***Introduction:***

The Waterfall Model was the first model of a software development process which got it’s name because of how it cascades from one section to the next once the current phase has been completed. Waterfall Model has several stages which covers the four fundamental software engineering activities which are Specification, Development, Validation and Evolution. When a customer comes to the team with a project, the team first needs to research about what the customer wants, what budget they have and if there is a time constraint on the project. The team then needs to take what the customer wants and make sure the customer requirements are feasible for the time and budget given to the team and that the project itself is technically sound and not out of their reach. The team then needs to make sure their requirements are well defined before they can move on to the next stage. The team needs to make a System Analysis of the project and make sure there are no other existing projects similar to the one that they need to create, otherwise they would have competition in the market who are already established and there may be copyright restrictions depending on the project. During the system analysis phase they have to ensure that each requirement involved in the project is well defined and that there is no new requirements or requirements that may be subjected to change down the line. Upon completion of the system analysis, the team needs to begin designing the project. When the design phase is complete there should be a clear a plan for the code which needs to be implemented. When they begin developing the project the requirements that they specified earlier should be translated into the software and hardware involved in the project easier as the guidelines which need to be met should be clear and well defined prior to the beginning of the implementation. When the project is completed, the team may have to perform maintenance for a set period of time after the project has been completed. The team will be required to fix any errors that occur in the project and they may be required to update the software over time as the system may become slow or an external software or hardware involed may be updated which could require the project to need changes.

***Describe the advantages of using the traditional Waterfall Model of the Systems Development Life Cycle for new developments and amending existing systems?***

An advantage of the Waterfall Model is documentation. Each stage in the Waterfall Model provides documentation such as requirement analysis documents and documents regarding design and implementation. A well documented project allows some flexibility in case of a team member leaving or becoming ill, so that a new team member can step in and familiarise themselves with the project through studying the documents. Documentation also reduces the risk of human error, if each step of the process is outlined for the team the likelihood of an error is decreased. With larger amounts of documentation, organisation is key for the entire project to flourish and with good organisation the project’s potential can be maximised.

As every phase of the Waterfall Model is clearly defined and each requirement is determined prior to any of design and implementation of the project to begin, it makes the design and implementation easier for the team who are working on the project to complete their tasks as every task that is required for a phase to be completed should be clearly outlined prior to them beginning designing and implementing.

Another advantage of the Waterfall Model is that it flows from one phase to the next upon completion of the prior phase. This sequential progression allows the team members to understand each phase as there is no overlapping of phases and each phase is easily explainable thus making each phase of the project easier to comprehend.

***Describe the disadvantages of using the traditional Waterfall Model of the Systems Development Life Cycle for new developments and amending existing systems?***

A disadvantage of the Waterfall Model is that is requires a more complex management system as the project has more documentation than the likes of agile development, thus making organisation more difficult as each stage in the Waterfall Model provides documentation so a lack of organisation can cause confusion and disrupt the whole project, misplaced documentation or errors in the documents could cause a huge increase in time and cost of the project and if the error goes unnoticed it could jeopardise the whole project.

In the Waterfall Model the end goal of each product cannot be defined early on, which doesn’t gives the team members a clear goal to achieve. Without a clear end goal, the project is more likely to change over the course of each phase which can cause problems as the Waterfall Model has a sequential design thus making going back to a prior stage difficult. If the project requirements aren’t clearly defined in the early stages of the project, it can cause the whole project to suffer and increase the time and cost of the overall project drastically. As the Waterfall Model doesn’t allow the team members to be innovative during the project development, the Waterfall Model is better used for smaller project in which the project requirements are clearly defined and understood by each member of the team working on the project.

As the Waterfall Model doesn’t provide a clear end product until late into the project development it is difficult for a client to get accustomed with the system prior to the completion of the product, which can cause issues as the customer cannot see the progress of the project clearly which could cause the client to want to alter some of the requirements defined early on in the project. If the client’s view of the project is uncertain the projects overall result upon completion may suffer as the client may not see the project until it is completed if they request a certain aspect of the project to be changed or if an error occurs in the project it could cost the client more as a change in a certain part of the project could require everything from documentation to the code of the project to need changes which can cost a lot of money for the client and could take a large sum of time.

Another disadvantage of the Waterfall Model is that is it difficult to determine how much cost and time each phase of the Waterfall Model may take. As each phase of the process has to be clearly documented and the process has to be completed fully before the team can progress onto the next phase as the Waterfall Model doesn’t allow much flexibility, so if a phase is moved on from and a mistake is found later on down the line it can be highly difficult to revert back to a prior stage of the process. So caution must be used during each phase to ensure no phase has an error. Due to an unclear end goal, the product may appear viable on paper during the early phases but when the team begins designing and implementing the project, the time consumption for the project may increase drastically either because the team continues with what they currently have or they may have to revert their project back to an earlier phase such as the system analysis phase.