

## COMPONENTS OF THE COMPUTING ENVIRONMENT

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### **Abstract**

*More and more organizations are depending on the computing environment to support and enable their business processes, activities and services. Strategies of many organizations involve both external and internal factors, including employees of the computing environment and the entire organization that deploys it. To this end, a clear distinction between information systems and information technology concepts is important to an exponential degree. Unfortunately, this doesn't exist, at least as empirical evidence.*

*Through interpretive case study, the research explored opportunities to gain insights into whether the interchangeable use of IS and IT terms is as result of ignorance or unconsciousness. The research was more interested in the implications of the interplay, rather than the fact that this interplay exists.*

**Keywords:** IS, IT, Strategy, Distinction and Implication

### **1. INTRODUCTION**

The paper is organized into four main sections. The first section covers the background and motivation for the study, exploring whether the lack of distinction between information systems (IS) and information technology (IT) has an impact on the computing environment and its employees. The second section discusses the research approach that was applied which includes qualitative case study and data collection. In the third section, the paper presents and discusses the empirical findings of the study. Finally, the paper concludes with highlights of the contribution of the empirical findings of the study.

In the study, Computing Environment is defined as a structured environment, which encompasses software and hardware and provides computer services, support and maintenance. This includes networking, application and security infrastructures. Computing has long been a significant element in the operation of many organizations that deploy it. During the last two decades, it has become increasingly important in many more organizations world-wide and in South Africa in particular. With this increasing role, investment in computing systems and technologies, assets and support have become a significant element in the organizations that it supports. This has led to several works such as Ciborra (1996); Kling (2000); and Papp and Fox (2002).

Besides the researcher and other academia, other intended audiences include human resource personnel and employment agencies, computing professionals, and anyone interested in the components that make up computing. It may be of particular interest to the Chief Information Officers (CIOs) and other Executives of organisations who are the original initiators and sponsors, and key stakeholders of computing investment.

The Human Resource department that is responsible for the administration of the computing environment on behalf of the organisation could gain a better understanding of issues in terms of the organisational structures of the computing environment. Likewise, it would benefit experts who are responsible for development and training: developing curricula to address the need to up skill. The topic might also be of interest to researchers and independent consultants involved in initiatives related to IS and IT fields.

## 2. BACKGROUND AND MOTIVATION TO THE STUDY

Employees and professionals in the computing environment often refer to themselves as IT specialist while they are actually deployed and specializes on IS functions. Also, the majority of organisations refers and classify the computing environment of their various organisations as IT department.

The issues underlying these differences and lack of distinction between IS and IT have over the years engaged many in and outside the field of computing, particularly students and professionals. To distinguish between these two concepts, definitions and explanations were drawn from numerous literature and documentation sources from both the academic and corporate domains.

According to Daniels (1994), Information Systems is a method of delivering information in accordance to organizational needs. In Daniels' view, IT is the technological apparatus that conveys the information. Daniels argues that technology is not a requirement for an information system, but a translator of symbols into a usable form. Kendall (1992) advances the view that an information system exists only to serve the business systems of which it is a component. According to Hicks (1993), information system is a formalized computer information system that can collect, store, process and report data from various sources to provide the information necessary for managerial decision making.

Through information systems, an organization executes its business plans and attempts to realize its business goals. Lederer and Gardiner (1992) refer to this as 'a portfolio of computer-based applications'. Ward and Peppard (2002) define information systems as the means by which people and organizations, utilizing technology, gather, process, store, use and disseminate information. It is thus concerned with the purposeful utilization of information technology.

On the other hand, IT refers specifically to technology, essentially hardware, software and telecommunication networks. It is thus tangible (e.g. servers, PCs, routers and network cables) and intangible (e.g. software of all kinds). IT facilitates the acquisition, processing, storing, delivering and sharing of information and other digital content (Ward and Peppard 2002).

## 3. RESEARCH APPROACH

The study consulted literature from both academic and professional domains. None of the literature referred to had conducted any study on the distinction between IS and IT, and its impact in the computing environment of the organization. The research conducted empirical case studies in four South African organizations. The four organizations are different in terms of business, cultural environment, transformative and technological settings in the computing environment. The study included the involvement of people, processes and technologies in the computing environment.

