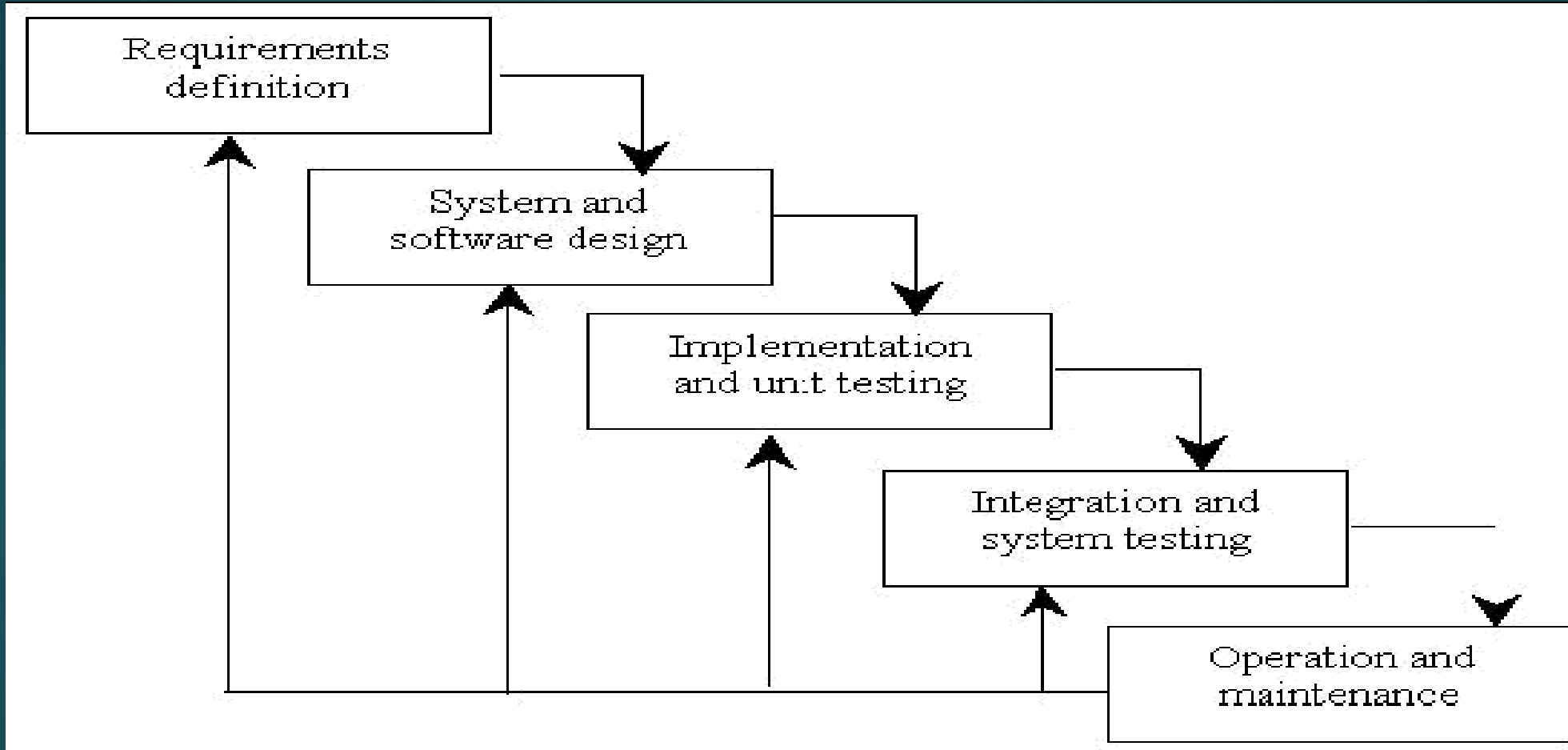WATERFALL MODEL
RAPID APPLICATION DEVELOPMENT
SPIRAL MODEL
V-PROCESS MODEL
PROTOTYPING

Waterfall Model

- Because of the cascade from one phase to another, this model is known as the waterfall model or software life cycle.

