

TOWARDS PHILOSOPHY OF INFORMATION TECHNOLOGY

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Abstract

Computers and information technology have attracted the interests of many philosophers as research area. Computing offers many benefits that continue to spread across different aspects of human life given the dynamic nature of this field. This is even accelerated by the emergence of new computing fields including computer science being the oldest computing field, computer engineering, software engineering, information systems and information technology being the youngest computing field. Some computing fields are more related than others especially those that are said to have emanated from same school of thought. Evolution of this field dates back to 1960s with computer science and information systems being the first two disciplines in computing field. In late 1980s, computer engineering and software engineering emerged, with information technology emerging in mid 1990s following increased growth in computer networks and the internet. The greatest challenge experienced by learners has been to identify the computing discipline that best suits their needs and interests. While IT has become an integral component of every other field today, little has been done to come up with philosophy of IT. This paper is an attempt to give the history of IT, define IT, knowledge in IT, and compare IT to other disciplines as well as try to answer philosophical questions related to this field. The beneficiaries of this paper include students, researchers as well as computing practitioners who might be interested in making their contribution towards formulation of philosophy of IT.

Keywords: Computing Disciplines, Computer Science, Philosophy of Information Technology, Information Technology

1. INTRODUCTION

Computers and Information Technology have been discovered as research topics by philosophers with extensive research targeting philosophical issues in relation to computing technologies. The issues studied include but not limited to computational systems, ontological state of virtual worlds, artificial intelligence, cyberspace regulations, and ethical issues surrounding information security among others. According to Brey and Søraker (2009), philosophy of computing focuses on computational processes and systems which he considers too limiting as it excludes computer science field and the impacts of computers have on society.

Computing is defined as any goal oriented activity that requires, benefits from or creates computing (ACM and IEEE, 2016). This paper adopts this definition. The dynamic nature of computing, diverse computing needs by users coupled with the fact that computing has come of age are some of the reasons that have necessitated the need to identify and clearly distinguish various fields of computing. Association for Computing Machinery (ACM) has made several attempts to identify and distinguish various disciplines including computer engineering (CE), computer science (CS), software engineering (SE), information systems (IS) and information technology (IT) with suggestions to include cyber security as a distinct discipline. It is worth noting that ACM further groups the disciplines into two major categories based on how closely linked the disciplines are.

The field of information Technology (IT) emerged in mid 1990s out of increasingly fast growth in internet following the emergence of World Wide Web (WWW) (Lunt & Ekstrom, 2008). This is one of the youngest of the disciplines in computing that is argued to have emerged from the business school of thought which helps explain the fact that IT as a field emerged as a result of business needs. The growth and expansion of computer networking exacerbated the growth of IT as a computing field (Lunt & Ekstrom, 2008).

Being the latest computing field, IT focuses on the application of the other computing fields to help solve organizational needs (ACM and IEEE, 2017). Equally, IT graduates are equipped with more applied and less theoretical knowledge necessary to manage computing infrastructure (Brey

& Søraker, 2009). This is especially so given the nature and skills needed in application of a technology. IT is used to design, progress, apply, organize and administer an information system in computer especially software application, and a physical element (Ahmad *et al.*, 2018). This field exploits existing computing platforms including systems software, application software as well as hardware to create larger systems that are solution oriented(Lunt & Ekstrom, 2008). The field is mostly concerned with installation of internal networks, hardware systems and database systems as well as maintenance of the same. IT is the youngest field of computing compared to the other fields(ACM and IEEE, 2017).

ACM argues that IT is focused on questions that advocate for users and meeting users' requirements in an organizational and the societal context through the selection, creation, application, integration and administration of computing technologies(Wabwoba & Ikoha, 2011). The emphasis is therefore on the technology itself than on the information it transfers. Therefore, Information Technology inclines more to practical and application. IT deals with troubleshooting and designing applications. It uses the computing technology to solve pragmatic problems therefore applying technical knowledge for product support(Wabwoba & Ikoha, 2011; Courte & Bishop-Clark, 2009).

2. STATEMENT OF THE PROBLEM

While IT emerged in mid 1990s and offers an interface between other computing fields and the ultimate consumer of the products of these fields, there is very little literature on philosophy of Information Technology. IT has become an indispensable field in every human aspect today. While attempts have been made in coming up with philosophies of other computing fields, there is little evidence of such attempts in IT as a computing field. This poses a great challenge to experts who are interested in creating boundaries in computing fields in academia and industry. There has also been difficulty in establishing how unique IT is from other fields such as mathematics, science, engineering as well as other computing disciplines. This paper therefore attempts to put together literature that can act as a guide in formulating philosophy of IT.

3. HISTORY OF INFORMATION TECHNOLOGY

Information Technology is coined from two words “information” and “technology” each bearing a separate meaning. According to Rapaport (2019), information is said to have different meanings depending on the context of application and does not refer some specific theory and therefore can be treated as a mere synonym for “data”(Rapaport, 2019). Information can also be thought of as processed data and packaged in a meaningful form (Allo, 2010).Technology on the other hand is defined as application of scientific knowledge in a given domain especially for a practical purposes (ACM and IEEE, 2017). Information Technology can therefore be thought of as the application of scientific knowledge in information processing and manipulation(Rapaport, 2019).

