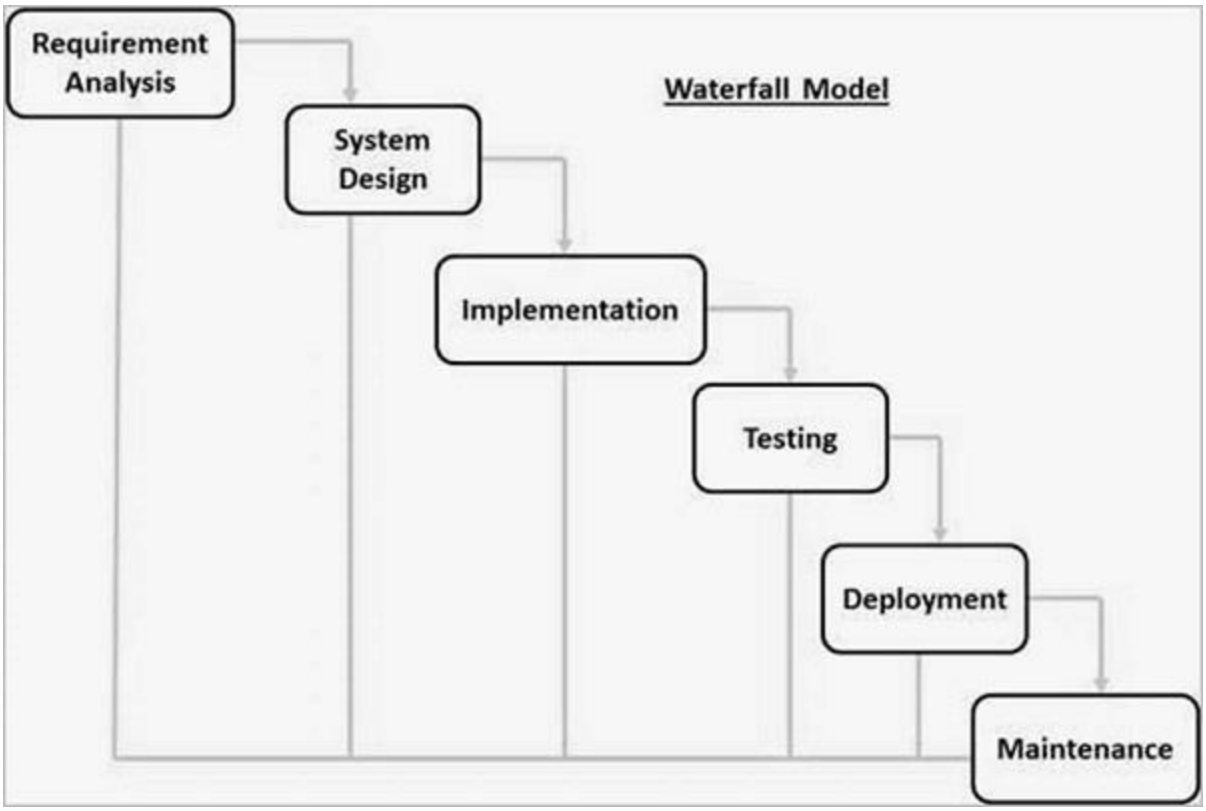

FIGURE 1 WATERFALL MODEL (TUTORIALSPOINT, 2022)

2.2. Advantages

- Structure is clear, granting ease of use for the team members.
- End goal is determined early, making it easier to develop the project
- Information is communicated effectively, making the model suitable for larger projects where tasks and team members are big.

(Lucid Content Team, 2022)

2.3. Disadvantages

- Since the model does not allow going back to the previous step to make changes. Any changes needed to make to the system would have to wait until the whole process is done and a new one is made. Implementing changes is harder.
- Client and end-users are not included in the process, changes are likely to come after the product is finished and more time is needed to develop it.
- Testing is delayed until the process is complete. Risking errors appearing early but fixed late.

(Lucid Content Team, 2022)

2.4. Principles

- The waterfall paradigm splits your processes into consecutive segments. You may only progress to the next step of your project when the current one has been completed. This also means that there is no room for deviation or revisiting a phase once it has been completed. The only way to go back is to start from scratch.

- Minimal client involvement: A waterfall project requires little or no customer engagement. This is largely because operations begin only once the customer's needs and objectives have been properly specified. The first meeting occurs before operations begin, and the second occurs when the project is nearing completion.
- This technique also includes detailed documenting of all requirements, the development process, and the end result. This contains everything from a timetable to the specific steps you will take to solve the client's difficulties. Because there is little to no client interaction during the development phase, every critical element must be recorded beforehand.

