

Chapter 5: Development, Implementation and Evaluation Phases

Answers to Review Your Knowledge Questions

1. What steps are necessary to complete the Development phase?

If the software is to be custom-built the programs are assigned to a programmer or team of programmers to be developed following the stages of the Program Development Life Cycle (PDLC) that are discussed in chapter 8.

Otherwise the software is purchased and modified if necessary.

Hardware is purchased.

Testing of individual components is performed using the test criteria from the design phase.

Testing of combined components is performed using the test criteria from the design phase.

2. What is project management?

Project management is a term used to describe the planning, organising, leading and keeping track of the development and implementation progress of an information system. Project management is divided into two areas.

1. Production and testing management.

The documents specifying the physical design of the system needs to be turned into reality in the form of working programs on a working machine. The hardware and software need to be purchased or developed and thoroughly tested.

2. Implementation management.

Once the system has been built and tested the old system needs to be decommissioned and the new one installed and commissioned, and this requires a conversion plan.

3. What are the benefits of project management?

When a project is carefully managed an information system is delivered that:

Works as designed;

Satisfies the goals of the organisation and

Is built on time and within budget.

4. Define the following project management terms:

Various tools are used in project management to assist in scheduling. The most frequently used tools in project management are Gantt and PERT charts. These charts use graphical means to represent the starting and finishing times of various aspects of the project, which tasks can be done simultaneously, the resources required, and most importantly the *dependency* of one task upon another. Task A is said to be 'dependent' upon Task B if Task A may not start until Task B has been completed.

a. Target dates

b. Milestone dates

At various points in the final project target, and progress milestone or decision dates will be defined.

Reviews of progress will be made at those times and decisions made about further progress, additional resource requirements, the need to reduce some of the functions proposed.

c. Critical path

The representation of the dependencies enables the highlighting of a critical path through the project. The critical path of a set of tasks represented in a Gantt or Pert chart is the one such that if the duration of any of the tasks along that path is increased, the completion date will be delayed by that increase. Thus the total duration of the project may be found by adding the times allocated for each task that lies on the critical path.

d. Slack time

Gantt charts highlight those parts of the project that have some slack time available. That is, the duration of the tasks that can be increased, or the start of those tasks delayed by a certain amount without causing a delay in the completion date for the project. Slack times can aid in getting around unplanned contingencies such as components not being developed or delivered on time.

5. Why are different teams of people involved in projects at different stages?

When creating a system, different teams of people will be involved in the project at different stages. A project plan should specify the nature, size and duration of use for each of these resource requirements. As the project progresses, people from the organisation will become part of the project team for a short time because of their expertise, or their areas of responsibility within the organisation. Planning for the hire of extra staff to ensure the completion of the project needs to be undertaken early.

Each team will also have responsibilities to report to the project leader and will be expected to complete a particular piece of the system. For example, one team may be working on programming a particular part of the project. Their responsibility would be to have that particular part completed on time so that it can be tested and then combined with other parts, produced by other teams, in time for integration testing and release to the customer.

Physical and human resources and requirements can be documented for each task in project management software.

6. Why should systems be tested?

Testing procedures need to focus first on the most critical parts of the project, to ensure that the main functionality of the system is available by the due date. Furthermore, time must be allocated in the project plan for fixing any problems that arise during final system testing. The assumption must be made that there will be problems found at the final test stage that have to be fixed. Experience shows that repairing problems which are discovered in the later parts of the testing require more effort and consume much more time than are usually estimated.

7. What does *handing over* the system mean and when does it occur?

Once testing has been completed the system needs to be handed over for day-to-day use by the organisation in the implementation phase. Before this is done another review is needed to check that the initial aims and objectives have been achieved and the full design has been implemented. As a result of the final review the organisation buying the system may insist that some more work needs to be done before they will formally accept the new system. After the formal acceptance the last payments for the system are usually finalised.

8. Why do systems need to be evaluated?

Once the system is up and running, an evaluation needs to be conducted after a period of time. If the evaluation highlights some problems they need to be fixed. Again the project manager will be involved in organising and supervising the remedying process.

