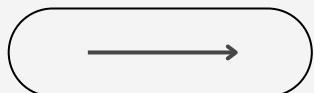


PRORTFOLIO # 1  
A Comprehensive Study

DATE  
08/24/2024



# EXPLORING COMPUTER SCIENCE AND THE FIVE MAJOR COMPUTING DISCIPLINES



BS INFORMATION TECHNOLOGY  
CIS 1102

PRESENTED BY  
mizzi pomoy

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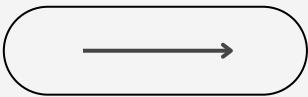
## What do we know?

Women have been in computing since before computers were machines, when complicated calculations were done by hand using brainpower (Davies, 2022).

## When did it all begin?

The computer science field began in the 1840s with Ada Lovelace, recognized as the first computer programmer. Lovelace was also the first person to suggest that computers could be more than just calculators (Barfield, 2021).

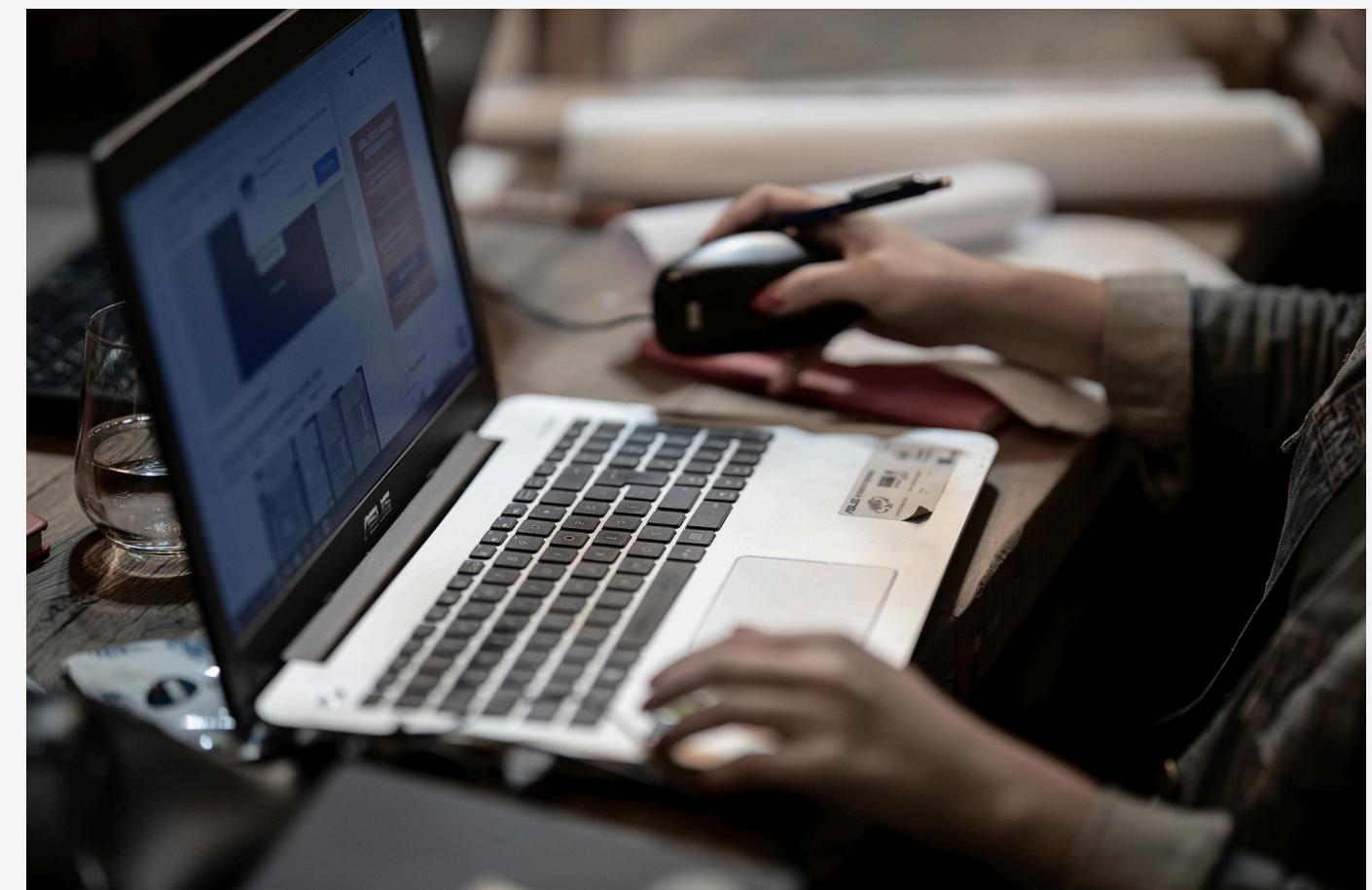
# COMPUTER SCIENCE AS A DISCIPLINE



# **WHAT IS COMPUTING? HOW DO WE DEFINE IT AS A DISCIPLINE?**

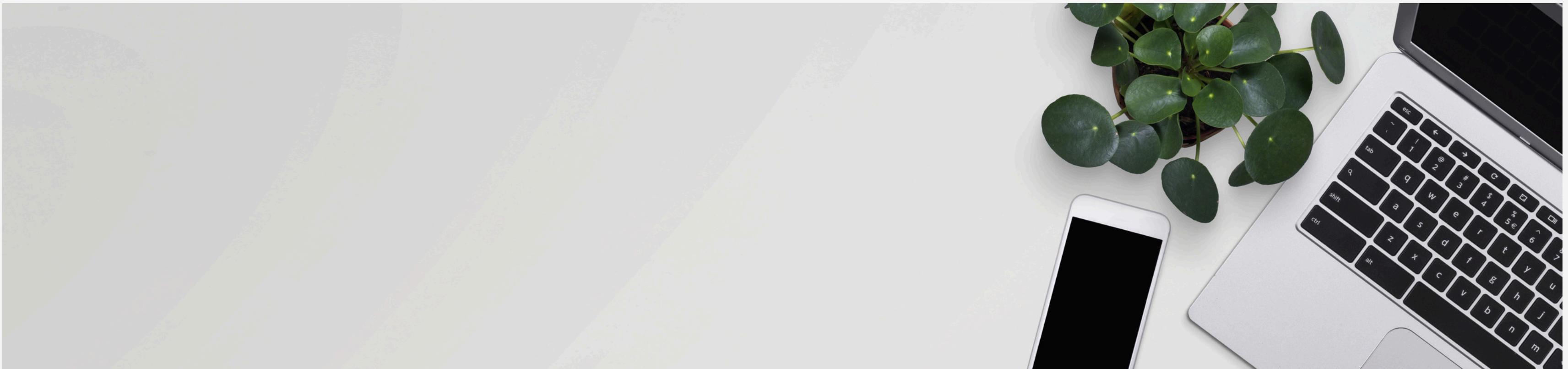
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Computer Science is an independent and recognized scientific discipline (Denning, 2013). The discipline of computing is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application. The fundamental question underlying all of computing is, “What can be (efficiently) automated?” (Denning et al., 1989).

