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What is Information Systems?

Trevor D Crossman PhD
Business Information Systems, University of Natal, Durban

Abstract

This paper is an attempt to answer the question 'What is Information Systems?' While the characteristics of both a science and a nonscience can be identified in Information Systems (IS), it is argued here that it is not helpful to try to force the discipline into either category. IS is a multi-facetted discipline which uses what is traditionally called science and nonscience to meet the needs of the user community. This brings IS into direct contact with its technological and social dimensions. Without recognizing this, effective and efficient use of the technology will be difficult and meaningful research in the discipline unlikely.
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Interest In The Question

It does seem strange to ask a question as basic as this. What is Information Systems? There are at least three reasons why it is regarded as important to attempt to answer to the question.

- Firstly, that there is no consensus on the definition of Information Systems (IS) is a known problem [7, p5].
- Secondly, IS is typical of those disciplines which do not remain static. As technology evolves and its impact is more widespread, the discipline as a whole is in a state of becoming either better or worse [15, p11]. Together with the whole discipline, each IS department and each individual within the departments is also affected. Unless we have a clear picture of the nature of the discipline, we cannot assume that we are good because we have been good.
- The third point is related to the previous one. If we do not have a clear picture of the nature of the discipline, we are not likely to apply the evolving technology correctly.

This, then, is an attempt to answer the question. To do so, the first step identifies those characteristics of IS which suggest that the discipline is a science. This, however, cannot be regarded as the whole picture because nonscientific dimensions of the discipline have become increasingly important with the advance of the technology. Because the IS discipline has both these science and nonscience characteristics, it becomes clear that to try to categorize it as either is both misleading and invalid. It is argued here that IS is a multi-facetted discipline which uses a clearly identifiable technical base, but has significant social and ethical responsibilities which result directly from attempting to meet the needs of the user community.

Characteristics Which First Come to Mind

As an attempt to identify the nature of the IS discipline is made, a number of technically related characteristics immediately come to mind.

Demanding exactness
Much of the discipline is typified by a demand that things be done in a particular way. The need for this exactness is clearly illustrated by such activities as attempting to master a programming language, or entering the commands to make a PC perform a specific function, or defining the details which will ensure error-free communications in an open systems environment. This exactness is a discipline characteristic.

Technical details
The exactness in IS is usually the direct result of the technical nature of the discipline. This is not surprising. The fact that IS uses the output of the technical disciplines like electronic engineering and computer science naturally results in technical details becoming an integral part of the IS discipline itself.

Jargon
It is well recognized that jargon is part of the computer industry. Computer specialists use this special vocabulary to explain what they do and how they have done it. Like all jargon, IS jargon is not generally understood by everyone. In fact, while IS developers may agree on the meaning of the unique vocabulary, we are warned against its use when designing interactive dialogues for those outside the discipline [16, p435]. It is common practice, also, for introductory books on IS to include a glossary of terms to help those unfamiliar with the jargon to understand the recognized way in which the words are being used within the discipline [9, p695] [16, p649].

Objectivity

Some technical areas of IS can be objectively demonstrated. Clear agreement can be reached on matters such as the exact cycle time of a particular model computer, the peak data carrying capacity of a particular network configuration, or the appropriateness of a particular database structure.

Is IS then a science?

Although this is sometimes regarded as a mistaken view [4, xvi], traditionalist thinking has associated a rational and objective discipline, characterized by a demanding exactness and an agreed jargon, as a science [13, p333]. For some time there have been those who have supported the idea that IS is a science. A typical example comes from an article in Datamation published more than a decade ago.

> 'In this scientific world ... feeling or believing is, or soon will not be acceptable in the programming environment.' [10, p106].

By concentrating on the characteristics of IS which easily come to mind, the idea that IS is a science is reinforced. (Are there not a number of Universities where IS and Computer Science are taught from the same department?).

This Is Not The Whole Picture

The point made here is that it is untrue to claim that these characteristics, traditionally regarded as scientific in nature, are typical of the IS discipline. There is another group of attributes which provide the discipline with a dimension which does not display the technical, rational and objective characteristics identified above.

Other Obvious Characteristics

While there is no doubt that some significant aspects of IS are technical, other characteristics of the discipline are typical of what traditionalists would call a nonscience.

Argument/disagreement

The IS discipline is typified by waves of argument and disagreement based on opinions about the nature and value of the rapidly evolving technology. For example, there is disagreement regarding the value of advances in AI/ES research [6, p60], there is debate on the need for and extent of privacy laws to protect data stored on databases [12, p509], and there is even a groping for consensus on the meaning of key terms within the discipline like 'information' and 'systems' [17, p59]. This leads to much debate on the central issues of IS.

Unstructured vagueness

For all the demand of exactness and the brilliance of the technology, the IS discipline is also characterized by an unstructured vagueness. For example, there are no clear-cut or easy answers to questions raised when attempting to identify the best way to use the technology in any particular environment [16, xxix]. The effective and efficient use of the technology is difficult to anticipate.

Moral/ethical issues

Boland asks the probing question whether designing an IS can be an amoral and purely technical act [3, p376]. He concludes that designing an IS must be a moral problem because it puts one party (the systems designer) in the position of imposing an order on the world of another (the user). This forces the designers of IS to face the ethical responsibility of critically analysing the consequences of using the technology into which the discipline is so enmeshed [3, p377]. Recently published texts, even at the introductory level, often include sections on social and ethical issues [16, p618]. In his article on the same topic, Clarke [5, p63] identified the extent to which these issues are taught and researched in South African universities. He strongly recommends that all members of the discipline should be acquainted with the social and ethical implications of their discipline.