(Waseem, 2022)

3. V-model

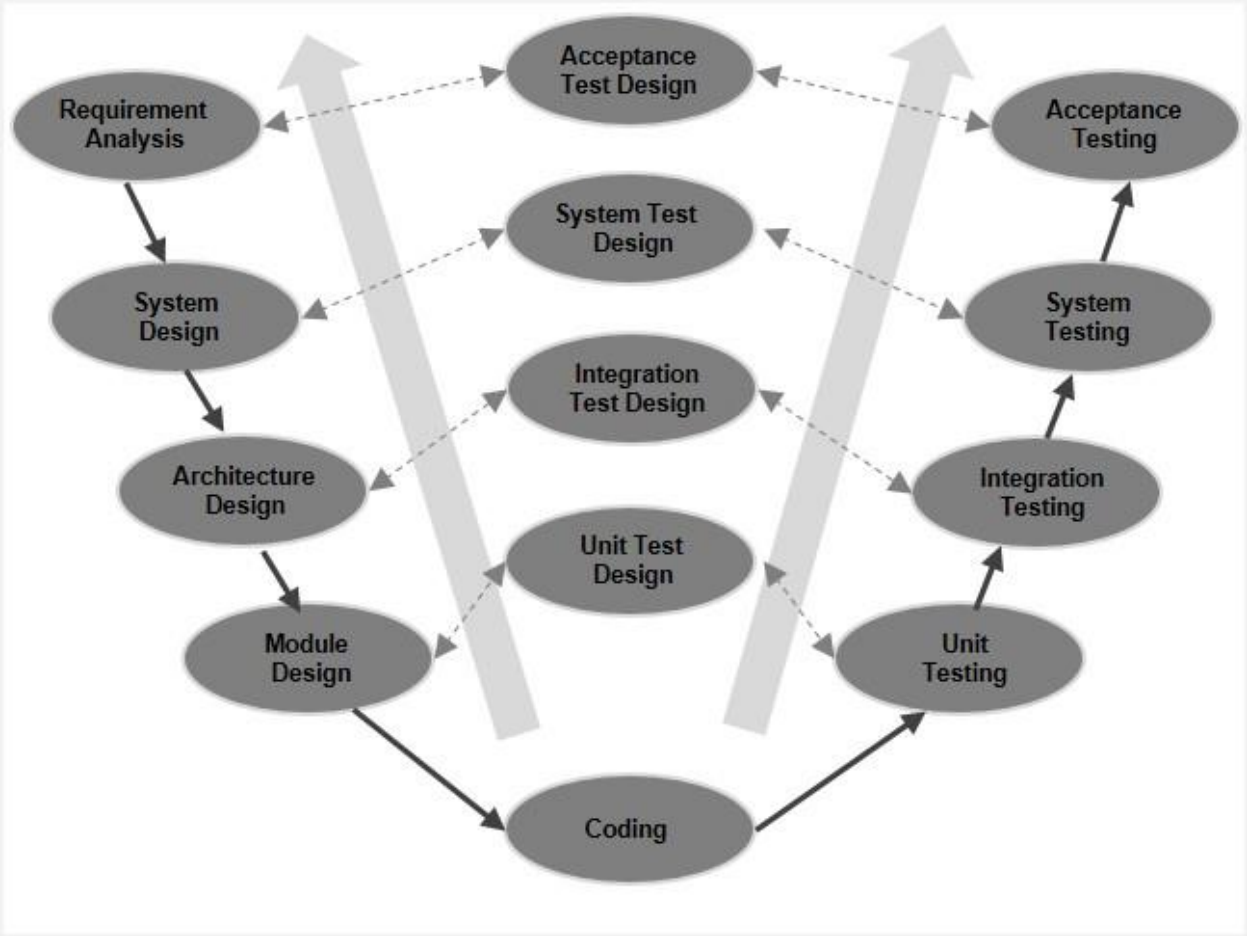

FIGURE 2 V-MODEL (TUTORIALSPOINT, 2022)

3.1. Definition

The V-model is an SDLC paradigm in which processes are executed sequentially in a V-shape. It is often referred to as the Verification and Validation model.

The V-Model is an extension of the waterfall model that is based on assigning a testing phase to each development step. This means that there is a testing phase for every single phase of the development cycle. This is a very disciplined plan, and the next step begins only once the previous phase is completed

3.2. Advantages

- Phases are performed one at a time in this highly disciplined methodology.
- Works effectively for smaller projects with well-defined needs
- Simple to grasp and use.
- Because of the model's rigidity, it is simple to manage. Each phase includes its own set of deliverables and a review procedure.

