Information Technology Fundamentals

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IT Discipline
Module 1: Part 1

Module 1. Main Objectives

- Review Computing Curricula
- Introduce Baccalaureate Degree Program for IT Engineering: Definition and Expectations
- Describe and Classify IT Professionals: Industry and Research Perspective

Contents

- Computer Science Definition and Fields
- Computing Disciplines: A History and Expectations

Science

The intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment

Computer Science

Computer science (CS) is the study of the theoretical foundations of information and computation and of practical techniques

for their implementation and application in computer systems

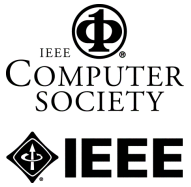
Computer Engineering

A discipline that integrates several fields of electrical engineering and computer science required to develop computer systems

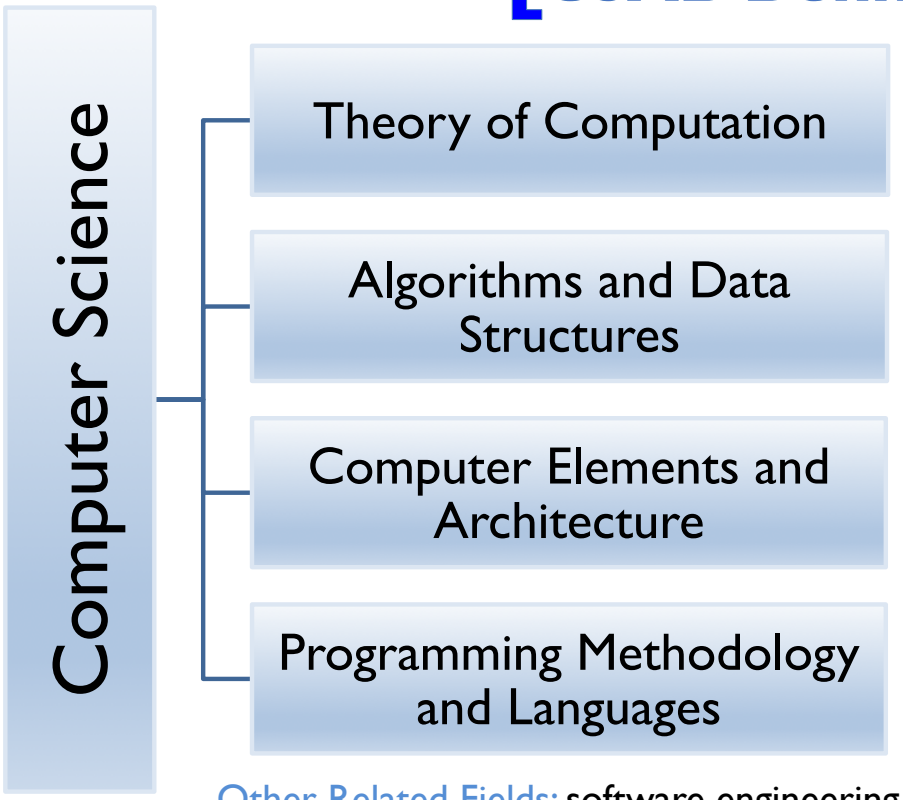
Computing Sciences Accreditation Board (CSAB)

- Association for Computing Machinery (ACM)

- IEEE Computer Society (IEEE-CS)

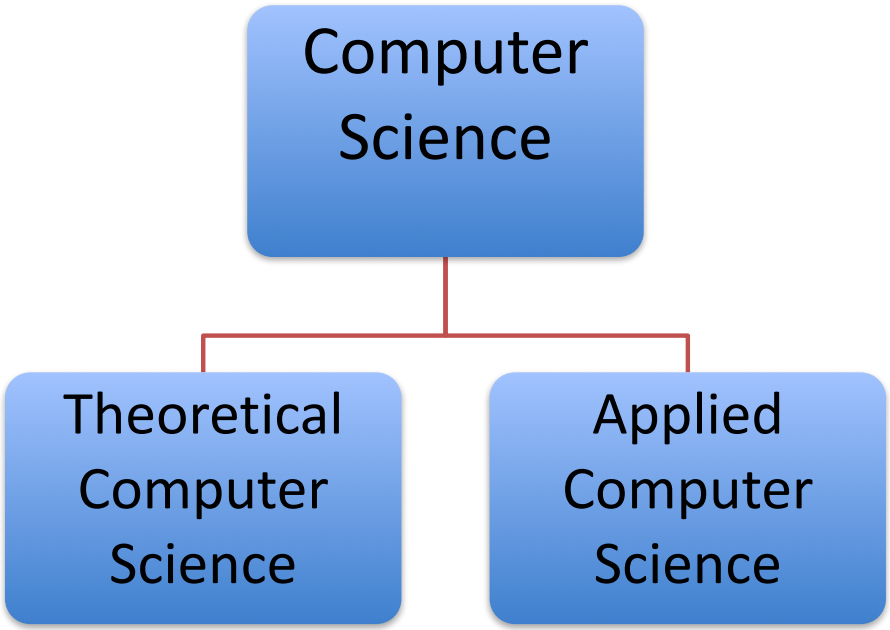


Computer Science Fields
[CSAB Definition]



