IT Fundamentals

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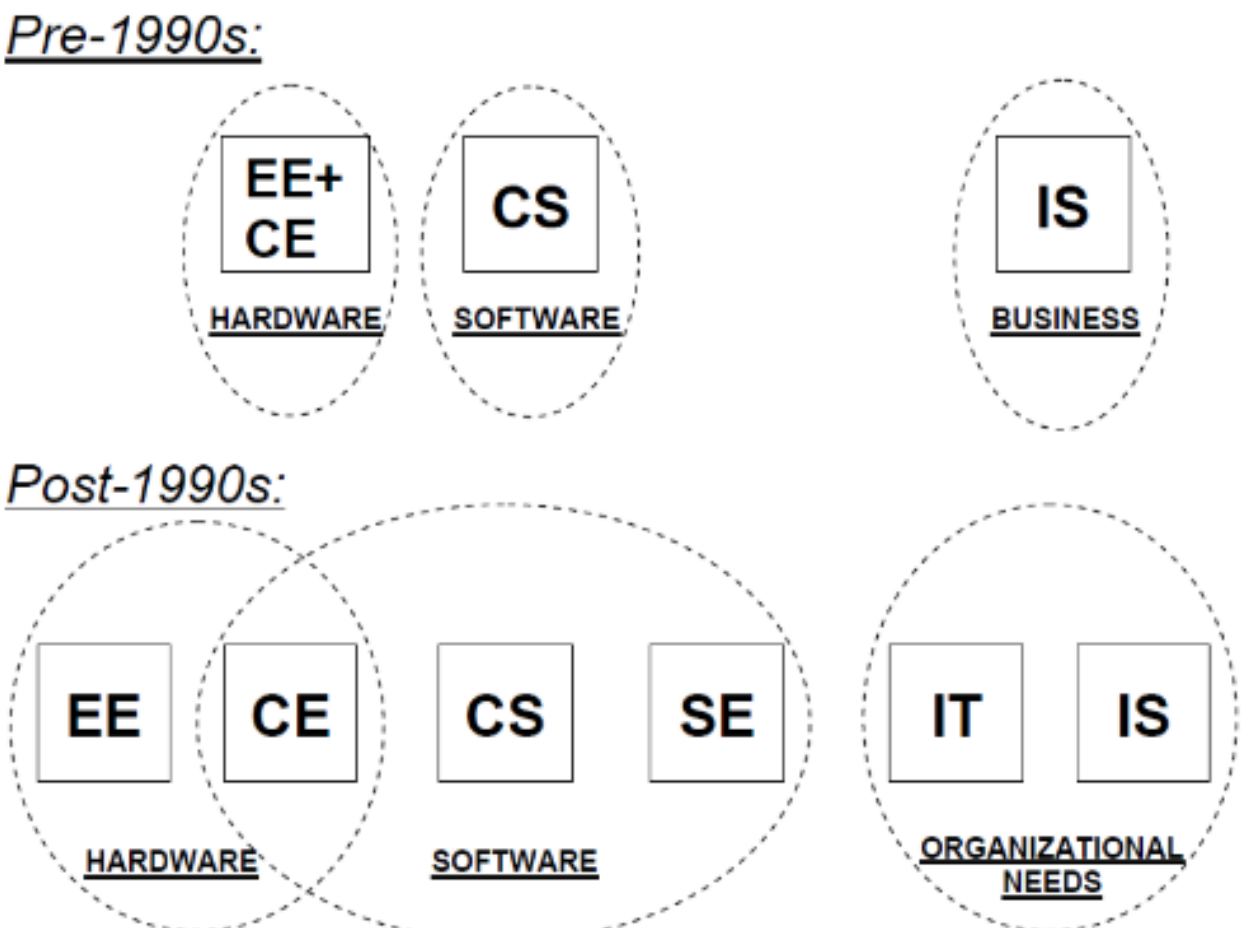
What Is Computing?