(tutorialspoint, 2022)

3.3. Disadvantages

- Uncertainty and high risk.
- Not suitable for complex, object-oriented programs.
- Poor model for long-term projects.
- Not appropriate for projects with a moderate to high risk of changing needs.
- It is tough to update a functionality after an application has entered the testing stage.
- Until late in the life cycle, no functioning software is developed.

(tutorialspoint, 2022)

4. Prototyping

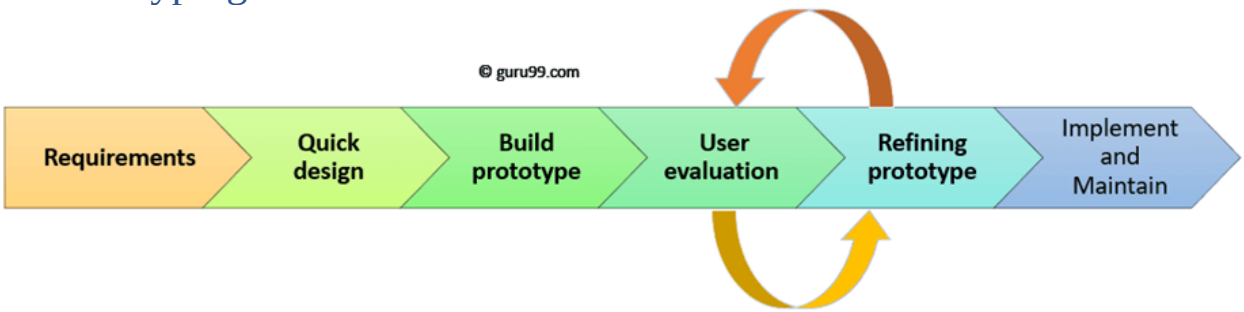

FIGURE 3 PROTOTYPING MODEL (MARTIN, 2022)

4.1. Definition

The Prototyping Model is a model in which a prototype is developed, tested, and changed until it is acceptable. It also builds the foundation for the final system or program. It works best when the project's needs are not fully understood. It is an iterative, trial-and-error process used by both the developer and the customer. (Martin, 2022)

4.2. Advantages

- Customers get an early say in the product, which increases customer happiness.
- Errors and missing functionality are quickly recognized.
- Prototypes can be utilized in more complex projects in the future.
- It stresses teamwork and adaptable design techniques.
- Users now understand how the product works better.
- Quicker client feedback allows for a greater understanding of customer demands.

(Lewis, 2019)

4.3. Disadvantages

- The primary downside of this technique is that it is more time and money consuming than alternative development methods such as the spiral or Waterfall model. Because prototypes are often abandoned, some businesses may not see the benefit in using this method.
- Inviting client feedback so early in the development process may also generate issues. One issue is that there may be an overwhelming number of modification requests that are difficult to satisfy. Another difficulty might develop if, after viewing the prototype, the buyer requests a faster final release or loses interest in the product.

(Lewis, 2019)

4.4. Principles

- Not a comprehensive development methodology in and of itself, but rather a way for dealing with specific aspects of a broader, more traditional development methodology.
- Attempts to decrease inherent project risk by segmenting a project and making it easier to adjust during the development phase.
- The user is involved throughout the development process, which enhances the chance of the final implementation being accepted by the user.
- Small-scale mock-ups of the system are created through an iterative change process until the Prototype meets the needs of the consumers.
- While most prototypes are created with the intention of being abandoned, it is feasible in some situations to progress from prototype to operational system.
- To prevent fixing the wrong problem, a basic grasp of the core business problem is required.