- very simple to understand and use

- each phase must be completed fully before the next phase can begin

- At the end of each phase, a review takes place to determine if the project is on the right path and whether or not to continue or discard the project.

- phases do not overlap

Waterfall Model Continued...

Advantages of Waterfall Model

▶ Waterfall model is simple to implement and also the amount of resources required for it are minimal.

▶ In this model, output is generated after each stage (as seen before), therefore it has high visibility. The client and project manager gets a feel that there is considerable progress. Here it is important to note that in any project psychological factors also play an important role.

▶ Project management, both at internal level and client's level, is easy again because of visible outputs after each phase. Deadlines can be set for the completion of each phase and evaluation can be done from time to time, to check if project is going as per milestones.

▶ This methodology is significantly better than the haphazard approach to develop software. It provides a template into which methods of analysis, design, coding, testing and maintenance can be placed.

▶ This methodology is preferred in projects where quality is more important as compared to schedule or cost.
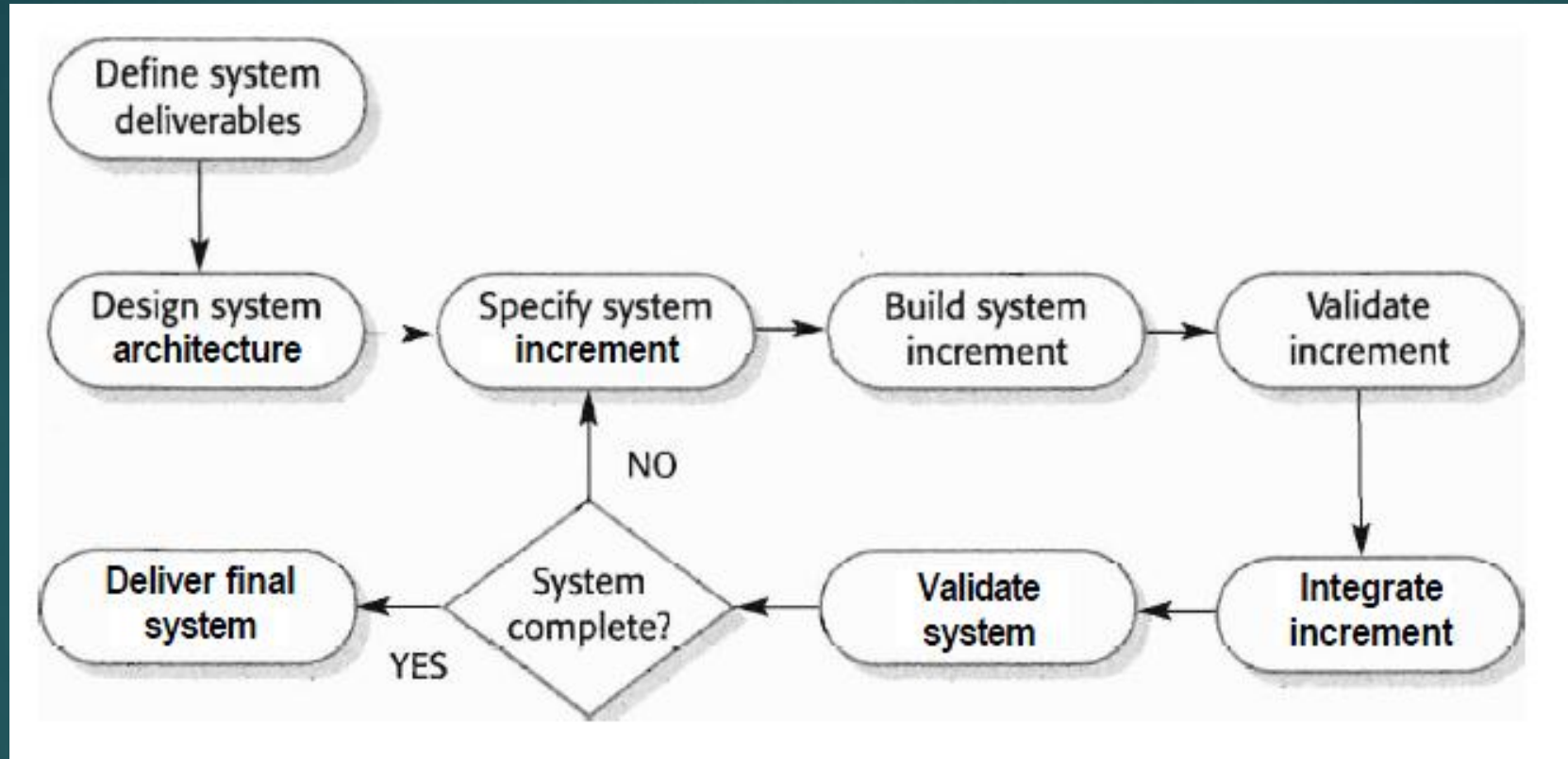
Disadvantages of Waterfall Model

