Electronic Health Record
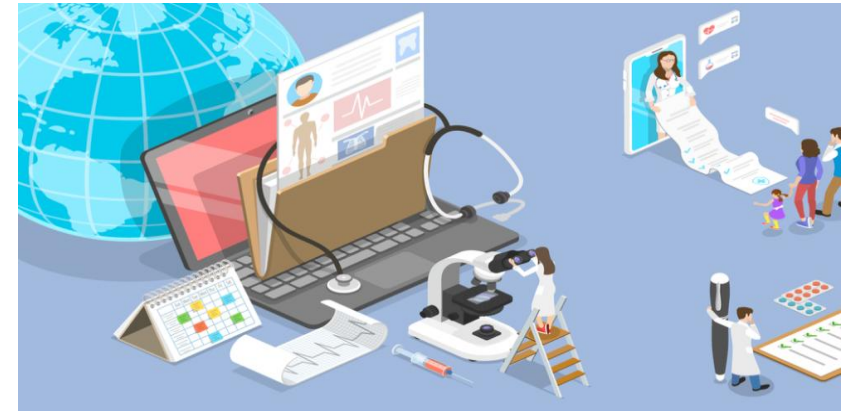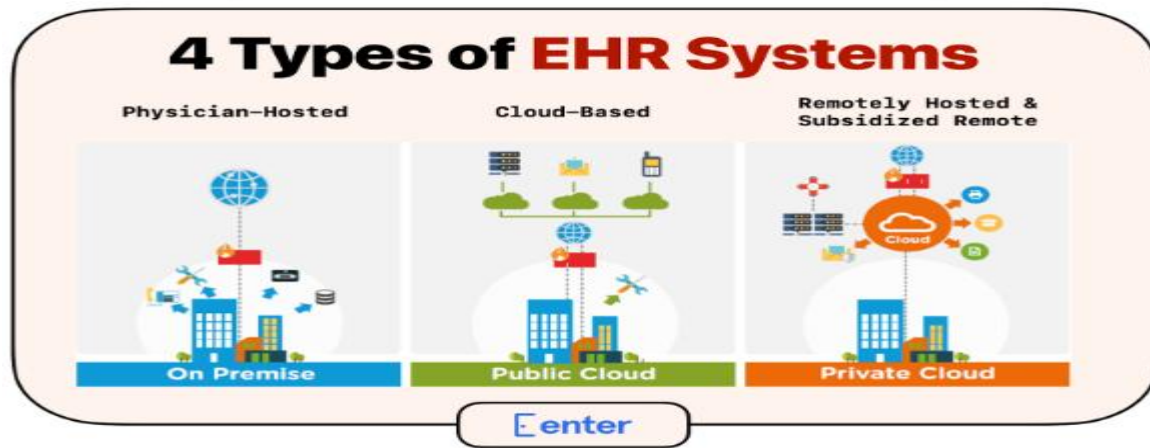

❑An **Electronic Health Record** is a computer software used to capture, store, and share patient data in a structured way.

❑An EHR is able to share medical information among all the authorized parties involved in the patient's care: clinicians, labs, pharmacies, emergency facilities, nursing homes, state registries, and patients themselves.

The first EHR prototype called a Problem-Oriented Medical Record appeared 50 years ago.

❑It consisted of a database of a patient's complete clinical history, a problem list with the patient's medical complaints, initial plan of care in which a doctor decides what to do about the problem, daily progress notes, and a discharge summary that tells about the fullest resolution of a problem emphasizing the remaining concerns.
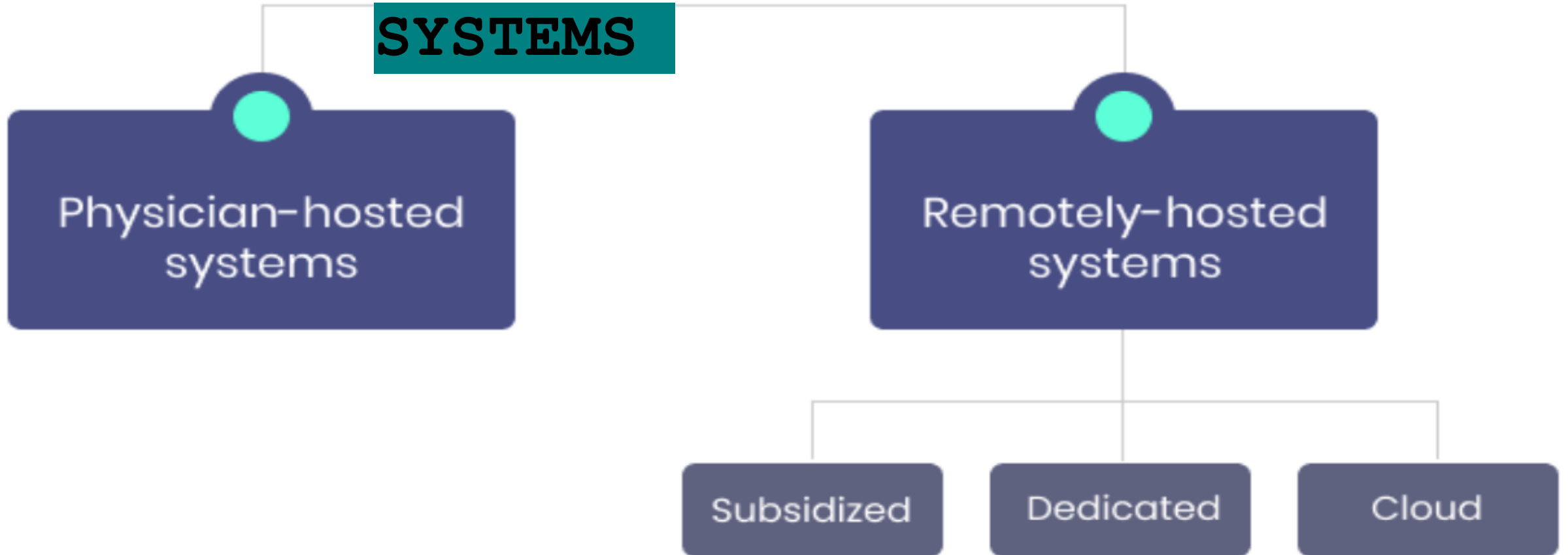
Types of HER System

There are main types of EHR systems:

TYPES OF EHR SYSTEMS

Physician-hosted systems
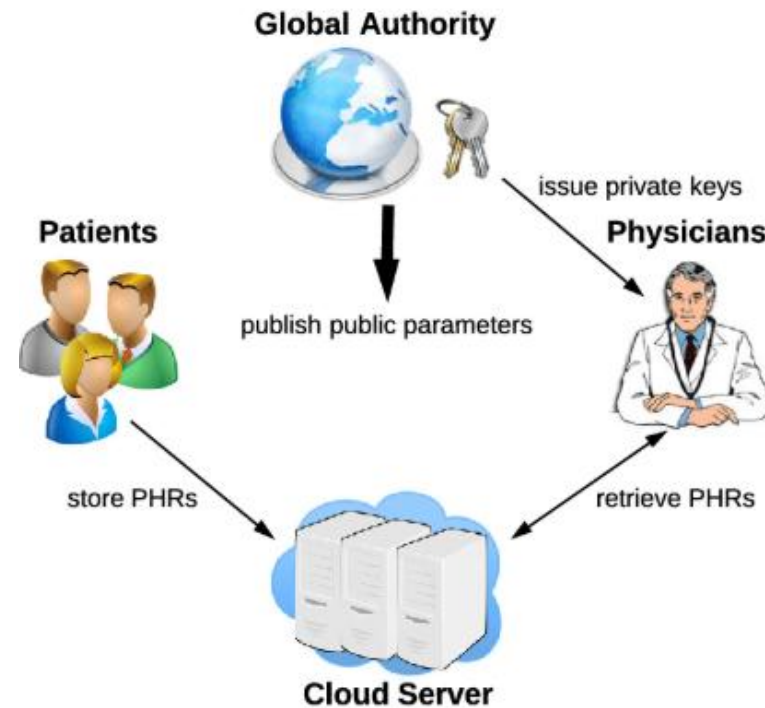
Remotely-hosted systems
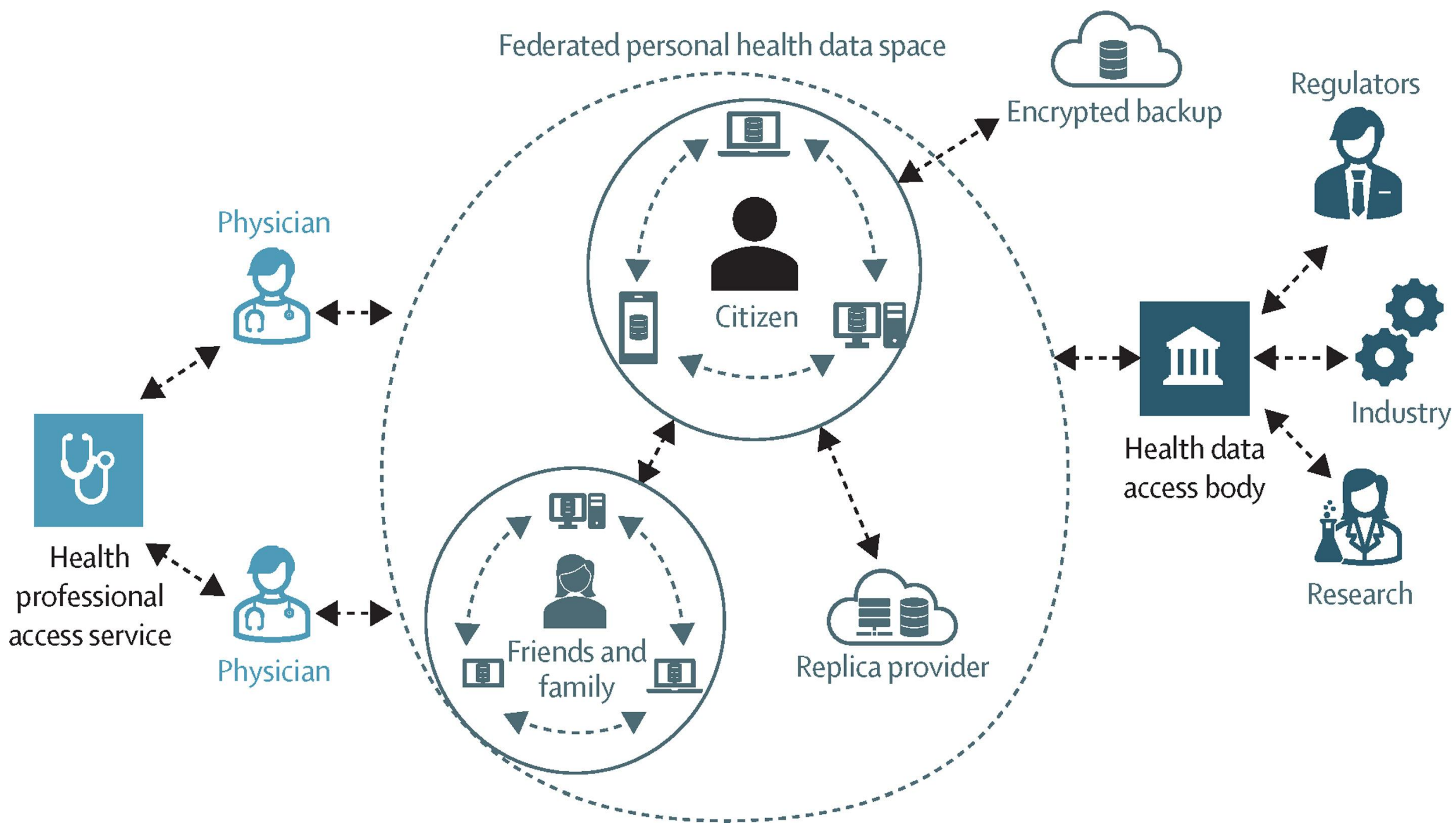
Subsidized

Dedicated

Cloud

Physician-Hosted EHR System

❑A Physician-Hosted EHR System is an electronic health record system managed and stored locally on the physician's own servers.

❑If your EHR system is physician-hosted, then all your medical history is stored on servers at the facility.
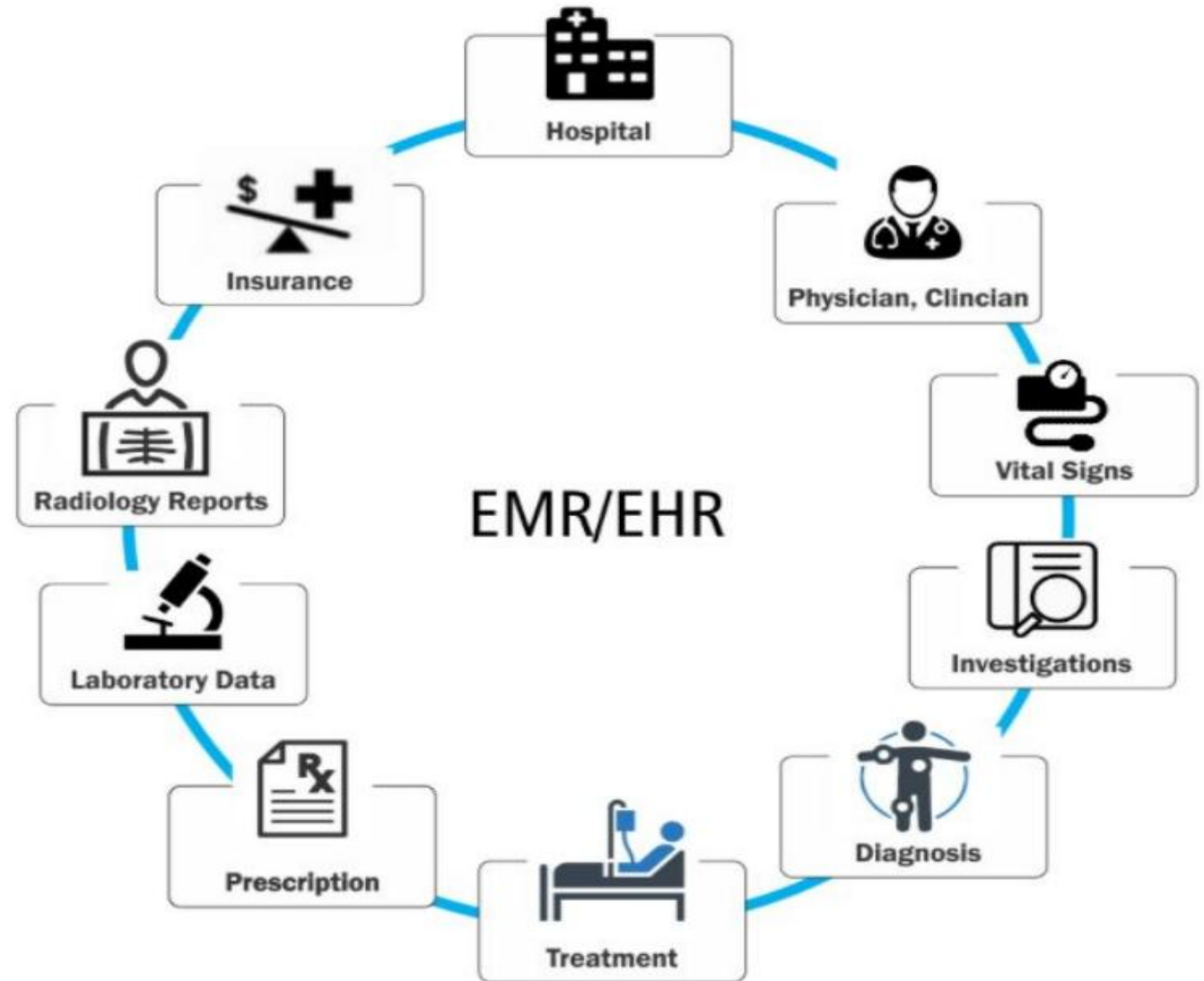
Remotely Hosted EHR System

❑A Remotely Hosted EHR System is an electronic health record system where patient data and software are stored and managed on off-site servers by a third-party