In a general way, we can define computing to mean any goal-oriented activity requiring, benefiting from, or creating computers. Thus, computing includes:

- designing and building hardware and software systems for a wide range of purposes;
- processing, structuring, and managing various kinds of information;
- doing scientific studies using computers; making computer systems behave intelligently;
- creating and using communications and entertainment media;
- finding and gathering information relevant to any particular purpose, and so on.

Computing Disciplines



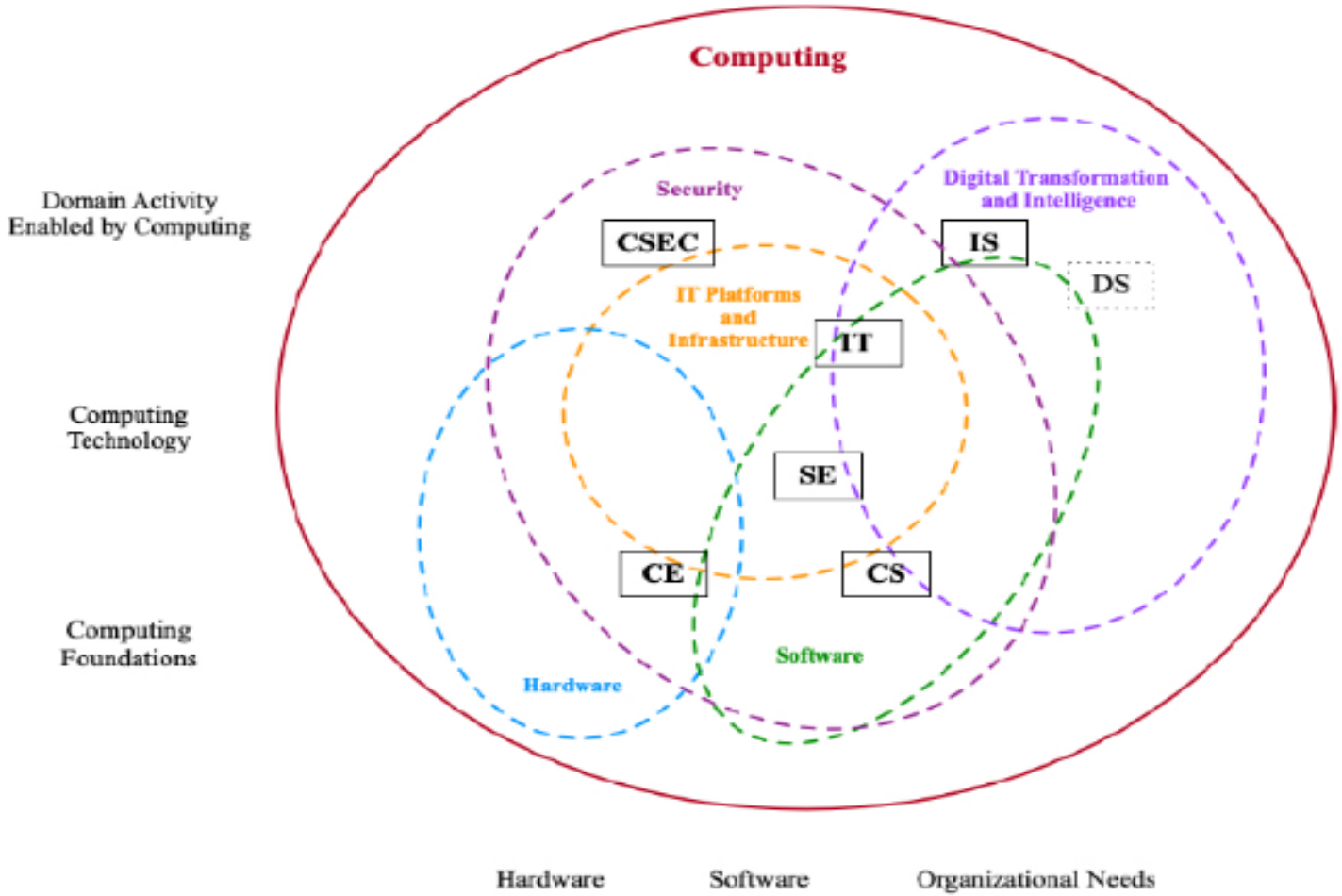


Figure 2.2. A contemporary view of the landscape of computing education

Legend: Curricular reports: CE=computer engineering; CS=computer science; CSEC=cybersecurity; IS=information systems; IT=information technology; SE=software engineering; DS=data science (under development).

