Industrial Internet of Things

Industrial Revolution

Dr Abhishek Hazra

abhishek.h@iiits.in

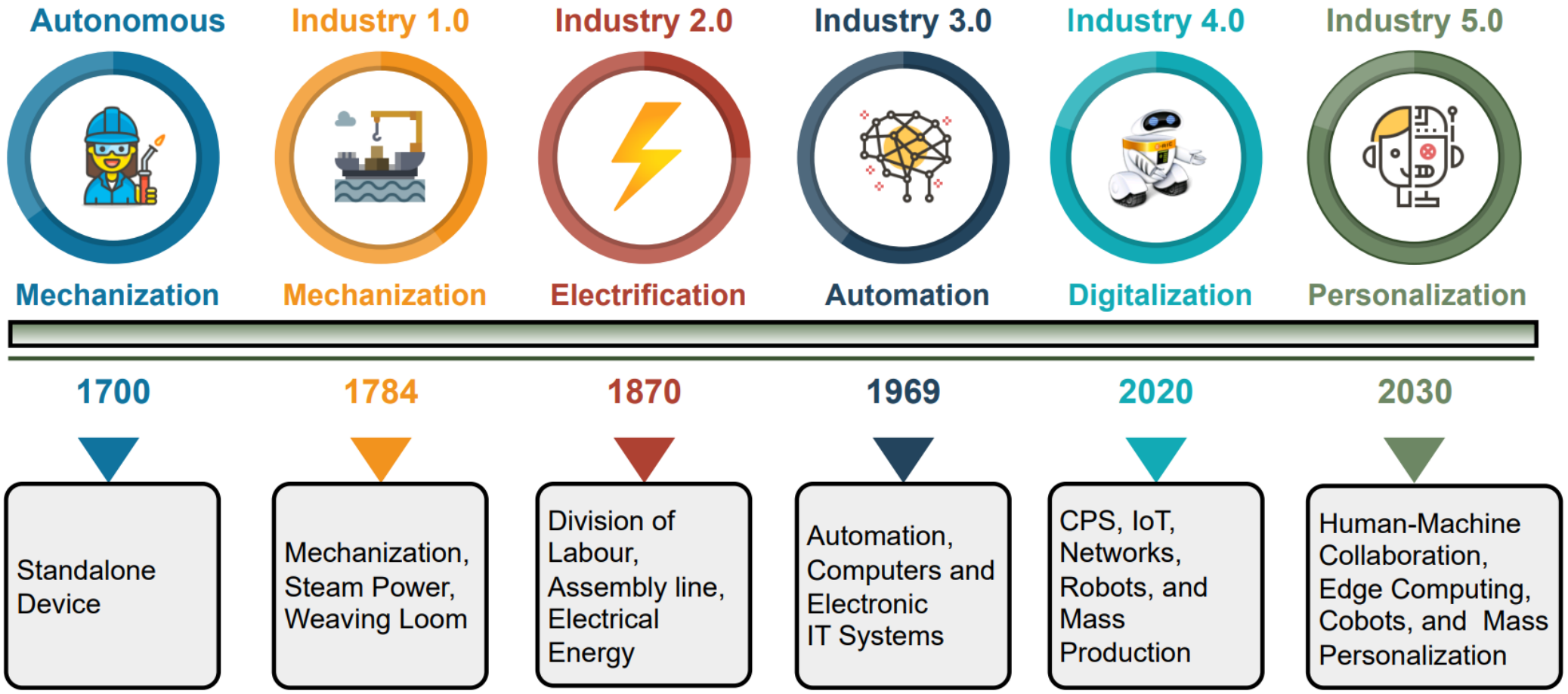
Introduction

- Current industrial revolution, Industry 4.0, integrates edge computing, cloud computing, IoT, and AI for intelligent factories.
- Aims: Increased productivity, mass customization, transforming previous industrial versions.
- Industry 1.0 (1800s): Mechanical manufacturing for water/steam-powered machines.
- Industry 2.0 (1870): Electric power, assembly line manufacturing, boosted production capacity.
- Industry 3.0: Associated with computer technology, automation, transportation, and logistics development.

Introduction

- Industry 4.0 (2011): Smart manufacturing, harnessing emerging technology for productivity and mass production.
- Industry 5.0: Future cognitive control process based on Industry 4.0, enhancing human-machine interactions.
- Goal: Value-driven approach, combining human experience with AI cognitive abilities and precision control.
- Envisions improving production quality by delegating repetitive tasks to robots and focusing humans on critical reasoning.
- Result: Incredibly effective production processes, trustworthy autonomy, lower costs.
- Importance of human-robot collaboration for efficient and value-added production processes.