Other Related Fields: software engineering, artificial intelligence, computer networking and communication, database systems, parallel computation, distributed computation, computer-human interaction, computer graphics, operating systems, and numerical and symbolic computation

Computer Science Fields



Theoretical Computer Science

1. Theory of Computation
2. Information and Coding Theory
3. Algorithms and Data Structures
4. Programming Language Theory
5. Formal Methods
6. Concurrent, Parallel and Distributed Systems
7. Databases and Information Retrieval

Applied Computer Science

1. Artificial Intelligence
2. Computer Architecture and Engineering
3. Computer Graphics and Visualization
4. Computer Security and Cryptography
5. Computational Science
6. Information Science
7. Software Engineering

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Computing Definition

- Any goal-oriented activity requiring, benefiting from, or creating computers
  - 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. *The list is endless!*

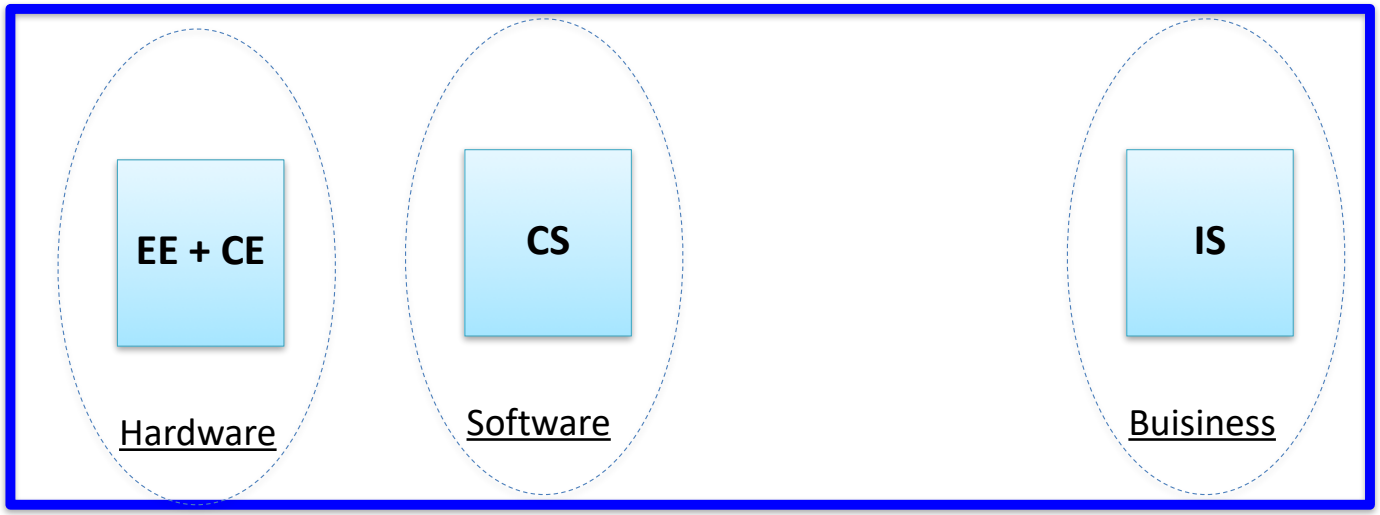
Computing Technologies

Computing includes the theory and science of computation, designing and building of software and hardware systems, and creating and managing new computing technologies for a wide variety of purposes to meet the needs of people, organizations, and society at large.

Computing Categories

- ***Scientific and theoretical perspective*:**
  Advancing the underlying science and theory of computation that enables computing discoveries.
- ***Technical and engineering perspective*:**
  Designing and building computing machines (devices, systems, services).
- ***Business, professional, and societal perspective*:**
  Ultimately, the purpose of creating and managing computing technologies is to serve individuals, organizations, and society at large.