5. Agile

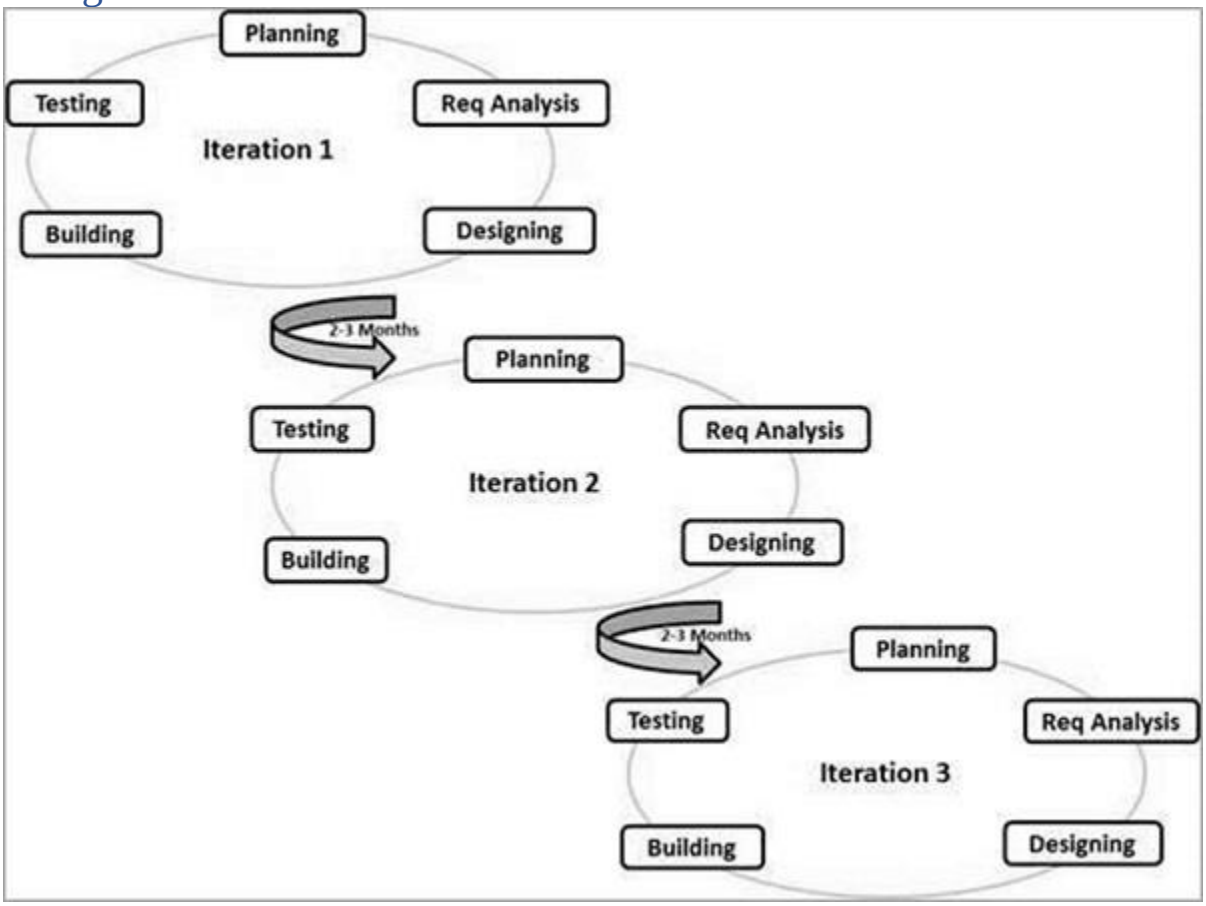

FIGURE 4 AGILE MODEL (TUTORIALSPOINT, 2022)

5.1. Definition

The Agile SDLC model is a hybrid of iterative and incremental processes that focuses on providing working software products to customers as quickly as possible. Every process in this approach is reduced to little builds. (Tutorialspoint, 2022)

Cross-functional teams must work concurrently on many areas such as planning, analysis, design, coding, unit, and acceptability testing. A workable product will be presented to the client and stakeholders at the conclusion of the process. (Tutorialspoint, 2022)

5.2. Advantages

- Is a practical approach to software development.
- Encourages collaboration and cross-training.
- Functionality may be quickly built and shown.
- The required resources are little.
- Suitable for both fixed and fluctuating requirements
- Provides partly workable solutions early on.
- A good model for surroundings that change on a regular basis.
- Minimal rules, readily implemented documentation
- Concurrent development and delivery within a larger planned environment.

- There is little to no planning necessary.
- Simple to handle.
- Provides developers with freedom.

(Tutorialspoint, 2022)

5.3. Disadvantages

- Not appropriate for dealing with complicated dependencies; higher risk of sustainability, maintainability, and extensibility.
- Without an overarching plan, an agile leader, and agile PM practice, it will not function.
- Strict delivery management determines the scope of the project, the functionality to be supplied, and the modifications needed to fulfill deadlines.
- Depends greatly on customer engagement, thus if the consumer is unclear, the team may be led astray.
- Because there is little documentation created, there is a high level of individual dependence.
- Due to a lack of documentation, transferring technology to new team members may be difficult.

