FACTFILE:
GCE DIGITAL TECHNOLOGY

AS1 APPROACHES TO SYSTEMS DEVELOPMENT

Rewarding Learning

Implementation

Learning Outcomes

Students should be able to:

- describe the describe the purpose of system implementation;
- evaluate different changeover methods: parallel, direct, pilot and phased;
- describe the different types of documentation: user documentation and technical documentation, and explain how they are used;
- explain what is meant by data conversion;
- describe the purpose of system maintenance; and
- evaluate different forms of maintenance: corrective, adaptive and perfective

Content in Implementation Fact File

Students should be able to:

- ✔ Introduction – The purpose of implementation
- ✔ Evaluating changeover methods
- ✔ User and technical documentation
- ✔ Data Conversion
- ✔ Purpose of system maintenance
- ✔ Evaluating forms of maintenance
- ✔ Questions

Introduction–The purpose of implementation

The term implementation is used to describe the process of creating a working computer system based on the previously produced system design documentation. While the design might include systems diagrams, the creation of interface designs and specification of verification and validation techniques to be applied to data as it is being input; the implementation process refers to the process of putting the design elements into practice.

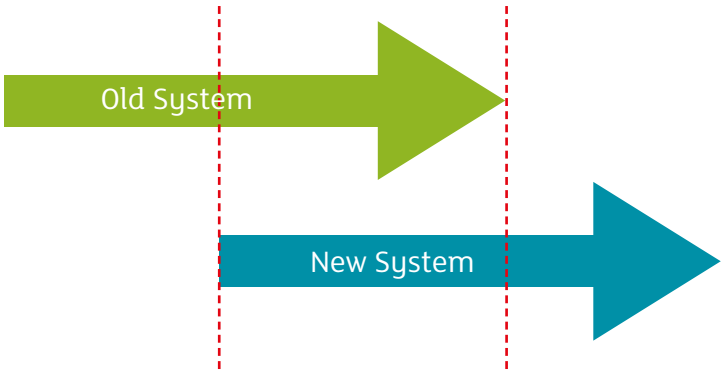
Following on from the design stage, implementation usually incorporates tasks such as determining the actual data structures to be used to store the data once it is input, specifying individual system modules and describing them in algorithmic form before actually creating the computer system and its associated elements.

Evaluating changeover methods

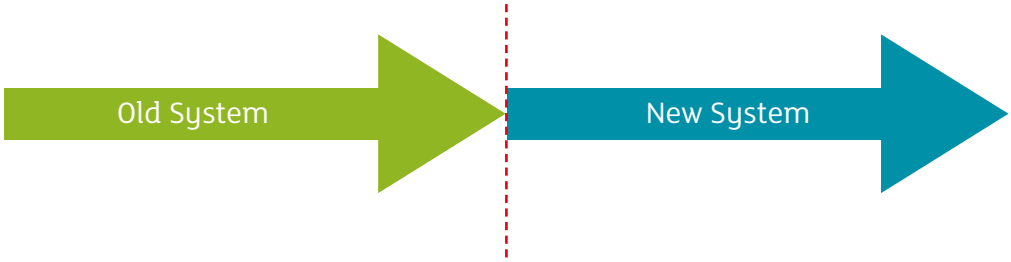
Following the design, implementation and testing of a new information system a changeover from the old to the new system must take place; this allows the information system to be tested in a real life scenario if necessary.

This process of changeover can be approached in a variety of ways depending on the size of the system and the nature of the data being processed. The methods of changeover include:–

parallel running – in this instance the old and new system will operate side by side for a short period of time.

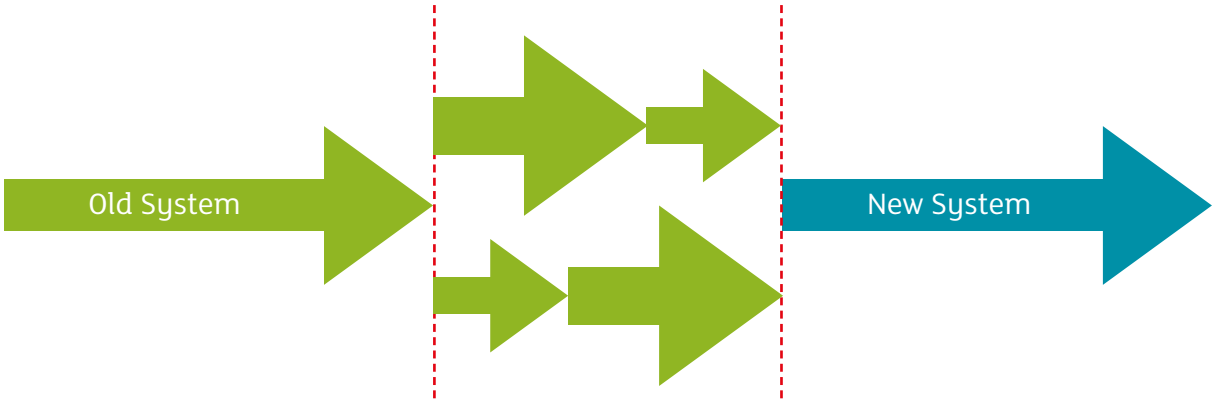


direct changeover – this method involves discontinuing use of the old system and immediately replacing it with the new system. There is no overlap between the old and new system.



phased implementation – in this instance some parts of the system will be replaced by the new system while the remainder of the system continues to operate using the old information system.
https://upload.wikimedia.org/wikipedia/commons/6/66/Phased_implementation.png

pilot running – similar in many ways to phased implementation, but only some data from the old system is processed by the new system. The new system will operate alongside the old system, but only processing part of the data.



