

Industrial Revolution 4.0

Hervy Qurrotul

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Learning objectives

Understanding the Industrial Revolution 4.0 for Students

1. Be able to understand the meaning and purpose of the Industrial Revolution 4.0
2. Be able to understand the impact of the Industrial Revolution 4.0.
3. Be able to understand the Industrial Revolution 4.0 in the education sector.
4. Be able to understand what students as the younger generation should do in the Industrial Revolution 4.0

Benefits of learning

1. Students/listeners will gain insight into the Industrial Revolution 4.0.
2. Students/listeners learn how to see opportunities in the Industrial Revolution 4.0.

What is the Industrial Revolution?

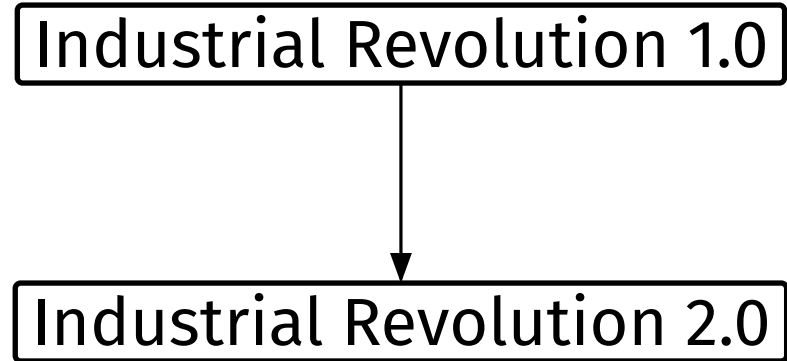
Industrial Revolution 1.0

Industrial Revolution 1.0

- Revolution in the 18th century.
- Every country still used traditional methods relying on muscle power.
- The maritime, agricultural, and plantation industries were still within the scope of their respective countries.
- **The discovery of mechanical processes** that generated motion from wind and water power.

- The discovery of the steam engine on a large scale.
- Production and distribution of goods using steam engines.

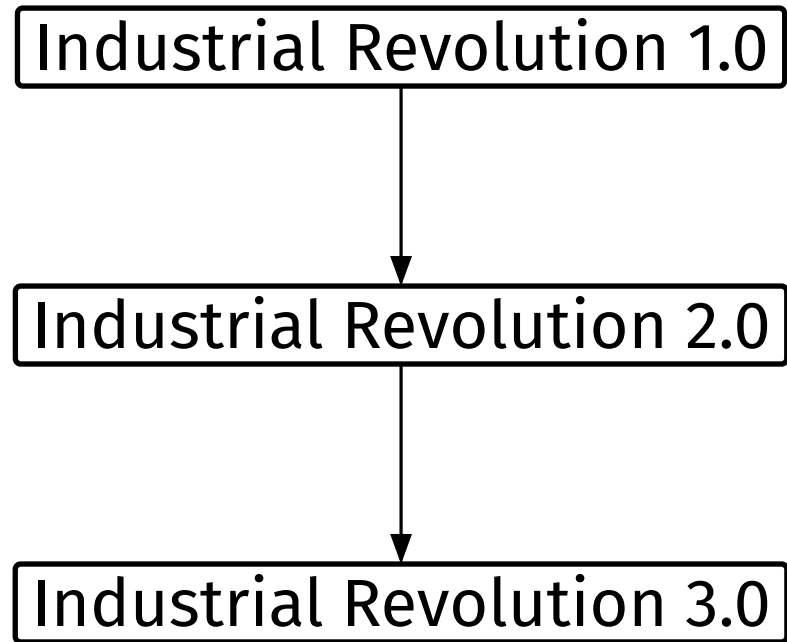
Industrial Revolution 2.0



- Revolution in the 19th century.
- The discovery of electricity, enabling 24-hour operation.
- The invention of the telegraph for communication using Morse code in 1844.
- The invention of the telephone, a development of the telegraph, by Antonio Meucci.

