

## Developing Information Systems for Business Intelligence Support

Ujam, E. C<sup>a\*</sup>, Ujam, A. J<sup>b</sup>, Idogwu, S<sup>c</sup>

<sup>a.</sup> Department of Science and Computer Education, Enugu State University of Science and Technology, ESUT, Enugu

<sup>b.</sup> Department of Mechanical Engineering, Nnamdi Azikiwe University, Awka.

<sup>c.</sup> Department of Mechanical & Production Engineering, ESUT, Enugu.

Corresponding Author: Ujam, E. C

---

**Abstract:** The purpose of this study is to develop an information system for decision makers, industries and organizations to support their business intelligence. In this work, an overview of different types of information system development, especially with respect to business intelligence is carried out. Many companies have adopted business intelligence (BI) tools and systems having understood the importance of enforcing achievements of the goals defined by their business strategies through business intelligence concept. The paper implores the functions and components of information system. Also the differences between information systems and computer, information system and information technology were analyzed. Information systems are multi faceted services that contribute to organizational decision making by providing information services in traditional sense, but also and more particularly by collecting and analyzing data from primary sources.

**Keywords:** Information System Development, Intelligence Support System, Business Intelligence and Information technology

---

Date of Submission: 02-03-2017

Date of acceptance: 25-08-2017

---

### I. Introduction

System development is the process of creating and maintaining information system including hardware, software, data, procedures and people.

It contains technical expertise with business knowledge and management skill.

A large category of information systems comprises those designed to; support the management of an organization. These systems rely on the data obtained by transaction, processing systems, as well as on data and information acquired outside the organization and provided by business partners, suppliers, and customers.

Information systems support all levels of management, from those in charge of short term schedules and budgets for small work groups to those concerned with long-term plans and budgets for the entire organization.

Management reporting systems provide routine, detailed and voluminous information reports specific to each manager's areas of responsibility. These systems are typically used by first level supervisors. Generally, such reports focus on past and present activities, rather than projecting future performance. To prevent information overload, reports may be automatically sent only under exceptional circumstances or at the specific request of a manager. Also the differences between inform systems and computer, information system and information technology will be discussed.

Business intelligence (BI) is a set of theories, methodologies, architectures, and technologies that transform raw data into meaningful and useful information for business purposes. BI can handle enormous amounts of unstructured data to help identify, develop and otherwise create new opportunities. BI in a simple word, makes interpreting voluminous data friendly. BI technologies provides historical current and predictive views of business operations. Common functions of business intelligence technologies are reporting online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics.

### II. Information System Development (ISD)

Information system (IS) is a system composed of people and computers that process or interpret information. The term is also sometimes used in more restricted sense or refer to only the software used to run a computerized database or refer to a computer system. Information systems are getting more and more multimedia based as well as network based. This evolution, as well as an increased rate of change, put new demands on methods and competencies required for developing future information systems.

An information system can briefly be defined as a system that manages information by: collection, manipulation, storage, transmission and display of information (Andersen, 1994). Also information system has been defined in terms of two perspectives: one relating to its function; the other relating to its structure. From a functional perspective, an information system is a technologically implemented medium for the purpose of recording, storing and disseminating linguistic expressions as well as for the supporting of inference making. From a structural perspective an information system consists of a collection of people, processes, data, models technology and partly formalized language, forming a cohesive structure which serves some organizational purpose or function. An information system can be defined technically as a set of interrelated components that collect or retrieve, process, store, and distribute information to support decision making and control in an organization.

In addition to supporting, decision making, coordination, and control information systems may also help managers and workers analyze problems, visualize complex subjects and create new products. The activities in an information system produce the information that organizations need to make decision, control operations, analyze problems, and create new products or services. These activities are input, processing, and output. Input captures or collects raw data from within the organization or from its external environment. Processing converts this raw input into a more meaningful form. Output transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require feedback, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