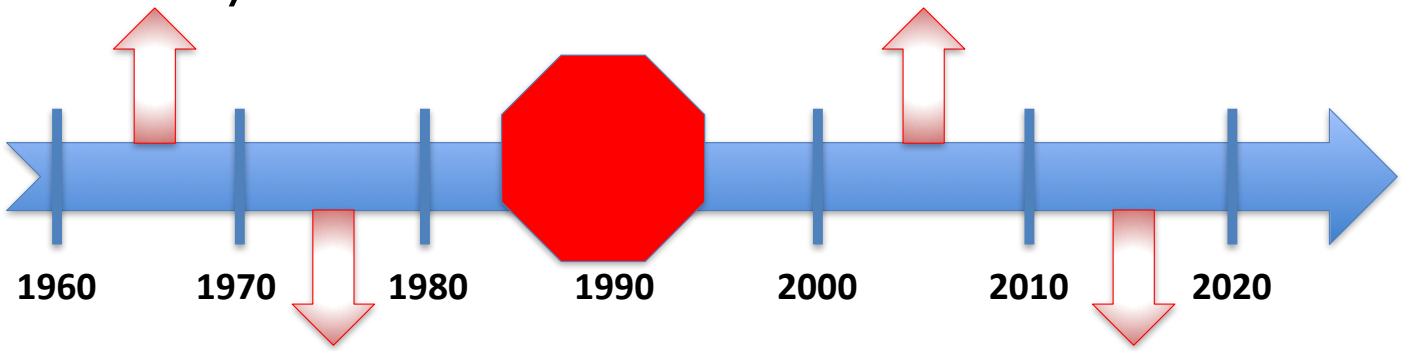
Pre-1990s Disciplines



The Landscape of Computing Disciplines

Computer science
Electrical engineering
Information systems

ACM Computing Curricula



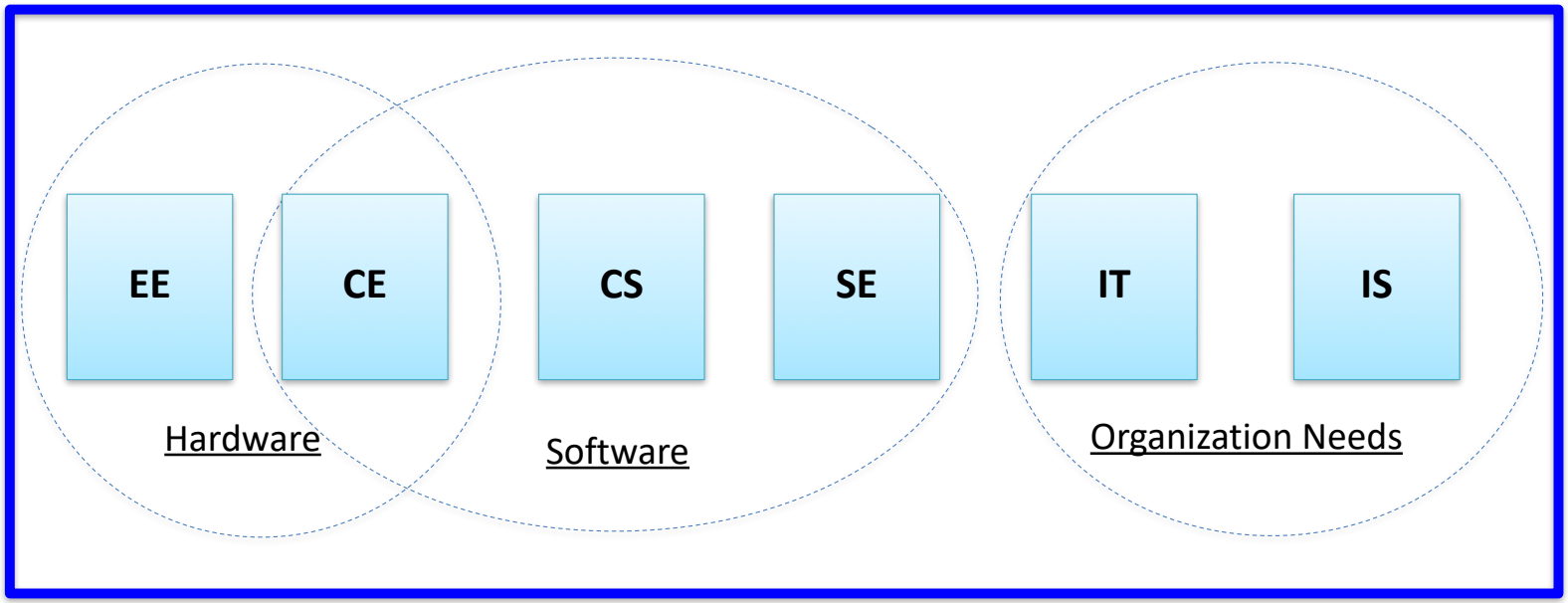
Advent of the Microprocessor
Emerge of Computer Engineering

New IT Curriculum

What Happened in 1990s?