The interpretive approach was selected for this study. The approach was used in: explanation of participants' behaviour, which cannot be easily identified with other research approaches; to allow an in-depth analysis of the case studies; to allow for the study of individuals in their natural setting, which involves physical interaction and gathering of material; because it emphasizes the researcher's role as an active learner.

The case study approach was used to explore in-depth, the complexity of the distinction between IS and IT. Further and primarily, it allows for the descriptions of the phenomena under study, which allowed access to the subtleties of changing and multiple interpretations (Walsham 1995), which would have been lost in other research approaches, including quantitative or experimental strategies (Yin 1994). In the case studies, data sources included interviews and documentation. Semi-structured interviews, tape recordings, and documentation were used for the research data collection. The number of interviewees varied according to the size of the organization.

As result of conducting semi-structured interviews, we had the freedom to probe the interviewees to elaborate on their original responses or to follow a line of inquiry introduced by the

interviewees. The semi-structured approach allowed us to conduct fairly informal interviews. More advantageously, it makes interviewees feel as though a conversation or discussion rather than in a formal question and answer situation was taking place.

The selection of the four organisations for the case study was based on the following factors: the first was that the four organisations had a wide range of structural diversity within their computing environments; secondly, the four organisations together provided a very good representation of a variety of sectors in which they each operate; thirdly, the selection of these organisations for the case studies was a matter of accessibility. A total of 43 interviews were conducted. The interviews were conducted with identified key members of each of the organizations. Based on the research questions, a formulated checklist was used as a guiding principle during the interview process so that uniformity and consistency could be assured in the data.

#### 4. FINDINGS

The findings from the empirical data are presented as follows:

##### 4.1 Distinction Between IS and IT

There are three basic components which are common to both the development and implementation of IS and IT. The components include technology, process and people. They are key to how IS and IT are developed, implemented or used. The components are critical to the success or failure of the computing environment's support and enablement of the business processes and activities. The next section describes these components:

- i. IS and IT are two separate concepts, but they are together in the computing environment.
- ii. IT is concerned with the exploration of hardware and software, including networks.
- iii. IS is concerned with the computer application in support of an organization's business goals and objectives.

Figure 1 below illustrates the interrelationship between IS and IT components in the computing environment. IT is a term that is broadly and widely used in most organizations. It has long dominated its sister component, IS. It recognizes that IT strategy can neither be formulated nor implemented in isolation from IS. From the study, seven main areas of practice within the computing environment were highlighted (as shown in Figure 1 below). Figure 1 clearly categorizes these areas of practices into IS and IT disciplines.

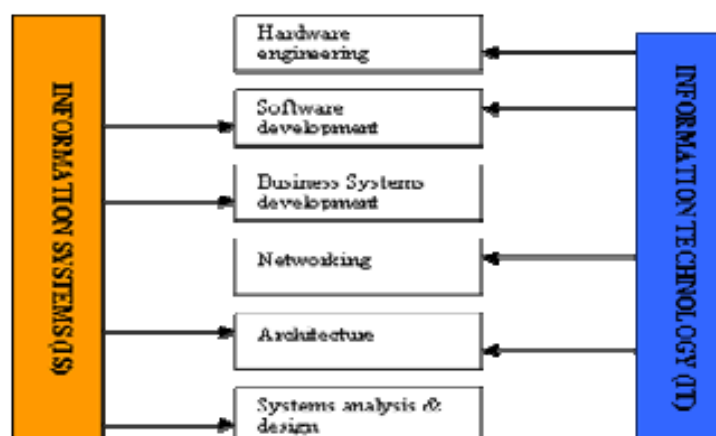


Figure 1: Distinction between IS and IT

##### 4.1.1 IS Component

The information systems component consists of systems through which the business carries out its processes and logic. They are directly used by the end user (those who act on behalf of the business). This also means that those who develop (developer, programmer), analyze and design these systems sit within the information systems domain.

#### **4.1.2 IT Component**

The IT component of the computing environment consists of artefacts such as hardware and software. The hardware are all physical or tangible artefacts of technology. They include servers, disks, network and other connecting cables. The hardware is sometimes referred to as technology infrastructure. Unlike the IS software, the IT software are tools that enable the IS software. Some examples are Operating Systems, software development tools (such as Cobol, Visual Basic and C Language) and antivirus software.

Neither IS nor IT components alone can achieve the goals and objectives of the organization that deploys it. Both components depend on each other to determine the technological solutions based on the organization's goals and objectives.