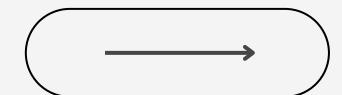


**Computer Science / Computing /  
Discipline**





# WHY IS COMPUTER SCIENCE CONSIDERED THE FOUNDATION OF TECHNOLOGY?

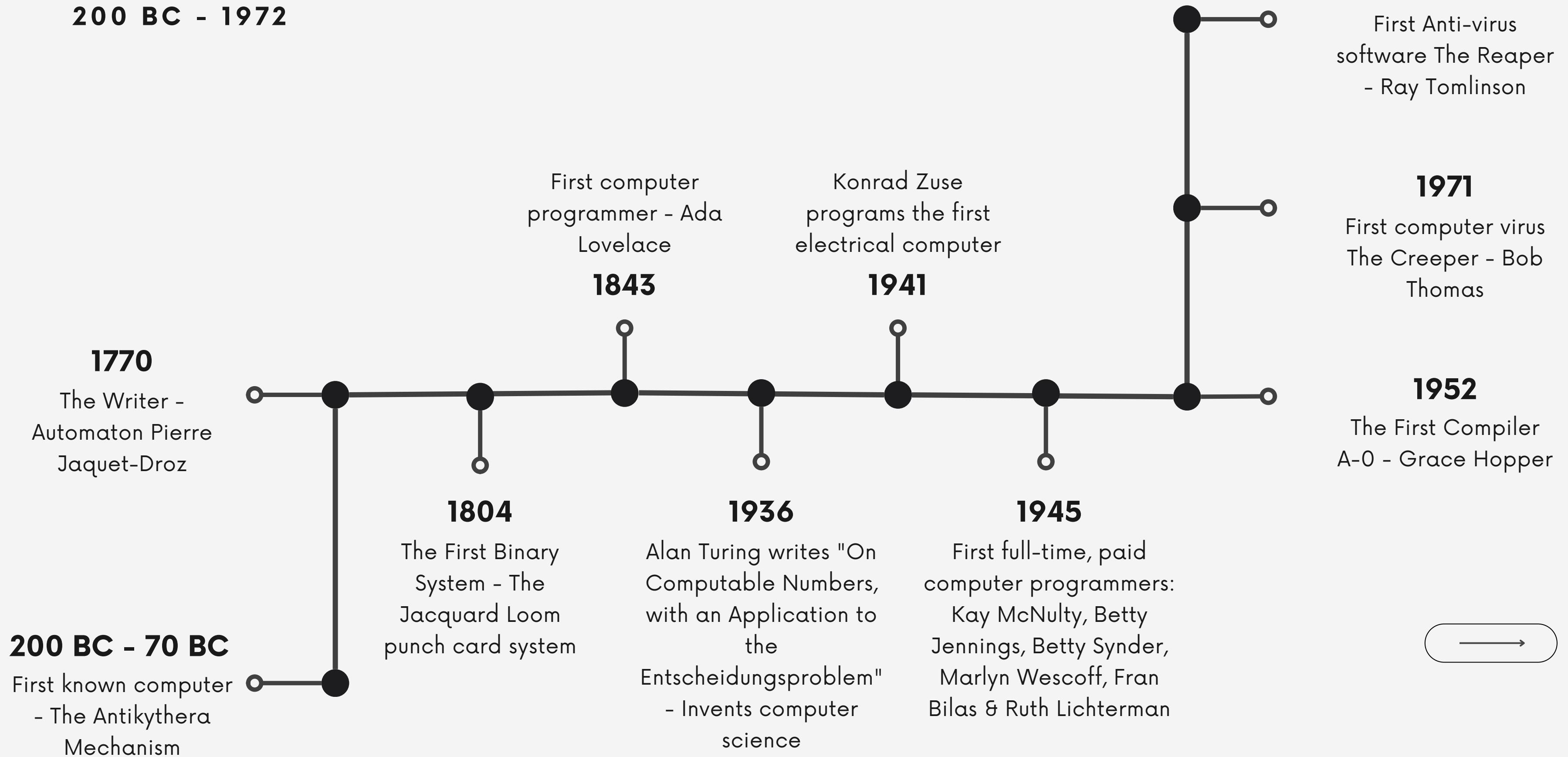


**Computer science is the underlying discipline that drives information technology, serving as the foundation upon which IT professionals build their expertise (Cosker, 2023).**

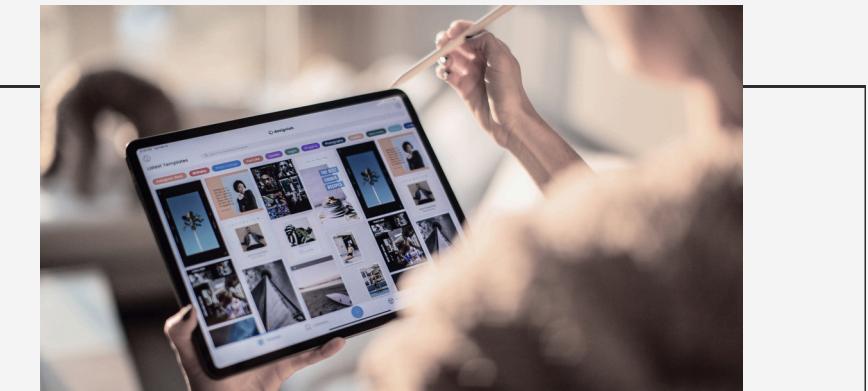
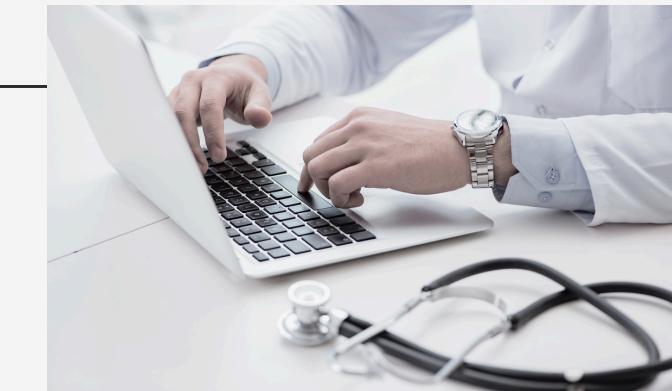
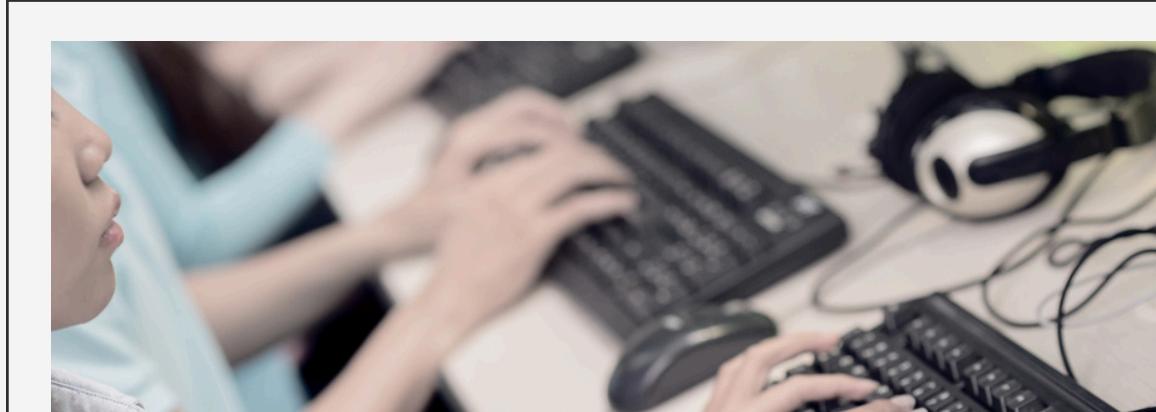
This provides the necessary knowledge and skills for IT professionals to develop innovative solutions to complex problems.

# A BRIEF HISTORY ON COMPUTER SCIENCE

200 BC - 1972



# HOW IS COMPUTER SCIENCE SHAPING OUR EVERYDAY LIVES?



## Use of computer in **Education**

According to Victor Cristea, E-learning has a vast presence in almost every field, including language teaching, where technology has significantly improved the ways of learning (2016).

## Use of computer in **Business**

Computer science can help businesses to better understand their customers. By analyzing customer data, businesses can develop more targeted marketing campaigns and improve their overall customer service (Johnson, 2022).

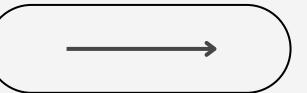
## Use of computer in **Healthcare Industries**

Using computer software enables researchers to analyze large data sets and find patterns in medical information including digital health, data analysis, medical decision-making, telemedicine, computational modeling and electronic medical records (Northern Kentucky University, 2023).

## Use of computer in **Banking Sectors**

According to Aguimar Neto, computer science and finance are closely interlinked fields today. Data mining, machine learning, NLP, cryptography, and other technical disciplines are transforming finance (2023).

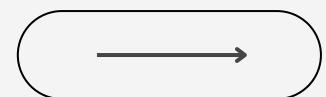
# What does the future of Computer Science look like?



Due to continuous growth and advancements, the Computer science future is bright and promising. The possibilities are endless and constantly expanding, with new areas of study and research emerging regularly. The rise of artificial intelligence, cybersecurity, and data science has created new opportunities for careers and innovation within the industry (Sugandhi, 2024).



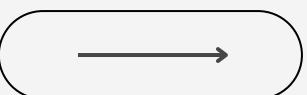
# Computing Discipline and Majors



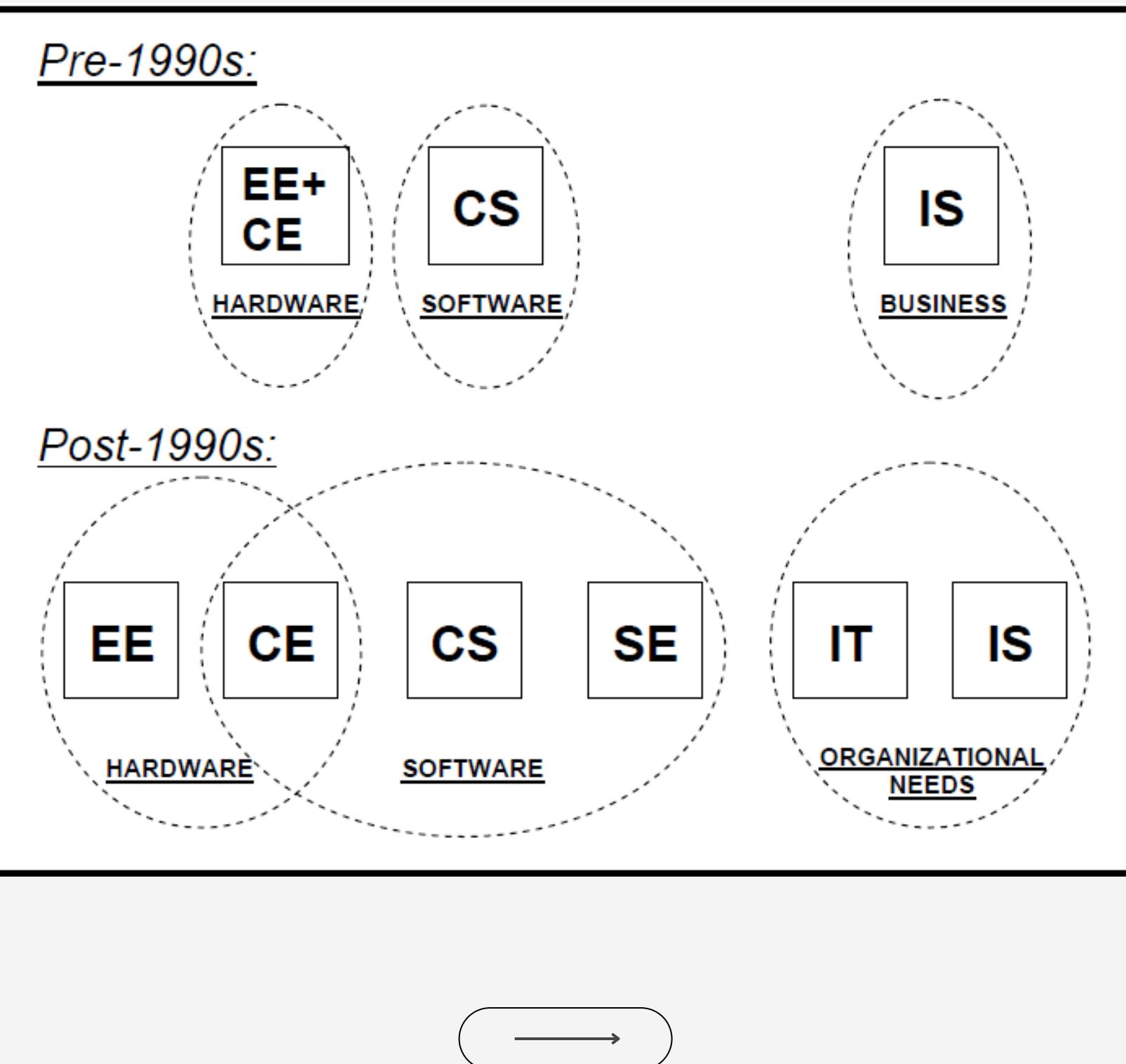
# What are the five major kinds of undergraduate degree programs in computing?