Descriptions of the major computing disciplines

- *Computer Engineering*
- A branch of engineering that integrates several fields of computer science and electronics engineering required to develop computer hardware and software.
- Computer engineering students study software development, focusing on software for digital devices and their interfaces with users and other devices.
- CE study may emphasize hardware more than software or there may be a balanced emphasis.
- Areas within computing engineering is embedded systems, the development of devices that have software and hardware embedded in them.

Descriptions of the major computing disciplines

Computer science :

- Computer science is the study of processes that interact with data and that can be represented as data in the form of programs. It is the theory, experimentation, and engineering that enables the use of algorithms to manipulate, store, and communicate digital information.
- We can think of the work of computer scientists as falling into three categories:
  - Design and implement software
  - Devise new ways to use computers
  - Develop effective ways to solve computing problems

Computer scientist must be skilled in four areas:

- ***Algorithmic thinking***, in which one is able to express problems in terms of step-by-step procedures to solve them.
- ***Representation***, in which one is able to store data in a way that it can be processed efficiently.
- ***Programming***, in which one is able to combine algorithmic thinking and representation into computer software.
- ***Design***, in which the software serves a useful purpose.

Descriptions of the major computing disciplines

- *Information Systems*
- Information systems specialists focus on integrating information technology solutions and business processes to meet the information needs of businesses and other enterprises, enabling them to achieve their objectives in an effective, efficient way.

- The information systems specialist plays a key role in determining the requirements for an organization's information systems and is active in their specification, design, and implementation.

Descriptions of the major computing disciplines

Information Technology

- Information technology is a label that has two meanings. In the broadest sense, the term information technology is often used to refer to all of computing. In academia, it refers to undergraduate degree programs that prepare students to meet the computer technology needs of business, government, healthcare, schools, and other kinds of organizations.

- In the previous section, we said that Information Systems focuses on the information aspects of information technology. Information Technology is the complement of that perspective: its emphasis is on the technology itself more than on the information it conveys.

Descriptions of the major computing disciplines

Software Engineering

- Software engineering is the discipline of developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain.
- Software engineering students learn more about software reliability and maintenance and focus more on
techniques for developing and maintaining software that is correct from its inception.
- In general, software engineers adopt a systematic and organized approach to their work, as this is often the most effective way to produce high-quality software.

What is Information Technology (IT) *

- Information technology (IT) is a broad discipline that deals with all aspects of technology, processing, and management of information, especially in large organizations, by dealing with computer software and electronic devices in order to transfer, store, protect, process, transmit and retrieve information.
- Information technology (IT) has been divided into two sections:
  - Physical Section

    The physical part is the devices used in the process of communication from computers and office and telephones to the wires used in the manufacture of networks that are connected with all devices to complete the transfer of information from one side to another.
  - Scientific section

    It is about programming languages, computational engineering, and artificial intelligence that manage the communication process according to steps determined by the administrator or engineer.

*Reference: https://www.scientificworldinfo.com/2020/03/different-application-areas-of-information-technology.html

Cybersecurity (CSEC) ?

Data Science (DS) ?

Top 20 IT Career Paths: Today and Tomorrow *

1. Network and Computer Systems Administrators.
2. Computer and Information Systems Managers.
3. Information Security Analysts.
4. Computer Network Architects.
5. Computer user support specialists.
6. Computer technical support specialists.
7. Computer forensic investigator.
8. Computer systems engineer.
9. Computer Systems Analysts.
10. Computer Programmers.
11. Data warehouse analyst.
12. Cloud architect.
13. Data solutions architect.
14. Software and hardware engineer.
15. IT project manager.
16. IT consultant.
17. Health IT specialist.
18. Database Administrators.
19. Information technology vendor manager.
20. Mobile application and Web Developers.

*Reference: https://www.scientificworldinfo.com/2020/03/different-application-areas-of-information-technology.html