INFS 401
AUTOMATION OF INFORMATION SYSTEMS

Session 4 – **HISTORICAL OVERVIEW OF AUTOMATED INFORMATION SYSTEMS**

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Session Overview

Welcome to session 4, the historical overview of automated information systems. In this unit you will go through the various developmental phases of automated information systems to get a full understanding of how automation of information systems evolved. Five major factors have influenced the development, namely the environment, economics and co-operation, influence of consultants, international bodies and the computer revolution.

Session Outline

This session will discuss the following topics

- The Environment
- Economics and Co-operation
- The Influence of Consultants
- The Influence of the Computer Revolution
- Influence of International Bodies

OBJECTIVES

By the end of this unit you should be able to

- describe how the environment in the early days of computer application influenced the development of automation of information systems
- trace the origins of co-operation and networking that have re-shaped the way information centres strike alliances
- indicate how the computer revolution has also assisted in the expansion of automated information systems

Reading List

- Burton Paul and Peteric Howard (1991) **Information Management Technology. London: Chapman and Hall**
- Clayton Marlene (1992) **Managing Library Automation.** London: Ashgate
- Haag, Stephen (2002) **Management Information System for the Information Age.** N.Y: McGraw-Hill
- Kimber T. R. (1974) **Automation in Libraries** N. Y.: Pergamon Press
- Mayo, William E. (1991) **Introduction to Computing for Engineers.** Y.N.: Mc Graw-Hill
- O'Brien, James (2003) I**ntroduction to Information System** Boston: McGraw-Hill
- Rosenblatt, Snelly (2006) **Systems Analysis and Design** 6th ed. Boston: Thompson Course Technology
- Wright Keith (1993) **Computer-related technologies in Library Operations.** Gower

Topic One

THE ENVIRONMENT

INTRODUCTION

The first factor that impacted on the development of automation of information systems is the environment in which these systems find themselves. It is referred to as the experimental phase.

OBJECTIVES

By the end of this section you should be able to

- State how automation of information centres started
- indicate the types of computers that were used from the beginning
- discuss the storage mechanism for that period

Impact of the Environment on Automated Information Systems

The environment was characterised by the use of main frame computers. These main frames were mainly used in research centres, military and academic institutions.

Automation at that time was expensive because the main frame computers were expensive and the information centres could not afford them and had to borrow computer time from parent organisations. For example, academic libraries had to use the main frame computers of the academic institutions of which they were part.

Impact of the Environment on Automated Information Systems Cont'd

The storage mechanism was the tape device which was not ideal for information searches. Access to information on tape was slow and retrieval and processing were cumbersome.

The information centres that used the mainframe computers of their organisations did not have full control over their operations. The processing mode was the batch one which is not convenient for information retrieval. Information systems require on-line processing. Generally, this phase of the development of automated information centres was not successful due to the following reasons:

Impact of the Environment on Automated Information Systems Cont'd

- Computer technology was not adequate
- Information workers were not sufficiently definitive in their requirements of the computer-based system
- Information workers had a low understanding of computer application to information work.

Activity 1.1

How did the computer environment affect the development of automated information systems?

SUMMARY

Well done! The environment in which automated information systems developed has been explained. The main characteristics were the use of mainframe computers, the use of tapes as storage media and the reliance on batch processing to manage information.

TOPIC Two:

ECONOMICS AND CO-OPERATION

INTRODUCTION

In topic 1 you studied one of the factors that helped to develop automated information systems. Economics and co-operation constitute the second phase.

OBJECTIVES

By the end of this section you should be able to

- describe how that co-operation among information centres helped to spread automation of information systems
- state what information professionals call retrospective conversion
- discuss how that co-operation helped information professionals to make substantive economic gains

ECONOMICS

- Automation of information systems from the beginning was expensive therefore, there was the need for cost sharing as one single information centre could not automate its functions alone. Information centres started to co-operate with each other. Co-operation centred around sharing databases, cost of their creation and their accessibility. They therefore made substantial economic gains.
- They also co-operated in retrospective conversion (RECON). Retrospective conversion is about how to capture existing data in the information centre and to convert all the data elements into machine readable forms.

ECONOMICS CONT'D

- **RECON** proved to be a problem for small information centres, the process was expensive and time consuming. These small information centres had to co-operate with big centres in order to use their facilities. Co-operation became the norm. Co-operation required standardisation by adopting similar methods of data capturing, processing and storing and disseminating information.
- Standardisation gave rise to International Standard Book Numbers (ISBN) and International Standard Serial Numbers (ISSN).
- Machine readable catalogues (MARC) came into being and was used widely as a way of having fixed ways of capturing data. Many of the systems operated successfully as compared to the experimental phase because at that time, technology had improved and there was better communication between information professionals and computer personnel.

