

Electrical, Computer and Software Engineering

- a historical perspective -

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Time

Science

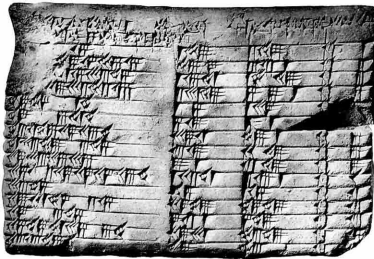
Production of Goods and Services

Engineering

➤ Antiquity

- Mathematics,
- Philosophy

➤ **Craftsmanship:**
 * *Artisans*
 * *Guilds*



The Only True Mathematical Table Surviving from Old Babylonian Mathematics ;
 circa 1,822 BCE – 1,784 BCE



Fragment of Euclid's of Alexandria (approx. 300 BCE), proposition 5 of Book II of the *Elements*, a single, logically coherent framework, including a system of rigorous mathematical proofs that remains the basis of mathematics 23 centuries later.

Value	0	1	2	3	4	5	6	7	8	9
Western Arabic	.	١	٢	٣	٤	٥	٦	٧	٨	٩
Eastern Arabic	.	١	٢	٣	٤	٥	٦	٧	٨	٩
Devanagari	०	१	२	३	४	५	६	७	८	९
Gujarati	૦	૧	૨	૩	૪	૫	૬	૭	૮	૯
Gurmukhi	੦	੧	੨	੩	੪	੫	੬	੭	੮	੯
Limbu	᱆	᱇	᱈	᱉	᱊	᱋	᱌	ᱍ	ᱎ	ᱏ
Bengali	০	১	২	৩	৪	৫	৬	৭	৮	৯
Oriya	୦	୧	୨	୩	୪	୫	୬	୭	୮	୯
Telugu	౦	౧	౨	౩	౪	౫	౬	౭	౮	౯
Kannada	೦	೧	೨	೩	೪	೫	೬	೭	೮	೯
Malayalam	൦	൧	൨	൩	൪	൫	൬	൭	൮	൯
Tamil (Grantha)	௦	௧	௨	௩	௪	௫	௬	௭	௮	௯
Tibetan	༠	༡	༢	༣	༤	༥	༦	༧	༨	༩
Burmese	၀	၁	၂	၃	၄	၅	၆	၇	၈	၉
Thai	๐	๑	๒	๓	๔	๕	๖	๗	๘	๙
Khmer	០	១	២	៣	៤	៥	៦	៧	៨	៩
Lao	໐	໑	໒	໓	໔	໕	໖	໗	໘	໙

Hindu-Arabic numeral system.
 The inscriptions on the edicts of Ashoka (1st mill. BCE) display this number system used by the Imperial Mauryas.



Pyramid of Giza / Pyramid of Khufu 2589–2566 BCE



South Pointing Chariot one of the most complex geared mechanisms invented sometime around 2600 BCE in China by the mythical Yellow Emperor

The Four Great Inventions of ancient China are the Compass, Gunpowder, Papermaking, Printing.