1. Computer engineering solidified its emergence from electrical engineering
2. Computer science grew rapidly and became accepted into the family of academic disciplines.
3. Software engineering had emerged as an area within computer science.
4. Software engineering began to develop as a discipline unto itself.
5. Information systems had to address a growing sphere of challenges.
6. Information technology programs began to emerge in the late 1990s.

Post-1990s Disciplines

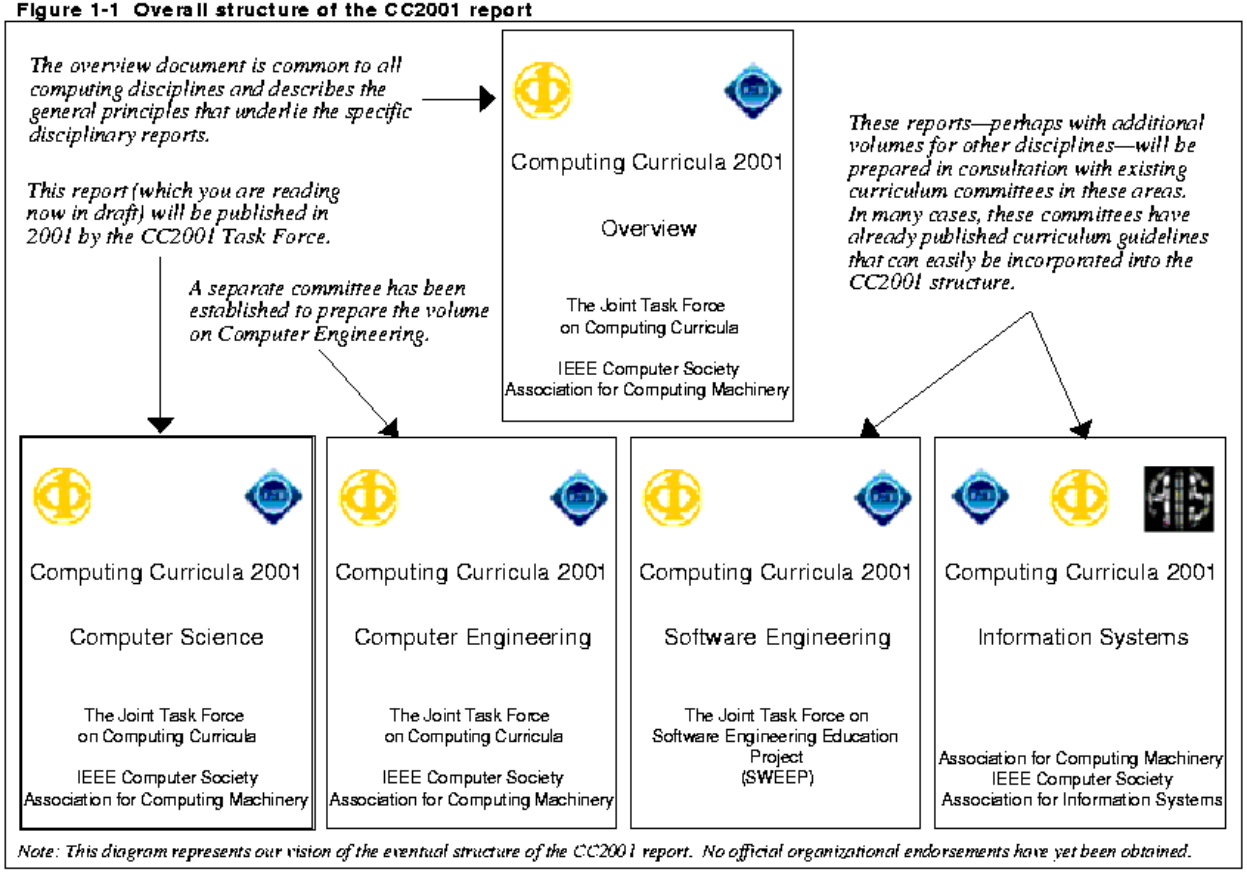


Computing Curricula: History

- Joint effort of IEEE – CS and ACM Started in 1998
- Revise and update 1991 model curricula
- Address developments of past decade and endure through the next decade
- Separate volumes for
  - Computer Science
  - Computer Engineering
  - Software Engineering
  - Information Systems
- Computer Science Volume completed in Dec. 2001 http://www.computer.org/education/cc2001/