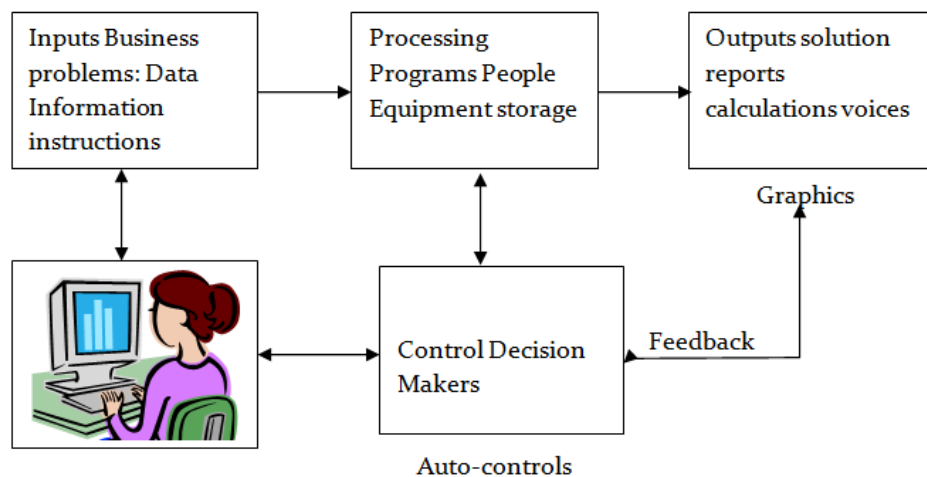


Figure 1: Functions of an information system

Information systems are a major corporate asset, with respect both to the benefits they provide and to their high costs. Therefore, organizations have to plan for long term when acquiring information system and services that will support business initiatives.

Executive information systems make a variety of critical information readily available in a highly summarized and convenient form, typically via a graphical digital dashboard. Senior managers characteristically empty many informal sources of information, however, so that formal computerized information systems are only of partial assistance.

Nevertheless, this assistance is important for the chief executive officer, senior and executive vice presidents, and the board of directors to monitor the performance of the company, assess the business environment, and develop strategic directions for the future. In particular, these executives need to compare their organizations performance with that of its competitors and investigate general economic trends in regions or countries. Often individualized and relying on multiple media formal, executive information systems give their users an opportunity to “drill down” from summary information to increasingly focused details. A system is a collection of related elements organized into a whole to perform a particular function and/or reaching a goal. Despite different definitions, the main characteristics of systems in our meaning are the fact that it is up to the observer of a system to view the system. Information systems comprise both formal and non-formal aspects. The non-formal aspects are primarily oriented towards phenomena and activities that are hard to formalize, such as social skills, experience and knowledge about different people’s reactions in different situations. In addition to this categorization, an information system can be divided into a computerized part and a non-computerized part. The computerized part of an information system consists according to Anderson (1994) mainly of those aspects of the system that can easily be formalized and by that are possible to automate.

This means that an information system is not a single and simple object, but has several components and stakeholders. The relation a stakeholder has to an information system depends on the view of interest at each time. In this work, we will relate to the information system concept as the computerized part of an information system.

### **COMPONENTS OF INFORMATION SYSTEMS**

1. Resources of people: (end users and IS specialists, system analyst, programmers, data administrators etc.).
2. Hardware: (Physical computer equipment and associate device, machines and media).
3. Software: (programs and procedure)
4. Data: (data and knowledge basis)
5. Networks: (Communications media and network supports)

#### **People Resources**

- End Users: (also called users or clients) are people who use an information system or the information it produces. They can be accountants, sales persons, engineers, clerks, customers, or managers. Most of us are information system end users.
- IS Specialists: People who actually develop and operate information systems. They include systems analysts, programmers, testers, computer operators, and other managerial, technical, and clerical IS personnel. Briefly, system analysts design information systems based on the information requirements of end users, programmers prepare computer programs based on the specifications of systems analysts, and computer operators operate large computer systems.

#### **Hardware Resources**

- Machines: as computers and other equipment along with all data media, objects on which data is recorded and saved.
- Computer systems; consist of variety of interconnected peripheral devices, examples are microcomputer systems, midrange computer systems and large computer systems.

#### **Software Resources**

Software Resources includes all sets of information processing instructions. This generic concept of software includes not only the programs, which direct and control computers but also the sets of information processing (procedures). Software resources include:

- System software, such as an operating system.
- Application software, which are programs that direct processing for a particular use of computers by end users.
- Procedures, which are operating instructions for the peoples, who will use an information system. Examples are instructions for filling out a paper form or using a particular software package.

#### **Data Resources**

Data resources include data (which is raw material of information systems) and database. Data can take many forms, including traditional alphanumeric data, composed of numbers and alphabetical and other characters that describe business transactions and other events, and entities. Text data, consisting of sentences and paragraphs used in written communication; image data, such as graphic shapes and figures, and audio data, the human voice and other sounds, are also important forms of data.