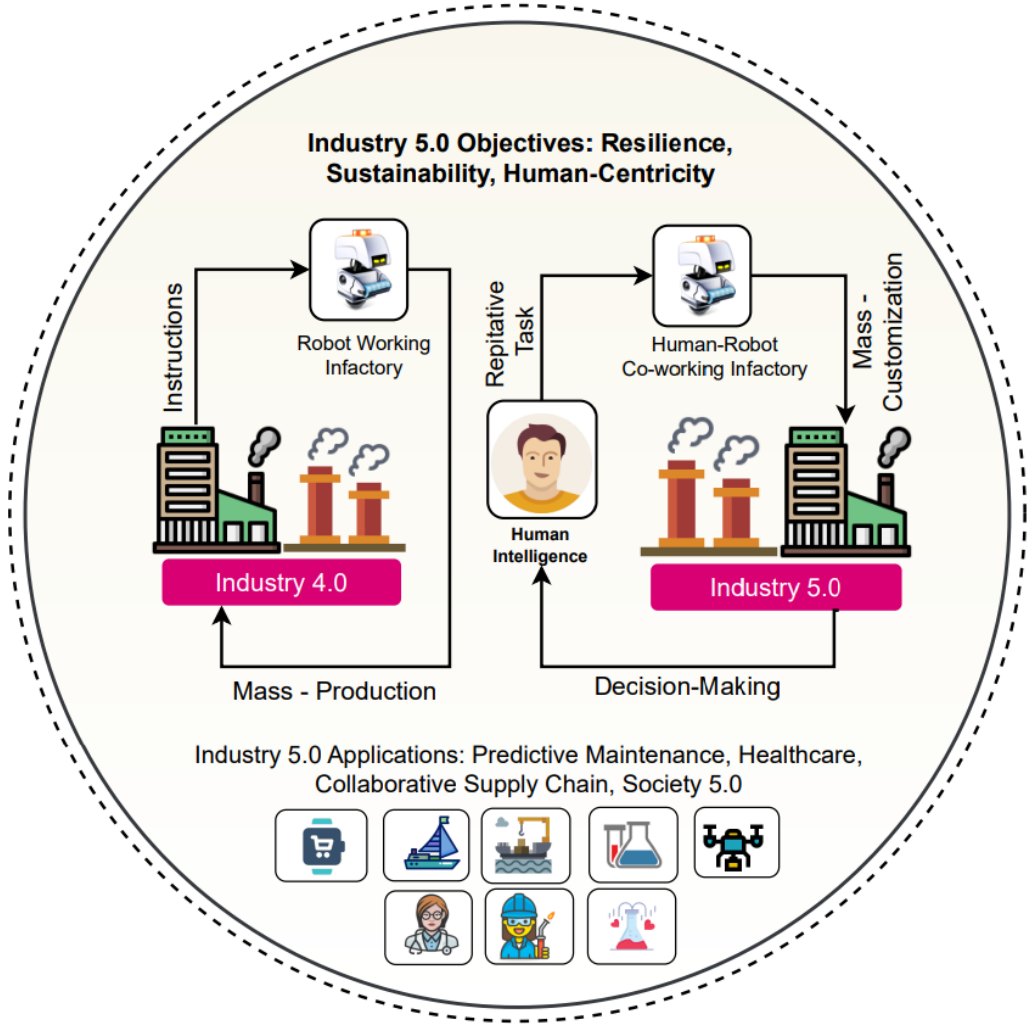
Industrial Revolution



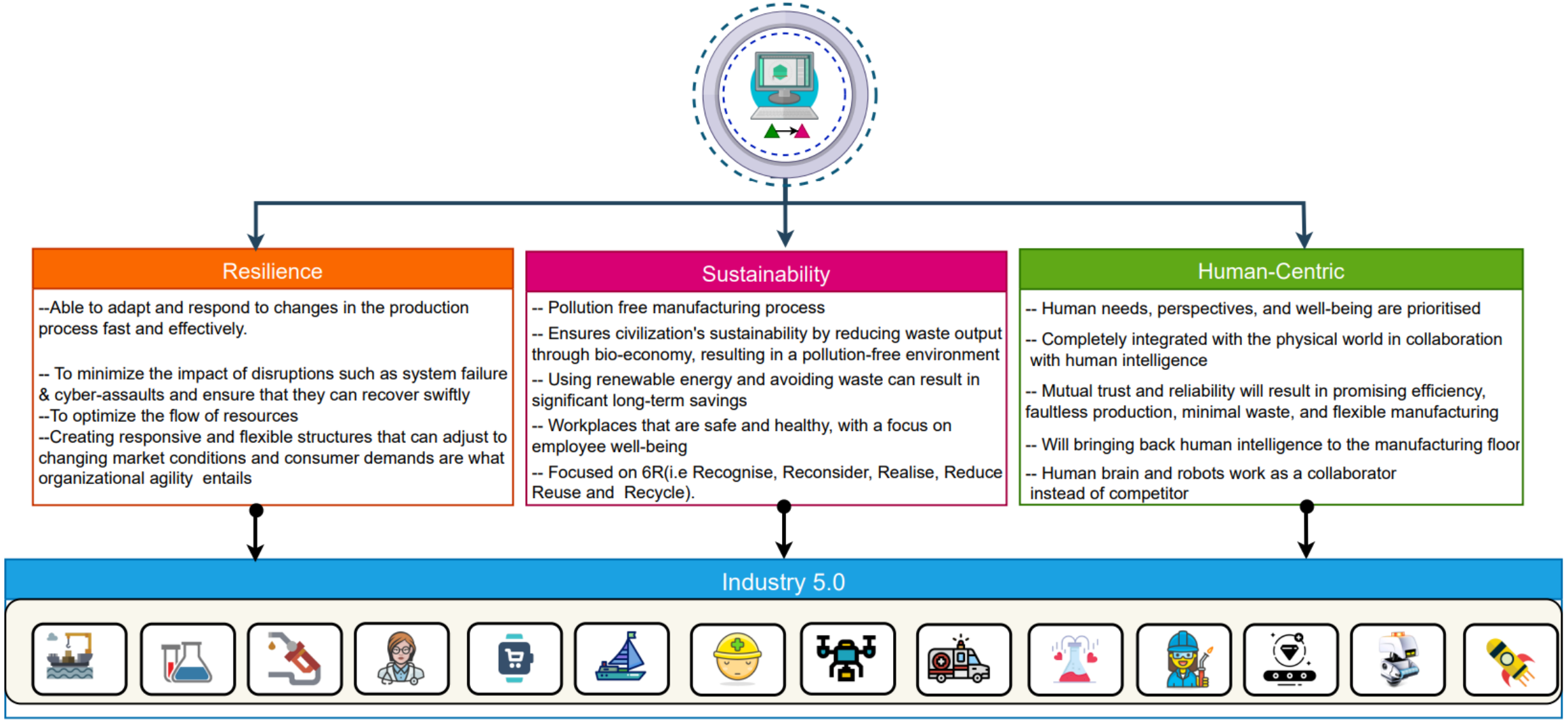
Difference

Parameters	Industry 1.0	Industry 2.0	Industry 3.0	Industry 4.0	Industry 5.0
Time Period	Late 18th to early 19th centuries	Late 19th century to early 20th century	Late 20th century to early 21st century	Early 21st century to present day	Future (Not yet established)
Key Technologies	Steam engine, Mechanization	Mass production & Assembly line	Automation, Digitization & Computers	IoT, AI, and Big Data	AI, Nanotechnology, and Renewable Energy
Production Focus	Automation of manufacturing processes	Standardized mass-production of goods	Personalization of commodities on a large scale	Manufacturing that is smart and linked	Production that is both sustainable and ethical
Human Role	Machine operators & labourers	Operators & assemblers can work	Employees who are problem solvers and innovators	Advanced AI, Replacing human	Collaboration between humans and machine
Communication	Telegraph, Telephone	Radio, & Television	Internet, Mobile Devices, Social Media	IIoT, Real-time data sharing and analysis	Intelligent communication and collaboration
Manufacturing scale	Large factories and Mills	Large factories and Assembly lines	Decentralized production, flexible manufacturing	Smart factories, DT, 3D printing	Distributed manufacturing and production networks
Production speed	Standardized production speed	High-speed production	Real-time production and delivery	Flexible and adaptive production processes	On-demand production and delivery
Supply Chain	Local supply chains	Linear supply chains	Networked supply chain with real-time monitoring	Agile and responsive supply chains	Decentralized and autonomous supply chains
Key Industry	Textile, Iron and Steel, mining	Automotive, Steel, & Chemicals	Electronics, IT, Biotechnology	Industry 4.0 technologies across industries	Industries across sectors

Industry 4.0 Vs 5.0



Industry 5.0 Objectives



Challenges

- Heterogeneity and Data Security
- Privacy and Trust
- Human-Robot Co-working
- Sustainable Environment
- Skilled-Workforce
- Industrial Standardization

Thank You!