Zenith Healthcare is a new company in the market and has launched its product two years ago. The product is loved by clients and is growing in popularity.  The level of product demand was not anticipated, and the current system architecture cannot support the rising demand. To support the anticipated demand, the company needs to **re-architect the system** and **provide the exact same functionality**.  Thus, **the requirements from the client perspective are very well known and do not need to change**.  **What needs to be changed in the system** to support the growing demand **is also well understood**.  The product has 4, fairly independent components.  All 4 components need to be re-architected.  Out of the 4, one of them has caused the most pain and the organization could benefit greatly if that component could be replaced first with a new, highly scalable architecture. The work of migrating to a new platform is a tedious job and the deployment of a new system will involve a lot of external communication, managing customer expectations, etc.

The technical architect and one project manager will be working from the corporate headquarters in Germany, but most of the team who will be doing the coding for the migration will be offshore in Belarus. The testing team will also be in Belarus.

**QUESTION 1**

What software development methodology would you suggest for this situation and why?

Step 1: Start analyzing the scenario by **identifying the characteristics of this situation** and **specify the logic behind the selection of characteristics**.

For example, you may identify "User Needs Unknown" as a characteristic based on statement X, Y, and Z in the scenario.

Step 2: Select a model that best fits the characteristics you identified in step 1. Justify your choice by providing by the logic behind your selection.

For example, you may say that since the scenario has characteristics X and Y, models A and B are potential candidates. Additionally, since the scenario has characteristic Z, model A is the best option.

**ANSWER: v0 v5**

**Characteristics:**

+ **Well known requirement/ user needs** - *"...with the exact same functionality. Thus, the requirements from client perspective are very well known and do not need to change"*

+ **Known Solution -** *"What needs to be changed in the system to support the growing demand is also well understood"*

+ **Benefit in deploying part of the product** - *"Out of the 4, one of them has caused the most pain and organization could benefit greatly if that component could be replaced first with a new, highly scalable architecture."*

+ Predictive situation

+ Low-risk level

**Select a model**

The right model: the Incremental Model

The right variation of it: the most basic incremental model -- all phases are completed in each increment. This allows us to replace the most pain-inducing component as fast as we can.

The right logic behind the selection: "Out of the 4, one of them has caused the most pain and the organization could benefit greatly if that component could be replaced first with a new, highly scalable architecture."

**V1**

The situation involves a 2 year old product that needs new architecture to handle growing demand. The **client needs are well known** as the system must perform the exact functions. The best design model for this scenario is **the Incremental Model** where the **Requirements and Design are done upfront and each branch afterwards will follow the Waterfall Model**. These designs work best with low-risk, predictive situations. Since the system is performing the same exact needs, the Requirements and Design will be consistent

**V5**

Based on the information in the situation which has been assigned to me above, I would like to recommend the project manager should apply iterative and incremental approach to develop the software. There are some reasons why I recommended that:

1.  Because the current system architecture cannot support the rising demand of the product which is loved by clients and is growing in popularity, it’s needed to be rearchitect but still provide the same functionality. It means that **the requirements from client perspective are really well known** and they don’t need to change, and the **change requirement to support the growing demand is clearly understood.** With that information, a **predictive model is suitable** for the situation. Some of them are Waterfall, VModel, Incremental, Iterative, Incremental and Iterative, and etc.

2. The product has been launched 2 years ago, it is working and to keep the growth of the product, Zenith Healthcare must cover the **problem of growing support fast enough to prevent losing of market shares**. Therefore, **Waterfall model and V-Model are not suitable**. The others are more appropriate than them.

3. The product has 4, faily independent components, and all of them need to be rearchitected, so we can organize the development team so that we can develop 4 of them in parallel. Moreover, out of the 4, one of them has caused the most pain and the organization could benefit greatly if the component could be replaced with a new, highly scalable architecture. Thus, we can set the priority to re-architect for the component earlier than others after rearchitecting for the whole system.

4. The technical architect and project manager work from the corporate headquater in Germany, but most of the team who will do the coding for the migration will be in Belarus. The testing team will also be in Belarus. It means that they are working in distributed model, hence, **they need a formal way to communicate with each other e.g. with documents**. On the other hand, The work of migration is a tedious job and the deployment of a new system will involve a lot of external communication, managing customer expectation, etc. Thus, we need a more interactive approach and rich communication including documents in development life-cycle.

**V7**

Based on the information provided, the project of Zenith Healthcare has following characteristics:

1. **Well known requirements** for 3 out 4 components - the project is just to re-architect the existing components and the functionalities of existing system are well accepted by clients.

2. **Experienced development team** - the team developed the existing system

3. **Components are relatively independent**

4. One out of four components is the pain point of existing business process and company can be benefited from the replacement of this component as early as possible.

5. **Involvement and feedback from clients are required** for re-engineering the problematic component so as to reduce the risk and ensure the new version can fulfill users' requirements and demand.

6. The rest of components is relatively stable

Summary the above points, the handling of the defected component should be distinct from other components due to its high risk, urgency and unclear requirement.