Only some data from old system is processed in the new system

Method of changeover	Advantages	Disadvantages
parallel	Supports comparison of results of processing with the new system and the old. Old system is available as backup in event of new system failure.	Increases workload for staff as all items must be processed in duplicate
direct	The new system is up and running immediately, no additional costs associated with duplicate processing of data or dual systems operating.	No means of comparison of output between old and new system (however, in some cases this may be the only option available during the changeover process). No backup in event of failure of new system.
phased	Supports gradual installation of new system and staff training (allows time for end user to become familiar with the new system).	If system failure occurs in the transitioned phase no backup system is available to staff.
pilot	Data processed by the old and new system is available for comparison. Staff involved in the operation of the pilot system can help with the dissemination of training to other staff members.	Cannot test the efficiency of the system with larger quantities of data.

User and technical documentation

All systems will be provided with a series of documents used to support the planning and development and maintenance of the system in addition to supporting the end user as they use the system. Some of the documentation provided to support information systems include:–

User documentation
User documentation provides the user with all the information they need to support them in the successful use of a piece of hardware or software. It may not include a lot of technical detail as the users tend to be non-technical. The end user does not need to know how the system works only what it can do so therefore the user documentation will instead incorporate some of the following into the contents:–

- A table of contents and an index to support the location of appropriate instructional content
- Details relating to the minimum hardware and software specification needed to support the system
- Instructions on how to install the application (if appropriate)
- Instructions on how to start using and how to exit from the system
- Detailed instructions (normally with screen shots) on how to use the main features of the system
- Where appropriate it will include examples of input and output produced by the system
- Instructions will also incorporate explanations on any error messages provided by the system
- A trouble shooting section with details on how to resolve common errors

User documentation may be provided in a variety of formats, for example traditional hard copy, on line or it could be embedded into the actual application in multimedia format. More sophisticated user documentation systems such as those provided online or embedded into the application may provide the user with additional support in the form of tool-tips, video tutorials or even search facilities to support the user in the location of the instructional content appropriate to their needs.

Technical documentation
Technical documentation describes how the system works rather than what it actually does. While user documentation is written for the end user, technical documentation is written for the professional involved in the design, implementation, testing and eventual maintenance of the system.

Data Conversion

Data conversion is the process of converting or transferring data from the old system to the new system. For some systems this could mean the input of data from paper based records to electronic format for storage on a database system. In other cases it could mean the complete migration of an entire database from one application to another. The process will normally involve both software and human intervention and great care is needed to ensure all necessary data is converted correctly in the process.

Purpose of system maintenance

Systems maintenance forms an important part of the development process. System maintenance is the process of ensuring that the system continues to run smoothly following implementation. Maintenance is carried out regularly to ensure the system meets the changing requirements of the organisation, for example:–

- Addressing needs not previously identified (eg due to changes in circumstances) – corrective maintenance
- External factors have influenced the organisation (eg change in legislation) – adaptive maintenance
- Improvements can be made to the operation of the system (eg new hardware has become available which could improve the efficiency of operation) – perfective maintenance

Evaluating forms of maintenance

Corrective Maintenance
The production of a detailed list of requirements should help ensure that all of the user's needs are clearly identified and addressed during the system development process. Other issues may however arise following the development stage.

Despite this fact however some errors may arise only when the system is in operation for a period of time.

Corrective maintenance refers to any action taken following a system or a component failure after the software has been delivered to the end user. It is a reactionary response to errors or problems as they arise, as any kind of system breakdown or failure of a component can cost the organisation time and money in terms of repair costs, lost production and or lost sales.

Actions taken to remedy the problem might involve the developers issuing what is known as a "software patch" which can be installed by the end user to ensure the error can be corrected.

Adaptive Maintenance
This type of maintenance refers to any modification of a software product performed after delivery in response to changes in the environment within which the software is to be used or to meet changing user requirements. The dynamic nature of most working environments means that some form of adaptive maintenance is inevitable. The need for a high level of adaptive maintenance, early after the release of the package may however indicate that user requirements were not adequately defined from the outset.

Perfective Maintenance
Perfective maintenance refers to any amendment made to a software product, following initial delivery, to help improve the performance of the software. Perfective maintenance allows the system to further develop to incorporate changes demanded by the organisation. When carrying out perfective maintenance the developer can also take the opportunity to upgrade code, making it more efficient. As with adaptive maintenance, a high level of perfective maintenance at an early stage following package release may indicate that user requirements lacked sufficient detail.

Questions

1 A store uses a database to store information on customers and products. The store is introducing a loyalty card system and maintenance is being carried out on the database system to support this.

a. Name and describe the type of maintenance being carried out on the system [3]

b. Name and describe two additional types of software maintenance. [6]

2 Parallel running is often used during the changeover phase in system development.

a. Describe one advantage and one disadvantage of parallel running. [4]

b. Name and describe two additional methods of changeover. [6]

3 User and technical documentation are both available to support computer systems.

a. Describe how user documentation might be used to support a new user to a system who wishes to complete a task for the first time. [3]

b. What type of user might use the technical documentation and what information might it contain to help that user type. [3]

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4 The introduction of a new computer package may involve data conversion.

a. Explain what is meant by the term data conversion and describe what the data conversion process might involve for a typical business organisation. [3]

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Bibliography

BCS Academy Glossary Working Party, 2013, *BCS Glossary of Computing and ICT*, 13th Edition, Swindon, BCS Learning and Development Ltd