The data resources of IS are typically organized into:

- Processed and organized data- Database
- Knowledge in a variety of forms such as facts, rules and case examples about successful business practices.

#### **Network Resources**

Telecommunication networks like the internet, intranets and extranets have become essential to the successful operations of all types of organizations and their computer based information system. Telecommunication networks consist of computers, communications processors and other devices interconnected by communications media and controlled by communications software. The concept of networks resources emphasizes that communications networks are a fundamental resource component of all information systems.

### III. Difference Between Computer And Information Systems

Computers provide effective and efficient way of processing data, and they are necessary part of an information system. An IS however, involves much more than just computers. The successful application of an IS requires an understanding of the business and its environment that is supported by the IS. For example, to build an information system that supports transactions executed on the Nigerian stock exchange, it is necessary to understand the procedures related to buying and selling stocks, bonds, options, and so on, including irregular demands made on the systems, as well as all related government regulations. In learning about information systems, it is therefore not sufficient just to learn about computers. Computers are only part of a complex system that must be designed, operated and maintained. A public transportation system in a city provides an analogy. Buses are a necessary ingredient of the system, but more is needed.

### IV. Information Technology And Information Systems.

Information technology is broadly defined as the collection of computer systems used by an organization. Information technology in its narrow definition refers to the technological side of an information system. It includes the hardware, software, database, networks and other electronic devices. It can be viewed as a subsystem of an information system. Sometimes, though, the term information technology is also used interchangeably with information system. The term IT in its broadest sense is used to describe an organizations collection of information systems, their uses and the management that oversees them. Obviously, you will be more effective in your chosen career if you understand how successful information systems are built, used, and managed. Also, in many ways, having a comfort level with information technology will enable you, off the job and in your private life, to take advantage of new IT products and system as they are developed. Finally, it is necessary to be knowledgeable in information technology, since such knowledge can also increase employment opportunities. A though computerization eliminates some jobs, it also creates many more.

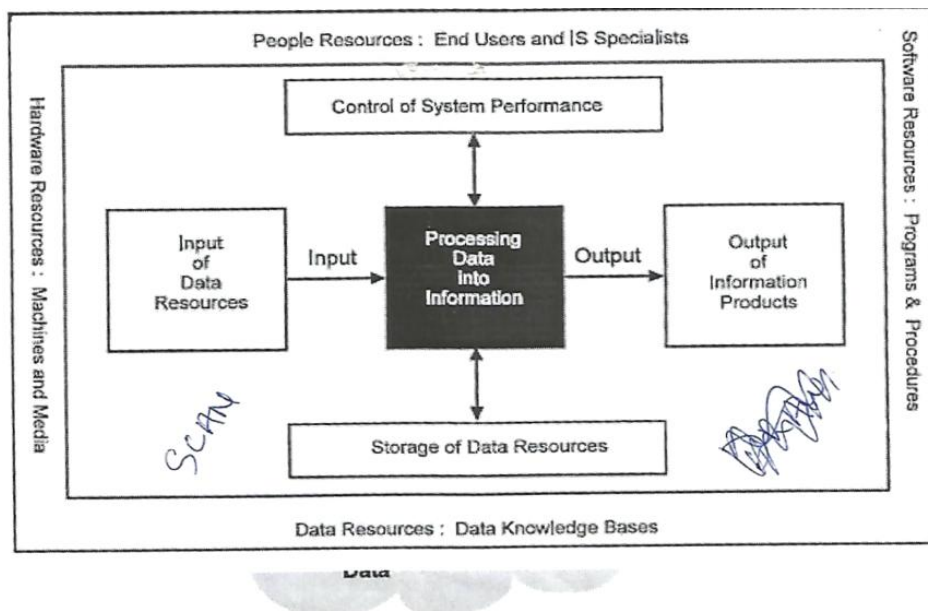


Figure 2: Components of Information System

#### 1. INTELLIGENCE SUPPORT SYSTEM (ISS)

Intelligence support systems (ISS) is a term that describes decision support systems that make extensive use of Artificial Intelligence (AI) techniques. Use of AI techniques in management information systems has a long history. Indeed terms such as knowledge based systems (KBS) and intelligent systems have been used since the early 1980s to describe components of management systems, but the term intelligence support system” is thought to originate with Clyde Hollsopple and Andrew Whiston in the late 1970s. Flexible manufacturing systems (FMS), intelligent marketing decision support systems and medical diagnosis systems can also be considered examples of intelligent support systems.