- Computer Engineering
- Computer Science
- Information Systems
- Information Technology
- Software Engineering



# BRIEF HISTORY ON THE FAMILY OF DISCIPLINES



## PRE - 1990s

- Computer Science was on the technical side
- Information Systems were on the business side

## POST - 1990s

- Computer Engineering became a strong discipline
- Software Engineering was sometimes thought as an area within CS and began its own identity
- Information Technology program was common worldwide but began emerging in the 1990s



# Overview



01

**Computer Engineering** is focused on the connection between hardware and software (Connolly, et al., 2017)

02

**Computer Science** covers the widest range of computing topics from its theoretical foundations to the development of new computing technologies and techniques (Connolly, et al., 2017).

03

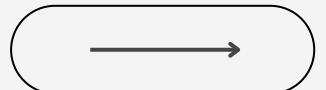
**Information Systems** is focused on integrating information technology solutions and business processes (Connolly, et al., 2017).

04

**Information Technology** programs prepare students to meet the computer technology needs of business and other organizations (Connolly, et al., 2017).

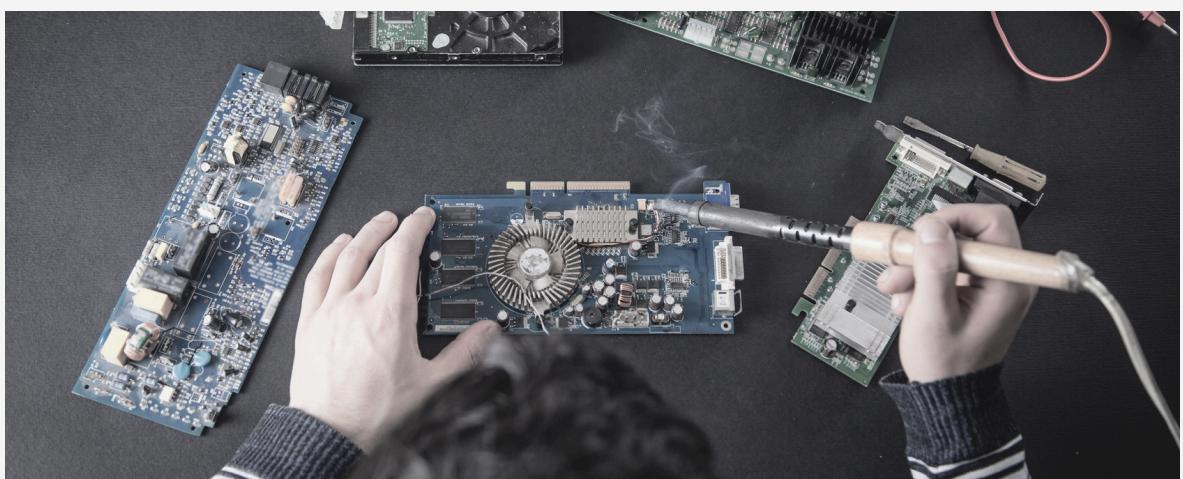
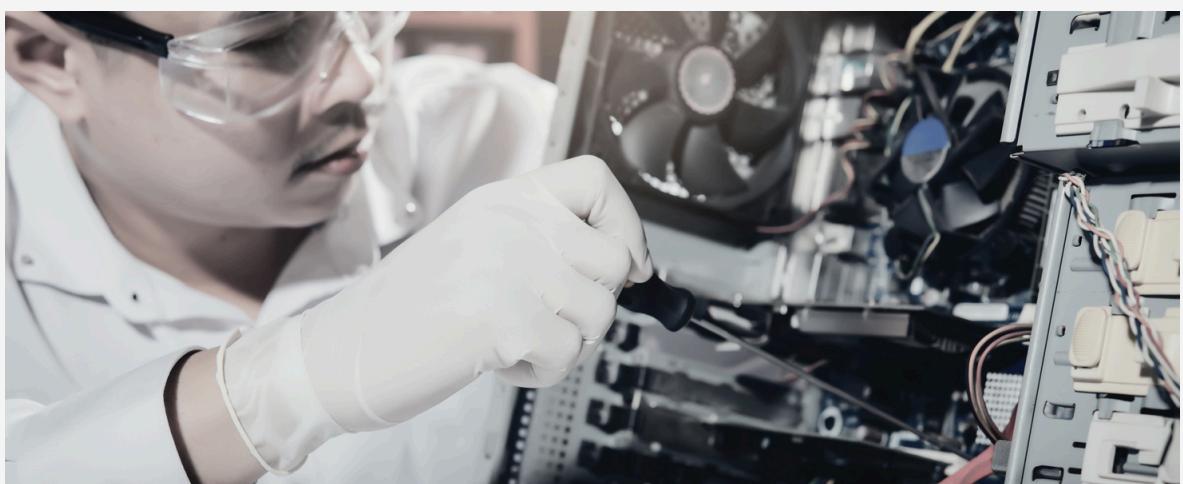
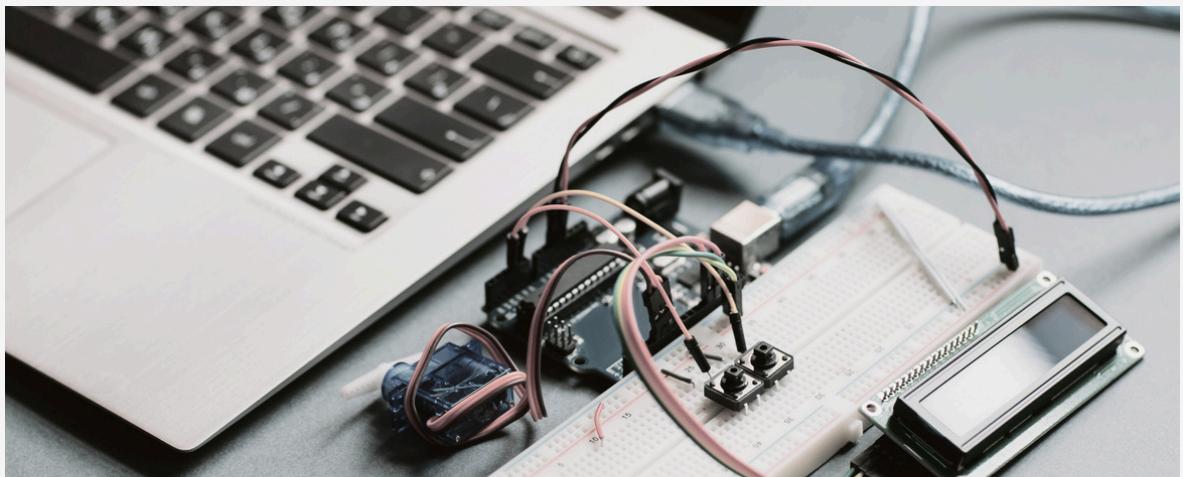
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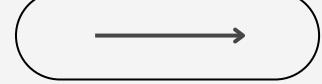
**Software Engineering** is the discipline of developing and maintaining large software systems (Connolly, et al., 2017).



# What is Computer Engineering?

Computer engineering is defined as the discipline that embodies the science and technology of design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment (Campbell, et al., 2007).

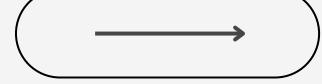




# How Do Hardware and Software Unite in Computer Engineering?

The relationship between hardware and software is often referred to as the "hardware-software co-design" or "hardware-software interface". This means that hardware and software are developed together, with each influencing the other, in order to ensure optimal performance and compatibility (Singh, 2024).





# How Do Hardware and Software Unite in Computer Engineering?

(cont'd)

Hardware and software work in tandem in a computer system where hardware refers to the physical components, like the CPU and memory, and software is the set of instructions that tells the hardware what to do. Software runs on the hardware to perform various tasks, from basic to complex operations (Simplilearn, 2024).