IT has been used since time immemorial to mean application of technology to process and manipulate information accurately and efficiently(Brey & Søraker, 2009). It is however important to note that while the term maintained the meaning, technology kept changing(Denning, 1999). The phrase would however fade as the technology of the day faded and became obsolete(Sparrow, 2004). IT was first used as a computing discipline in mid 1990s following increased dependence of business operations on computing applications and services.This signifies that as a discipline, information technology has continued to grow with emerging technologies.

4. KNOWLEDGE IN INFORMATION TECHNOLOGY

The fact that IT focuses more on the application of computing to impact human life, knowledge in IT can therefore be thought of as that which seeks to understand applied knowledge and less theoretical knowledge to manage computing infrastructure while the opposite of this is considered knowledge in computer science(ACM and IEEE, 2017). According to Ahmed *et al.* (2018), IT is used to design, progress, apply, organize and administer an information system in computer especially software application, and a physical element(Sparrow, 2004).This field seeks to apply existing computing platforms including systems software, application software and hardware to create larger systems that are solution oriented(Wabwoba & Nambiro, 2018). It is therefore correct to argue that theoretical knowledge is not considered as knowledge in IT as it focuses more on application as opposed to theoretical knowledge.

Knowledge in IT can therefore be said to be the knowhow of application and integration of scientific knowledge of computing fields including systems software, application software and hardware to create larger systems that are solution oriented to help solve organizational information needs (Brey & Søraker, 2009).

5. DISTINCTION BETWEEN IT AND OTHER FIELDS

Computer science is the oldest computing branch that mostly focuses on theoretical knowledge for efficient programming, of computers, mathematics algorithms and design (Denning, 1999), IT is the youngest computing field concerned with applied knowledge and skills on installation of internal networks, hardware systems and database systems as well as maintenance of the same (ACM and IEEE, 2017). Just like computer science, IT can be argued to have no nature when compared to natural sciences since it can be thought of as applied computer science to some extent and CS only came into existence when its two histories of logical-mathematical and engineering began to intersect in the 1940s, so its “nature” was only defined by what those logicians, mathematicians, and engineers were doing (Mahoney, 2011). Equally, CS and IT are sciences with both theoreticians and experimentalists. Newell and Simon, (1976) suggest in their discussion of empirical results that there are “fundamental principles” of CS as a science.

While IT is said to have emerged from the business school of thought, computer engineering (CE) is said to have emerged as one of the fields of electronic engineering (ACM and IEEE, 2016; Lunt & Ekstrom, 2008). IT focuses on application of computing knowledge and skills to support business activities while CE focuses on research, design and development of computer equipment such as circuitry boards, microprocessors as well as accompanying software code (ACM and IEEE, 2016). IT as a computing field is concerned with applied knowledge and skills on installation of internal networks, hardware systems and database systems as well as maintenance of the same whereas computer engineering studies computers and computer systems (ACM and IEEE, 2017). Questions abound as to whether IT is engineering or not. According to Rapaport (2019), engineering is concerned with generation of products that impact the society positively yet not all IT applications affect the society positively, example hacking has adverse effect.

Like IT, software engineering (SE) is argued to have emerged from business school of thought to bridge the increasing need to have rigorous software development methods which gave rise to SE (Lunt & Ekstrom, 2008). However, SE is said to be closely related to CS as both have fundamentals of programming which is not the case for IT(Sparrow, 2004). SE was meant to help in application of proven design methods in computer programming while IT focuses on application of computing knowledge and skills to support business activities(Wabwoba & Nambiro, 2018; Lunt & Ekstrom, 2008). Both information technologists and software engineers perform software debugging which is considered practical software engineering (Rapaport, 2019). Rapaport (2019) argues that the process of finding and fixing program bugs is an important of program verification since the annotation technique can help develop correct programs that can be proved whether the program is run or not (Scherlis & Scott, 1983).

6. CHARACTERIZATION OF IT

While CS is “a broad-based quantitative and qualitative study of how information is represented, organized, algorithmically transformed, and used, IT can be argued to be the application of CS and other computing disciplines.” Rapaport, (2019) further argues that “CS is the discipline that deals with representation, implementation, manipulation, and communication of information” (Rapaport, 2019). This second characterization though too broad can also be used to characterize IT which also deal with these four aspects of information(ACM and IEEE, 2017). IT is also characterized with identification of available technologies and they how can be reliably implemented and integrated them with existing systems (Wabwoba & Nambiro, 2018). It is also characterized with frameworks for identification and classification opportunities but notably, there is lack of testable models based on relevant theories(Bakos & Treacy, 1986).

7. CONCLUSION

To conclude, information technology is the youngest field in computing and is mostly concerned with the application of computing technology to solve business and individual needs. Information technologists are most likely to interact with individuals in other fields than any other computing field as it is concerned with application of computing technology to meet information needs of diverse domain.

To be successful practitioners and researchers, information technologists require much more than knowledge. They must perform activities expected of them such as system integration, cloud security as well as API-based architecture development which require development of skills and dispositions through cautious practice in an authentic context to demonstrate proficiency in IT learning.

It is also worth noting that information technologists are more focused on applied knowledge than theoretical knowledge. They can be thought of as the users and troubleshooters of computing systems designed and developed in other computing fields. IT is a science just like computer science and software engineering. Growth in information technology is influenced by emerging technologies and this is signified by the fact that the phrase information technology has been used in other periods with other technologies.

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