#### **4.2 Implication for Employees**

The activities of IS and IT were done within the structures that exist in the computing environment of each of the organizations. Parts of these structures were created by the allocations of tasks to individuals and teams to enable and support technologies, systems and business processes.

What is very interesting is that diploma qualifications from majority of the institutions suggests IT specialisation and university degree qualifications focus on IS. The lack of distinction between the IS and IT seriously impacts the allocation of tasks in the computing environment. However, some universities, especially universities of technology have now begun to have academic department dedicated to IT. For example, some senior developers were assigned to configure servers. This unfortunately was not as a result of multi-skilling but lack of understanding of the distinction.

This lack of understanding of the distinction also affects some employees as they affirmed that they were not able to answer some related questions in job interviews. Their curriculum vitae and qualification suggest something different from their responses.

#### **4.3 Impact on Structure**

The analysis also revealed how employees responded to the structures within the computing environment in the process of development and implementation of computing strategy, support for processes and management of systems and technologies in the organizations. These actions and responses reflected on how the design development and implementation of computing activities were interpreted, how the various involved tasks were allocated, how these tasks were sanctioned and carried out. This manifested in the quality of work, which was somehow compromised. For example, during software development, senior software developer was tasked with the responsibility of selecting infrastructure for the project. This was based on his seniority in the organisation. This is attributed to the structures which were manipulated to accommodate certain individuals.

#### **4.4 Confusion for the Employment Agency**

Employment agencies hardly hear of IS jobs. All jobs in the computing environment are referred to as IT positions. They are only able to make the distinctions through the specification and requirements, on one hand and on the other hand by reading through the curriculum vitae of the candidates. They are consistently faced with the challenge of differentiating between IS and IT candidates in sourcing for candidates for their clients. It proves to be even more difficult for them as they are not specialists in the computing field. However, due to this, less experienced agents often present candidates for the wrong prospective jobs.

The findings of the research have the potential to change the way the computing environments are currently structured and how IS and IT is understood and subsequently how it impacts the environment.

## 5. CONCLUSION

IS and IT are two common terms in the computing environment. Both terminologies have been loosely used and applied by most people including the practitioners. The empirical findings contributed to the understanding of the distinction between IS and IT strategy in the computing environment. The study also contributed to a better understanding of the roles, and the relationship between the two.

The other contribution of this study is its aim to be of significance to decision makers, professionals, including managers and employees of the organization within the computing environment. It is expected that the key contribution will arise from the understanding of the distinction. Through this, a better understanding of the impact on employees, and structures will be gained.

## 6. REFERENCES

- [1] Ciborra, C.U. (1996) Improvisation and information technology in organizations, *Proceedings in International Conference on Information Systems*, USA; Philadelphia, pp.369 - 80.
- [2] Daniels, C.N. (1994) *Information Technology: The Management Challenge*, London; Addison-Wesley publishing Ltd.
- [3] Hicks, J. (1993) *Management Information Systems: A User Perspective*, USA, St. Paul, Minnesota; West Publishing Company.
- [4] Kendall, P. (1992) *Introduction to Systems Analysis and Design: A Structured Approach*, 2<sup>nd</sup> ed., USA; Wm. C Brown Publishers.
- [5] Kling, R. (2000) Learning About Information Technologies and Social Change: The Contribution of Social Informatics, *The Information Society*, vol. 16, No. 3, pp. 217 - 232.
- [6] Lederer, A.L and Gardiner, V. (1992) The Process of Strategic Information Planning, *Journal of Strategic Information Systems*, vol. 1, no. 2, pp. 76 - 83.
- [7] Myers, M.D. and Avison, D. (2002) An Introduction to Qualitative Research in Information Systems, In: M. D. Myers & D. Avison, (eds.), *Qualitative Research in Information Systems: A Reader*, pp. 3 - 12, London; Sage publications.
- [8] Papp, R. and Fox, D. (2002) Information strategy development: The strategic alignment imperative, Eighth Americas Conference on Information Systems.
- [9] Ward, J. and Peppard, J. (2002) *Strategic Planning for Information Systems*, 3<sup>rd</sup> ed., England, West Sussex; John Wiley & Sons.
- [10] Yin, R.K. (1994) *Case Study Research, Design and Methods*, 2<sup>nd</sup> ed., California, Newbury Park; Sage Publications.

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