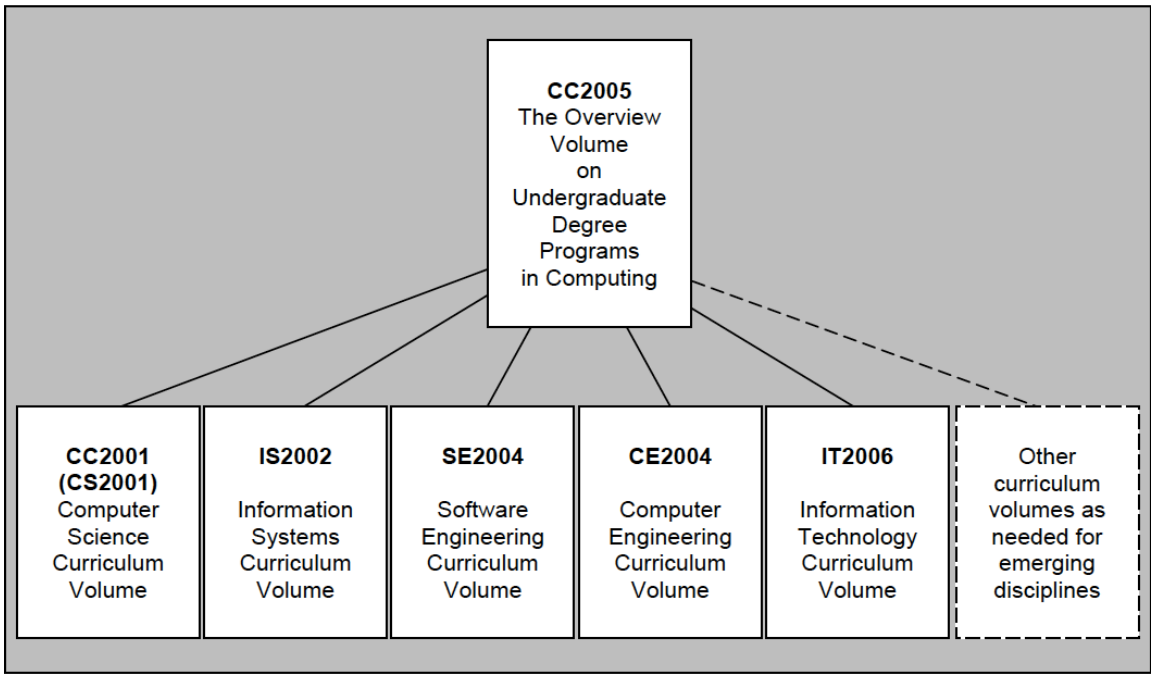
Computing Curricula: Results in 2001

Figure 1-1 Overall structure of the CC2001 report



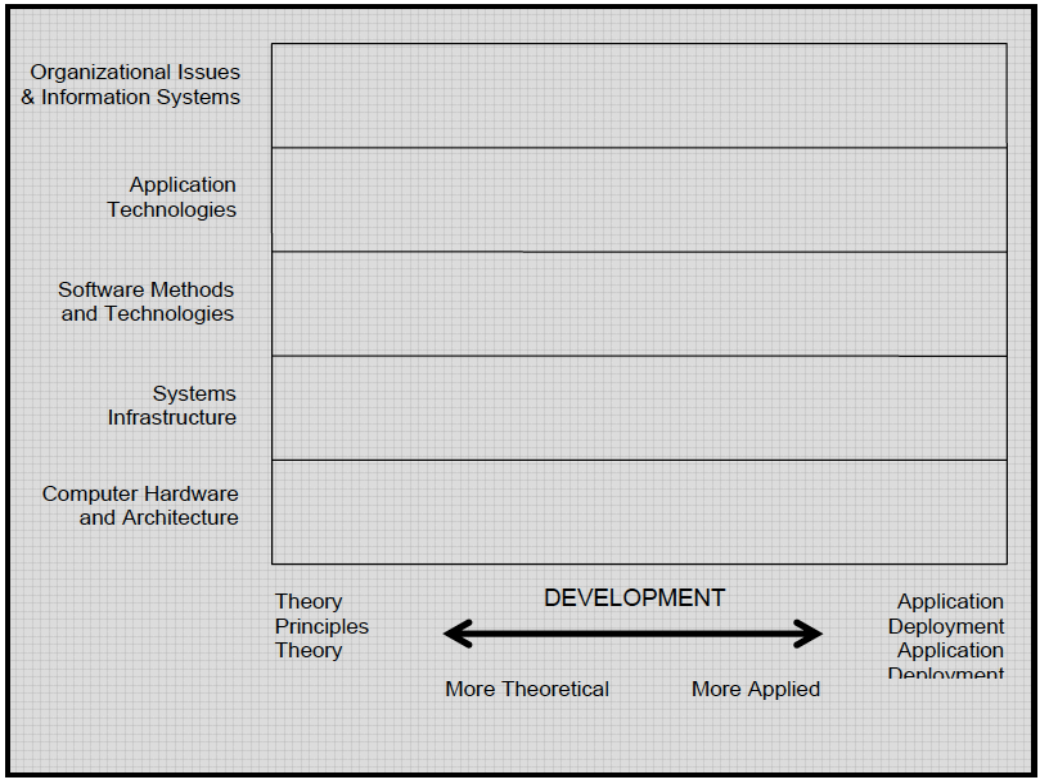
Note: This diagram represents our vision of the eventual structure of the CC2001 report. No official organizational endorsements have yet been obtained.

