Software Development Process

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Abstract

In this short report, Software Development Process (SDP)-a coherent set of activities for software production is introduced. Besides, different process models and their strengths and weakness are elaborated. The report has been formatted, so whether or not you are currently a software project manager, actively working on a project team, or completely in the dark about this mysterious field, this report has something for you. There is so much more to know than this report is able to present, however, it gives a taste of the subject and a high-level view of core components.

Keywords: software, software development process, software process model, strengths, weakness

1 Introduction

Software Development Process is an essential tool. It enable you to develop software in a logical way, and reduce the amount of mistakes. Most importantly, it enables you to create better software solutions - more reli-able, scalable and efficient.We address the following concepts in this report:

- What is software Development Process?
- Why we need software processes?
- Understand the strengths and weakness of different models.
- Understand the way of choosing different process models for different project.

Software Development Process In software engineering, software development process is a splitting of software development work into distinct phases containing activities with the intent of better planning and management. It is often considered a subset of the systems development life cycle. The methodology may include the pre-definition of specific deliverables and artifacts that are created and completed by a project team to develop or maintain an application.

Common methodologies include waterfall, prototyping, iterative and incremental development, spiral development, rapid application development, extreme programming and various types of agile methodology as shown in Figure 1.

2 Waterfall Model

The model can be represented in the Figure1, The waterfall model is a sequential design process, used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of analysis, design, coding, testing, and maintenance. The waterfall model is also called classical life cycle: the next stage will not start until the previous stage is finished.

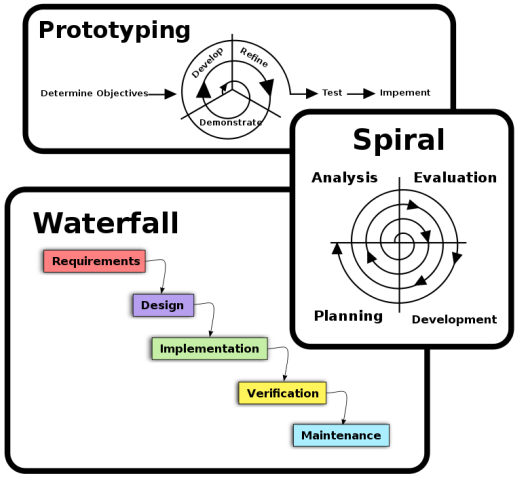

Figure 1: *Waterfall model, prototyping, and spiral development.*

- Analysis are corresponding to the Communication. The detail of the system are being established in this part.
- Design is corresponding to the planning. This stage designs the process to detail. It establishes overall system architecture. Software design involves identifying and describing the fundamental software system abstractions and their relationship.
- Implementation is corresponding to the modeling. During this stage, the software design is realized as a set of programs.
- Test is corresponding to the construction and deployment. Testing involves verifying that each part of the software meets its specification.
- Maintenance is corresponding to the deployment. The system is put into practice. The customers start to use the system, during this stage, some problems that not be found initially comes out. The software developers change some codes designed and of the system to keep the system work well.

This software process is linear model but includes lots of iterations. Software designer needs to finish the stages one by one, he must make every part finished and validated, which considers the following stages. Because of the cost of producing and approving documents are costly and involve significant rework.

Advantages of Waterfall Model

- It fits with other engineering process model.
- The waterfall model are that documentation is produced at each phase.

Disadvantages of Waterfall Model

- one-shot approach
- limited scope of iteration
- long cycle time
- not suitable for system of high uncertainty

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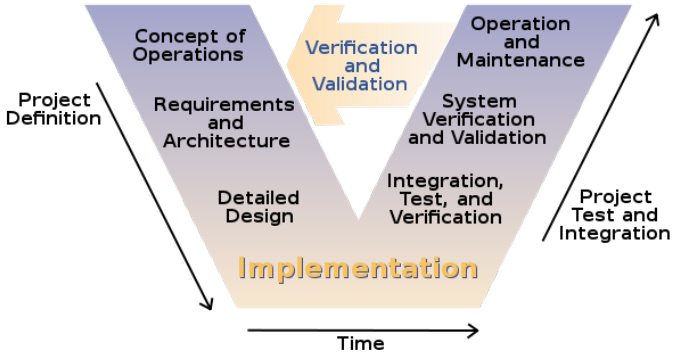
3 V Model

The V represents the sequence of steps in a project life cycle development. It describes the activities to be performed and the results that have to be produced during product development. The left side of the ”V” represents the decomposition of requirements, and creation of system specifications. The right side of the V represents integration of parts and their validation.