CO-OPERATION

In view of the many problems associated with the early automation of information systems, co-operation among the information centres became necessary. Many information centres established co-operative systems. The most outstanding and prominent co-operative venture was developed in the USA in 1967. This is the OCLC formerly the Ohio College Library Centre, and now the Online Computer Library Centre. Initially when it was established it was to serve librarians in Ohio only. It however rapidly expanded its services to libraries outside the State and by 1980 its services had reached Europe.

CO-OPERATION CONT'D

OCLC is now the biggest co-operative service in the world serving over 5,000 information centres. Other co-operative ventures that emerged were the Research Libraries Information Network (RLIN) and the Washington Library Network (WNL). In the UK there were some co-operative ventures. For example, there is JANET, the Joint Academic Network. This is a network linking university campuses and providing connections to networks worldwide. It provides connection facilities to electronic mail, file transfer, access to the British National Library and serves as a gateway to other international networks.

Activity 2.1

Establish why information centres co-operated with each other during the early days of automation of information system.

SUMMARY

This Section has introduced you to yet another factor that helped with the development of information systems. Economic gains were made as a result of co-operation among information centres.

TOPIC Three:

THE ACTIVITY OF CONSULTANTS

INTRODUCTION

In topic 2 you looked at the second factor that helped with the development of automated information systems. The activities of consultants also helped with the development of automated information systems and this section is about the influence of consultants on automation of information systems.

OBJECTIVES

By the end of this section you should be able to

- review how some consultants propagated the use of computers in information centres
- discuss how some consultants influenced the automation of information centres

Influence of Consultants on Automation of Information Centres

The work of consultants also had an effect on the automation of information systems. The consultants were mainly systems analysts, software publishers and some traditional librarians. Some professionals from the computer field such as systems analysts and computer vendors developed products and services tailored towards the needs of information centres. They urged many information centres to automate. Others adopted vigorous sales techniques to market their wares.

Influence of Consultants on Automation of Information Centres Cont'd

By so doing they managed to convince information centres which were not automated to do so though they hardly discussed the initial problems associated with computer-based systems, particularly, difficulties such as cost of conversion, the lack of knowledge of the information professionals requirements for computer systems.

Influence of Consultants on Automation of Information Centres Cont'd

Traditional librarians who had had experiences with computer-based systems also influenced the automation process. They used systems analysis and design methods to help information centres automate. They combined their understanding of the manual processes with their new knowledge in mechanisation to consult for information centres. Most of them did this as a post-retirement occupation.

Influence of Consultants on Automation of Information Centres Cont'd

The third consultants were software publishers who wrote special purpose computer programs and sold them to information centres that had not automated. By so doing they also helped the spread of automation of information centres.

Activity 3.1

Discuss the role of consultants in the development of automated information systems.

SUMMARY

The third factor that helped with the development of automated information systems is the influence of consultants, namely, traditional librarians, system analysts and software publishers.

TOPIC Four:

THE INFLUENCE OF THE COMPUTER REVOLUTION

INTRODUCTION

In Section 3 you were introduced to another factor that helped with the development of automation information systems. In this section the influence of the computer revolution on automated information systems is discussed.

OBJECTIVES

By the end of this section you should be able to

- trace the generations of computer development from the first through to the fifth generations
- identify the different hardware components that characterised the various generations of computer development
- evaluate the effect the computer revolution had on the development of automated information systems

THE EVOLUTION OF THE COMPUTER AGE CONT'D

Modern age of computers spans more than 50 years and is typically broken down into 5 generations. Each generation has been marked by a significant advance in technology. The generations are generally defined as follows:

THE EVOLUTION OF THE COMPUTER AGE CONT'D

Generation	Dates	Hardware
First	1951-1957	Vacuum tubes
Second	1958-1963	Transistors
Third	1964-1969	Integrated circuits
Fourth	1970-1990	Microprocessor (large scale integration)
Fifth	1991-2005 & beyond	Connectivity infrastructure

THE EVOLUTION OF THE COMPUTER AGE CONT'D

These different generations of computers provided the advantages and potential for the improvement of information systems as each generation brought about improvement in information processing. They became well adopted for:

- Text processing
- Preparation of local bibliographies and resource guides
- Improving on-line database searching.

With each generation cost decreased, performance improved, utilisation became easier and the computer industry continued its rapid growth.

THE EVOLUTION OF THE COMPUTER AGE CONT'D

The first generation 1951-1957

- During the first generation, computers used vacuum tubes. The first ones were the electronic digital computers called UNIVAC which were introduced by Dr. John W. Mauchly and Prosper Ekert Jnr. The IBM 650 was also invented and between 1951-1953 IBM sold 1000 of them.
- In 1952 Dr. Grace Hopper introduced the A6 compiler (software that converts high level language into instructions that computer can execute). 1957 saw the introduction of first high-level programming language - FORTRAN (formula translator). Vacuum tubes were unreliable and generated a lot of heat.