Remotely-hosted Systems

Global Authority

Patients

issue private keys

Physicians

publish public parameters

store PHRs

retrieve PHRs

Cloud Server

Federated personal health data space

Citizen

Friends and family

Physician

Physician

Health professional access service

Encrypted backup

Replica provider

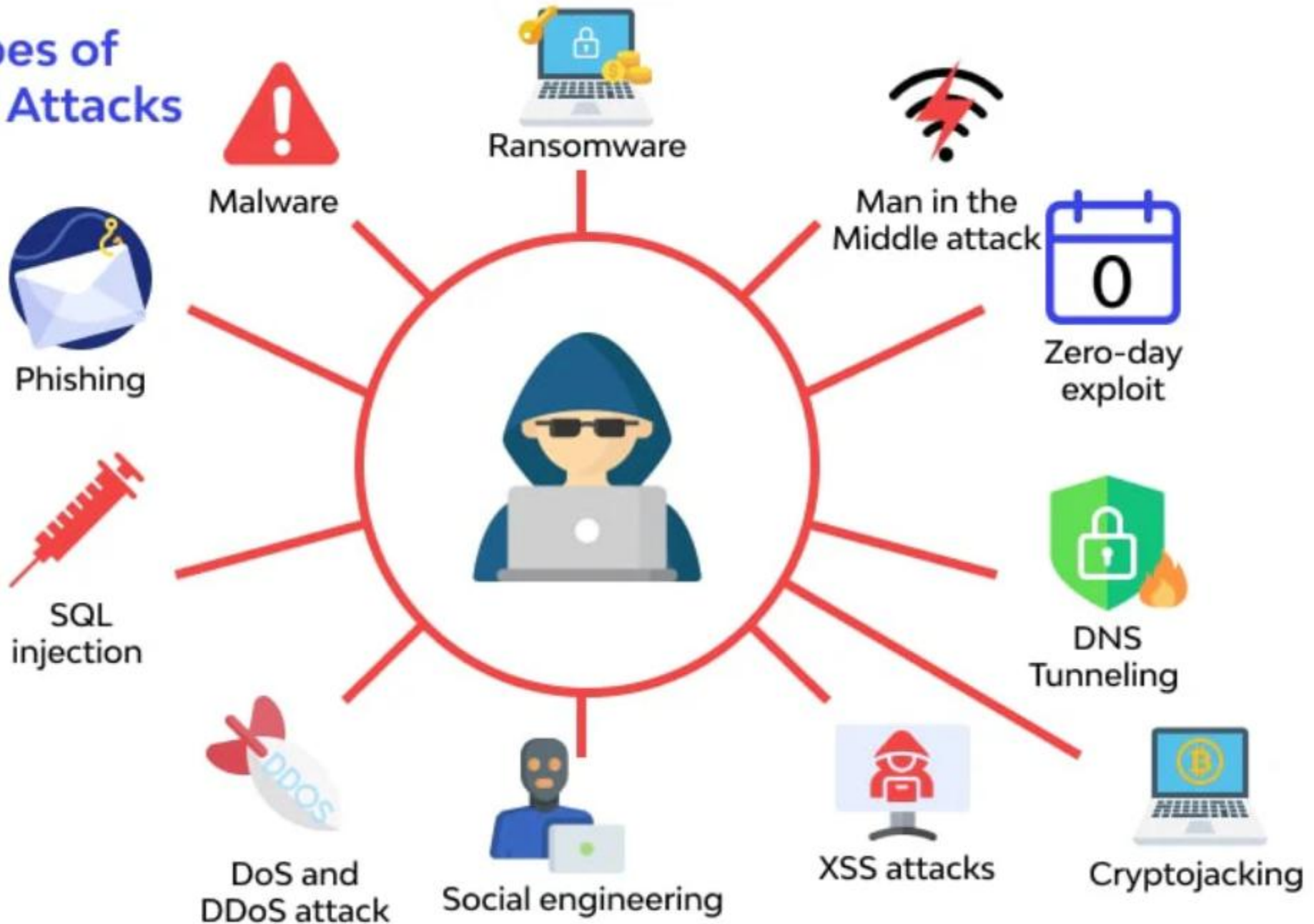Health data access body

Regulators

Industry

Research

Top Threats Against Electronic Medical & Health Records

- Phishing Attacks
- Malware & Ransomware Attacks
- Encryption Blind Spots
- Cloud Threats
- Employees

Types of Cyber Attacks

Malware

Ransomware

Man in the Middle attack

Zero-day exploit

Phishing

SQL injection

DNS Tunneling

DoS and DDoS attack

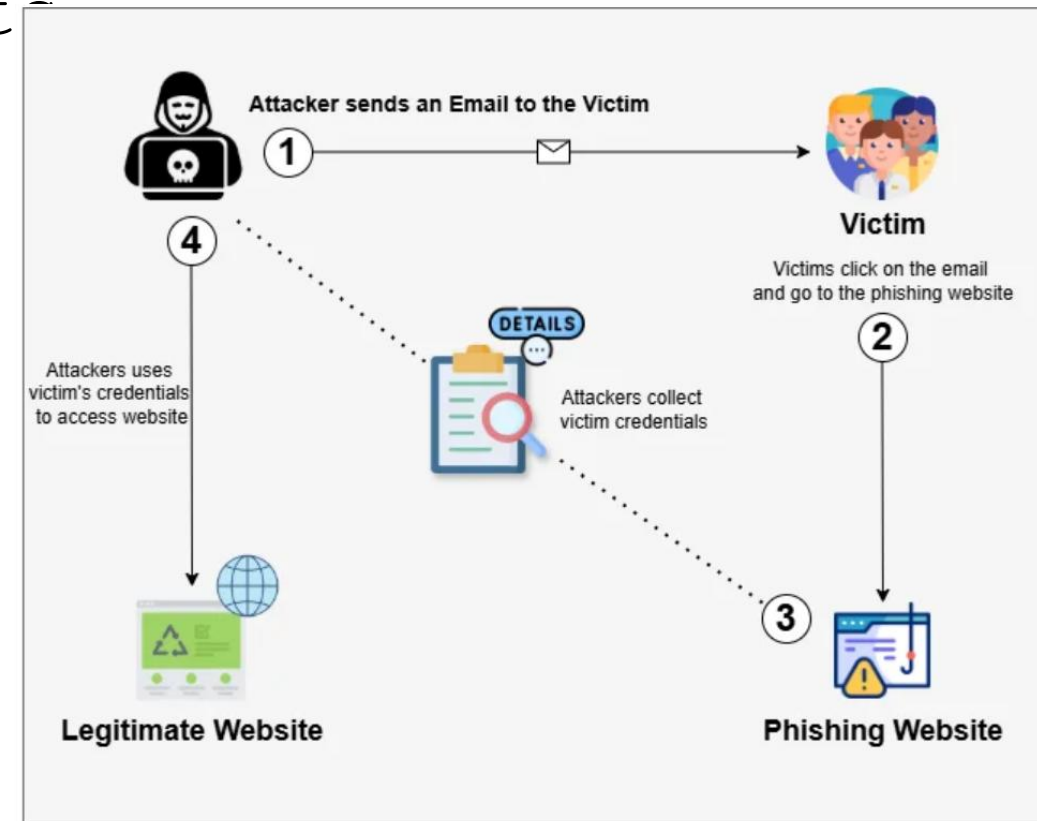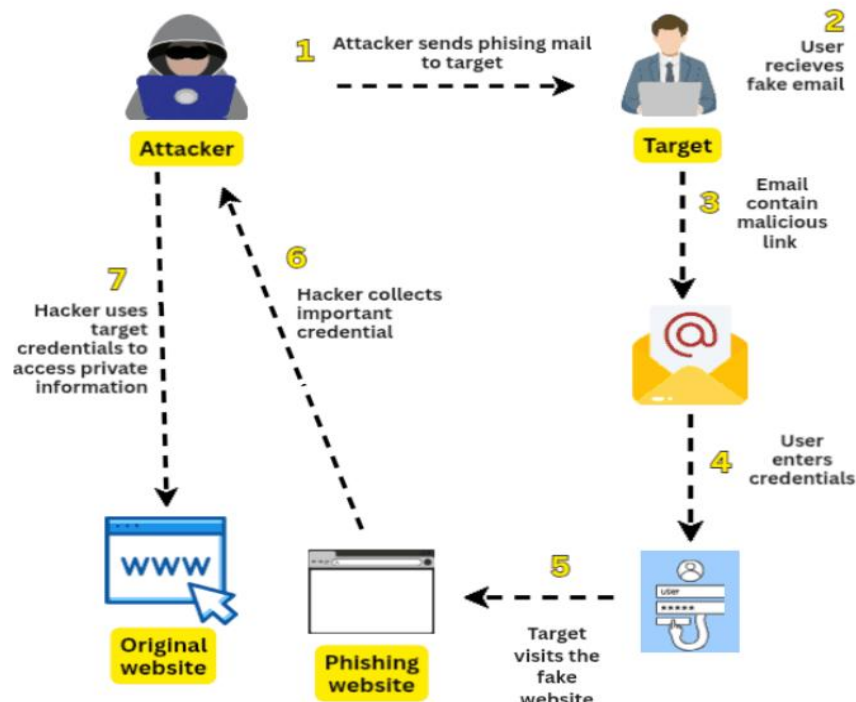Social engineering