Roman aqueduct built circa 19 BCE. Pont du Gard, France,

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Antiquity

- Mathematics,
- Philosophy

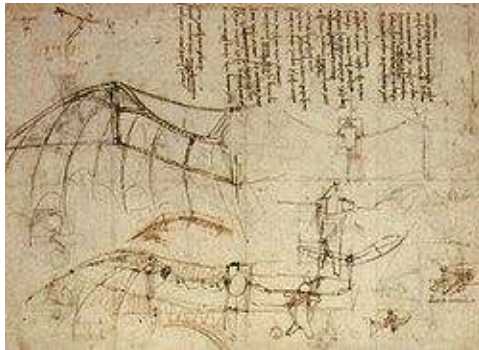
Craftsmanship

- * Artisans
- * Guilds

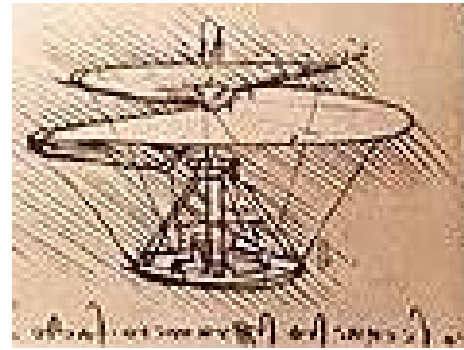


Leonardo da Vinci (1452 –1519)
an Italian polymath: painter, sculptor,
architect, musician, scientist,
mathematician,engineer, inventor,
anatomist,geologist, cartographer,
botanist and writer, the archetype of
the Renaissance man.

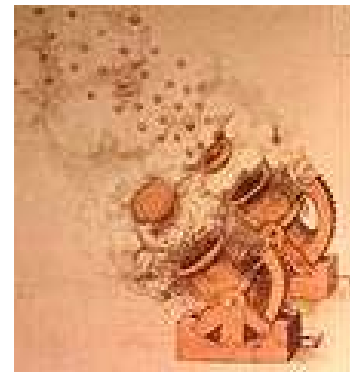
Military Eng..



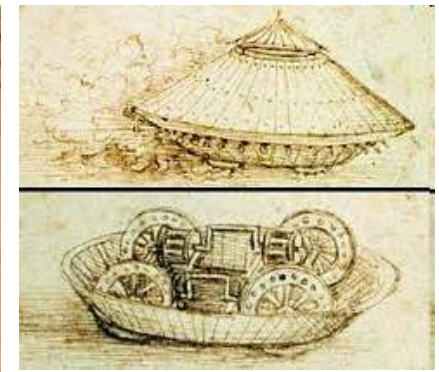
Design for a flying machine with wings based closely upon the structure of a bat's wings.



"Aerial Screw", considered as an early helicopter.