# SIGNIFICANT DEVELOPMENTS OF THE 1990s

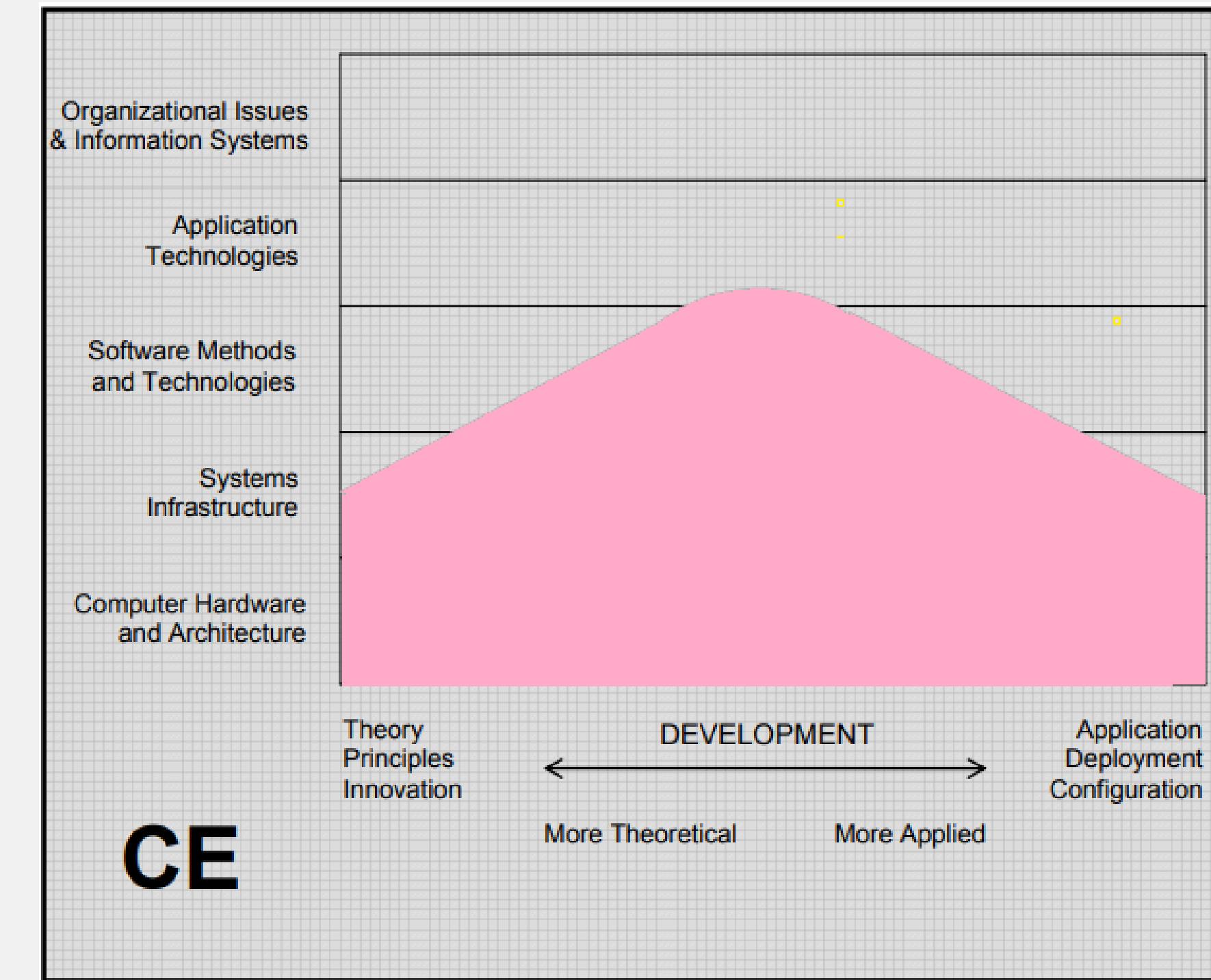
**Computer engineering** solidified its emergence from electrical engineering. (Shackelford, et al., 2005). Emerged during the late 1970s - 1980s, but not until the 1990s that computer chips became basic components of most kinds of electrical and mechanical devices.

The dramatic expansion in the kinds of devices that rely on chip-based digital logic helped computer engineering solidify its status as a strong field and, during the 1990s, unprecedented numbers of students applied to computer engineering program (Shackelford, et al., 2005).



# A CONCEPTUAL DIAGRAM ON THE DISCIPLINE OF COMPUTER ENGINEERING

Computer Engineering spans a wide range of topics, from fundamental hardware principles to applied software development. As it moves from hardware to software, their focus narrows, primarily centering on the software needed to integrate and control hardware systems. This highlights the discipline's balance between theoretical concepts and practical application in developing integrated computing systems.



# IMPACT OF COMPUTER ENGINEERING IN TERMS OF



## EDUCATION

This interdisciplinary field draws upon the principles of electrical engineering, mathematics, and computer science to develop computers and systems that are more efficient, reliable, and secure (Hussaini, 2023).



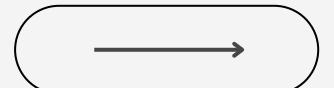
## BUSINESS

Enterprise resource planning (ERP) systems streamline business processes, integrating functions such as finance, human resources, and supply chain management (St. mary's Group of Institutions, 2024).



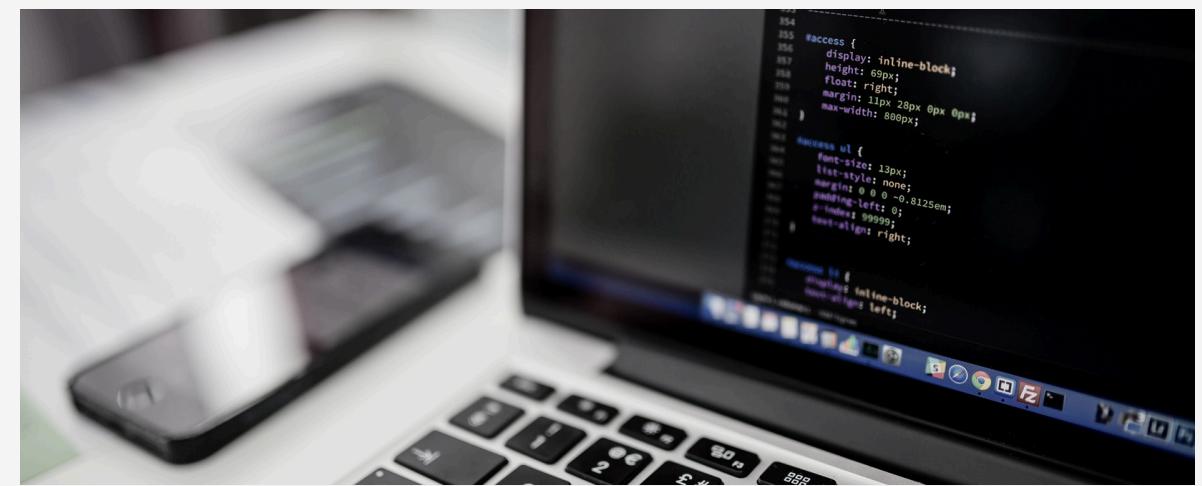
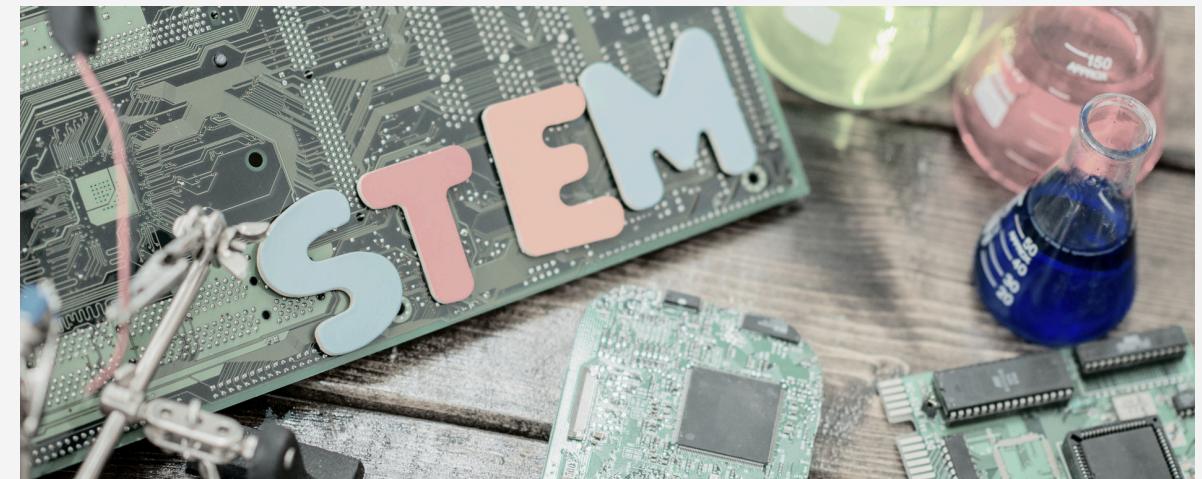
## HEALTHCARE

Enhanced diagnostic accuracy, streamlined patient care, improved accessibility, optimized treatment plans, and efficient healthcare delivery. (The Role of Computer Engineers in Healthcare Technology, 2024).