Structure of the Computing Curricula Series



CS2001	IS2002	SE2004	CE2004	IT2008	CS2008	IS2010	CS2013	SE2014	CE2016	IT2017

The Problem Space of Computing



- How each discipline occupies the *problem space* of computing
- Represent current realities, not ambitions for the future
- What students in each of the disciplines typically do after graduation

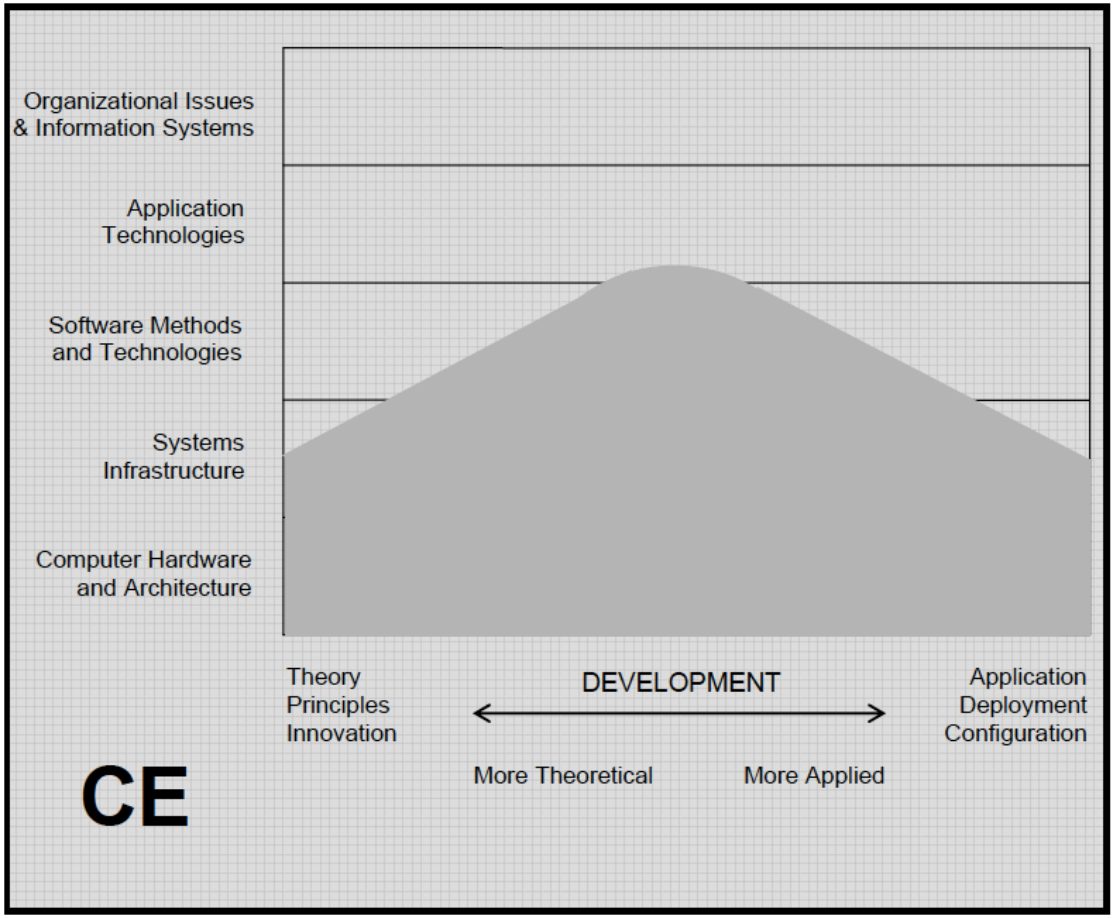
The Computing Disciplines

1. Computer Engineering
2. Computer Science
3. Information Systems
4. Information Technology
5. Software Engineering

Computer Engineering

- Concerned with the design and construction of computers and computer-based systems
- Involves the study of hardware, software, communications, and the interaction among them
- Its curriculum focuses on the theories, principles, and practices of traditional electrical engineering and mathematics and applies them to the problems of designing computers and computer-based devices.
- Dominant Area: Embedded Systems