XSS attacks

Cryptojacking

Phishing Attacks

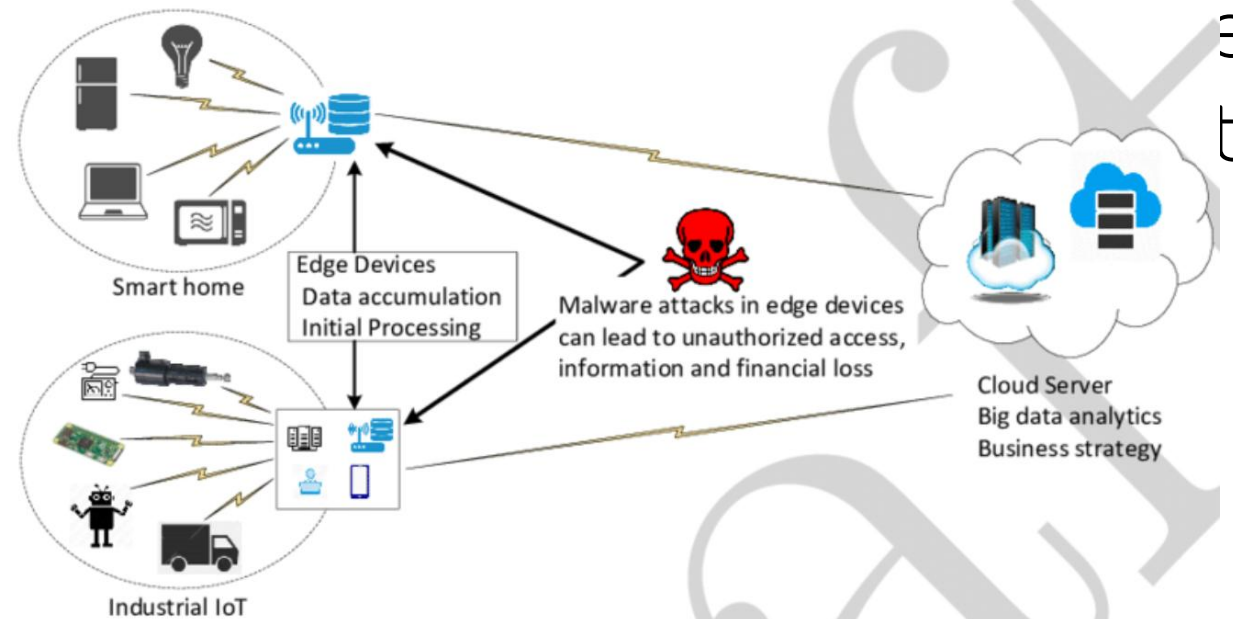☐ Phishing attacks are tricks using fake emails to steal your personal information.

☐ Phishing attacks are one of the most common and dangerous forms of cyber threats.

HOW PHISHING ATTACKS HAPPEN?

1 Attacker sends phising mail to target
2 User recieves fake email
3 Email contain malicious link
4 User enters credentials
5 Target visits the fake website
6 Hacker collects important credential
7 Hacker uses target credentials to access private information

Attacker
Target
Original website
Phishing website

Attacker sends an Email to the Victim

Victim
Victims click on the email and go to the phishing website

Attackers uses victim's credentials to access website
Attackers collect victim credentials

Legitimate Website
Phishing Website

Malware Attacks
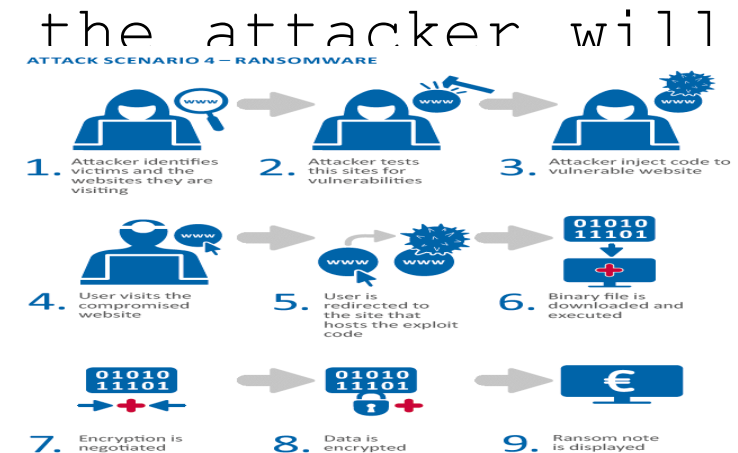
❑Malware attacks use harmful software to damage or take control of computers and steal data.

❑Malware attacks in medical healthcare are cyberattacks using harmful software to damage or take co   e systems and steal   t information.

Smart home

Edge Devices
Data accumulation
Initial Processing

Malware attacks in edge devices can lead to unauthorized access, information and financial loss

Cloud Server
Big data analytics
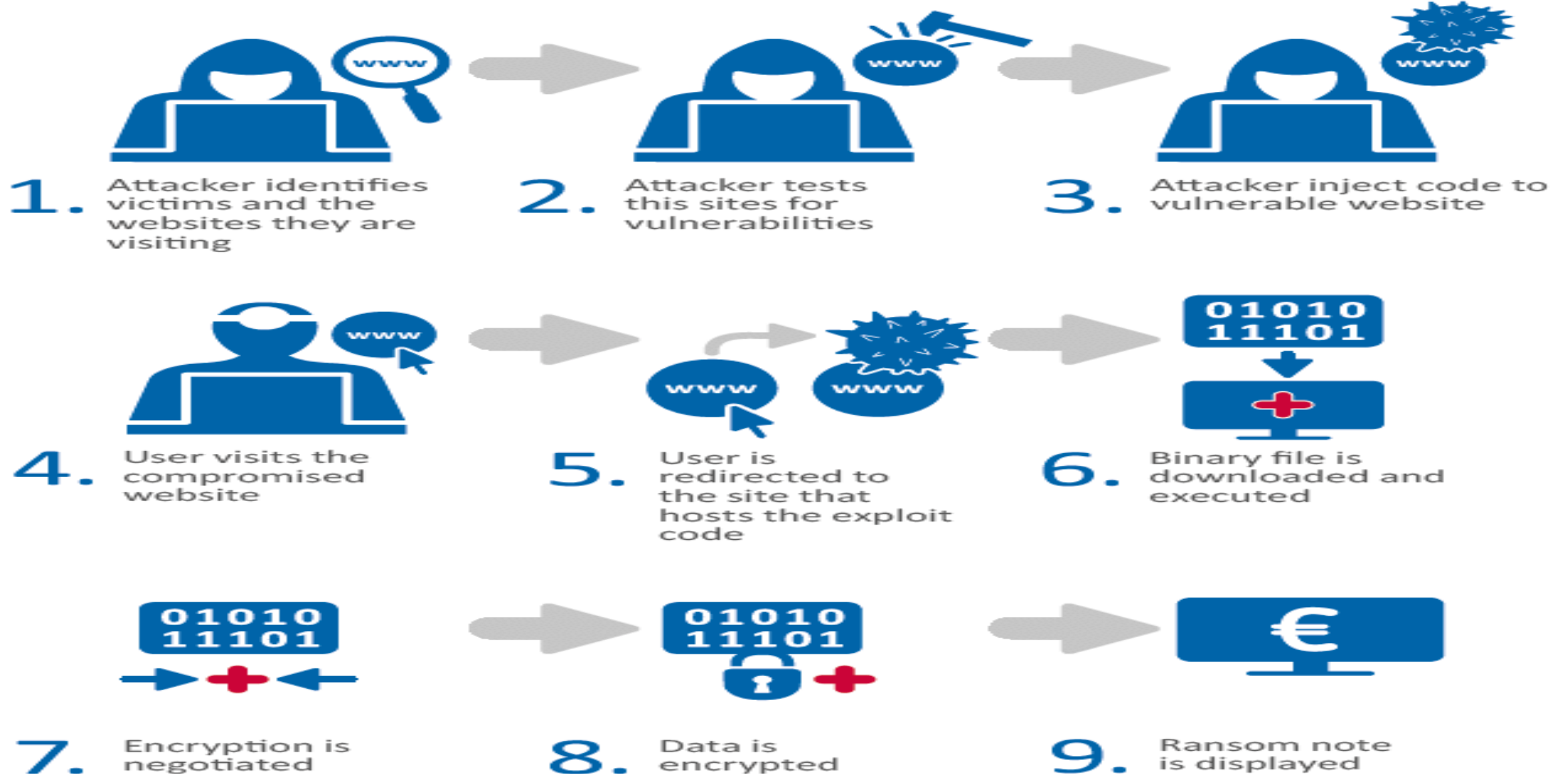Business strategy

Industrial IoT

Ransomware Attacks

❑ Ransomware is a type of network security attack where an attacker encrypts a victim's files or entire healthcare system record, rendering them inaccessible.