# What is Computer Science?

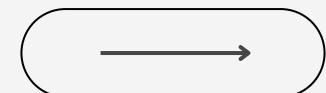
The study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information (Tucker, et al., 2024).



# SIGNIFICANT DEVELOPMENTS OF THE 1990s

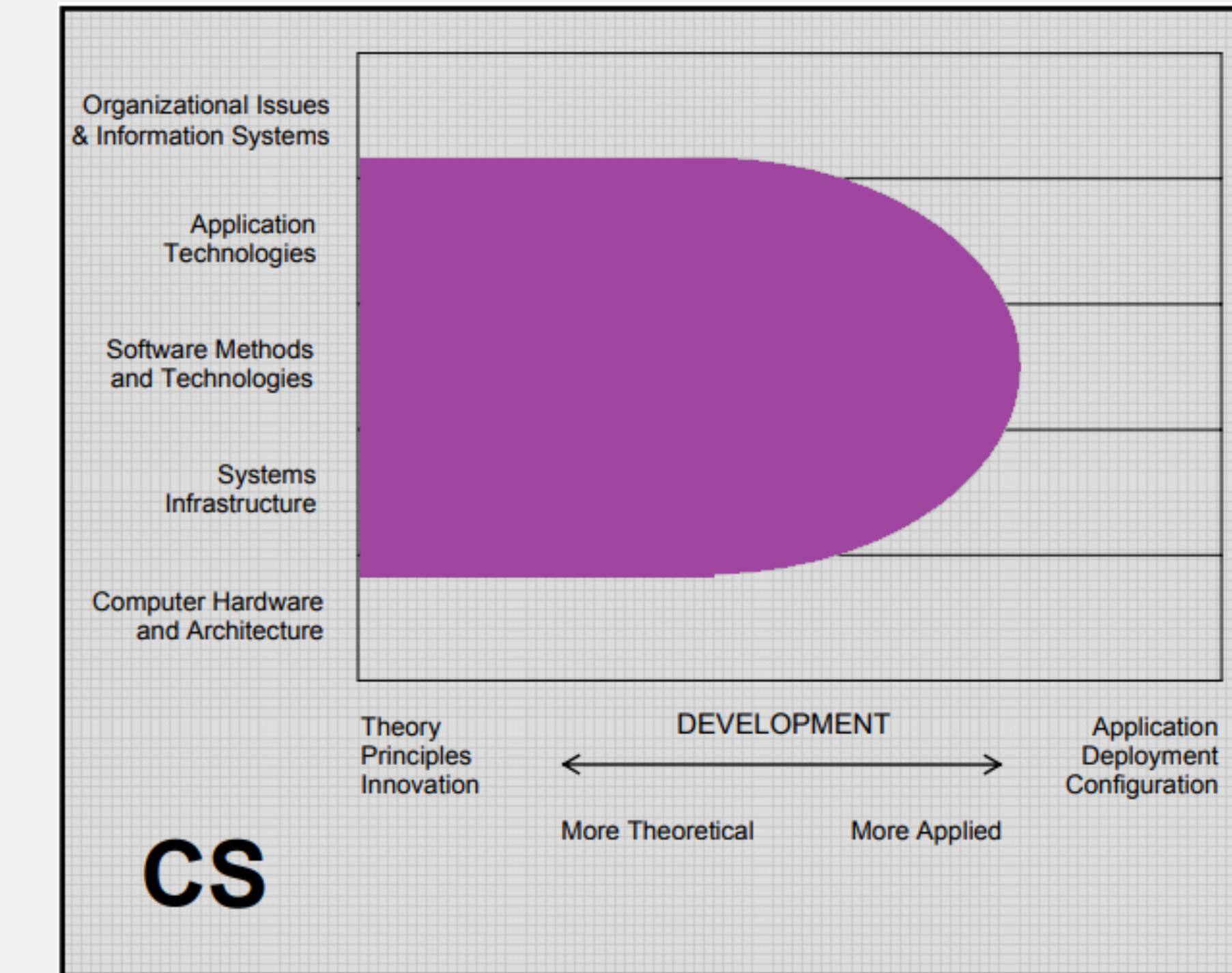
**Computer science** grew rapidly and became accepted into the family of academic disciplines (Shackelford, et al., 2005) . It first appeared as a discipline in the 1970s, but faced a considerable controversy about whether computer science was a legitimate academic discipline.

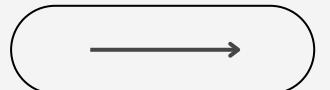
By the 1990s, computer science had developed a considerable body of research, knowledge, and innovation that spanned the range from theory to practice, and the controversy about its legitimacy died (Shackelford, et al., 2005).



# A CONCEPTUAL DIAGRAM ON THE DISCIPLINE OF COMPUTER SCIENCE

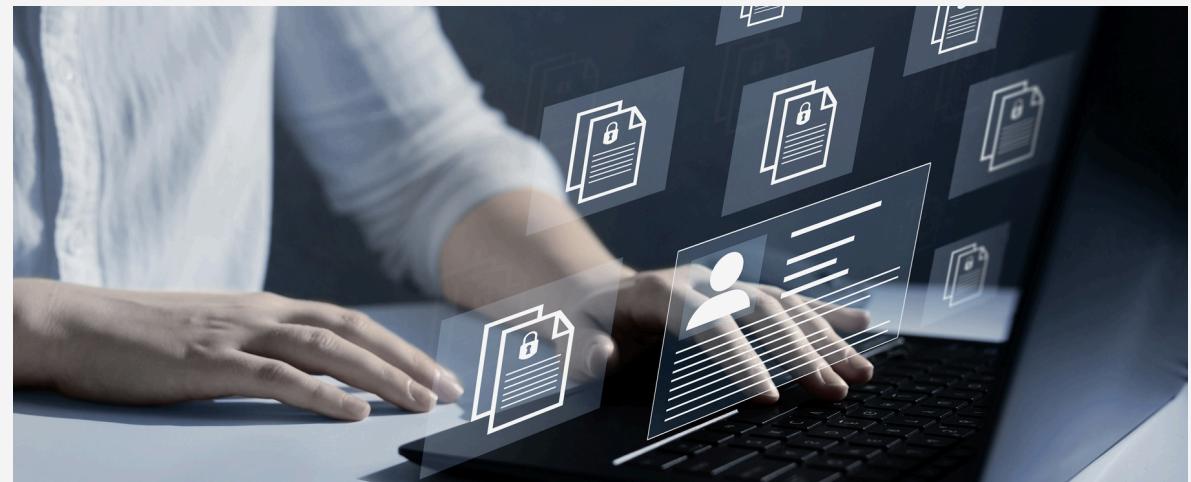
Computer Science spans a wide range of areas from software to advanced information systems. Computer scientists focus on designing and developing various types of software, including system infrastructure and application technologies. However, they typically do not engage in the deployment or customization of these products for specific organizational needs.





# What is Information Systems?

According to Zwass, information system is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products (2024).



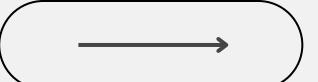
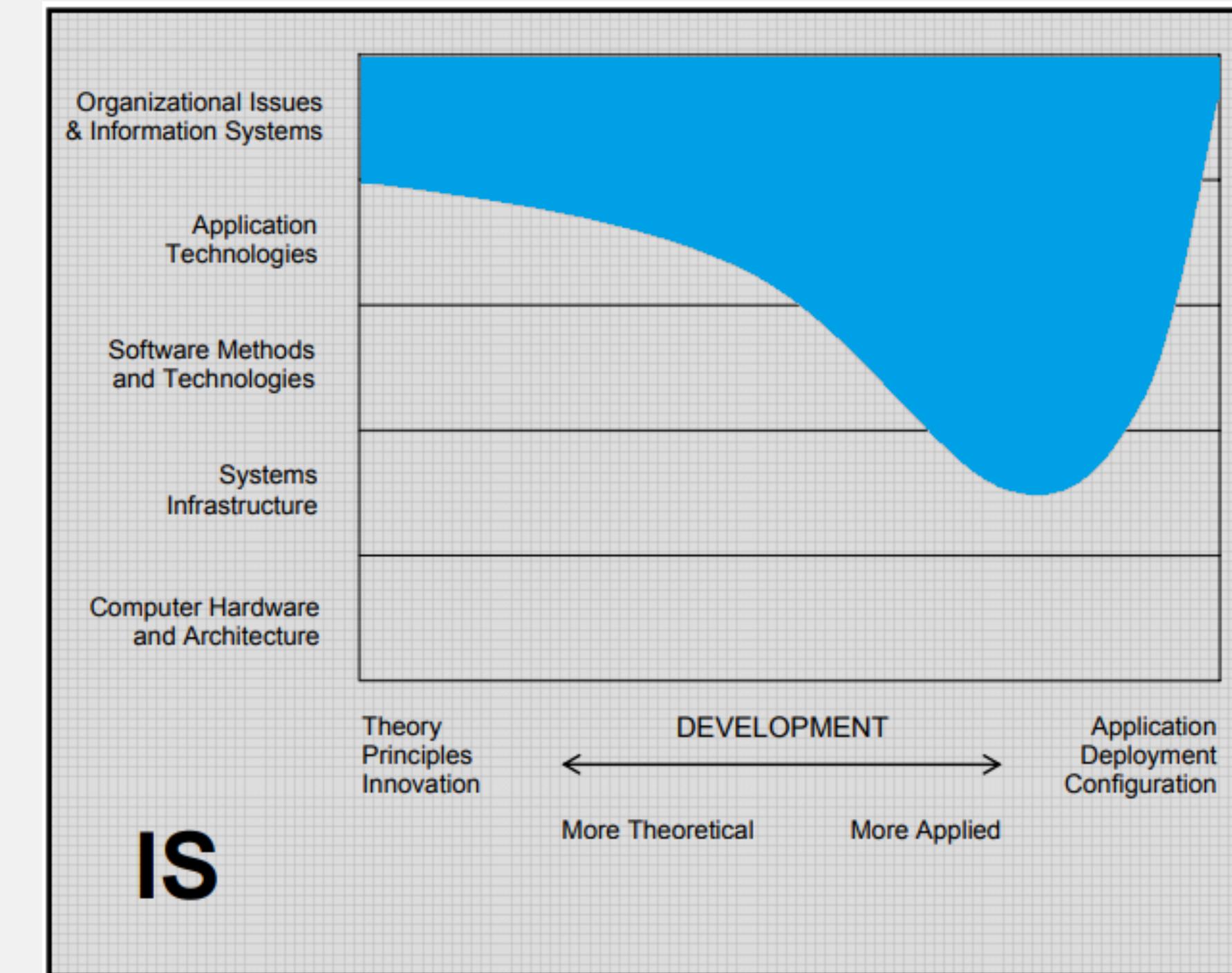
# SIGNIFICANT DEVELOPMENTS OF THE 1990s