Incremental model is a ideal model adopted for this project. Each components is deemed as the independent increment in the project. Each increment can be applied with different development models. **For details, spiral model is applied to the defected component so as to incorporate involvement and feedback from clients** in the development to ensure the new version can be truly validated by user and can process with the increasing demand. Waterfall model will apply to the rest components to save the resources for the reengineering of the defected component The increment can be implemented at different point of time. The increment of defected component can be started first so that the team have more time and resource to polish this component with a hope to launching new version as earliest convenience.   starts at different time so that the development can develop the defected component first and then the rest components with a hope of  early tackling the pain points from the defected component.

**QUESTION 2**

Imagine that you were the lead or project manager for this project. For the selected model, take us through a simulated/fictitious journey on how this project will be completed all the way from defining requirements to deployment. You are free to make up characters as you feel appropriate to fit your story. Please watch the video on "Applying Software Development Models" to get an idea. The video stays at a high level, but you can go into further detail as you feel necessary. In your story, please make sure to talk about artifacts and practices followed by the team on this project

**RUBRIC**

the story supports the model selected

The story was very detailed and complete (covers all artifacts and ceremonies of the model selected)

**ANSWER:**

**V1**

The PM and Architect will deploy the Incremental Model with **the Requirements and Design are done upfront.** After this is deployed to our remote team**, each team can work on the 4 components of the system simultaneously in seperate incremental branches** and be launched when ready to meet rising demand. **Testing can be done individually since each component functions relatively independent**. The 1 component that requires replacement can be worked on first to allot for time testing while the other components are much more predictive and can be relaunched. This design will allow for development of multiple parts at one time since there is a **high demand and will result in a faster development time**.

**V5**

By apply iterative and incremental development model, at the beginning, the project team will perform requirement analysis activity first to create requirement document and a meeting to get agreement on the requirement document will be hold before moving to re-architect activity. After rearchitecting the whole system, architect and development team will work on re-architecting the most pain component first, then re-architect three other components in parallel. Then the team will develop and test those components simultaneously. When each component is completed, it will be integrated and deploy into the system immediately. Integration test activity will be performed each time a component is integrated into the system. After all components were integrated completely, the Testing team in Belarus will do the system test for the whole system. After that, the system will be tested at the site of project manager and architect with some client representatives as an alpha acceptance testing. At last step of development process, the system will be tested at clients' site in a beta acceptance testing phase in a duration of several months.

**V7**

In my imagination, the project team will initiate the requirement workshop with clients for the new version of the system. The team can compile specifications, architecture design and overall component design.

Then the team can initiate the first increment which is the component with most pain points with spiral model. This is a iterative process that the team first define the objectives of re-architect for this component, then identify the risk and solution, develop the prototype and then review with clients what to do next iteration. In each loop, the team can receive feedback from clients and refine the new component to ensure the final version and make sure that the process is on the right track. The loop is stopped until the team and clients think the new version is good enough to launch. With spiral model, the risks can be deviated and the new version of component can be verified and validated by the client to solve the existing pain points.

With the progress of implementing new version component to replace the old defected one, the team can initiate other increments with waterfall model. The waterfall approach is pretty straight forward. The team and clients goes through requirement, design, implementation, testing and deployment. The gate may be set in between each phase to let every stakeholder to review if everything in precedent phase is on track.

**QUESTION 3**

Assume that you are the quality lead or technical lead on this project. What kind of testing would you suggest the team to do? Be sure to justify your answer. To answer this question, first, list down the key things from the use case above that are really important. For e.g. scalability, performance, usability, integration between components, etc. After that, identify what type of testing would you want the team to do to make sure that upgraded product is high quality and deployed defect free. Please refer to the "Testing and Verification" section in module 2. Also, please watch the following videos to learn about various types of testing methods:

<https://www.coursera.org/learn/software-processes/lecture/G30EZ/software-testing-perspectives>

**ANSWER**

**V1**

I would suggest a Validation Testing. Validation confirm that the software performs to the user's satisfaction and assure that the software system meets the user's need.

**V5**

As I describe above, the team should perform following testing levels:

+ Component Testing

+ Integration Testing

+ System Testing

+ Alpha Acceptance Testing

+ Beta Acceptance Testing

And the team must perform following type of testing:

1. Functional Testing - to make sure the efficiency and completeness of the functionality of the system.

2. Performance Testing - to make sure that the architecture of whole system and each components satisfies practical requirement.

3. Scalability Testing - to make sure that the organization could get the benefits from the popularity growth of the product.

4. Usability Testing - to make sure that users are able to learn and easy to use the system

**V7**

As incremental model is adopted, the increments start at different time. And incremental testing approach is also adopted. We first tested the first component which is supposed to be the new version of the original defected component. Then, we add more test cases to verify if the first component works well with later components step by step. A bottom up testing approach is also applicable as the components are relatively independent.

**QUESTION 4**

Continuing your role as a quality lead or technical lead for the project. Write a few examples of test cases or a descriptive narrative for what you expect the testing team to use when testing this product. Please refer to the "Testing and Verification" section in module 2. Feel free to make assumptions about the functionality of the system to come up with a scenario.

**V5**

Testing team should check following aspects:

1. Do the system have all of functionality as the previous version? Are they completed and efficient?

2. Is there any defects in those functionality?

3. Is the system able to scale up to meet the growth demand?

**V7**

For bottom up approach, the testing is expected to deliver the stub to test the individual components. Then the team can build the driver to test if the components work well with its adjacent components and so on until the driver combines all components