9. When selecting local or overseas hardware suppliers, is it best to purchase from the cheapest supplier? Discuss.

Sometimes suppliers of hardware are overseas but an Australian version may be available; or a local company in a country town can supply the software rather than a large city company. Which should be chosen? The usual decision is to choose a local supplier because of related matters such as warranties, repairs or training that are easier to access from a local supplier. Other factors such as costs, reliability and expertise of the supplier can influence the decision not to purchase from a local supplier.

10. The establishment costs for an information system is usually much less than the ongoing costs of maintaining the new equipment. Do you agree with this statement? Discuss.

Studies have shown that the establishment costs for information systems are usually much less than the ongoing costs of maintaining new equipment. For the small home office, the cost of colour printer cartridges can far outweigh the cost of the original printer even in the first year of use. It may be cheaper in the long term to get a small laser printer for the majority of the in-house printing and outsource the colour printing.

The same situation can occur for medium sized businesses where the cost of the original equipment is small compared to the cost of employing technical staff. Leasing of equipment may become an option in this case rather than outright purchasing.

11. Why is it important to check the reliability of suppliers?

Since a business usually has a long-term relationship with their equipment suppliers the reliability of the supplier is a major factor.

12. What does the term *ergonomics* mean? Provide some examples.

Ergonomics is the branch of engineering science in which biological science is used to study the relation between workers and their environments. Some users have great difficulty with a track-pad or mouse-stick that can be found on a notebook computer. The size and clarity of notebook computer screens can be straining on the eyes, and the position of the keyboard can also be a problem. For these types of situations an external mouse, keyboard and screen may be necessary. The external components can come in the form of individual items or combined together in a docking station that can be expensive.

13. Describe the tests conducted to establish whether a component of a computer is robust.

The component needs to be tested in the following ways:

over a long time period

in the non-standard situation where it will be used

in unusual circumstances - electrical interruptions, in heat, in cold, in dirty and dusty places, etc.

14. Why would training requirements influence the choice of hardware or software purchased?

Most new hardware and software involves the training of users and technicians that can be very expensive, especially if it needs to take place in a location that is not close to the organisation. This factor may influence the choice of hardware and software to some extent but would not override the purchase if there were other major factors involved. However the combining of training with the company that supplies the components can be a benefit as often the training can take place onsite and be tailored to the exact requirements of the business.

15. What is a *conversion plan*?

When all the components of the system have been developed and tested the system now enters a period known as the conversion phase during which the changeover to the new system takes place. One recommended way to proceed with the implementation is to formulate a formal conversion plan. The timing and management of the conversion plan is organised by the project manager and his or her team.

16. What is the difference between?

a. Direct conversion

With this method of conversion there is a complete change over, in a very short period, from the old system to the new system. The change over is normally undertaken after a specified period of time to enable users to become comfortable with the new system as well as to transfer any information that might be necessary.

b. Parallel systems

Parallel Systems involves running both the old system and the new system side-by-side for a period. The advantage of this method is peace of mind and security. Where there are doubts about the new system, or

the integrity of data and the information produced is important, there may well be significant advantages in using this method. The main advantage is that the results of the new system are checked against those of the old system. There are significant disadvantages with respect to costs, as all procedures have to be performed twice.

c. Pilot approach

Where a new system involves drastic changes in an organisation or very new techniques are to be used it is sometimes advisable to implement a working version of the system, a pilot version, in one small department of the organisation before launching the application on the organisation as a whole. The pilot approach has a number of advantages. The ability to make changes to the new system as a consequence of trials in a real situation is very useful. Also the members of the organisation who participated in the pilot can be assets in the full implementation as sources of expertise that can be used in the training and solving problems.

d. Phase-in method

In a very large organisation it may be best to implement the new system through a phase-in method as it may not be possible or desirable to implement the new system at once in the whole organisation. The differences between the pilot and phase-in methods are that the former is used as an aid in the development of the application, whilst in the latter, the application is fully developed but takes time to completely install throughout the organisation due to organisational, economic and technical considerations.

17. When changing over the system how much impact should it have on the organisation?

The main consideration is that the organisation has the least amount of disturbance during, before and after the changeover.

18. Describe factors that affect the implementation of a system.

Factors that affect the implementation of a system are based on technical, economic and operational considerations.

The impact of changes to procedures in the organization on the efficiency and effectiveness of the organization.

The input or conversion of data from the old system to the new one takes time and this delay must be considered in planning the implementation.