❑ The attacker then demands a ransom payment, usually in cryptocurrency, in exchange for decrypting the files and restoring access.

❑ Ransomware attacks often occur through malicious email attachments, fake software updates, or compromised websites.

❑ Once the victim's system is infected, the ransomware encrypts the files, displaying a ransom note with instructions on how to pay the ransom.

❑ Paying the ransom does not guarantee that the attacker will provide the decryption key, and it may
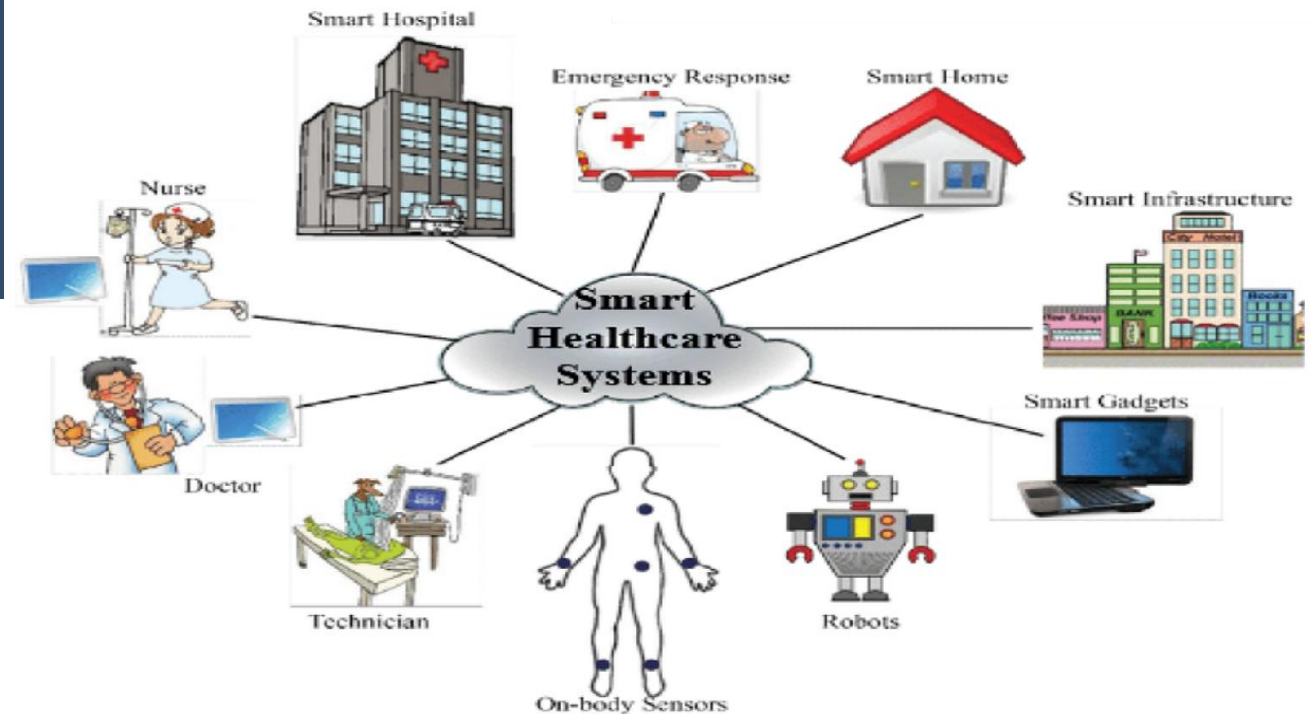

ATTACK SCENARIO 4 – RANSOMWARE

1. Attacker identifies victims and the websites they are visiting
2. Attacker tests this sites for vulnerabilities
3. Attacker inject code to vulnerable website
4. User visits the compromised website
5. User is redirected to the site that hosts the exploit code
6. Binary file is downloaded and executed
7. Encryption is negotiated
8. Data is encrypted
9. Ransom note is displayed

Ransomware Attacks

ATTACK SCENARIO 4 — RANSOMWARE

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Healthcare Cyber Security

Industry Revolution

THE 5 INDUSTRIAL REVOLUTIONS

1780	1870	1970	2011	2020
Industry	Industry	Industry	Industry	Industry
1.0	**2.0**	**3.0**	**4.0**	**5.0**

Mechanization   Electrification   Automation   Digitalization   Personalization Humanization
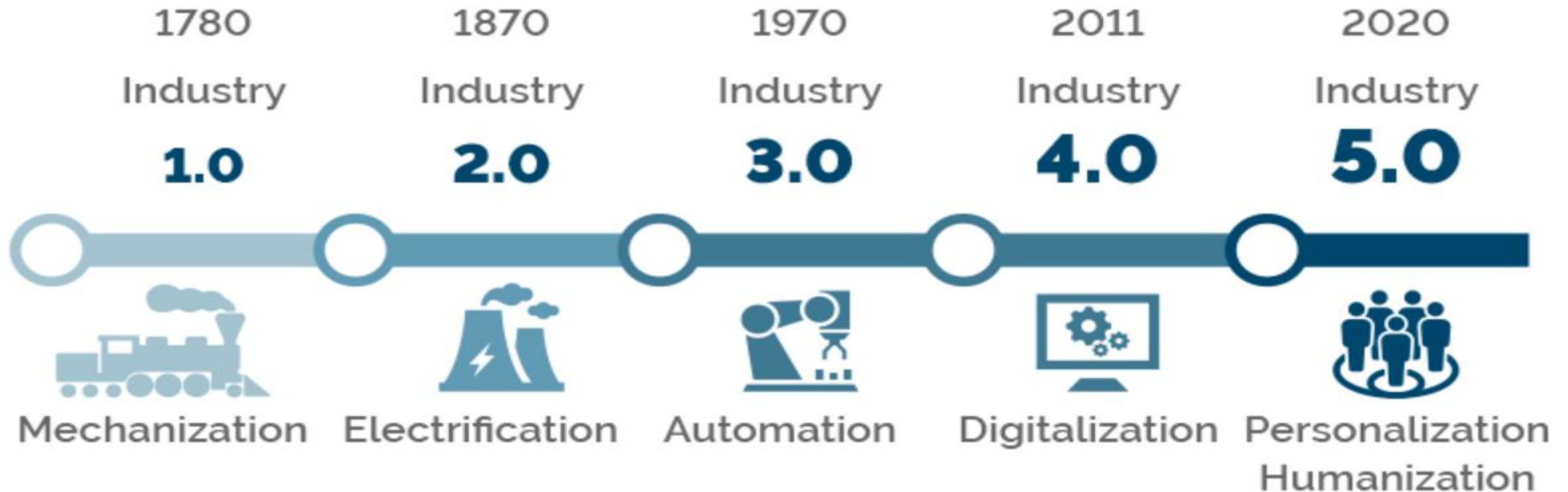
Industry

❑Industry is the collective term for the production of goods and services within an economy.

❑It encompasses all activities involved in manufacturing, processing, and production using labor, machinery, tools, and chemical or biological processing.
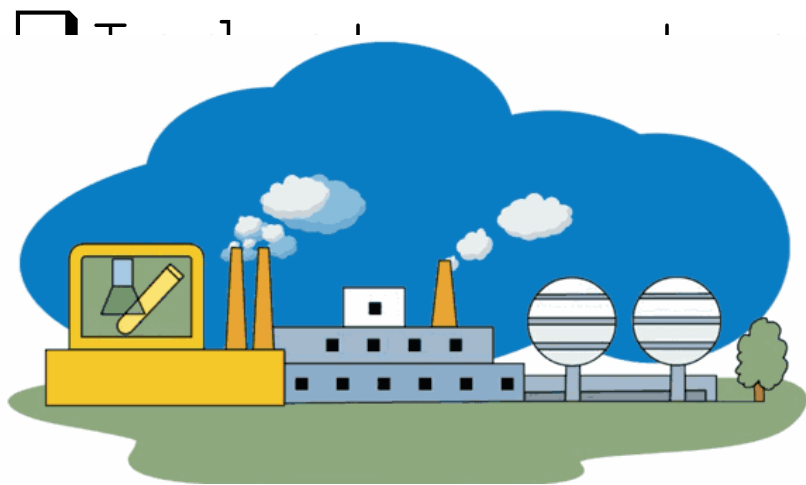
❑I_____sforms   raw   ma_____o
_____cts   or   goods,   _____e
_____d in further produ____