Ideally, an intelligent support system should behave like a human consultant, support decision makers by gathering and analyzing evidence, identifying and diagnosing problems, proposing possible courses of action and evaluating the proposed actions. The aim of the AI techniques embedded in an intelligent decision support system is to enable these tasks to be performed by computer, whilst emulating human capabilities as closely as possible.

Many ISS implementations are based on expert systems as well established type of KBS that encode the cognitive behaviours of human experts using predicate logic rules and have been shown to perform better than the original human experts in some circumstances. They typically combine knowledge of a particular application domain with an inference capability to enable the system to propose decisions on diagnoses. Accuracy and consistency can be comparable to (or even exceed) that of human experts when the decision parameters are well known, but performance can be poor when novel or uncertain circumstances arise.

Some research in AI, focused on enabling systems to respond to novelty and uncertainty in more flexible ways is starting to be used in intelligent support systems. For example intelligent agents that perform complete cognitive tasks without any need for human intervention have been used in a range of decision support applications. Capabilities of these intelligent agents include knowledge sharing machine, learning data mining and automated inference. A range of AI techniques such as case based reasoning; rough sets and fuzzy logic have also been used to enable decision support systems to perform better in uncertain conditions.

## V. Business Intelligence

Business intelligence is a set of theories, methodologies, process, architectures, and technologies that transform raw data into meaningful and useful information. BI can handle large amounts of information to help identify and develop new opportunities. Making use of new opportunities and implementing an effective strategy can provide a competitive market advantage and long-term stability.

BI technologies provide his topical, current, and predictive views of business operations. Common functions of business intelligence technologies are reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics.

Business intelligence is a term that refers to the sum total, or effect of gathering and processing data, building rich and relevant information, and feeding it back into daily operations so that managers can make timely, effective decisions and better plans for the future.

Generally Business intelligence brings to managers a quite number of advantages. The advantages enjoyed by market leaders are made possible by business intelligence including the high responsiveness of the company to the needs of its customers, recognition of customer needs, ability to act on market changes, optimization of operations, cost-effectiveness, quality analysis as the basis for future projections, the best possible utilization of resources. Business processes are the collections of activities designed to produce a specific output for a particular customer or market.

## VI. Advantages And Benefits Of Business Intelligence

- Business intelligence gives any firm the specific view of corporate data that is required for progress.
- In sales and marketing, business intelligence offers new tools for understanding customers' needs and responding to market opportunities.
- By providing financial planners with immediate access to real-time data, business intelligence build new value into all financial operations including budgeting forecasting.
- Business intelligence supports decision making with automatic alerts and automatically refreshed data.
- Business intelligence provides performance monitoring for accelerated action and decision making possible to receive and process data from cross-border business activities.
- Business intelligence can bring to companies competitive advantage.

## References

- [1] Anderson J.R (2003) Information Support System <https://www.cs.unc.edu/anderson/papers.html> pg. 75-110.
- [2] "How Companies are implementing Business Competency Centers"(PDF) Computer World Archived from the Original(PDF) on 28 May2013. Retrieved 1 April 2014.
- [3] <http://www.businessdictionary.com/definition/information-system.html>.
- [4] Jackson P. ; Introduction to expert systems(1986) Addison-Wesley.
- [5] Rud , Olivia(2009). Business intelligence success factors. Tools for Aligning your business in the global economic. ISBN 978-0-470-39240-9.
- [6] Sugumaran V.; application of agent and intelligent information technologies(2007)IGI publishing.
- [7] Turban. E, Aronson. J, & Liang T.; Decision support system and intelligent system(2004). Pearson .
- [8] [www. Britannica. Com>topic>information system](http://www.Britannica.Com/topic/information-system)
- [9] Wikipedia, the free enclopedia [https://en.M.wikipedia.org>wiki>information system](https://en.M.wikipedia.org/wiki/information_system)
- [10] Wikipedia the free enclopedia [https://en.M.wikipedia.org>wiki>business intelligence](https://en.M.wikipedia.org/wiki/business_intelligence)
- [11] [www.scitorcorporation.com>the story](http://www.scitorcorporation.com/the_story)
- [12] [www.willey.com/college/turbaze/ppt-97/chapter//.ppt](http://www.willey.com/college/turbaze/ppt-97/chapter//.ppt).

Ujam, E. C. "Developing Information Systems for Business Intelligence Support." IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), vol. 12, no. 4, 2017, pp. 66–70.