▶ Real projects rarely follow the sequential flow and iterations in this model are handled indirectly. These changes can cause confusion as the project proceeds.

▶ It is often difficult to get customer requirements explicitly. Thus specifications can't be freeze. If that case arises baseline approach is followed, wherein output of one phase is carried forward to next phase. For example, even if SRS is not well defined and requirements can't be freeze, still design starts. Now if any changes are made in SRS then formal procedure is followed to put those changes in baseline document.

▶ In this model we freeze software and hardware. But as technology changes at a rapid pace, such freezing is not advisable especially in long-term projects.

▶ This method is especially bad in case client is not IT-literate as getting specifications from such a person is tough.

▶ Even a small change in any previous stage can cause big problem for subsequent phases as all phases are dependent on each-other.

▶ Going back a phase or two can be a costly affair.
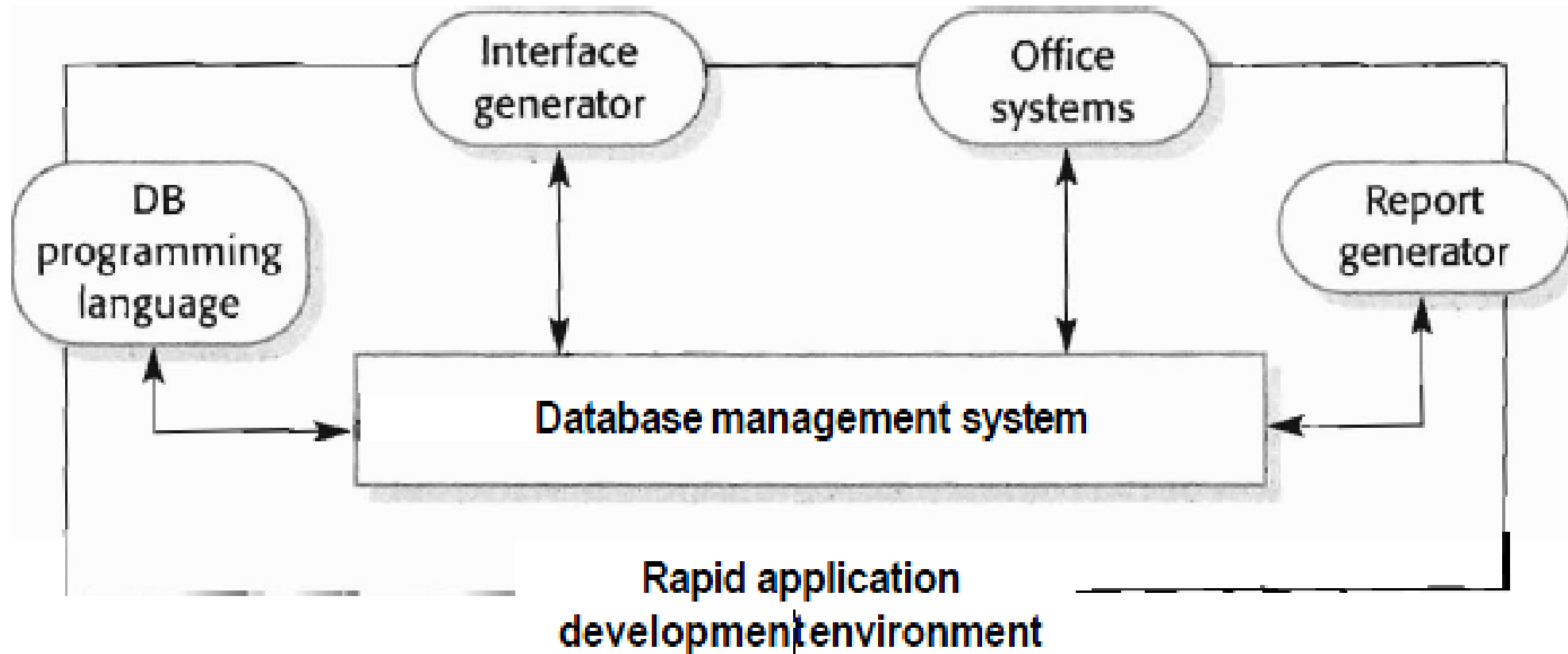
Rapid Application Development