Industrial Revolutions

Agriculture 5.0
Robotics, UAV, and big data analytics

Agriculture 4.0
AI, IoT, ML, 5G and cloud computing

Agriculture 3.0
GPS, remote sensing, and GIS

Agriculture 2.0
Agricultural Machinery and Agrochemical

Agriculture 1.0
Traditional Agricultural Tools
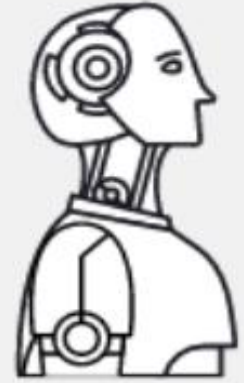
Future

Today

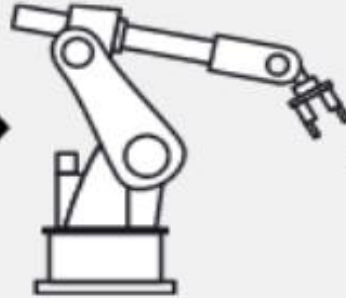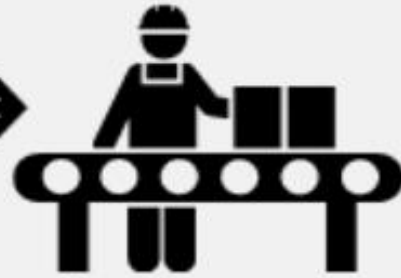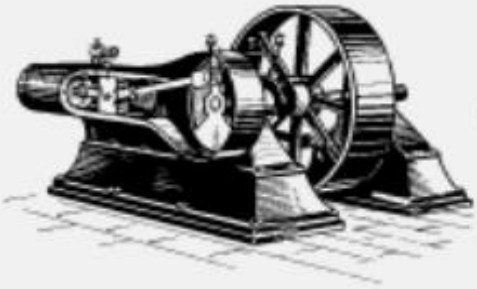GIS
Designing our future

20th century

1950s

19th century

Timeline of the Agricultural Revolution

Industrial Revolutions

REVOLUTIONS

Industry 1.0	Industry 2.0	Industry 3.0	Industry 4.0	Industry 5.0
mechanization, water and steam powers	mass production, electric power, assembly line	computers, automated production, electronics	cyber-physical systems, IoT, networking, machine learning	human-robot collaboration, cognitive systems, customization
1800	1900	2000	2010	2020

Industrial Revolutions

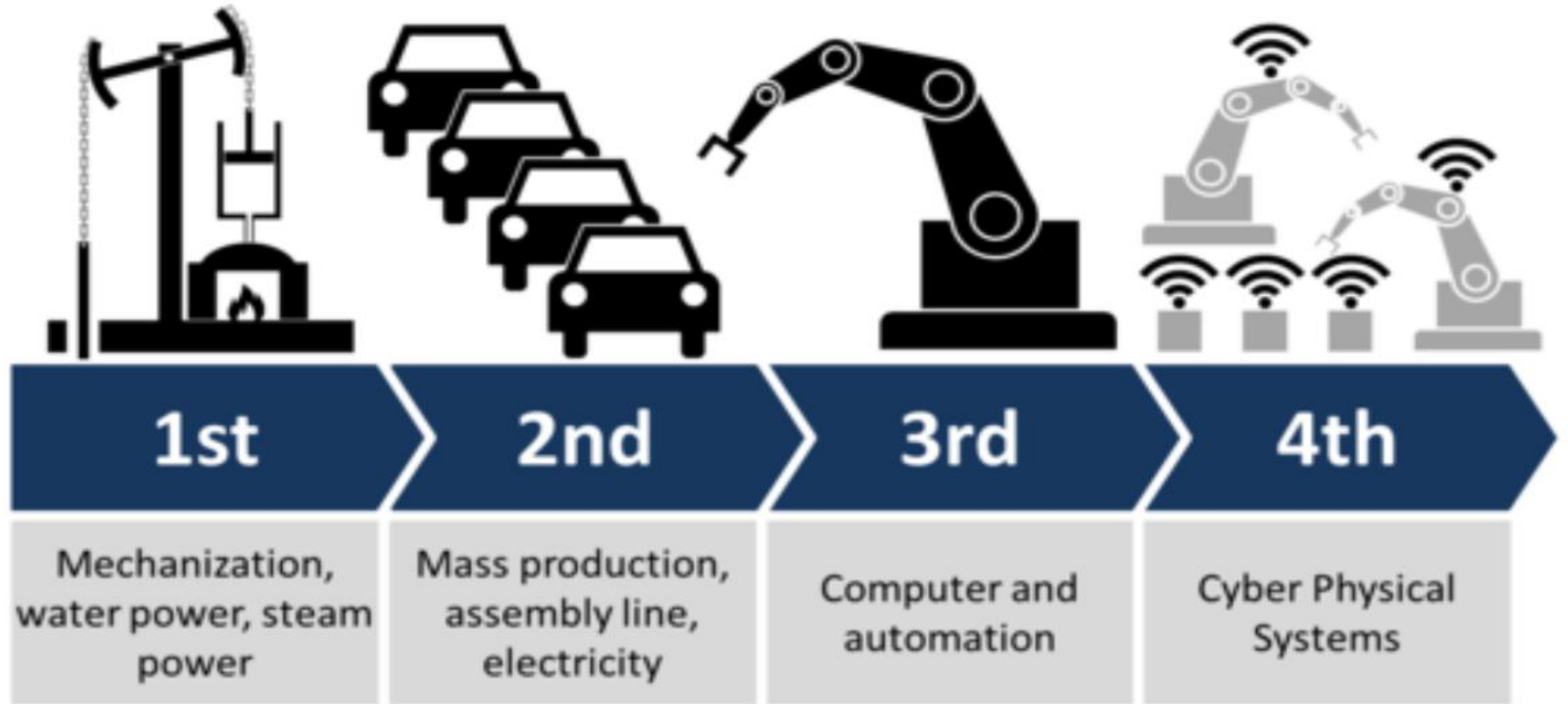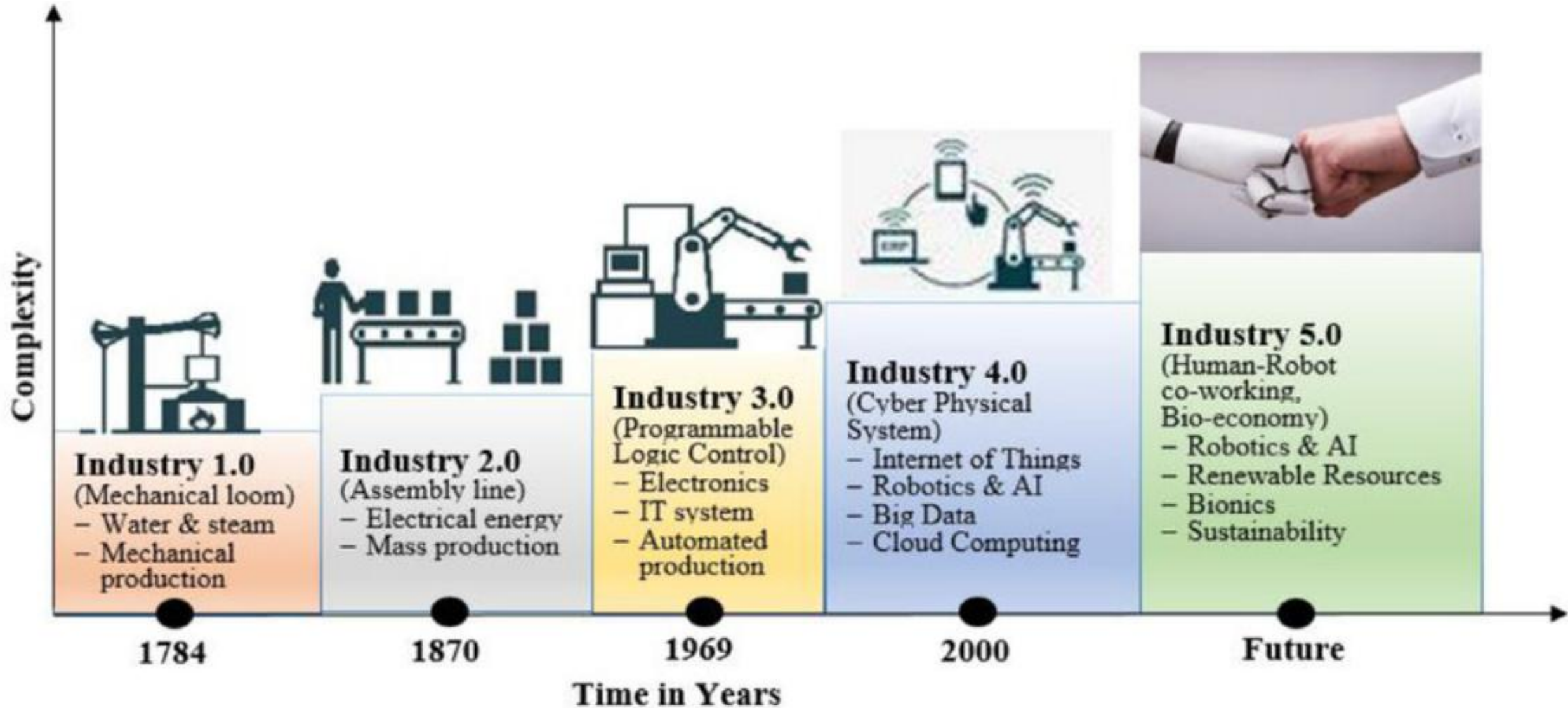| 1st	2nd	3rd	4th
Mechanization, water power, steam power	Mass production, assembly line, electricity	Computer and automation	Cyber Physical Systems