**Information systems** had to address a growing sphere of challenges. Prior to the 1990s, many IS specialists focused primarily on the computing needs that the business world had faced. By the end of 1990s, networked PCs had become basic commodities. Computers became integral parts of the work environment, organizations had more information available.

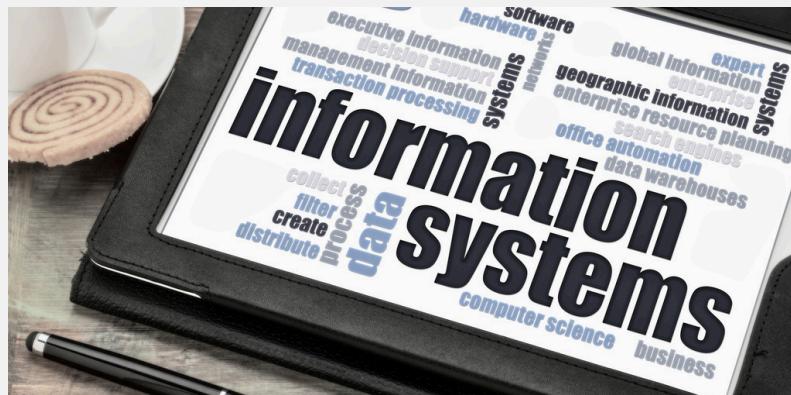
The problems of managing information became extremely complex, and the challenges of making proper use of information and technology to support organizational efficiency and effectiveness became crucial issues. Because of these factors, the challenges faced by IS specialists grew in size, complexity, and importance. In addition, information systems as a field paid increasing attention to the use of computing technology as a means for communication and collaborative decision making in organizations (Shackelford, et al., 2005).

# A CONCEPTUAL DIAGRAM ON THE DISCIPLINE OF INFORMATION SYSTEMS

Information Systems focuses on the connection between information systems and organizations, covering everything from theory to application. IS professionals not only deploy and configure systems but also customize software, especially databases, to meet organizational needs. They bridge the gap between technology and business, ensuring that information systems effectively serve the enterprise.



# IMPACT OF INFORMATION SYSTEMS IN TERMS OF



## EDUCATION

It enhances academic success by providing access to resources and tools needed for learning. Effective use of IS can help students in organizing, managing, and storing academic materials efficiently (The Role of Information Systems in Academic Success, 2023)



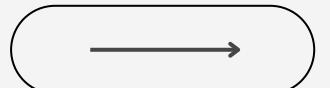
## BUSINESS

Higher efficiency, production process, customer service, finance and accounting, information processing and other processes could be improved with the help of information systems (Lipaj & Davidavičienė, 2013).



## HEALTHCARE

Information systems have evolved within healthcare to allow doctors to provide better treatment through more accurate diagnoses and information sharing (Indeed Editorial Team, 2024).



# What is Information Technology?

The field of information technology (IT for short) is often associated with the computer systems, hardware, software, and networks related to the processing and distribution of data (CISCO, n.d.).



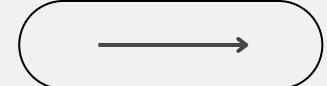
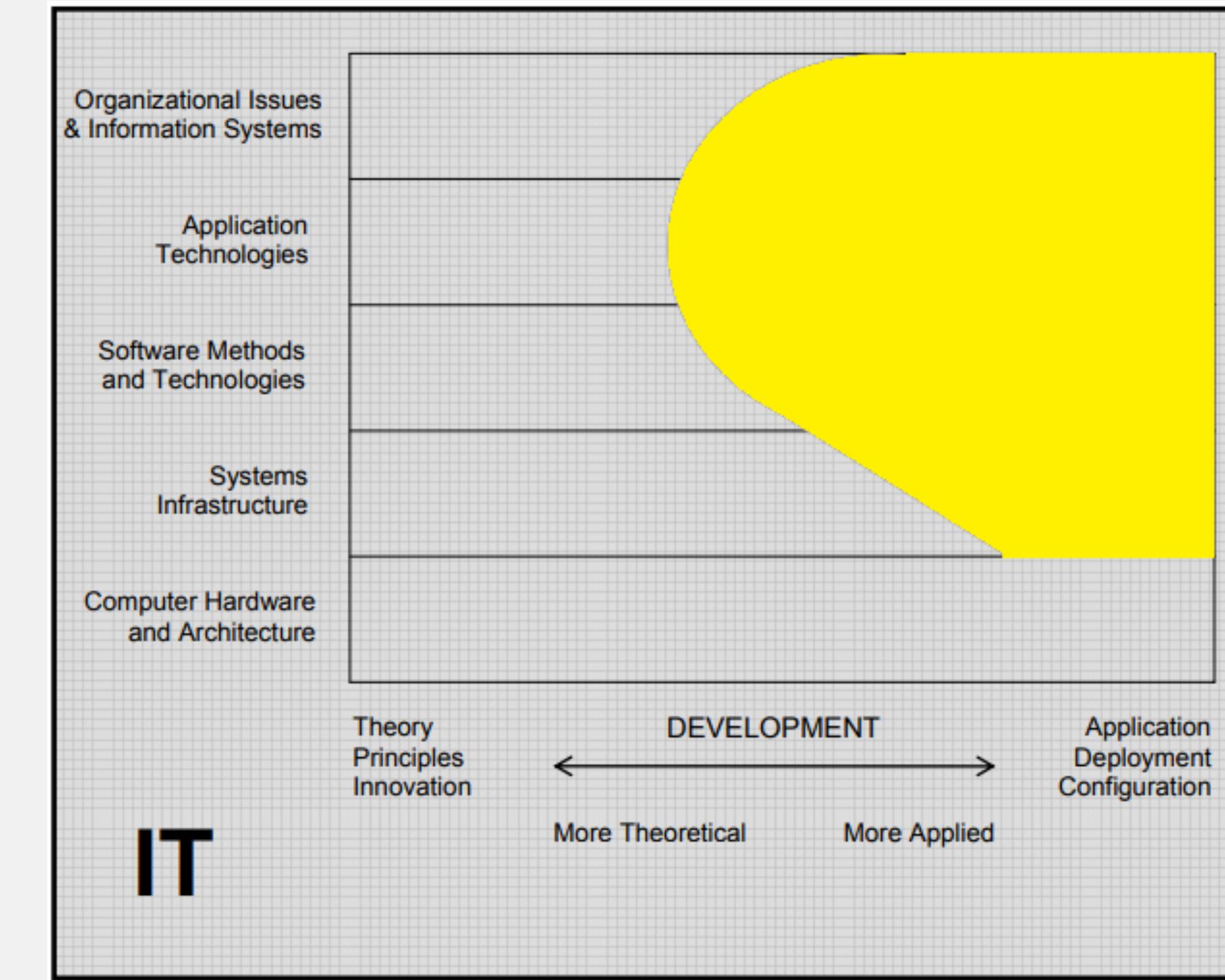
# SIGNIFICANT DEVELOPMENTS OF THE 1990s

**Information technology** programs began to emerge in the late 1990s. During the 1990s, computers became essential work tools at every level of most organizations, and networked computer systems became the information backbone of organizations.

While this improved productivity, it also created new workplace dependencies as problems in the computing infrastructure can limit employees' ability to do their work. IT departments within corporations and other organizations took on the new job of ensuring that the organization's computing infrastructure was suitable, that it worked reliably, and that people in the organization had their computing-related needs met, problems solved, etc. (Shackelford, et al., 2005).

# A CONCEPTUAL DIAGRAM ON THE DISCIPLINE OF INFORMATION TECHNOLOGY

Information Technology is all about getting technology to work for people and organizations. IT pros focus on applying, deploying, and configuring systems to meet real-world needs. While they overlap a bit with Information Systems, IT people are more about creating user-friendly digital tools and making sure everything runs smoothly.



# IMPACT OF INFORMATION TECHNOLOGY IN TERMS OF



## EDUCATION

Increased access to information, personalized learning experiences, and opportunities for collaboration (Ascione, 2023).