Cannons



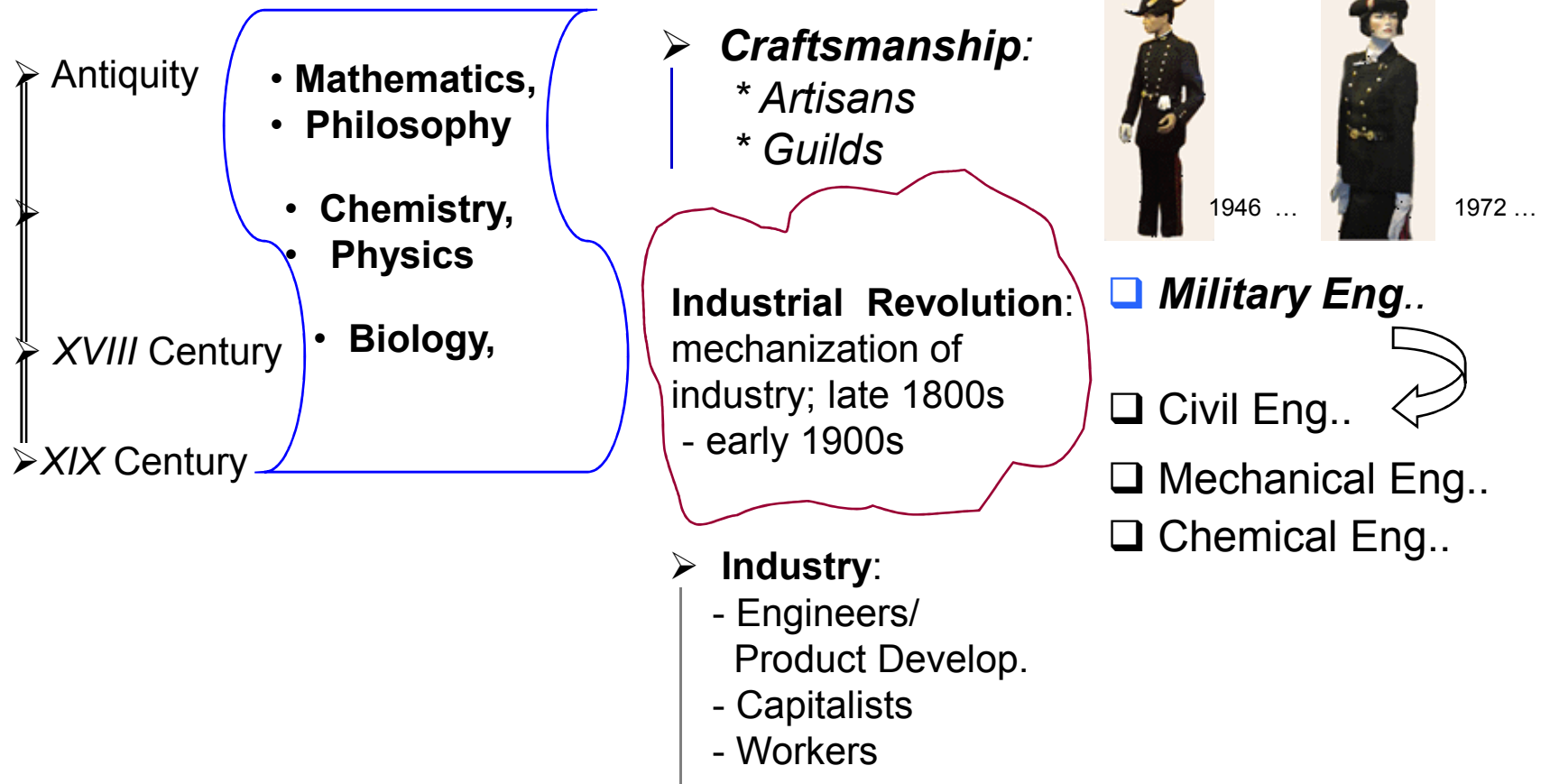
Tank

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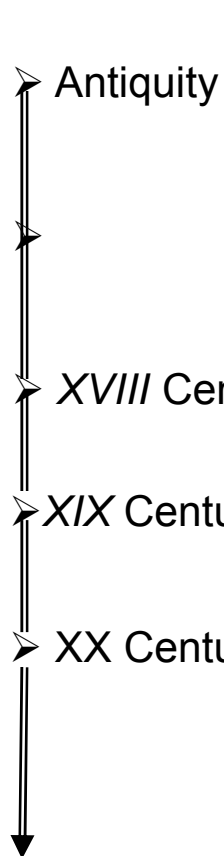


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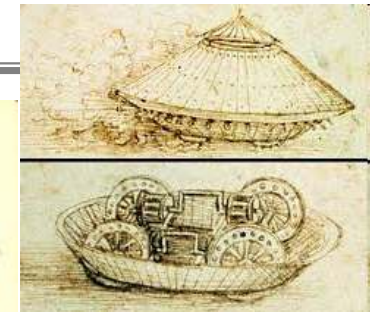


- **Mathematics,**
- **Philosophy**

- **Chemistry,**
- **Physics**

- **Biology,**

➤ **Craftsmanship:**
 * *Artisans*
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Industrial Revolution:
 mechanization of
 industry; late 1800s
 - early 1900s

Military Eng..

Civil Eng..

Mechanical Eng..