- designed to produce useful software quickly

- they are iterative processes where specification, design, development and testing are interleaved

- The software is not developed and deployed in its entirety but in a series of increments, with each increment including new system functionality

Rapid Application Development

Rapid Application Development Environment

Interface generator

Office systems

DB programming language

Report generator

Database management system

Rapid application development environment

Advantages and Disadvantages of Rapid Application Development

Advantages

- a lot of application functionality can be implemented quickly at a very low cost.

- Users who are already familiar with the applications making up the system do not have to learn how to use new features.
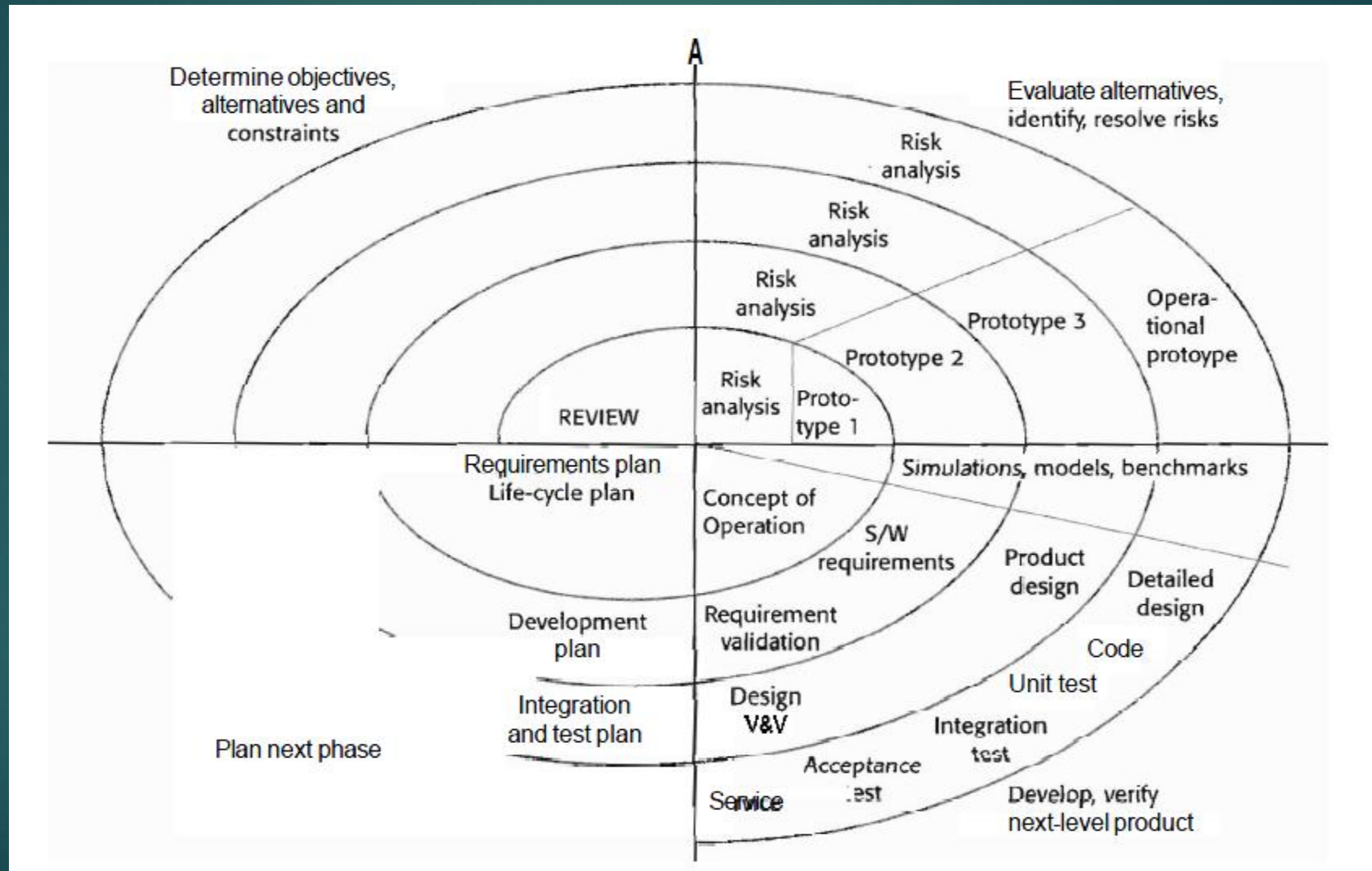
Disadvantages

- If users do not know how to use the applications, learning may be difficult, especially as they may be confused by application functionality that isn't necessary.

- There may also be performance problems with the application because of the need to switch from one application system to another.

- The switching overhead depends on the operating system support that is provided.

Spiral Model

- The development of the system spirals outwards from an initial outline through to the final developed system.

- Rather than represent the software process as a sequence of activities with some backtracking from one activity to another, the process is represented as a spiral.

- Each loop in the spiral represents a phase of the software process.

Spiral Model Continued…

Advantages and Disadvantages of Spiral Model

Advantages

- There is the explicit recognition of risk in the spiral model

- High amount of risk analysis hence, avoidance of Risk is enhanced.

- Good for large and mission-critical projects.

- Strong approval and documentation control.

- Additional Functionality can be added at a later date.

- Software is produced early in the software life cycle.