THE EVOLUTION OF THE COMPUTER AGE CONT'D

The second generation 1958-1963

- This generation began with the first computers built with transistors. Transistors are small devices that transfer electronic signals across a resistor. These new computers were faster, smaller and more reliable than the 1st generation machines. 1960 saw the introduction of first business application programming language-COBOL (Common Business Oriented Language) based on English-like phrases.
- In 1963 there was the introduction of the first computer industry standard character set ASCII (American Standard Code for Information Interchange) that enables computers to exchange information.

THE EVOLUTION OF THE COMPUTER AGE CONT'D

The third generation 1964-1969

- In 1964, computer manufacturers began replacing transistors with integrated circuits. An integrated circuit (IC) is a complete electronic circuit on a small chip made of silicon (one of the most abundant elements in the earth's crust).
- These computers were more reliable and were more compact than computers made with transistors and they cost less to manufacture. The first mini computers were introduced by Digital Equipment Corporation in 1965. In the same year BASIC programming language was introduced. In 1969 ARPANET was introduced and it also marked the beginning of the Internet.

THE EVOLUTION OF THE COMPUTER AGE CONT'D

Fourth generation 1970-1990

- Many key advances were made during this generation, the most significant being the microprocessor – a specialised chip developed for computer memory and logic. It involved the use of a single chip to create a smaller personal computer. This revolutionised the computer industry. These chips used large scale integration (LSI).

THE EVOLUTION OF THE COMPUTER AGE CONT'D

Fifth generation – age of connectivity 1991-2005 and beyond

- The present generation is referred to as the connected generation because of the industry's massive effort to increase the connectivity of computers. The rapidly expanding Internet, World Wide Web, and intranets have created an information super highway that has enabled both computer professionals and home computer users to communicate with others across the globe. Another development is the advances in artificial intelligence.

Activity 4.1

Describe how the computer revolution has impacted on the development of automated information systems.

SUMMARY

Computer revolution has been described according to the generations dating from 1951 to the present age. Each generation has been characterised by differences and improvement in hardware technology. Information professionals have computerised on the opportunities that these development have brought and have used those computers to gather, store, process and disseminate information

TOPIC Five:

THE INFLUENCE OF INTERNATIONAL ACTIVITIES

INTRODUCTION

The last factor that influenced the development of automated information systems are the activities of some international bodies as well as national efforts made by some advanced countries.

OBJECTIVES

By the end of this section you should be able to

- appreciate efforts made by the UK and USA towards the development of automated information systems
- know that some international bodies also assisted with the development of automated information systems

INTERNATIONAL ACTIVITIES

During the development of automation of information systems countries such as United States, France, UK, Russia, Canada, Belgium, Japan and Australia took it upon themselves to develop tools that facilitated the easy use of computers in information centres. Other international bodies such as IFLA (International Federation of Library Association, International Standards Organisation (ISO)) helped to advance the course of automation. Their activities were centred primarily on standardisation. For example IFLA assisted with the development of ISBD (The International Standard Bibliographic Description) for monographs and ISO published its standards for bibliographies.

INTERNATIONAL ACTIVITIES CONT'D

In the US, MARC formats were developed and a national programme for co-operation, communication and networking were also put in place. A Federal Library Committee linked all Library resources and made networking and resource sharing easier. In conjunction with OCLC, they connected databases with telecommunications systems that helped with co-operation.

INTERNATIONAL ACTIVITIES CONT'D

They also assisted in doing RECON and also set standards for MARC specifications. In the UK early computerisation of information systems failed in similar circumstances to the early days of automation in the 1960s. However, in 1973 there were some co-operative activities that helped the course. There were two projects that enhanced automation of information systems. These were Birmingham Libraries Co-operative Mechanisation Project (BLCMP) and South-Western Academic Libraries Co-operative Automation Project (SWALCAP).

Activity 5.1

What influence did international agencies such as IFLA have on the automation of information systems?

SUMMARY

The influence of some international bodies on the development of automation of information systems have been explained. The US and UK look on some co-operative roles that helped with the development.

ASSIGNMENT 2

Discuss the impact of the following on the development of automated information systems.

- The computer revolution
- The role of consultants
- International activities

UNIT SUMMARY

Well done! You have completed Unit 2 which has discussed how the automation of information systems evolved. Five main factors that helped with the development of automated information systems have been explained under; environment, economics and co-operation, activities of consultants, the influence of computer revolution and the influence of international bodies.

References

- Burton Paul and Peteric Howard (1991) **Information Management Technology. London: Chapman and Hall**
- Clayton Marlene (1992) **Managing Library Automation.** London: Ashgate
- Haag, Stephen (2002) **Management Information System for the Information Age.** N.Y: McGraw-Hill
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