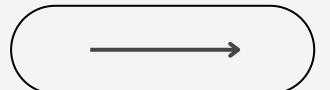
## BUSINESS

Increased operational efficiency to improved security and the ability to automate daily tasks (Kotselas, n.d.).



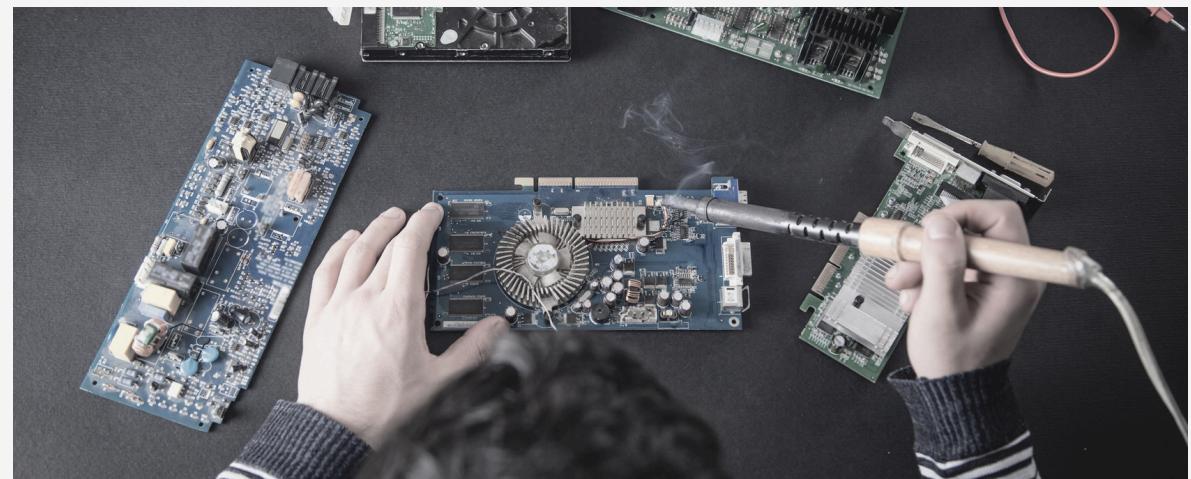
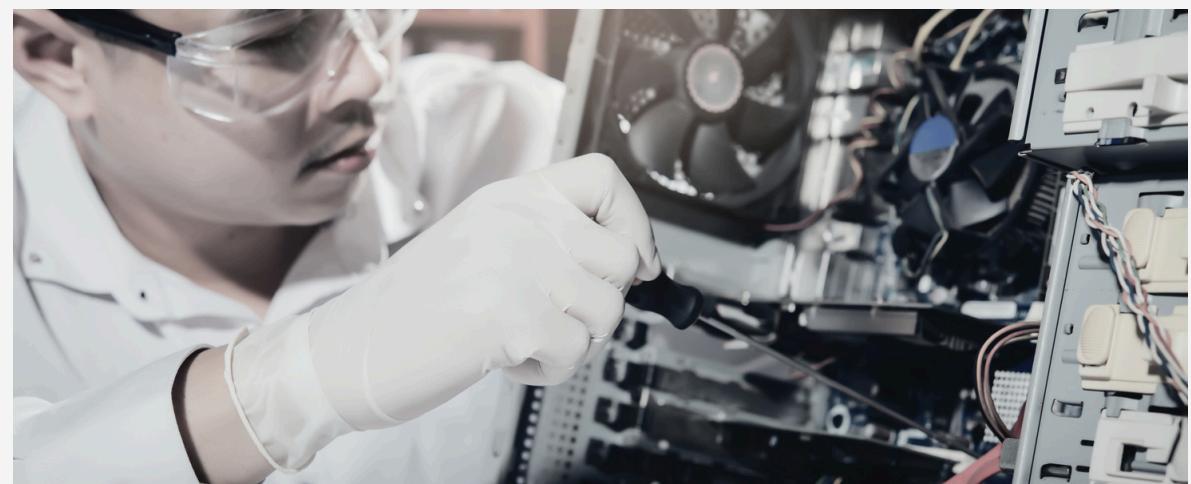
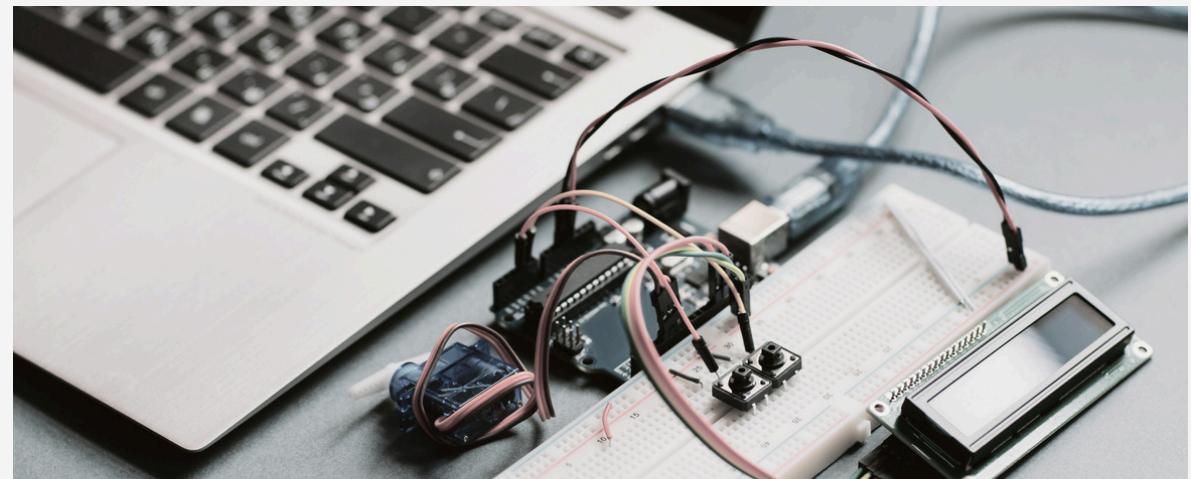
## HEALTHCARE

While every medical operation has different needs, a few areas that have the biggest impact on patient safety include easier access to information, adoption of digital medical records, improved public health, and Clinical Decision Support (CDS).



# What is Software Engineering?

It is the process of developing, testing and deploying computer applications to solve real-world problems by adhering to a set of engineering principles and best practices (Yasar, 2023). It aims to create high-quality, reliable, and maintainable software.



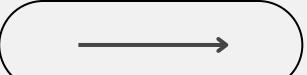
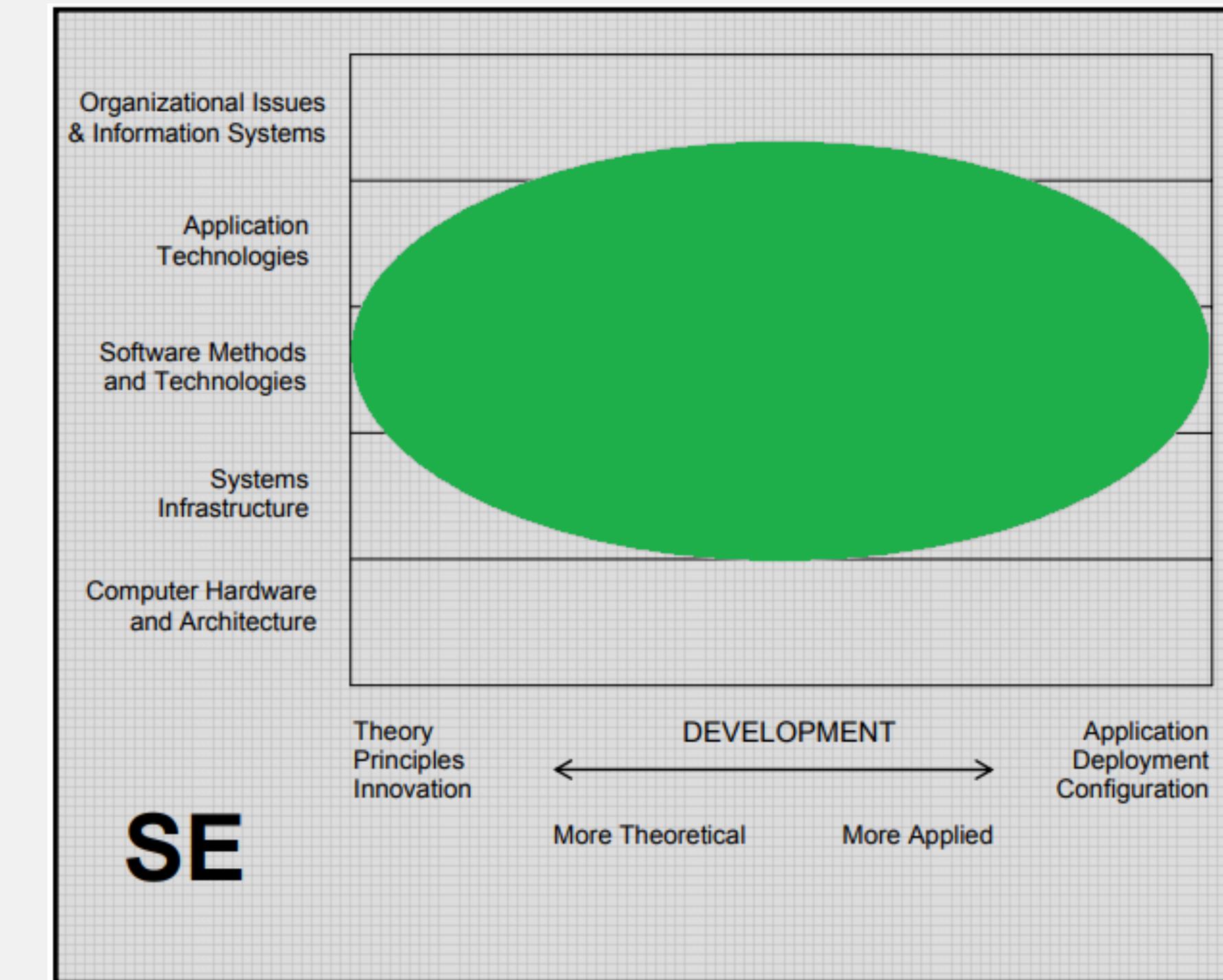
# SIGNIFICANT DEVELOPMENTS OF THE 1990s

**Software engineering** emerged within computer science to address the challenges of creating reliable software for complex problems, where producing high-quality software is difficult, expensive, and essential, especially in safety-critical tasks.