Figure 1 : Evolution of Industry in Phases of Industrialization

Industrial Revolutions

Industrial révolutions from Industry 1.0 to Industry 5.0 (adapted from [29 , 27]).
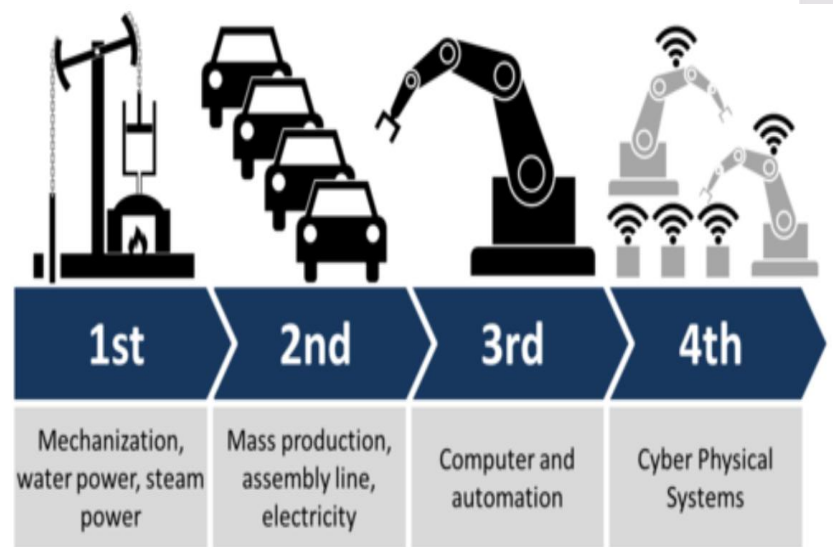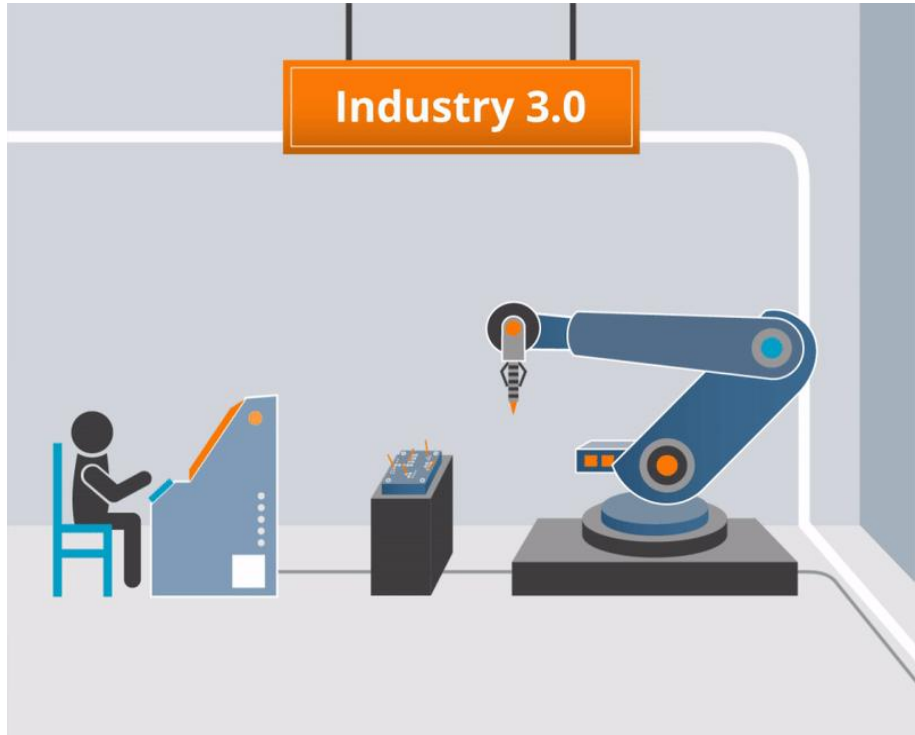
Industry 1.0

Industry 2.0

Industry 3.0

Industry 4.0

1st	2nd	3rd	4th
Mechanization, water power, steam power	Mass production, assembly line, electricity	Computer and automation	Cyber Physical Systems

Figure 1 : Evolution of Industry in Phases of Industrialization

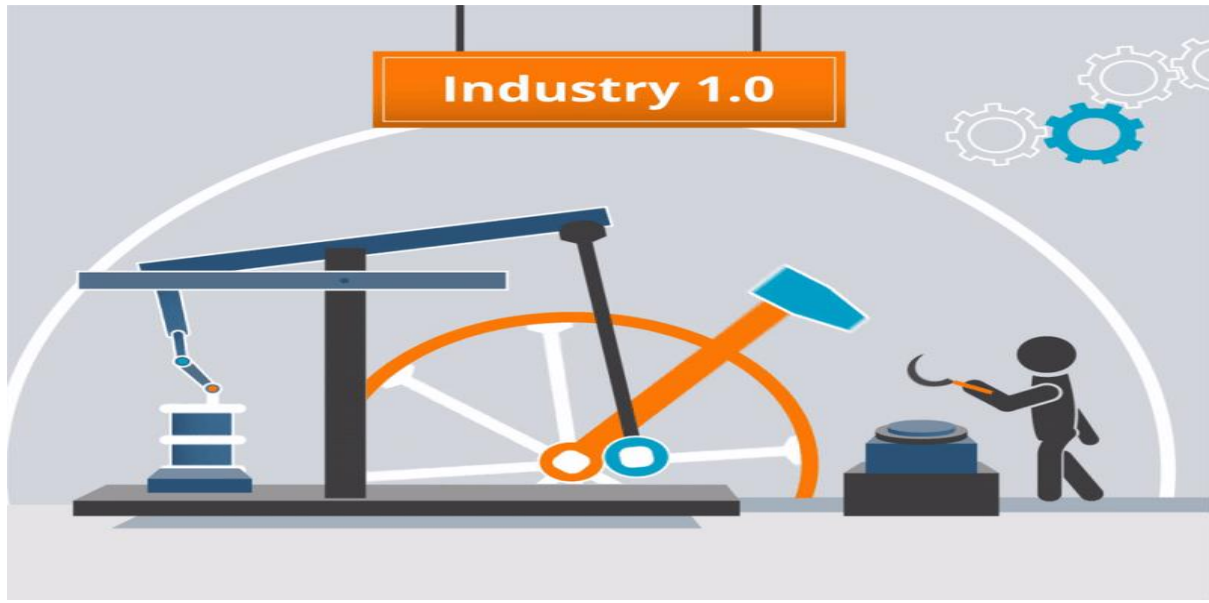| 1st	2nd	3rd	4th	5th
Mechanization, water power, steam power	Mass production, assembly line, electricity	Computer and automation	Cyber Physical Systems	Co Working
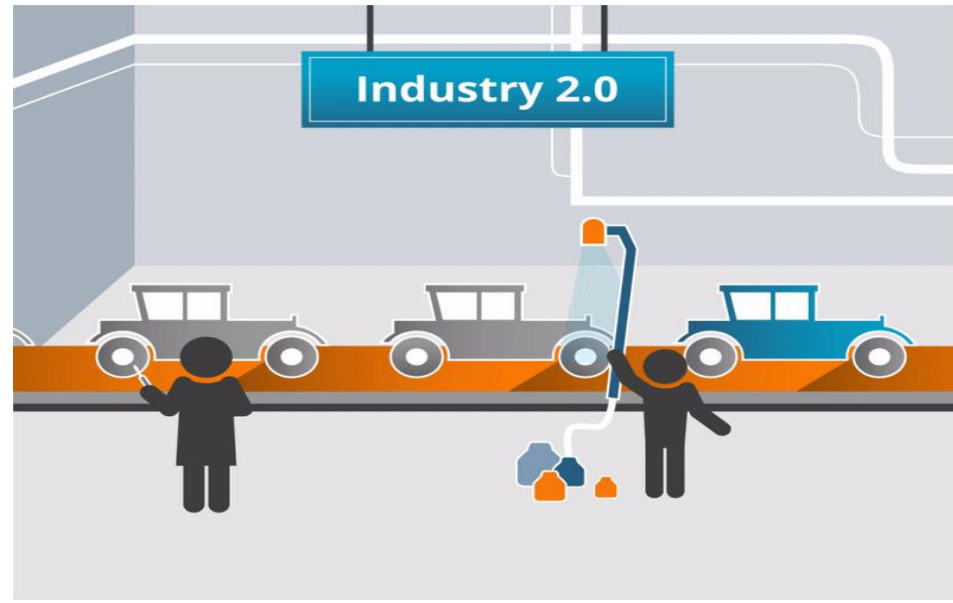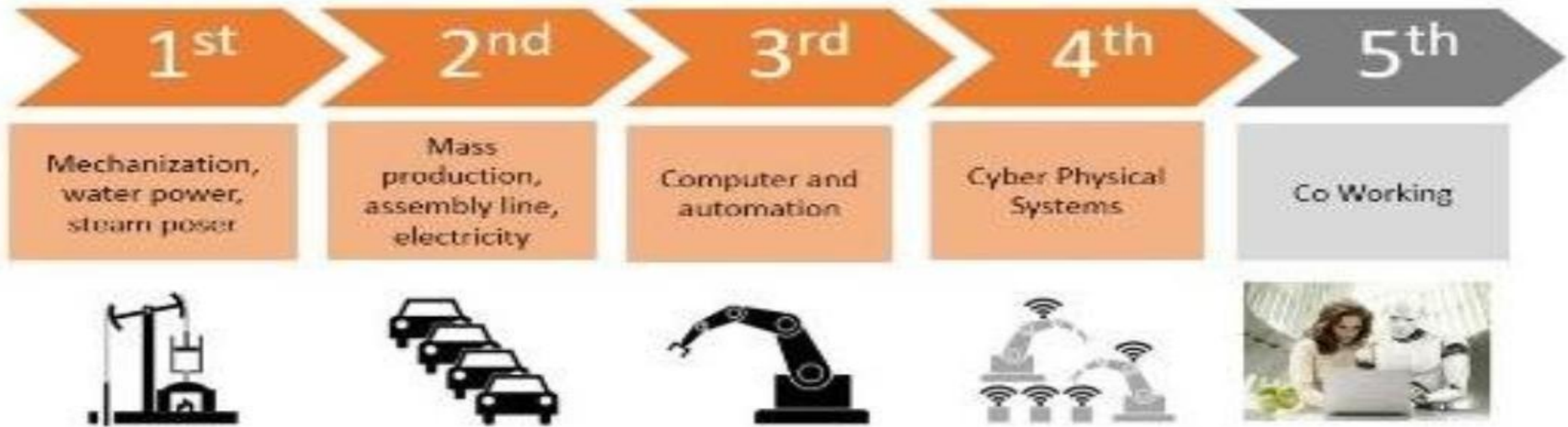
The Five Industrial Revolutions.