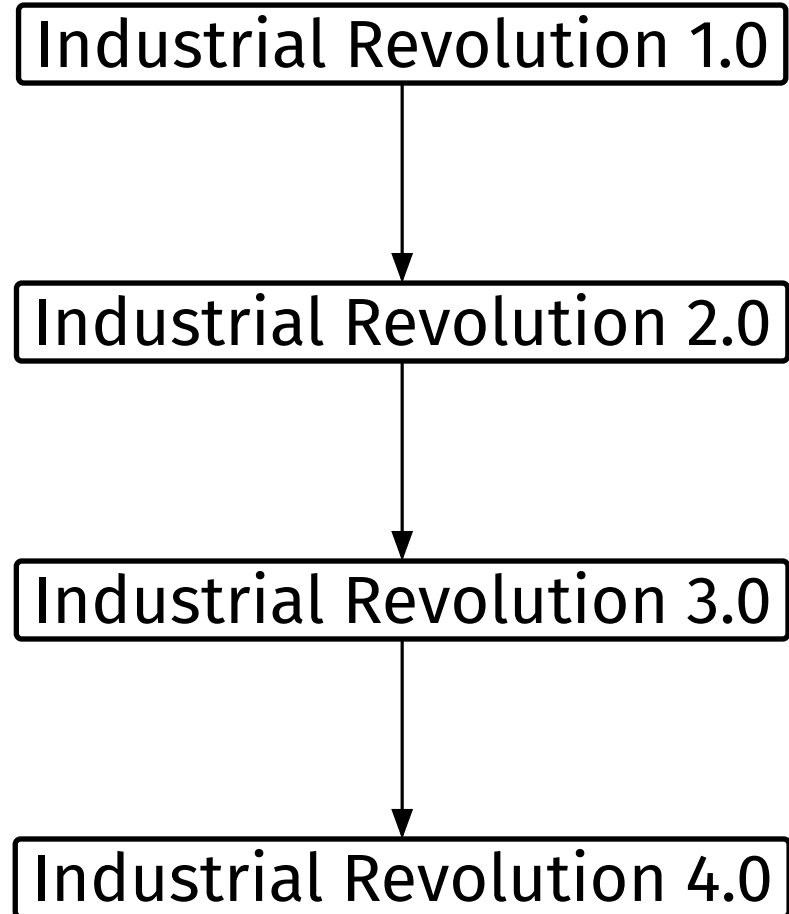
- The invention of the light bulb by Thomas Alva Edison.
- The creation of airplanes in the 1800s and the automobile as a means of transportation.

Industrial Revolution 3.0



- The revolution in the 20th century.
- **The invention of the microprocessor chip.**
- The invention of computers for communication and telecommunications.
- The invention of the internet, cloud, and personal computing.
- Digital advances marked by the shift from analog to digital machines.

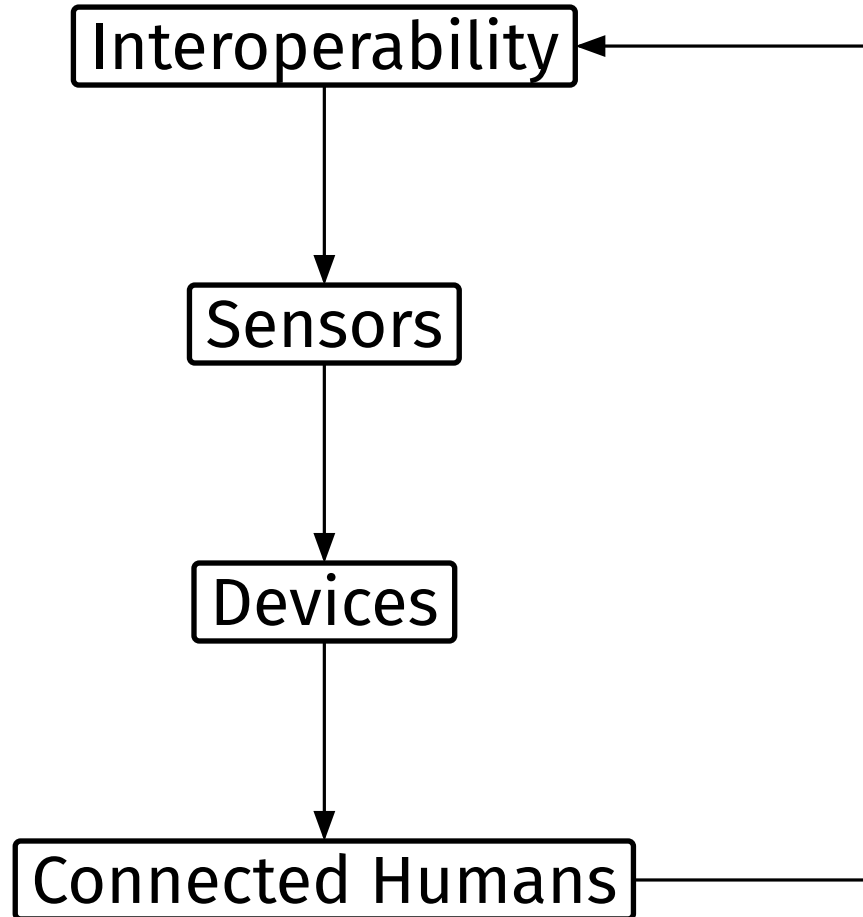
Industrial Revolution 4.0



- A revolution from the 20th century to the present.
- The combination of **automation technology and cyber technology**.
- Known as a cyber physical system.
- The existence of sensors as the senses of IoT component objects.
- The emergence of various new jobs and professions.

- Breakthroughs in robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the Internet of Things, 3D printing, and autonomous vehicles.

4 Designs in Industry 4.0



- Interoperability (Compatibility).
- Sensors are available.
- Devices are available.
- Humans to connect and communicate with each other through IoT.