The financial costs involved in the changeover can be significant so an organisation may decide to introduce the new system one section or branch at a time. A phased-in method may not be possible depending on the type of system and how dependent one part is on the other.

There are many effects on staff associated with implementing an information system. Benefits can be positive such as providing job enrichment. However there can also be negative effects on individuals in the organisation and customers who have to adapt to the changes.

One of the major issues with respect to the implementation of a new system is the training of staff and customers.

The type of hardware and software in the system may be a basis for deciding the type of changeover method. A large system may need to be phased-in while a small system might only require a direct changeover. The linking of a new part providing new functions to a legacy system can also influence the type of change over.

A successful changeover method would need to cater for any data and information security and access requirements. All passwords and other security arrangements need to be documented and in place before the system is put into service.

19. What does the term *depersonalisation of services* mean?

One negative side effect of introducing information systems is the depersonalisation of services. For example, automated telephone answering services allow the caller to make a selection from a menu of options read out. The caller chooses which option they want and hence may get through the entire phone call without actually speaking to a real person. Increasingly, bill paying over the telephone network eliminates the need to make contact with real people. Another example is the use of the Internet, where

bank customers can perform transactions without having to step into a bank. Despite some of the cost saving benefits this has on organisations, many customers still prefer dealing with other people on a day-to-day basis.

20. Why is the training of staff and customers necessary?

There are two main reasons training is important. The first and obvious reason is that users of the system need to learn how to perform the procedures that are part of the new system. The second reason is the necessity to build confidence in the system while overcoming any negative attitudes that might have formed about the new system.

21. What are the key elements in a training strategy?

Training needs to be conducted in a systematic manner. A training strategy needs to be developed that will most likely be put into place before the full implementation of the new system.

Who is to be trained

The type of training to take place

Who should conduct the training

The length of the training course

Where and when the training will take place

22. Why are there different types of user documentation and for whom are they created?

Technical Reference Manual - this document is created for technicians and describes how the system operates and also describes the specifications of the hardware and the software. Information is also provided on how to perform modifications to the system if the need arises. Other information contained would include details on how to maintain the system.

User Guide - a user guide is a non-technical guide to support the use of the system. It is a basic set of instructions. Instructions may include how to perform such functions as install the system, turn on the system, save files, and print reports, and generally how to navigate around the program.

User Manual - this manual contains more extensive details about the program than the user's guides.

Quick Start Guide - this is a non-technical guide that allows the user to get started on installing and using the program. This guide only provides very basic details on the most common features of the program and is often only one page.

Procedures Manual - a procedures manual illustrates the steps and procedures that must be followed when operating the system. It gives details of which tasks need to be performed, by whom and when.

Trouble-shooters Guide - this is a guide briefly describing how to deal with malfunctions of the system. It gives tips and hints on how to overcome problems that are to be performed before the technicians are called.

23. What are the four components to a disaster recovery plan?

The Emergency Plan - The Emergency plan, states the actions to be taken as soon as the disaster has happened. The plan would include the names and telephone numbers of people and emergency authorities (police and fire) to contact. Certain procedures need to be followed in relation to the computer equipment such as shutting down the computers. Employees will need to be evacuated and finally, a procedure that allows for re-entry into the facility.

The Backup Plan - The development of a system for making effective backups needs to have been developed for this plan to be effective. The appropriate people should be trained and the documentation detailing the exact procedures to be followed needs to be produced.

The Recovery Plan - The recovery plan specifies the operations that need to take place so that the system can be fully operational. There could be possibly two committees that would look after the situation. One committee could look after the software replacement and the second committee could be responsible for hardware replacement.

The Test Plan - The test plan is a dry run of the disaster recovery plan. It is a simulation of a disaster and is written so that tests on how the organisation would respond to the disaster can be conducted.

24. Describe the four types of software upgrades.

Slipstream upgrade - this is a relatively small upgrade to the software. It happens routinely and is often done without inconveniencing the users of the system.

Patch - a patch is a small change that corrects a problem. Patches are often used to rectify small bugs that may appear in a program. Anti-virus program manufacturers often release patches to their in-field installed code to detect and provide remedies for new viruses.

New Release - a new release improves on some parts of the software but it fundamentally operates the same as before. It will require minor alterations to user documentation, and also possibly involves more retraining.