It began to develop as a discipline unto itself after it became a significant component of CS study in the 1990s. Focusing on rigorous methods for designing and building things that does what it's supposed to. As software engineering matured, the scope of its challenge became clearer. In addition to its computer science foundations, software engineering also involves human processes that, by their nature, are harder to formalize than are the logical abstractions of computer science (Shackelford, et al., 2005).

# A CONCEPTUAL DIAGRAM ON THE DISCIPLINE OF SOFTWARE ENGINEERING

Software Engineering is all about creating software that's reliable, on time, and within budget. SE covers everything from the theory of software development to the practical needs of large projects. SE also dips into systems infrastructure and organizational needs, ensuring that software is robust and fits the client's requirements.



# IMPACT OF SOFTWARE ENGINEERING IN TERMS OF



## EDUCATION

Develop innovative solutions to complex problems, create new technologies that improve people's lives, and drive economic growth and social change (Nsibula, 2024).



## BUSINESS

It helps businesses manage data efficiently, analyse customer patterns, and make informed decisions that drive growth and profitability (INSTITUTE OF DATA, 2024)



## HEALTHCARE

Advancements in technology are enabling innovative solutions that increase access to care, reduce costs, improve outcomes, and empower patients (How software engineering is revolutionizing healthcare solutions, 2024).

# WHAT MAKES THEM DIFFERENT FROM EACH OTHER?

## Computer Engineering

Focuses on designing and integrating hardware and software systems to create efficient computing devices.

## Computer Science

Emphasizes the theoretical foundations of computing, including algorithms, programming, and data structures.

## Information Systems

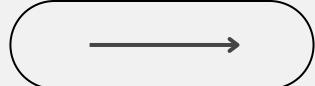
Concentrates on using technology to manage and process information within organizations to support business operations.

## Information Technology

Deals with the implementation and management of computing infrastructure to meet the needs of individual users and organizations.

## Software Engineering

Specializes in the systematic design and development of large-scale, reliable software systems within time and budget constraints.



# AN ANALYSIS TO COMPUTING

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Computer Science is often seen as the foundation of modern technology. It's the study of computers and everything related to them, from how they're built to the algorithms that make them work. As a discipline, it's vast, covering theoretical aspects like algorithms and data structures, and practical applications such as programming and software development. What's fascinating about computer science is its ability to push the boundaries of what we think is possible.

It can sometimes feel overwhelming due to its broad scope. But that's also what makes it exciting. You're not just learning how to code; you're learning how to think logically and solve problems. It's a discipline that requires both creativity and precision. The more you delve into it, the more you realize how interconnected everything is, from the smallest algorithm to the most complex software systems. Computer Science is about understanding these connections and using them to create new and innovative solutions.

# AN ANALYSIS TO COMPUTING (cont'd)

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When we talk about computing as a whole, it's not just about Computer Science. There are five major disciplines within computing: Computer Engineering, Information Systems, Information Technology, Software Engineering, and of course, Computer Science. Each of these fields has its focus and importance, contributing to the larger landscape of technology.

- Computer Engineering is all about the hardware. It's the discipline that combines electrical engineering with computer science to design and build computer systems. It is a bridge between the physical components of a computer and the software that runs on it.
- Information Systems focuses on how businesses use technology to solve problems. It's about understanding the needs of an organization and finding ways to meet those needs using IT. This discipline requires a mix of technical skills and business acumen.

# AN ANALYSIS TO COMPUTING (cont'd)

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- Information Technology is all about implementing and managing computer systems. IT professionals are the ones who make sure that the technology in an organization runs smoothly. They work on everything from setting up networks to ensuring cybersecurity.
- Software Engineering is the discipline of designing and building software. It's about more than just writing code; it's about creating software that is reliable, scalable, and meets the needs of its users.

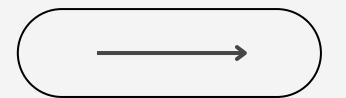
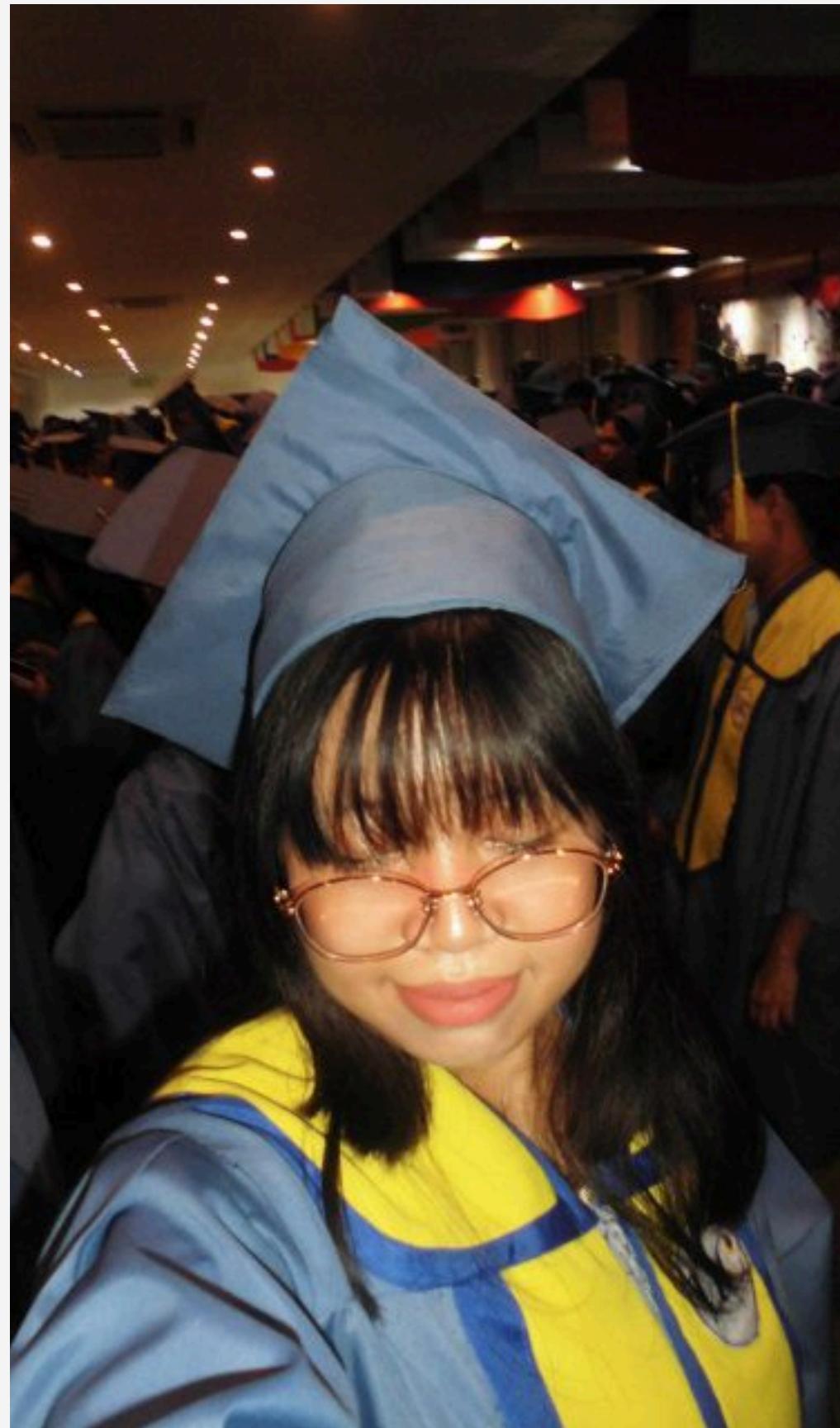
Each of these disciplines plays a crucial role in the world of computing. Together, they create the technology that powers our world, from the hardware that runs our devices to the software that makes them useful. Exploring these fields gives you a broad understanding of how technology works and how you can contribute to its future.

# ABOUT ME

My name is Mizzi R. Pomoy, and I am a freshman at the University of San Carlos - Talamban Campus, currently pursuing a Bachelor of Science in Information Technology.

I graduated from the University of Cebu - Lapu-Lapu and Mandaue.

I chose to pursue BSIT because I was fascinated with game development, a passion that has grown over the years. Additionally, I've considered following in my father's footsteps, aiming to continue our family's legacy in programming.



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