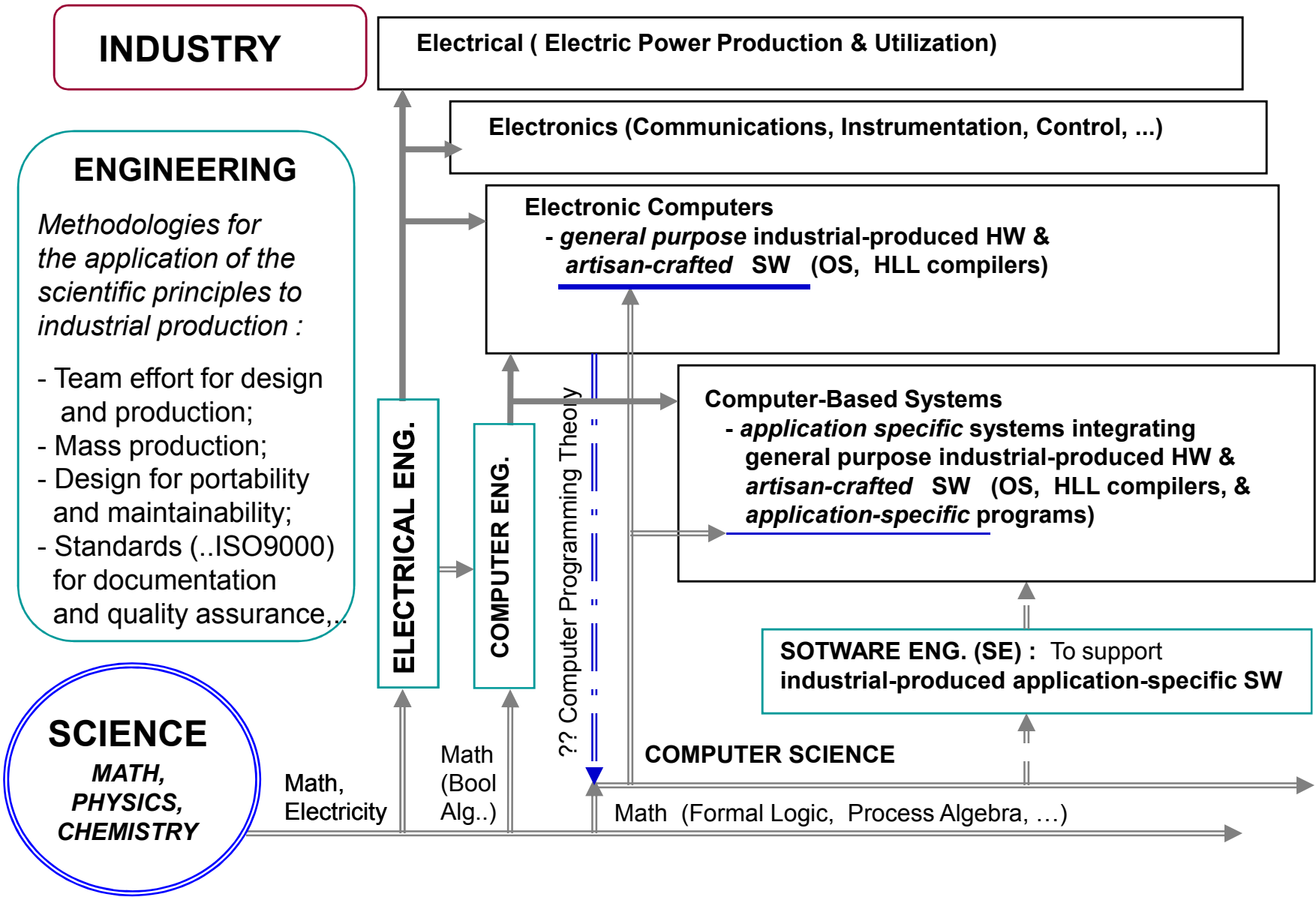
Chemical Eng..

Electrical Eng..

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ELG, CEG, SEG

➤ **Industry:**
 - Engineers/
 Product Develop.
 - Capitalists
 - Workers
 - **Entrepreneurs**





Electrical Engineering

What do electrical engineers do?

- Electrical engineers design and build electrical systems ranging from electrical generating stations to CD players, telephones, televisions and computers.
- They also help to design and produce the computer chips that are the foundation of today's high-technology industry. Finally, electrical engineers work in the space industry, in robotics, in cellular telephone and digital television design, and in the production of aids for the handicapped.
- Electrical engineers apply their knowledge, for example, to building an integrated circuit that allows a handicapped person to communicate, to designing an algorithm that analyses radar signals, to ensuring accurate and efficient transmission of information on the Internet.