New Version - the program is currently on the system, however a new version will upgrade the current version, because there are new functions and features that can be used.

25. What is a maintenance agreement?

Part of maintenance requires arrangements, maintenance agreements, which need to be made with the suppliers of the equipment - either software or hardware - to rectify future problems that may occur. As components come with warranties, this may not be considered to be of major significance, however as software and hardware slip out of warranty, it is advisable to make arrangements with the suppliers to come out and rectify the problems with the components.

26. What steps are involved in an evaluation?

An evaluation plan needs to be produced that specifies the following in detail:

The evaluation criteria to determine if the new information system is a success. The criteria come from the logical design and the physical design (especially the testing table);

The techniques and procedures for collecting data about each criterion.

These should include:

The actual questionnaire, survey or interview questions, and

Details of who, what, how, when and where the measurements are to be taken.

27. What types of criteria are used to evaluate the success of a new system?

The original aims and objectives of the system of the logical design;

The physical design specifications and the testing table;

Other factors that were taken into consideration in the design – economic, operational and technical factors and other individual and organisational factors such as:

Usability - The usability of the system refers to how easy it is to operate. If the system is not user-friendly, then perhaps some aspects of it will need to be modified. The new system needs to be easy to use and operate without much fuss.

Effectiveness - Effectiveness pertains to presentation, relevance, accuracy, comprehensiveness (or content) and overall quality. The output needs to suit the purpose and be in formats that follow the appropriate conventions. The information produced by the system needs to be accurate, and comprehensive with nothing omitted that is needed and no extra superfluous information.

Efficiency - Efficiency means cost, time and effort. Each part of the new system needs to have data collected about these three areas and be evaluated to determine any problems.

Costs - Economic costs associated with a new system need to be examined to determine whether the development and the operating costs are within budget.

Maintenance - Another significant factor in the new system's success is how often and for how long the system needs attention. The mean-time-between-failure (MTBF) is a common measure of the need for maintenance and the mean-time-to-repair (MTTR or down-time) gives a measure of the ease of repair of the system.

28. What is the difference between a *qualitative evaluation* and a *quantitative evaluation*? Provide an example for each.

Qualitative evaluation involves asking the managers, users and customers of their opinion of the system as a whole and any particular problems they have noticed. This can be done with interviews and questionnaires.

Quantitative evaluation involves measuring and recording facts and statistics about the performance of the system. Statistical survey data can also be collected from users and customers and analysed.

29. Why is it necessary to log equipment breakdowns?

The log information is kept on a database, which records the exact nature of the problem, the date/time of the problem and other important information pertinent to the problem and how it was solved. This log can be analysed to determine how often, for how long and why the equipment has been unreliable and caused down time.

30. Why does quality assurance testing take place?

Another technique used to evaluate the success of a system is to routinely and/or randomly select aspects of the system and test to see that they function correctly. For example, one aspect of the system could be backing up of files. To test that this aspect of the system works, it would be imperative for the person to go through the backup tapes to make sure all the data was stored correctly.

It is virtually impossible to test all functions of the system in the evaluation phase, especially if the new system is rather large, therefore it is easy to randomly select a number of aspects and place those components through some testing to see how the system copes in various situations. Thorough testing should have taken place in the implementation phase of the SDLC, however testing in the implementation phase is a form of quality assurance check.

31. Why is it important to record user comments?

The users of the system are the people who have first-hand experience of the positive aspects and negative aspects of the new system. If many users experience similar problems or a pattern is occurring such as all the users state individually that the system is very slow and doesn't print out certain reports properly, then it becomes apparent that there is a problem with the new system. It is the recording and documenting of the users' comments that adds weight to the problems experienced. It would also be appropriate to receive some positive feedback about the new system as some of the good points of one part of the system could be implemented in another part.

32. What benefits can be derived from surveys, interviews and questionnaires?

A set of questions carefully compiled needs to be asked of the user to gain specific information. There needs to be a set of questions that are consistently asked of all users to elicit the same information from them. This will give an accurate picture of the state of the system within an organisation.

33. Why is it important to monitor staff reactions?

Negative staff reactions should be monitored and acted on quickly. The reactions could take the form of increased absenteeism, uncooperative behaviour, expressions of resentment and other feelings. A suggestion box could be used as well to get a record of positive and negative reactions.