Computer Engineering



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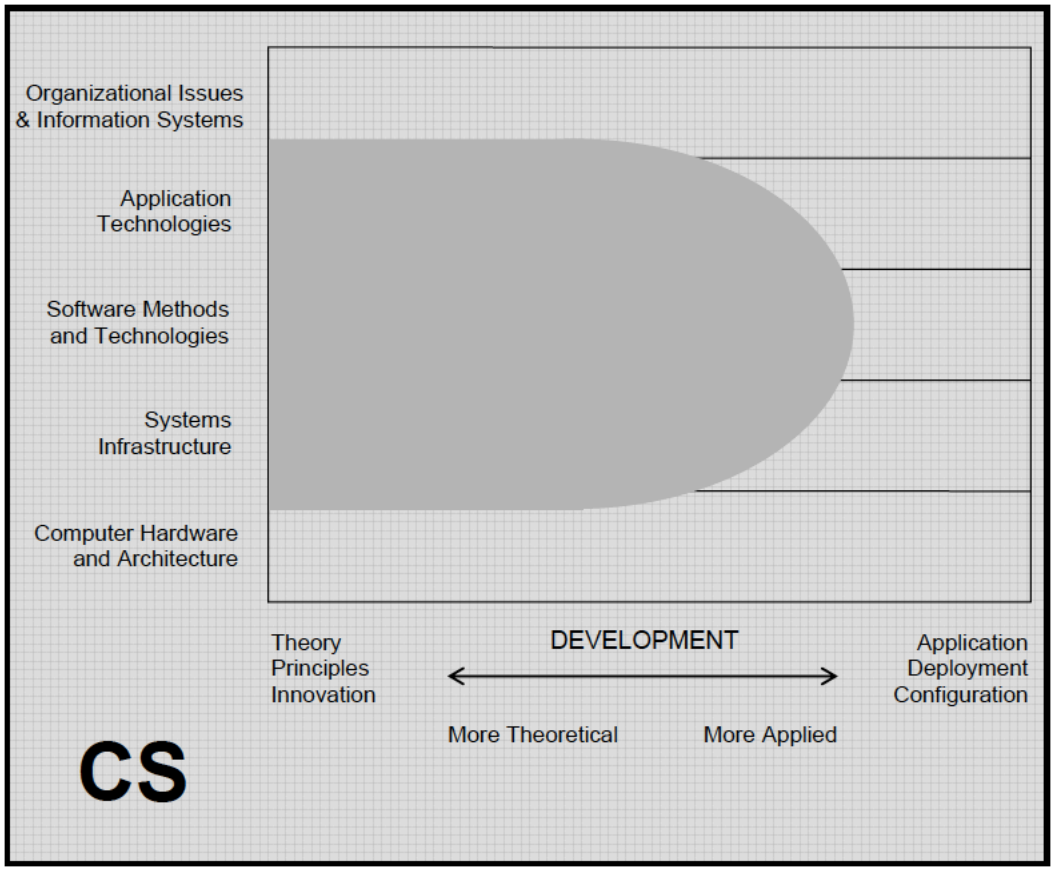
Computer Science

Spans a wide range, from its theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, intelligent systems, bioinformatics, and other exciting areas.

- They design and implement software.
- They devise new ways to use computers.
- They develop effective ways to solve computing problems.

