Problem Set:

You've been hired as an Agile Methods consultant by Driverless Cars, a new (fictitious) technology company that develops software to enable self-driving cars. The new software will allow cars to drive themselves without human intervention, including driving and parking while avoiding accidents with pedestrians and other vehicles.

Driverless Cars has asked you for a proposal describing the advantages and disadvantages of the following approaches for creating a new software module to parallel park cars without human assistance at slow speeds using a variety of sensors, cameras, and motors.

- Waterfall Method
- RUP
- Extreme Programming

You should assume that the project is starting from scratch and does not use any existing software.

In your submission, you must create a 2-3 page description of the problem along with the advantages and disadvantages of using each approach.

For each software development life cycle (SDLC), describe:

- The process, including the priorities of each approach
- Advantages of the SDLC for this problem
- Disadvantages of the SDLC for this problem

Submit your document.

Solution:

I. Waterfall Method

To begin, the Waterfall Process Model was created and put into action. A linear-sequential lifespan model is another term for it. A waterfall model has no gaps between phases since each step must be finished before going on. That is why it is known as the Waterfall model. The waterfall model defines the software development process as a series of successive occurrences. To put it another way, the development process cannot begin until the preceding stage has been accomplished before going on to the next." This waterfall model's stages do not overlap.

A. Advantages

Aside from departmentalization and control, waterfall development provides additional advantages, such as cheaper development costs. A deadline may be set for each stage of development, and a product can progress through the model phases of the development process one at a time. The life cycle of a project begins with conception and finishes with operation and maintenance. The development steps follow a precise timeline.

Here are few of main advantages of waterfall method:

1. Useful and understandable in its simplicity
2. The model's rigidity makes it easy to manage. Each phase has a set of deliverables and a review process that must be adhered to.
3. Phases are processed one at a time.
4. Ideal for smaller projects with clearly defined needs.
5. Intuitive, well-defined phases
6. Milestones are well-understood.
7. Tasks are easy to organize.
8. Processes and results are well-documented and well-understood

B. Disadvantages

The problem with using waterfall development is that it does not allow for much contemplation or reassessment time. It is quite tough to update something that was not documented or thought about during the idea stage of an application during the testing stage.

Here are few of major drawbacks of waterfall method:

1. No workable code has been created yet.
2. Uncertainty and danger.
3. This approach should not be used for complex or object-oriented projects.
4. It is not recommended for long-term initiatives that are projected to last several years.
5. This should not be used for projects with a moderate to high chance of requirements changing. As a result, this process paradigm is fraught with risk and uncertainty.
6. It's difficult to assess development within phases.
7. Cannot adjust to changing circumstances.
8. Changes in scope can lead to the collapse of a program.

II. Rational Unified Process (RUP)

It is a software development approach for object-oriented models that employs the Rational Unified Process (RUP). Other titles include the unified process model (UPM). Rational Corporation created and documented it using UML (Unified Modeling Language). IBM Rational Method Composer (RMC) provides this method. IBM can personalize unified processes.

The fundamental purpose of RUP is to provide high-quality software at a reasonable price and time. Any step of the life cycle can be repeated as many times as necessary to fulfill the major goals.

A. Advantages

This technique of working can handle changes in requirements, whether they occur from the client or the project itself. It emphasizes the significance of precise documentation. It is necessary to integrate throughout the software development process, particularly during the building phase.

B. Disadvantages

The problem of using waterfall development is that it does not allow for much contemplation or reassessment time. It is quite tough to update something that was not clearly documented or thought about during the idea stage of an application during the testing stage.

III. Extreme Programming

Extreme Programming (XP) is a software development style that focuses on increasing the flexibility and quality of software. Extreme programming is a software development process that is part of the agile methodology family. Small to medium-sized teams may generate high-quality software by adhering to XP's values, principles, and practices, to respond to changing and increasing needs. As a result, programmers can concentrate on code. Extreme Programming offers the benefit of lowering the likelihood of programming and project failure. XP makes certain that the customer gets exactly what they desire from the software. One of the benefits of Extreme Programming projects is their simplicity.

A. Advantages

The following software development difficulties can be handled as a result of Extreme Programming:

1. On-time delivery is ensured by schedule slippage and controlled development cycles.
2. Canceled projects, the emphasis focused on customer engagement fosters consumer openness and the prompt settlement of any future complaints.
3. Expenses incurred because of alterations Extensive and continuing testing guarantees that the modifications do not disrupt current functionality. A functioning system always gives enough time to adapt to changes to keep present processes running smoothly.
4. Defects in the manufacturing process and after delivery: Unit tests are prioritized to find and repair issues as quickly as feasible.
5. By engaging the consumer as a team member, constant contact and explanations are ensured.
6. Business changes are considered unavoidable and are always accommodated.
7. The extensive team cooperation that fosters excitement and goodwill reduces staff turnover. Team spirit is fostered by multidisciplinary integration.

B. Disadvantages

The problem of using waterfall development is that it does not allow for much contemplation or reassessment time. It is quite tough to update something that was not clearly documented or thought about during the idea stage of an application during the testing stage.

Here are few of major drawbacks of Extreme Programming:

1. There is a significant time investment involved, as well as a significant cost.
2. It is probable that similar defects will develop in the future as a result of poor defect documentation.
3. It may result in errors in the original code. If your programmers are geographically divided, it is not a good idea to utilize Windows Extreme Programming.