Internet of Things (IoT)

Understanding the Internet of Things

- The discovery of the internet that connects humans, better known as the Internet of Human.
- Meanwhile, the Internet of Things connects objects or inanimate objects.
- IoT uses sensors as the senses of an IoT device.

The Role of Technology in Industry 4.0

The presence of technologies such as artificial intelligence will eliminate traditional jobs while creating new skills and jobs.

Dominant technologies:

- High-speed mobile internet.
- Artificial intelligence.
- Big data analytics.

The Industrial Revolution 4.0 requires Open Source Software

Benefits of using Open Source software:

- Open Source software provides freedom of original source code so that it can be viewed by the public.
- It is more secure and has high stability.
- The advantages of Open Source are that it is free, inexpensive, and easy to obtain.
- An alternative to commercial/proprietary licensed software that is considered to monopolize the market.

Examples of Open Source Software

Name	Description
Linux	An inexpensive and easily accessible operating system.
Mozilla Firefox	Browser for exploring websites.
XAMPP/LAMPP	Local server for website development.
PHP	Programming language for website development.
Python	General programming language for websites, robotics, IoT, and so on.

Name	Description
NodeJS & NPM	Cross-platform JavaScript runtime environment.
Vim/Helix	CLI editor for programming.

Examples of Linux and Open Source Operating Systems

Name	Link	License
Ubuntu	ubuntu.com	<u>GNU GPL V3</u>
Fedora	getfedora.org	<u>GNU GPL V3</u>
Debian	debian.org	<u>GNU GPL V3</u>
Arch Linux	archlinux.org	<u>GNU GPL V2</u>
openSUSE	opensuse.org	<u>GNU GPL V2</u>
Void Linux	voidlinux.org	<u>BSD 2-clause</u>

Benefits of Open Source Software

In education:

- With Open Source, students and educators will not only learn theoretically.
- Strong in the practical use of open source software.
- Can learn and explore together in a course.
- In general, open source operating systems are bundled with daily applications so there is no need to purchase or subscribe.

Benefits of Open Source Software in business

- Minimizes license and maintenance costs.
- Not tied to hardware or software vendors.

Benefits of Open Source Software in the government sector

- The budget required is relatively smaller.
- Compared to closed source programs, open source software has high security and reliability.

Technological Opportunities and Challenges

Technological Challenges in the Era of the Fourth Industrial Revolution

- Information technology security issues.
- The reliability and stability of production machines or servers.
- Lack of adequate skills.
- Reluctance to change systems among stakeholders.
- Loss of many jobs due to automation.

Impact of Using Technology in the Era of the Industrial Revolution 4.0

- The integration of human activities with information technology and the economy is increasing.
- Technology also has a significant impact on the world of education.
- Technology as a supplement to learning.
- Technology as a support for learning activities.
- Technology as an alternative learning support.
- Human lifestyles are undergoing drastic changes.

- In the world of marketing, end users can now reach producers directly without going through long distribution channels.

Technology in the Concept of Education

Education Strategy

The government's Making Indonesia 4.0 program aims to make Indonesia one of the top 10 countries with the strongest economies in the world by 2030.

- Improving the quality of human resources is an important factor in the success of Making Indonesia 4.0.
- Sharpening the mindset of the younger generation with fundamental knowledge. One way to do this is by developing students as the next generation of leaders.
- Blended Learning (Hybrid) as a learning method and model.

- Educators (teachers/lecturers) are required to master the curriculum and learning methods as well as dynamic technologies such as artificial intelligence, cloud computing, big data, the internet, social media, and cyber security.

Information and communication technology for learning

- Adding competencies to every education curriculum. Such as critical thinking, creativity, good communication skills, high self-confidence, and emotional management skills.
- Having creative educators. Not just teaching, but also guiding and facilitating students.

Essential Skills: Coding/Programming

Programming in the era of the Industrial Revolution 4.0

As the impact of the 4.0 industrial revolution emerges, disruptions are occurring not only in the manufacturing industry, but also in the industrial workforce.

This means that many jobs are being replaced.

Learning programming has a positive impact because it trains the brain to think logically. Of course, it must also be learned in the right way.

Skills that must be possessed

- Complex problem solving.
- Critical thinking.
- Creativity.
- People management.
- Coordinating with others.
- Emotional intelligence.
- Judgment and decision making.
- Service orientation.
- Negotiation.
- Cognitive flexibility.

The importance of learning coding/ programming

- User awareness and the younger generation.
- Problem solving.
- Future prospects.
- Remote working.
- Creating new innovations.
- Sharing and learning together.
- Critical, structured, systematic, and efficient thinking.

Benefits of learning coding/programming

- Training precision.
- Develops logical thinking.
- Develops personal potential.

How to start learning programming?

- Find out more.
- Choose a place to learn.
- Be committed.
- ~~Intention.~~
- ~~Motivation.~~
- ~~Enthusiasm.~~

Thank you!