Is IS then a nonscience?

Significant concerns within IS, which stand in stark contrast to the objective technical nature of the discipline, call for resolution. Here it is contended that the way that companies resolve these unstructured and relativistic issues will be influenced by (and in turn, will influence) the culture of the organization. These issues are of such importance that it can be argued that the emphasis of the discipline should move away from the technology and its related objectivity, to include subjective, social and moral issues. If the traditional split between science and nonscience is held, therefore, evidence suggests that in spite of its technical base and scientific tendencies, IS belongs to nonscience.

Another Suggestion

One of the reasons why IS can be fitted into both science and nonscience is because the dichotomy between the categories may be invalid. This is the point argued by Rorty [13, p335], who claims that it is better to drop the science/nonscience distinction altogether so that disciplines as different as morality, physics, and psychology can be viewed as equally objective.

Rather than become embroiled in that philosophical debate, another reason is suggested here why IS appears to be both a science and a nonscience. The nature of IS is such that it is not appropriate to try to classify it into either category. It is widely held that the objective of building and installing IS (which is the essence of the discipline) is to meet the needs of a user community [16, p592]. Its objective, then, is not to try to discover truth, or to understand what 'is', but to build and instal systems using what is known. This knowledge can come from either of the fields traditionally referred to as science and nonscience. This view is supported by Ahituv and Newmann [1, p4] who identify the fields which contribute to the study of IS. Their list includes what they call the 'exact sciences' (like decision theory, mathematical economics and statistics), the 'behavioural and social sciences' (like organizational behaviour, management theory and cognitive psychology), and 'technology' (like electrical engineering, computer science and communications).

The suggestion, then, is that IS fits into a category of applied knowledge. If bridges collapsed about as often as application systems malfunction, and if they were repaired by attempting to patch the malfunctioning section, it would be attractive to support the 1968 NATO Software Engineering Conference claim that building software applications is similar to other engineering tasks [14, p5]. Perhaps the disciplines are different because bridges are built into the structure of the terrain, while IS are built into the structure of organizations.

It is contended here that IS is a hybrid discipline, with the objective of meeting the needs of the user community.

> 'It involves technical, personal, organizational, philosophical, linguistic and mathematical matters. This list is long but could well turn out to be longer because we are at the beginning of studying (it) and we are not sure neither of what it involves nor yet where to draw a boundary round it.' [2, p203].

Consequences of This Suggestion

By recognizing that IS is a discipline characterized by using what is known to meet identified user needs, some important consequences can be identified.

1. The significance of there being no generally accepted theory base for IS.

   It is acknowledged that there is no universally accepted theory of IS [1, p5]. From the traditionalist science/nonscience perspective, this could have been a factor which artificially enhanced or diminished the status of IS. It is argued here that the existence (or not) of an IS theory base is no longer as issue in assessing the value of the discipline. Perhaps the intellectual tools to handle the complexity of IS within a coherent framework presently missing, will be developed in the future. That will be useful. Useful because a theoretical framework is an intellectual convenience and an environment in which academic research can be done. It must be recognized, however, that such a framework is not a reality which will change the nature of the discipline [2, p203]. Whether a generally accepted conceptual framework exists or not, technology will be used to attempt to meet user needs.

2. The significance of the question is reconfirmed.

   There are large numbers of people who have followed successful careers in the IS discipline who have not found it necessary to resolve any of these issues. It can be argued, therefore, that we should not worry about the question at all, but get on with the job of using the brilliance of the technology as it evolves. There is a danger in this approach. Questioning what IS is focuses on this danger. The question reminds us that IS is another complex, multi-facetted, applied discipline. Like all applied disciplines (e.g. engineering) there is the need to understand the implications on individuals, organizations and society of using the technology. History warns us (through examples such as the invention of gun powder, the development of the internal combustion engine, and advances in genetics) to consider the implications of applying advancing technology. This makes the question significant, and the attempted answer important.

3. The need to think holistically.

   Part of the nature of the discipline is that we must learn to see both the forest and the trees. The value of general systems theory to the IS developer is consistently stated [16, p5] [8, p36] [15, p68]. It is only by attempting to understand the whole problem to be solved that IS developers can fulfil their function in the process of business re-engineering as the change agents [12, p210]. IS developers need to recognize that each system they build is a sub-system of a larger system. It is exactly this which introduces the moral dimension to the activity.

4. Accept the moral and ethical responsibility.

   By confirming, as has been done in this paper, that IS is not a discipline locked into a purely technical world, powerful reasons are provided to ensure that the moral and social consequences of using information technology are considered. It is no longer acceptable, if it ever was, that IS developers see their role as no more than attempting to implement neat and tidy technical solutions to a network of business needs. Those who imagine this, place themselves at a disadvantage. Support is given here to both Clarke and Boland in their call for IS developers to accept the moral and ethical responsibilities which are an integral part of the discipline.

Conclusion

In this paper an attempt was made to provided an answer to the question 'What is Information Systems?'. It is submitted that IS is a multi-facetted discipline which, using a changing and brilliant technology, implements sub-systems with significant social and ethical consequences. Each advance in technology moves the discipline into yet another environment where these problems again need to be faced and resolved. We do not always understand immediately the implications of these moves or the seriousness of these problems, so 'we need a clear vision and a firm set of human values if we are to survive' [11, p154].

Knowing this of the discipline has two specific consequences. Firstly, we can direct more effectively and manage more efficiently the use of computer-based technology, as we attempt to meet the needs of the user community. Secondly, direction and emphasis is provided for future IS academic research programmes.

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  - author's affiliation and address;
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