Computer Science



The Computing Disciplines

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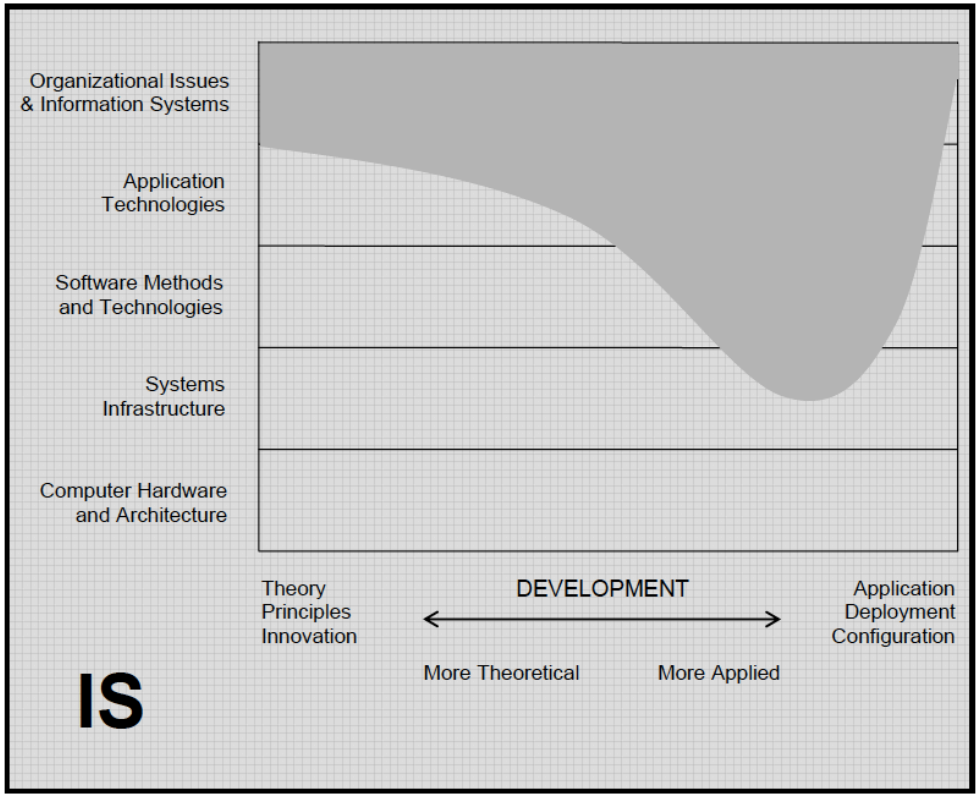
Information Systems

- 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.
- **Located in business schools**
- E.g., Computer Information Systems or Management Information Systems

Information System



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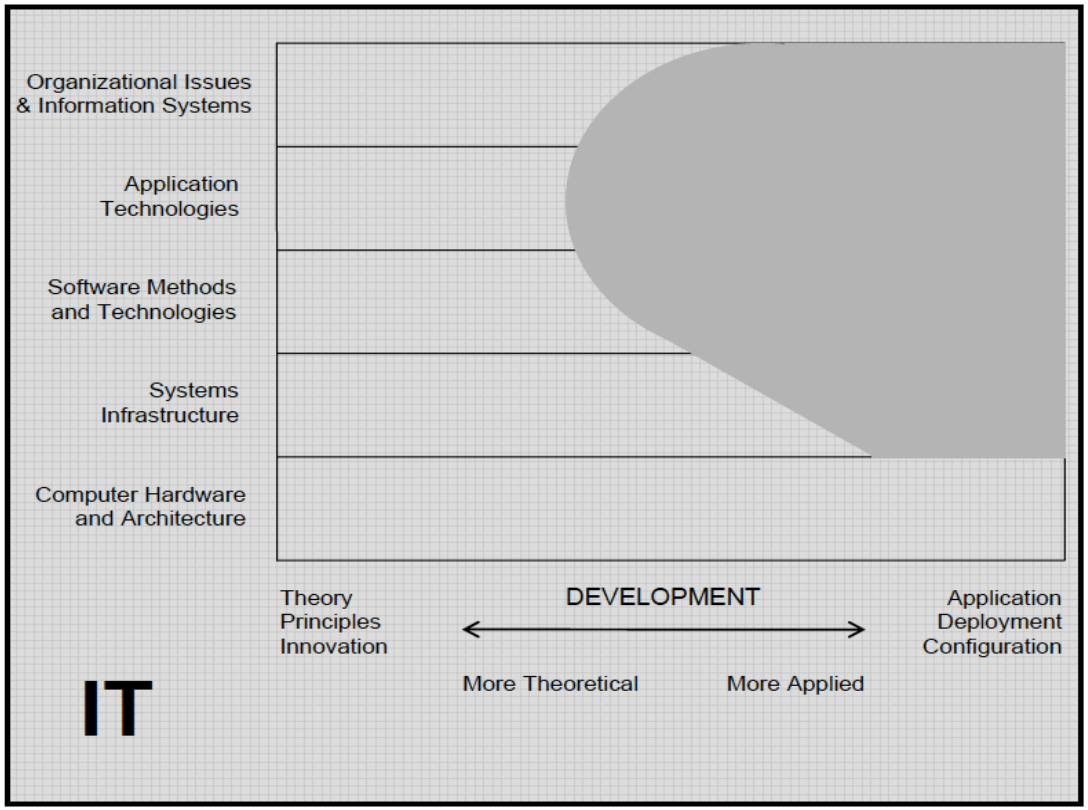
Information Technology

- Information technology is a label that has two meanings.
  1. In the broadest sense, the term information technology is often used to refer to all of computing.
  2. 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.

Information Technology



The Computing Disciplines

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Software Engineering

The discipline of developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them.

Software Engineering