(Tutorialspoint, 2022)

6. Spiral

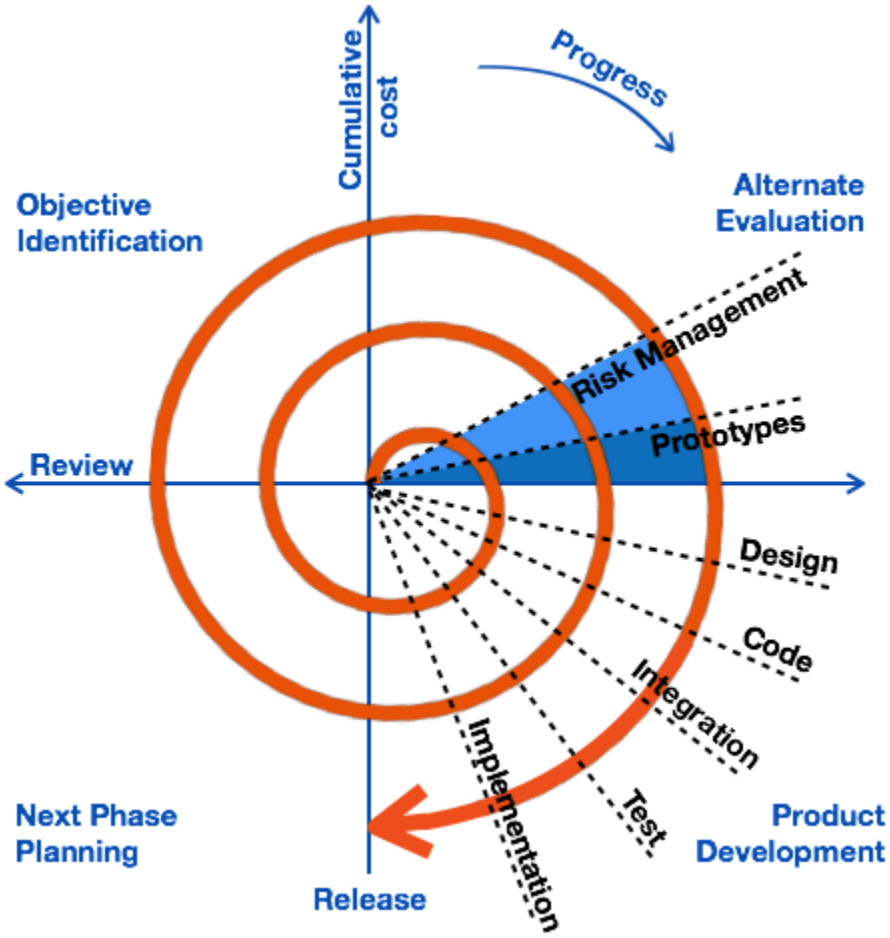

FIGURE 5 SPIRAL MODEL (TUTORIALSPOINT, 2022)

6.1. Definition

One of the most significant Life Cycle Application Development methods for risk management is the Spiral Model. In its diagrammatic portrayal, it seems to be a spiral with multiple loops. The precise number of spiral loops is unclear and varies between projects. Each spiral loop represents a stage in the software development process. (Tutorialspoint, 2022)

The project manager may identify the precise number of steps necessary to generate the product based on the project risks. The project manager has a crucial role to play in creating a product utilizing a spiral model since he or she carefully estimates the number of steps.

6.2. Advantages

- Changes to requirements made after work has begun can be simply adopted and implemented.
- Risk management - The spiral model incorporates risk analysis and management into each phase, boosting security and the likelihood of preventing assaults and breakages. The iterative development method also makes risk management easier.
- Customer pleasure is facilitated by the spiral model. If the program is being developed for a client, the client will be able to examine and evaluate their work at every stage. This enables users to express concerns or make modifications before the product is fully produced, saving the development team time and money.

(Tutorialspoint, 2022)

6.3. Disadvantages

- High cost - Because the spiral approach is costly, it is not appropriate for minor projects.
- Dependence on risk analysis - Because successful project completion is dependent on good risk management, participating employees must be skilled in risk assessment.
- The spiral model is more sophisticated than the other SDLC choices. Protocols must be strictly followed in order for it to function properly. Furthermore, because the model includes intermediate steps, there is more documentation.
- Time management is difficult since the number of needed stages is typically unknown when the project begins, making time management nearly impossible. As a result, there is always the possibility of running behind time or over budget.