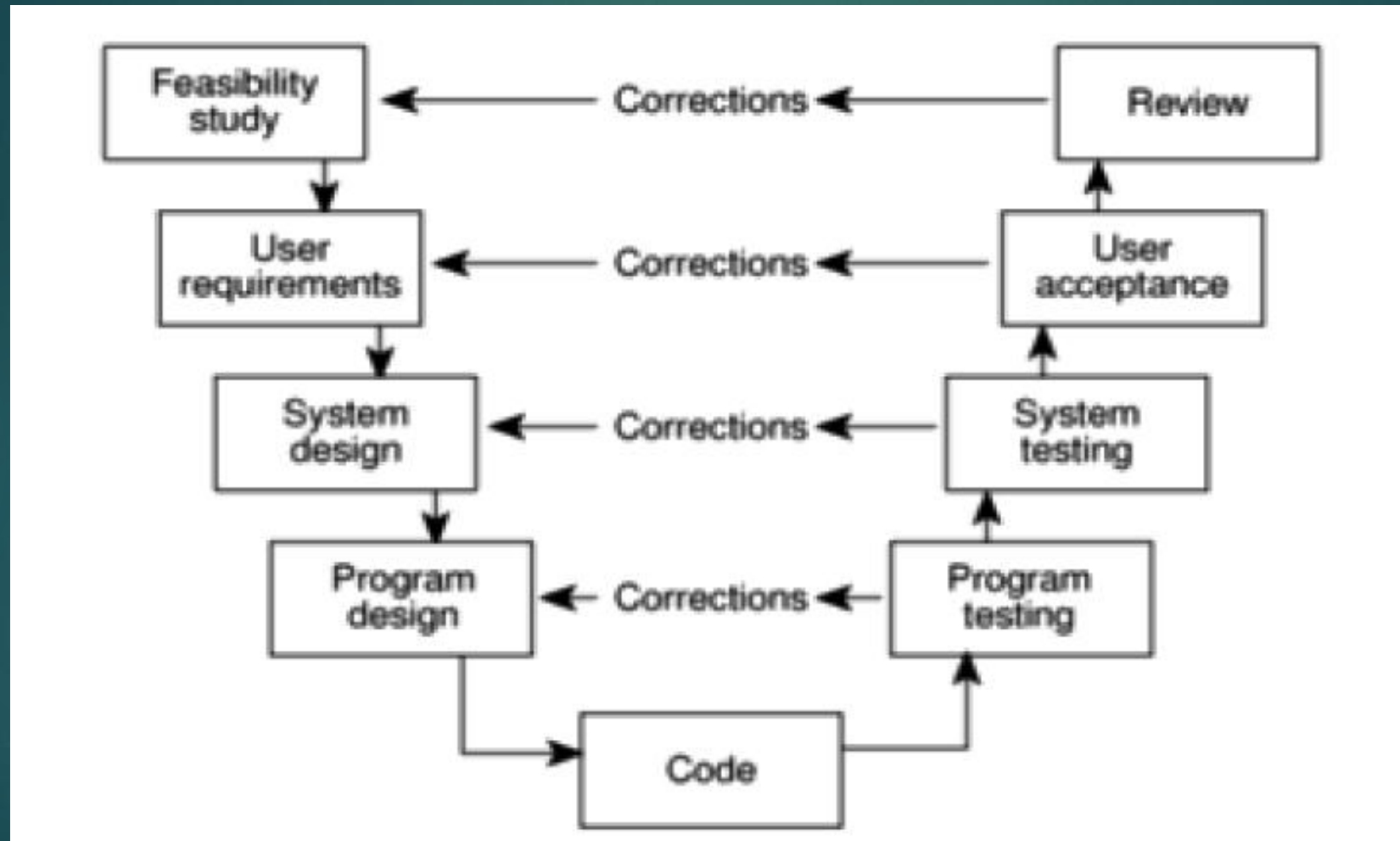## Disadvantages

- Requirements and design documents may not be passed from one company to another.

- Can be a costly model to use.

- Risk analysis requires highly specific expertise.

- Project's success is highly dependent on the risk analysis phase.

- Doesn't work well for smaller projects.

V – Process Model

- Collaboration of waterfall model and stresses the necessity of validation that match the activities for the project.

- Expanding the testing phase in waterfall model.

- Each step has a matching validation process that can, where defects are found, cause a loop back to the corresponding development stage and a reworking of the succeeding steps.

V – Process Model Continued…

Advantages and disadvantages of V-Process Model

Advantages

- More Testing phases, so accurate project is carried out.

- Simple and easy to use.

- Testing activities like planning, test designing happens well before coding. This saves a lot of time. Hence higher chance of success over the waterfall model.

- Proactive defect tracking – that is defects are found at early stage.

- Avoids the downward flow of the defects.

- Works well for small projects where requirements are easily understood.

Disadvantages

- The feeding back should only occur where a discrepancy has been found between what was specified by a particular activity and what was actually implemented.

