Information Engineering

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Abstract - Being in the age of information, we are bombarded with large volumes and diverse types of information. Information engineering is a family of data-oriented analysis and techniques used to design, develop, and maintain information systems which support strategic missions, decision processes, and daily operations of a company. It is often regarded as a data-oriented methodology rather than a process-oriented methodology. This paper provides a brief introduction to information engineering.

Keywords: information engineering, social information engineering, information integration

I. INTRODUCTION

In today digital world, information is one of the most valuable goods in the economy. Information is an important matter in scientific investigation, with a potentially enormous economical, industrial, and social impact. It contributes to organizational strategic development. A variety of critical systems heavily depend on information. Such systems include health care systems, CAD/CAM, air traffic control, hotel/airline reservation, telecommunications, banking/ATM, computing, geographical information system (GIS), and biotechnology [1]. Although information is an elusive stuff, engineers find ways to handle it.

Information engineering (IE) is the application of science and technology in developing quality information systems, which are computer-based infrastructures that collect, process, store, and act on information. It is the incorporation of an engineering approach to the generation of information and the promotion of the better use of information and resources. IE focuses on the generation, distribution, processing, and use of information in engineering systems including image processing, machine vision, pattern recognition and computer graphics. It combines the traditional computer science with engineering. It has become the methodology of choice for developing management information systems. Information engineering domain is shown in Figure 1 [2].

Clive Finkelstein is regarded as the father of information engineering because he wrote the first publication on information engineering. The goals of information engineering are [3]: (i) to develop systems that comply closely with user specifications, (ii) to reduce overall systems development time, (iii) to promote longer system life, (iv) to reduce cost of maintenance over the system's useful life.

II. CHARACTERISTICS OF IE

IE integrates tools, techniques, and methodologies for developing information systems. It enables the design, construction, and operation of efficient and economic information systems for modern business practices. It will produce business systems characterized by [4]: availability of common data which is consistent in meaning and structure wherever it is stored so that it can be used for operational and

- *Data sharing*: The availability of common data that can be used for operational and information purposes. Data is central to any information system.
- *Multidimensional systems*: Systems that use various hardware and communication facilities to provide operational and decision support services.
- *Business orientation*: Models of business, which support objectives and management information needs.
- *Connectivity*: A capability that allows machines and people to communicate within the enterprise.
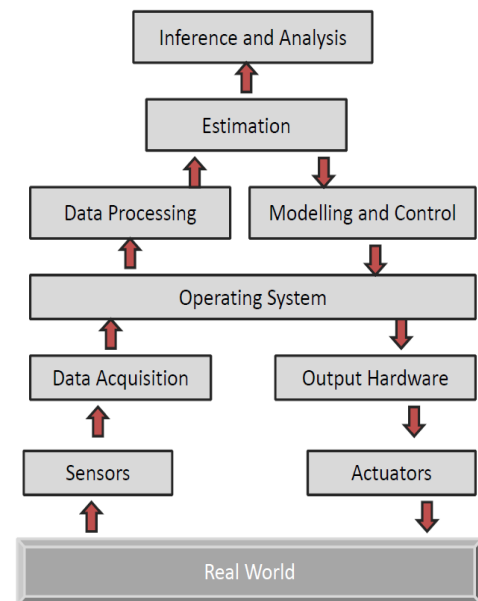

Figure 1 - Information engineering domain [2].

- *Artificial intelligence*: Using complex rule-based systems to capture expert knowledge.

- *CASE tools*: CASE (Computer assisted software engineering) tools automate several steps of the information systems development process. CASE tool selection is complex because there is no single tool that will satisfy all project requirements.

III. CHALLENGES

A lot is wrong with information processing today: it takes too long to build information systems and the cost of maintaining them is outrageous. The extensive use of information systems may have unplanned human and social effects. There are risks to the society from incompetence or misbehavior. We must accept the responsibility to always look at the broadest consequences of what we design.

A major challenge about IE is the volatile and fast changing nature of the discipline. Due to the rapid scientific and technological advances, it is easy for information engineers to lag behind. Students specializing in IE are expected to understand and develop systems that are not only increasingly complex but rapidly changing. Another challenge originates from the already crowded structure of the computing curricula. This makes it hard to include IE concepts and practices into chosen courses and make necessary changes within the higher education to meet future needs.

In spite of these challenges, IE revolution will have impacts on university education and research. It is intended to unify and combine the various requirements that must be engineered in any complex application as we continue through the 21st century.

IV. CONCLUSION

Information engineering constitutes a variety of tasks related to information, information retrieving, and information exploitation. These tasks are becoming increasingly important with the confluence of computer and communication technologies [5]. IE methodologies have evolved as a way of addressing many concerns faced by both functional users and data processing professionals. Although IE may never solve all of the problems associated with software development, it does involve the functional user in the early stages of systems development. IE needs men and women who can apply their engineering know-how to design information systems. Undergraduate and graduate degrees are offered in IE along with electrical engineering in several institutions worldwide, particularly in US, Europe, and China [6,7].

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