(Tutorialspoint, 2022)

6.4. Principles

- The emphasis is on risk assessment and limiting project risk by splitting a project into smaller pieces and offering greater flexibility during the development process, as well as providing the ability to analyze risks and determine project continuance throughout the life cycle.
- Each trip around the spiral traverses four basic quadrants: determine the iteration's objectives, alternatives, and constraints; evaluate alternatives; identify and resolve risks; develop and verify iteration deliverables; and plan the next iteration.
- Begin each cycle with the identification of stakeholders and their win conditions and end each cycle with review and commitment.

7. Model chosen for the project

In this project, Agile Model will be chosen to develop the software needed for Tune Source due to its lower cost. Furthermore, clients are satisfied with the finished result since changes are made and clients are involved in development choices throughout the process.

Agile software development is appropriate for Tune Source since it can be utilized with any sort of project, but it requires greater client participation and interaction. We may also utilize it when the customer requires some functional requirements completed in less than three weeks and the requirements are unclear. This will result in a more value and usable piece of software being available sooner, which will boost customer satisfaction. Provides a competitive edge to teams by discovering faults and making modifications throughout the development process rather than at the end. It reduces the amount of time spent on assessments because each evaluation is only a minor element of the overall project.

It guarantees that modifications may be made more quickly and throughout the development process by using consistent assessments to analyze the product against the desired results. It maintains transparency in each project by conducting frequent, consistent meetings with clients and tools that allow everyone involved to view project data and progress. It shortens the time necessary to access certain system capabilities. Finally, it is appropriate for the project.

8. Risks and approach to manage them

	Risk description	Type	Probability	Impact	Solution
1	Data of the store is lost or corrupted due to power outage	Physical risk	Medium	High	implement a uninterruptible power system so that the system can safely shut down in case of a power outage
2	A user makes purchased using stolen credit cards	Financial	Low	Medium	Work tightly with credit card company and only let the transaction go through when the company has verified that it is legitimate
3	A developer accidentally pushed defective codes into production	Human error	Low	High	Implement a version control solution so the code can be rolled back in case such a scenario happens
4	Due to miscommunication, the developer team has created a website that is far from what the client has envisioned, the aesthetics and layout are off with what they think it would be	Quality	Medium	High	Wireframe and detailed design layout should be carefully discussed with the clients before the front-end is coded.
5	A customer's credit card has been charged twice for a month of subscription	Quality	Low	Medium	Investigate the part that causes such problem for the customers, offer them a refund along with a discount as an apology to keep them subscribed. Implement a better quality assurance

					process to prevent future incidents from happening
6	The project is projected to go over the budget that was initially discussed and offered during the development of the system	Budget	Medium	High	Another meeting/discussion regarding such problem need to be held should this happen to decide whether to cut out features to lower the cost of the project of to invest more into the project to ensure the quality for the users.
7	The project manager demands for a mobile app of the website since more and more people are using smartphones and that would bring much more profits and revenues for the store	Project scope	Low	Medium	This falls too far out of the scope of this project. One good way to approach this is to make it a separate project to be developed after this project has been finished and put online.
8	The project uses vanilla JavaScript to make a website. However, there is a new framework called ReactJS that would greatly reduce the development time and cost.	Technology	Medium	Medium	Migrate the developed part into a system that runs on the framework. The migration will take extra time and effort, but in the long run it would save much more time and cost than it costs.
9	Personnel from Human Resource has tried to prevent the employees from unionizing. This has caused an uproar among them, and they are striking, tremendously slowing the development	Resource	Low	Very High	The person responsible' s employment needs to be immediately terminated. Professionals on labor laws and negotiation need to be invited to ease down the tension between the company and the employees. A union should also be formed to meet the demand of the employees and incentivize them to continue working and completing current and future projects.
10	Project manager comes up with the idea of automatic playlist generation where the system would automatically create a playlist based on each user's listening activity and favorites songs and genres.	Project scope	Low	Low	Since this is not an essential part of an online music service, it can be left to develop after all the initial requirements have been met and the product is ready to be online. At that stage, such a feature can be

	This way the users can discover new music similar to what they already listen to and love				focused on to be developed as it involves Artificial Intelligence and Machine Learning, which is not a part of traditional websites.

III. Feasibility study

1. Purpose of conducting a feasibility study for the project.

Feasibility studies are critical for business growth. They may help a company decide where and how it will operate. They can also identify possible roadblocks to its operations and estimate the amount of capital required to get the firm up and operating. Feasibility studies seek marketing tactics that will persuade investors or banks that investing in a specific project or business is a sensible decision.