- Very rigid and least flexible.

- Software is developed during the implementation phase, so no early prototypes of the software are produced.

- If any changes happen in midway, then the test documents along with requirement documents has to be updated.

Prototyping

- A prototype is an initial version of a software system that is used to demonstrate concepts, try out design options and, generally, to find out more about the problem and its possible solutions.

- **A** system prototype may be used while the system is being designed to carry out design experiments to check the feasibility of a proposed design.

- System prototypes allow users to see how well the system supports their work.

- They may get new ideas for requirements and find areas of strength and weakness in the software.

Prototyping Continued…
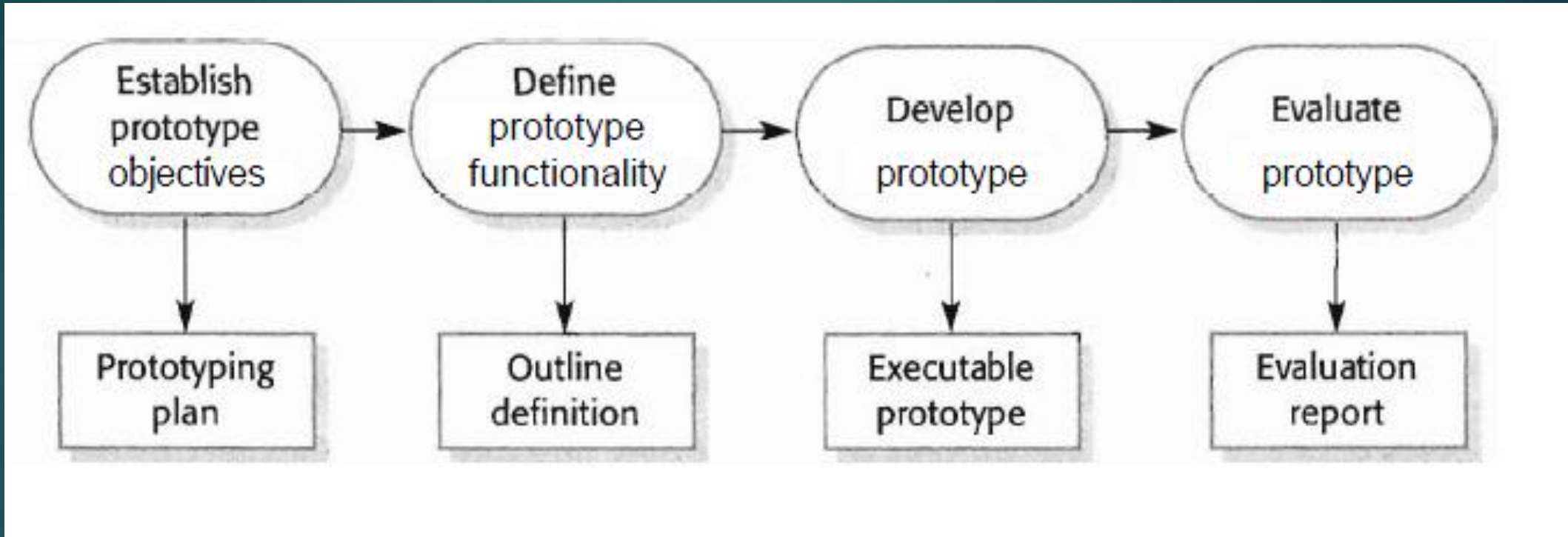
Advantages and Disadvantages of Prototyping

Advantages

► Improved system usability

► A closer match of the system to users' needs

► Improved design quality

► Improved maintainability

► Reduced development effort

Disadvantages

► the mode of use of the prototype may not correspond with how the final delivered system is used.

► The tester of the prototype may not be typical of system users.

► The training time during prototype evaluation may be insufficient.

► If the prototype is slow, the evaluators may adjust their way of working and avoid those system features that have slow response times.

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