Advantages of V Model

- V -model is easy to understand and provides a great deal of structure.
- It is most suitable when requirements are stable and unchanging and when potential problems can be reasonably predicted.
- The V -model presents verification and validation processes with more specificity than does the Waterfall model.

Disadvantages of V Model

- Same disadvantages as the Waterfall model.
- Like Waterfall does not allow enough flexibility and that projects can’t move forward at a satisfactory pace.
- Most companies that want to turn a profit don’t want to spend too much time and effort in the planning stage.
- Not only that but most software projects are complex and often change requirements or make enhancement requests throughout the development life cycle

4 Spiral Model

The spiral model is a risk-driven process model generator for software projects. Based on the unique risk patterns of a given project, the spiral model guides a team to adopt elements of one or more process models, such as incremental, waterfall, or evolutionary prototyping.

Advantages of Spiral Model

- Emphasis on alternative and constraints supports the reuse of exiting solutions
- Target testing by treating it as a risk, which has to be addressed.
- Maintenance is just another phase of the spiral model. It is treated in the same way as development.
- Estimated (budget and schedule) get more realistic as work progresses, because important issue are discovered earlier.
- It is more able to cope with the (nearly inevitable) changes that software development generally entails.
- Software engineers, who can get restless with protracted design processes, can start working on a project earlier.

Disadvantages of Spiral Model

- Only intended for internal projects (inside a company), because risk is assessed as the project is developed. Hardly suitable for contractual software development.
- Spiral model is risk driven. Therefore it requires knowledgeable staff.
- Suitable for only large scale software development. Does not make sense if the cost of risk analysis is a major part of the overall project cost.

5 Prototyping Model

The prototyping model begins with the requirements collection, developers and customers work together to define the goal of the software, marking the requirements that have been knewn and planning the district that needs to be defined more clearly. Then turns to the quick design, which concentrates on the parts which are visible to the customers like the input and output. Quick design contributes to the achievements of prototyping. Customers evaluate and put forward some related details to get a better prototyping.

Advantages of Prototyping Model

- Demonstration of the consistency and completeness of a specification
- Reduced need for documentation
- Reduced maintenance costs
- Feature constraint
- Production of expected results for testing real system

Disadvantages of Prototyping Model

- Users sometimes misunderstand the role of the prototype
- Lack of project standards possible
- Lack of control
- Additional expense
- Machine efficiency
- Close proximity of developers

6 Phased Development

Two approaches

- Incremental
- Iterative

Advantages of Phased Development

- Early feedback
- Less possible requirement changes
- Early benefits for users
- Improved cash flow
- Easier to control and manage
- Capture early market
- Facilitate early training
- Can be temporarily abandoned
- Increase job satisfaction

Disadvantages of Phased Development

- Software breakage
- Reduced productivity

6.1 Incremental

The incremental model combines the basic elements and the iteration characteristic of the prototyping model, it adopts the linear sequence

along the time, each linear sequence produces increments of the software. When the incremental model is used, the first increment implement the basic function, but other functions have not been added, customers evaluation of each increment will influence the next increments characteristic and function[Sommerville2006].

Advantages of Incremental Model

- The concept of the increment package is introduced, without requirements are fully supplied. The development can be implemented only if one increment package is out.
- No need to much human resources for the project in the initial development stage. If the core product is accepted by the customers, more human resources can be put in. If the developers can implement the project before the deadline, the core can still be sent to the customers.
- The increment can manage the technical risk efficiently

Disadvantages of Incremental Model

- Each increment should deliver some system functions, which makes it difficult to map the customers requirements and give the increment of the right size

6.2 Iterative

Deliver full system in the beginning, then enhance functionality in new releases

7 Overview

Different process models have different strengths and weaknesses, base on the requirements of a project, suitable process model can be chose. Sometimes, a combination of different models may be a good option.

Waterfall Model: A reasonable approach when requirements are well defined

Incremental model : A good approach when a working core product is required quickly.

Prototyping model: A useful approach when a customer cannot define requirements clearly.

8 Conclusion

There are a number of different process models for software engineering purposed, each of models presents its advantages and disadvantages, but they all share the same common activities. Depending on the requirement characteristics of the project, different process models can be applied.

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