2. How the feasibility criteria apply to Tune Source

2.1. Technical feasibility

2.1.1. Familiarity with Application

The development team are well familiar with the application. In the past, they have developed five online stores for different clients such as Heliaboke, The Feebles, Delish Condish, and all run stably, quickly, and were able to pull in much more customers. Making the risk of this aspect Very Low.

2.1.2. Familiar with Technology

Since web-based technology is easy to use and adapt to, the risk for this is Low. The development team has worked with media streaming services in the past such as Tidal, Crunchyroll, and FUNimation. They have proved to be well familiar with the type of project that Tune Source is.

The staff who will interact with the software should already be acquainted to websites and the internet. They would have to go through training sessions to familiarize with the new system when it goes online.

2.1.3. Compatibility with the existing system:

This is low risk as the system implements Microsoft technology (ASP.Net) which is proven to be reliable and have not posed any challenges with compatibility. For example, ASP.Net can be used together with JavaScript, another website technology that is extremely widely used, unlocking many more potentials for the website development.

2.2.Economic feasibility

The system will be developed within a year with support from the developer for 5 years. The table below proves that the project is economically feasible.

	2022	2023	2024	2025	2026	2027	Total
Benefits							$ -
Increased sales from new customers		384,125	$460,950	$553,140	$663,768	$796,522	$2,858,505
Increased sales from existing customers		363,188	$435,825	$522,990	$627,588	$753,106	$2,702,696
Reduction in inventory		$80,000	$96,000	$115,200	$138,240	$165,888	$595,328
Reduction in staff		120,000	$144,000	$172,800	$207,360	$248,832	$892,992
Total Benefit		947,313	1,136,775	1,364,130	$1,636,956	$1,964,347	$7,049,521
After examining the current tangible value of the company with past projects as a reference, the system is projected to bring in nearly 1 million dollars in revenue in 1 year after the implementation and 7 million for the whole period where the system is supported by the development team.							
Development Costs							
Development team	$500,000	$ -	$ -	$ -	$ -	$ -	$500,000
Consultant	$30,000	$ -	$ -	$ -	$ -	$ -	$30,000
Hardware and software	$200,000	$ -	$ -	$ -	$ -	$ -	$200,000
Data conversion	$5,000	$ -	$ -	$ -	$ -	$ -	$5,000
Office and equipment	$100,000	$ -	$ -	$ -	$ -	$ -	$100,000
Development training	$5,000	$ -	$ -	$ -	$ -	$ -	$5,000
Total Development cost	$840,000	$ -	$ -	$ -	$ -	$ -	$840,000
This is the funding needed to develop a system for the store, as this is a one-time cost, it only occurs at the year in which it happens and does not for the rest of the project.							

Operational Costs							
Software upgrade		$3,000	$3,180	$3,371	$3,573	$3,787	$16,911
Software license		$1,500	$1,590	$1,685	$1,787	$1,894	$8,456
Hardware maintenance		$1,000	$1,060	$1,124	$1,191	$1,262	$5,637
Hardware upgrade		$1,000	$1,060	$1,124	$1,191	$1,262	$5,637
Staff training		$1,000	$1,060	$1,124	$1,191	$1,262	$5,637
Technicians		$60,000	$63,600	$67,416	$71,461	$75,749	$338,226
Administrator		$50,000	$53,000	$56,180	$59,551	$63,124	$281,855
Total operational cost		117,500	$124,550	$132,023	$139,944	$148,341	$662,358
This is the funding needed to keep the system running throughout the period after the development of the system. It only occurs after the development and implementation of the system.							
Total Cost	$840,000	$117,500	$124,550	$132,023	$139,944	$148,341	$1,502,358
Total Benefit - Cost	-$840,000	$829,813	$1,012,225	$1,232,107	$1,497,012	$1,816,006	$5,547,162
The first year is spent on developing the software, therefore the system is not online to make any revenue yet, making the money flow a negative value. After examining the current tangible value of the company with past projects as reference, the system is projected to bring in near 1 million dollars in revenue in 1 year after the implementation and 7 million for the whole period where the system is supported by the development team.							

2.2.1. Intangible Benefits

Implementing an online store would attract many more customers to Tune Source, increasing the reputation and market shares of the company.

- Reduce the number of staff number needed for a larger scale of operation.
- Reduce the amount of labor needed to make and process payment as the system is automated.
- Minimize human errors in record keeping.
- Is flexible for future expansion.

