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# Introduction

When creating products in the software industry, teams employ various Software Development Life Cycles (SDLC) to produce high quality pieces of software. Each version of a SDLC has their own nuances and differences between them. It is up to the team to use and employ the most suitable SDLC for their respective product. In this essay I will compare the characteristics of the following SDLCs; Waterfall Model, Iterative Model, Spiral Model, V-Model, Big Bang Model, RAD Model, and the Software Prototype Model. The characteristics that I will discuss are the testing integration, customer involvement, nature of the processes steps and the ability to handle change.

# Testing Integration

Testing is a crucial part of the development of a product in the software industry. Testing will allow for errors, gaps, or missing requirements to be found. If a process integrates testing into its lifecycle it will be able to produce a product of greater quality than those that do not.

In the waterfall model, testing is integrated after the implementation stage and before the deployment stage. In this stage all the units developed during the implementation phase are tested thoroughly before deployment. The v-model varies slightly as it is an extension of the waterfall model and is based on the association of a testing phase for each corresponding development stage. This means that for every single phase in the development cycle, there is a directly associated testing phase. This ensures a maximum amount of quality. Both models described previously, vary greatly from the big bang model. Here, testing is not implemented at all, unless it is implemented under the user’s discretion. This model does not ensure that a product will come out with the greatest of quality.

Testing and debugging can be done easier if is done during smaller iterations. This is what the iterative model employs with testing being done after the design and development stage of each build. The spiral model is different as it is both iterative and systematic in nature. Here, testing is implemented during the third quadrant known as the construct or build stage.

With the agile model being agile in nature, testing is implemented frequently through the release iterations. This minimizes the risk of any major failures in the future. In the RAD model the overall testing time is reduce as the prototypes are independently tested during every iteration. However, the data flow and the interfaces between all the components need to be thoroughly tested with complete test coverage. Since most of the programming components have already been tested, it reduces the risk of any major issues. The difference in the software prototype phase is that testing takes place during the development of the product but there is no dedicated testing phase or stage.

# Customer Involvement

The involvement of the is necessary to achieve not only a quality product, but a product that meets all the requirements of the customer at hand. Therefore, the customer’s input should be retrieved at as much as possible in a development lifecycle.

In the agile model the customer has a great amount of customer interaction continuous customer interaction takes place throughout the development cycle. Customer interaction is vital in the agile methodology. This varies greatly in the waterfall model, where the customer is only involved at the tart of the process during the requirement and gathering stage. They are also involved near the end at the deployment and maintenance stages. The customer is not heavily in this process. In the v-model however the customer is only involved during the first phase, the business and requirement analysis stage. Even thought the customer is involved during this one stage, detailed and comprehensive communication is had with the customer to understand their expectations and fully.

In the Big Bang model, there is little to no customer involvement, due to it being sporadic and unpredictable in nature. This differs greatly from the iterative model whereby models are produced early which facilitates customer evaluation and feedback. The software prototyping model builds on this as it facilitates the team to understand the customer requirements at an early stage of development. Due to the rapid creation of prototypes, the customer can evaluate and give input on each iteration of the product. Similarly, the RAD model focuses on the gathering of customer requirements through workshops or focus groups, testing of prototypes and many other ways, so that they can obtain as much information from the customer. The spiral model is like the v model in the way it interacts with the customer. Here the customer is involved in two quadrants, the identification, and the evaluation stage, where the customer explains their requirements and evaluates the work of the team respectfully.

# Nature of The Processes Steps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ~~WATERFALL~~ | ~~V MODEL~~ | ~~ITERATIVE~~ | ~~SPIRAL~~ | BIG BANG | ~~AGILE~~ | RAD | ~~S. PROTOTYPE~~ |

Depending on the task or project at hand, a certain procedure would be needed to fully achieve the required goal. Some may benefit more than others, and all have their advantages and disadvantages that separate them.

The first nature of process is the sequential pattern. This means that one step, stage or phase must be completed before you can proceed to the next stage of the process. This is a highly disciplined model. The advantages are that it is simple to follow, and it enhances managerial control. The disadvantages are that it can be very time consuming and if a change needs to be made later in the life cycle, then the product development can become difficult and expensive to bring. The processes that employ this style of pattern are the waterfall and v-model.

The next nature of process is the iterative pattern. This is where the process does not start with a full specification of requirements. Instead, development begins by specifying and implementing just a small part of the software, which is then to be reviewed to identify further requirements. The advantages of this are that potential defects are spotted and dealt with early, functional prototypes are developed early, progress can easily be measured, and it is easy to change project scope unlike the sequential model. The processes that make use of this style of pattern are the iterative model, spiral model, and agile model.

Another process is the prototyping pattern. This refers to the building of software application prototypes which displays the functionality of the product under development, but may not actually hold the exact logic of the original software. The processes that make use of this style of pattern are the software prototype model and the agile model.

The RAD (Rapid Application Development) model is based on prototyping and iterative development with no specific planning involved. The process of writing the software itself involves the planning required for developing the product.

Some models, make use of an amalgamation of different process. The spiral model combines the idea of both the iterative development with the systematic, sequential pattern. It is a combination of iterative development process model and sequential linear development model. It allows incremental releases of the product or incremental refinement through each iteration around the spiral split into 4 quadrants. The agile method is combination of iterative and incremental process models with focus on process adaptability and customer satisfaction by rapid delivery of working software product. Agile Methods break the product into small incremental builds. These builds are provided in iterations. Each iteration typically lasts from about one to three weeks.

# Ability to Handle Change

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| WATERFALL | V MODEL | ITERATIVE | SPIRAL | BIG BANG | AGILE | RAD | S. PROTOTYPE |

In the development of a product, there is a myriad of possibilities and reasons for change during a lifecycle. This a natural occurrence when developing a product. Some products may be more at risk to change than others. Therefore, it is vital for the team to use a development cycle that will be best suited for the product at hand.

The waterfall model and the v model should not be used where the requirements are at a moderate to a high risk of changing. This is due to them being very sequential and disciplined in nature.

Not suitable for the projects where requirements are at a moderate to high risk of changing. So, risk and uncertainty are high with this process model.

Not suitable for the projects where requirements are at a moderate to high risk of changing. Once an application is in the testing stage, it is difficult to go back and change a functionality.

Although cost of change is lesser, but it is not very suitable for changing requirements.

Changing requirements can be accommodated.

Highly malleable to change

The process has a great ability to change due to the iterative nature of it and the customer involvement

Changing requirements can be accommodated

Changing requirements can be accommodated

# Conclusion