Industry 1.0   Industry 2.0   Industry 3.0   Industry 4.0
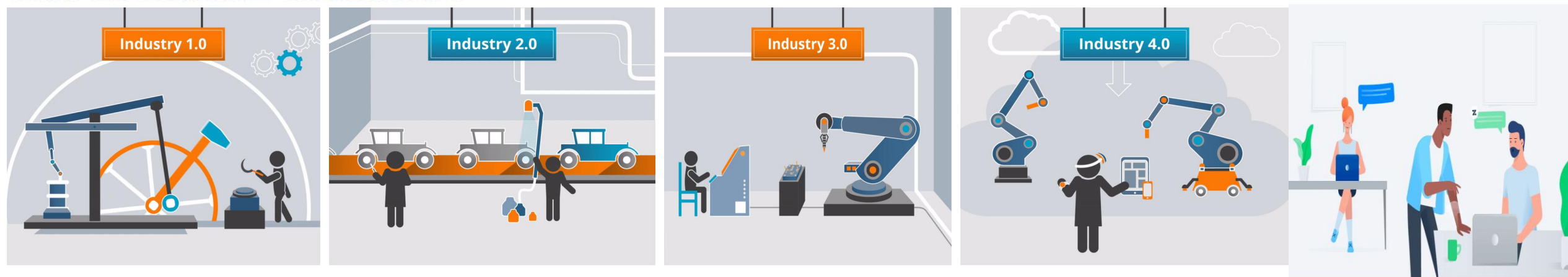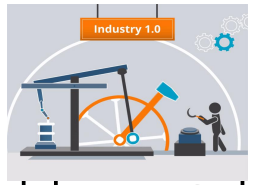
Industry 1.0

❑Industry 1.0, also known as the First Industrial Revolution, began in the late 1700s and early 1800s, primarily in Great Britain.

❑It was characterized by the introduction of machinery, specifically steam engines, into the production process, transitioning from manual labor to mechanized manufacturing.

❑This era saw significant advancements in industries like textiles, mining, and iron production.

Advantages of Industry 1.0

❑Increased Production Efficiency: Steam engines and mechanized machines allowed factories to operate more efficiently than manual labor or water power, leading to higher production volumes.

❑Mass Production: Enabled the mass production of goods like textiles, iron, and coal, making products more widely available.

❑Urbanization and Economic Growth: Fostered the growth of new industries and cities as people moved from rural areas to metropolitan centers for factory jobs.

❑Reduced Human Labor Dependence: Machines took over manual tasks, minimizing human physical labor and increasing consistency and quality of output.

❑Foundation for Technological Progress: Laid the groundwork for future industrial advancements, including automation and digitization.

Disadvantages of Industry 1.0

❑Poor working conditions: Factories prioritized production and profit over worker safety. Workers, including children, often worked 14-16 hours per day with minimal breaks in hazardous, unsafe environments.

❑Child labor: Many children, some as young as 3, worked long hours in unsafe conditions without

Disadvantages of Industry 1.0

❑Unsanitary living conditions: Rapid urbanization led to overcrowded cities with poor sanitation, sewage in streets, contaminated water supplies, and pollution from factory waste.

❑Environmental pollution: Air, water, and soil pollution increased significantly due to factory

Disadvantages of Industry 1.0

❑Inequalities: Workers were paid low wages, with women and children earning significantly less than men. Wealth was unfairly distributed, enriching factory owners while workers remained poor.

❑Food shortages: As many workers left farms to work in factories, agricultural production sometimes

Disadvantages of Industry 1.0

❑Negative social impacts: The rise of industrial capitalism increased social inequality, and harsh living and working conditions contributed to social tensions.

❑Health issues: Factory workers faced health problems from poor working conditions, pollution, and unhealthy lifestyles associated with industrial living.

Industry 2.0

❏ Industry 2.0, also known as the Second Industrial Revolution, was the period in the late 19th and early 20th centuries.

❏ It was marked by the transition from steam-powered manufacturing to electric-powered production.

❏ This era introduced electricity as the main source of energy, replacing steam engines, which allowed factories to operate more efficiently and flexibly.

Advantages of Industry 2.0

❑Significant increase in economic growth and production efficiency due to the adoption of electricity and mass production techniques like the assembly line.

❑Introduction of new communication technologies such as the telephone and radio, improving connectivity.

Advantages of Industry 2.0

❑Development of new materials like steel, plastics, and synthetic dyes, enabling stronger, cheaper, and diverse products.

❑Advances in transportation including the automobile and airplane, expanding mobility.

❑Improvements in public health through vaccines and pharmaceuticals.

Advantages of Industry 2.0

❑Rise of middle-class opportunities and social mobility as industrial jobs increased.

❑Growth of infrastructure such as railroads, subways, and skyscrapers.

❑Increased availability and affordability of goods, improving people's standard of living.

Disadvantages of Industry 2.0

❑Increased pollution and environmental damage due to industrial waste and heavy coal use.

❑Poor working conditions in factories, including sweatshops with long hours and low pay.

❑Use and abuse of child labor.

❑Overcrowded, unsanitary urban living conditions, leading to health problems.

Disadvantages of Industry 2.0

❑Widening gap between rich factory owners and poor workers.

❑Consumerism resulting in waste and overconsumption.

❑Rise of monopolies and large corporations, limiting competition.

❑Technological advances enabling government surveillance.

❑Exploitation of natural resources with long-term environmental consequences.