2.3.Organizational feasibility

- For the CEO and people in executive position, accurate reports on sales performance will be automatically generated every month or quarter, making the decision-making process more accurate and wiser.
- For the inventory managers, as the store migrates to online space, the logistics becomes less of a problem to them as the products will be purchased and listened to over the Internet, freeing them of stress and potential human errors.
- This project is highly significant for businesses because we will deliver these services to Tune Source as soon as feasible and will establish new services for Tune Source to reach clients as quickly as possible while causing no loss to Tune Source. And the marketing department sees this initiative as a strategic strategy since the capacity to sell digital music downloads is crucial to Tune Source's competitiveness in its sector. Tune Source's unique and hard-to-find music collection is a currently unused asset.

- Other stakeholders feel the project is extremely feasible since they have great expectations for it, believing that Tune Source will enhance revenues by allowing existing consumers to acquire digital music. Specifically, we hope to attract new clients who are interested in our unique repository of rare and hard-to-find music.
- Customers who subscribe to Tune Source's download services will provide them with a new cash stream, they hope. They anticipate an increase in bundle sales when clients who have downloaded one or two tracks from a CD opt to purchase the full CD in-store or through our website. Tune Source also anticipates increased revenue from the selling of music downloads and gift cards.

2.4. Feasibility conclusions

After considering all essential aspects, as well as the project's risk and viability. It is concluded that the viability of this project is exceptionally high. Technical feasibility, economic feasibility, and operational feasibility are all viable for Project Tune Source.

3. Alternative Solution

3.1. JavaScript

JavaScript is a scripting or programming language that allows you to implement complex features on web pages — whenever a web page does more than just sit there and display static information for you to look at — displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, and so on — JavaScript is almost certainly involved. It is the third tier in the layer cake of standard web technologies, the first two of which (HTML and CSS) have been explored in considerably more depth elsewhere in the Learning Area.

Because to the emergence of Node.js, JavaScript is now utilized for everything in today's modern landscape. Regardless of how you look at it, this technology creates strong software for businesses all around the world. Furthermore, firms such as LinkedIn and Medium use it to provide a platform for users to access their services.

JavaScript may be used to develop a variety of software, including games, computer programs, online applications, and even blockchain technology.

JavaScript, on the other hand, is undoubtedly the most used online programming language. Over 125,000 positions on LinkedIn, for example, are searching for working professionals with JavaScript abilities.

JavaScript operates on web visitors' machines even when they are not connected to the internet.

Without a server, JavaScript allows you to construct extremely responsive interfaces to improve user experience and provide dynamic features.

3.2. ASP.net

ASP.NET is a web development platform that includes a programming paradigm, extensive software infrastructure, and a variety of services for creating sophisticated online applications for PCs and mobile devices.

The HTTP protocol is used by ASP.NET to create bilateral communication and collaboration between the browser and the server.

The Microsoft.Net platform includes ASP.NET. ASP.NET applications are compiled code written in the.Net framework employing extendable and reusable components or objects. These scripts may make

advantage of the whole class hierarchy in the.Net framework. The following languages can be used to write ASP.NET application code: C#, Visual Basic.Net, Jscript, and J# are all examples of programming languages.

3.3. Alternative Matrix

		Alternative 1: JavaScript		Alternative 2: ASP.net web app	
Criteria	Weight	Score	Weighted score	Score	Weighted score
Economic					
Decreased hardware Cost	8	4	32	2	16
Decreased operational cost	7	4	28	3	21
Decreased maintenance cost	6	4	24	3	18
Decreased development cost	9	5	45	5	45
Saved cost of staff	7	5	35	5	35
			0		0
Technical			0		0
Shortening development time	5	3	15	2	10
Increased security on authorizing payments	10	4	40	5	50
Increased security on protecting customers information	10	4	40	4	40
Improved streaming quality for the users	7	4	28	4	28
Optimizing the file size for the songs on the system	4	3	12	5	20
Integration with third party payment system	10	5	50	3	30
			0		0
Organizational			0		0
More effective accounting due to accurate financial reports generated automatically	7	3	21	5	35
More insightful decision from automated data reporting	5	3	15	5	25
Decreased human error as the system is automated and online	5	4	20	4	20
Total	100		349		313

IV. Conclusion

In conclusion, this report has discussed many aspects of the Tune Source's website development, including the SDLC model chosen for the project, feasibility studies, risk management, and alternative solution to develop the software. Overall, the analysis proves that the development is perfectly feasible and viable in many aspects. The SDLC model chosen is user-centric, making it flexible to changes and pleasurable to the stakeholders. The technologies used would be ASP.Net with combination of JavaScript

should the team feel necessary. After the feasibility studies was done on the project, it is concluded that the project is perfectly feasible to develop.

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