Where Do Electrical Engineers Typically Work?

- * Mobile and wireless communications
- * Electronics and chip design
- * Telecommunications and signal processing
- * Computer technology
- * Control systems
- * Microwave circuit design for telecommunications
- * Information processing

Computer Engineering

What do computer engineers do?

- Computer engineers solve a wide range of problems using computers; they design the microprocessors along with the hardware that goes in the computer and develop the software that controls the system. They also ensure computers communicate properly with one another.
- Computer engineers are equally at ease designing the hardware of systems powerful enough to execute complex tasks efficiently and developing the software to perform given tasks reliably.

Where Do Computer Engineers Typically Work?

- * Hardware design
- * Software development
- * Information processing technology
- * High-speed communication networks
- * VLSI and ASIC chip design
- * Control systems
- * Robotics

Software Engineering

What do software engineers do?

Software engineers design, develop, and maintain software systems for information processing through the structuring, representing, transforming and transmitting of information. They apply engineering principles in the design of large-scale and embedded software systems to ensure public safety, quality and optimal cost of products.

While software engineers have some background in hardware, they specialize in the design, maintenance and evolution of software systems. Typically, they are responsible for the development and management of large-scale software projects where issues of public safety and the maintenance and evolution of software systems are of paramount importance.

Where Do Software Engineers Typically Work?

- * The information technology field continues to grow at an incredible pace, and there is a definite demand for software engineers in all branches of our economy.
- * Software engineers are needed in telecommunications, information processing, banking, government institutions and many other sectors. Graduates of one of the first programs in software engineering will have a broad choice of career options and can look forward to a challenging career in a constantly evolving field.

Computer Science

What do computer scientists do?

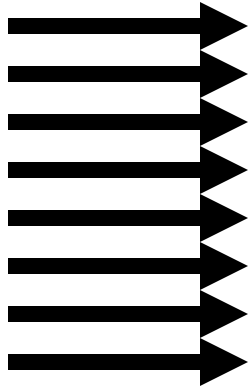
- Computer scientists specialize in the design and development of software systems; their work is concerned with information processing through the structuring, representing, transforming and transmitting of information. Computers allow user-friendly human-machine interfaces which have found applications in all spheres of human activity.
- The fundamentals of computer science include programming systems and languages, computer architecture, data structures, algorithm design, operating systems, databases, computer networks, image processing and recognition and artificial intelligence.

Where Do Computer Science Graduates Typically Work?

- * There are two main types of employers: the software industry, and software users.
- * In the first category, employers include industries that develop software products (e.g. databases, graphics), those that develop products including embedded software, and those that develop software services.
- * In the second category, employers include companies and institutions of all types: banks, government, industry, financial institutions, etc.

IT as an Enabler

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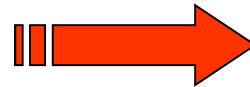
IT Enabler



e-Society



Bio & Health Engineering.



Infrastructure
Preparedness



Environmental Technologies

e-Society



Telecom Systems
And Networks



Wireless
Technologies



Information
Security and
Privacy



Multimedia, Virtual
Environments and
Haptics

Bio and Health Engineering



IT in Health



Biomedical
Engineering

Infrastructure Preparedness



Robotics
and
Automation



Mobile and
Sensor
Networks

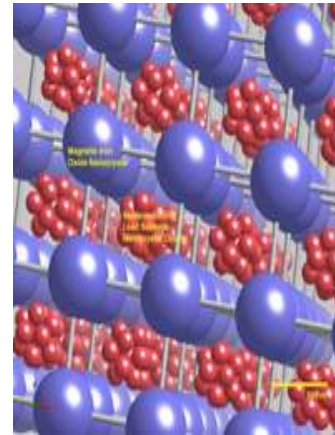


Infrastructure
Protection and
Emergency
Preparedness

Environmental Technologies



Environmental
Technologies



Advanced
Materials