

Unit 75: Industry 4.0

Unit code : F/617/3949

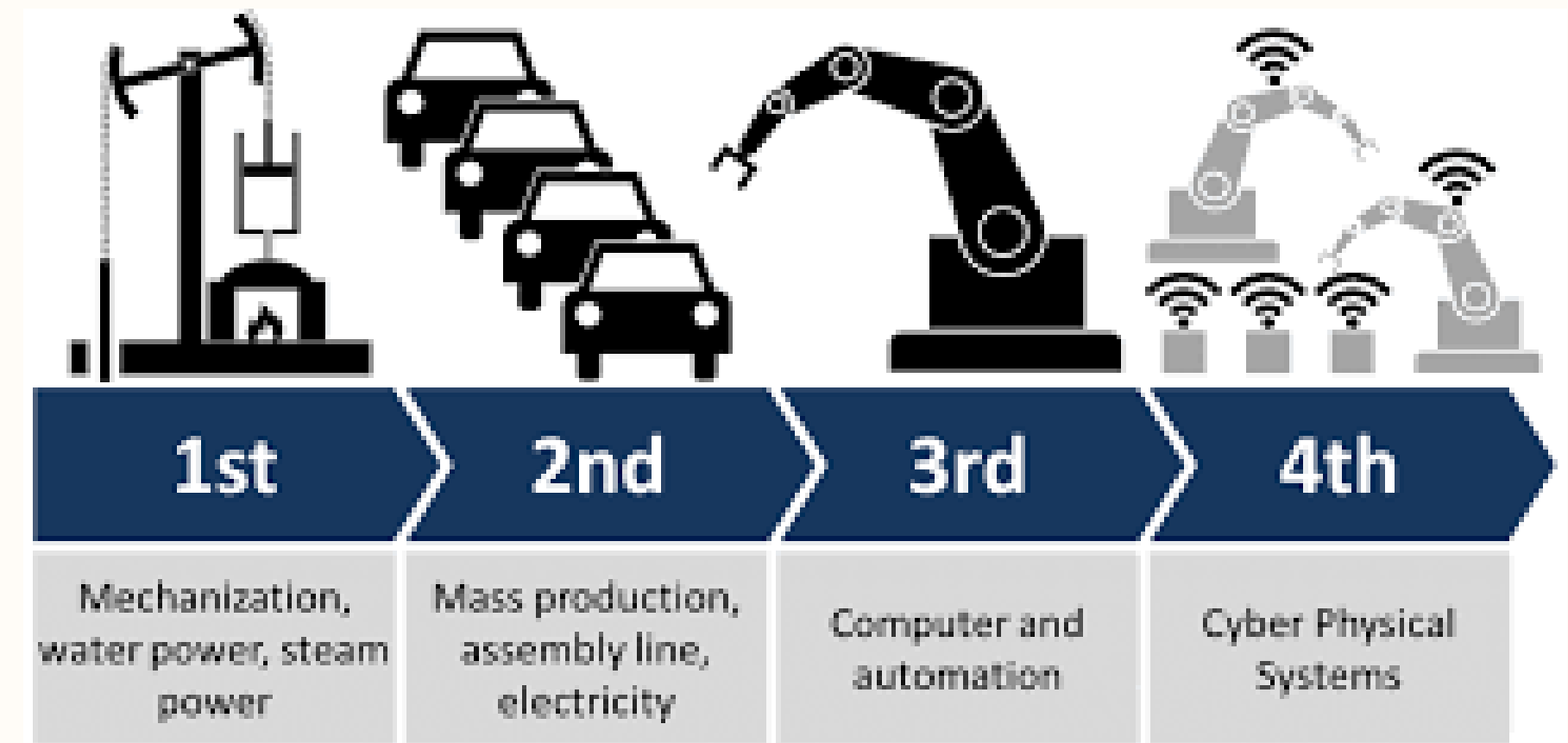
Unit level : 4

Credit value : 15

Tutor: Mr P.M.SUBRAMANIAN

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- Factors Leading to Industry 4.0
- Smart Factory
- Cyber-Physical Technologies, Benefits
- Transitioning from Industry 3.0 to 4.0
- Futuristic Trends in Manufacturing
- Factors Shaping Industry 5.0.



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- Fourth Industrial Revolution or 4IR
- Digitization -Manufacturing Sector

4 Disruptive Technologies

- connectivity, data, and computational power: cloud technology, the Internet, blockchain, sensors
 - analytics and intelligence: advanced analytics, machine learning, artificial intelligence
- 
- human–machine interaction: virtual reality (VR) and augmented reality (AR), robotics and automation, autonomous guided vehicles
 - advanced engineering: additive manufacturing

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- Building workforce capabilities and shifting mindsets
- Global Lighthouse Network (GLN) -2018
- IR4 Implemented - Digital Factories
- Tata Steel's plant in Kalinganagar, India
- Responsible Production
 - combining productivity,
 - sustainability
 - active workforce engagement

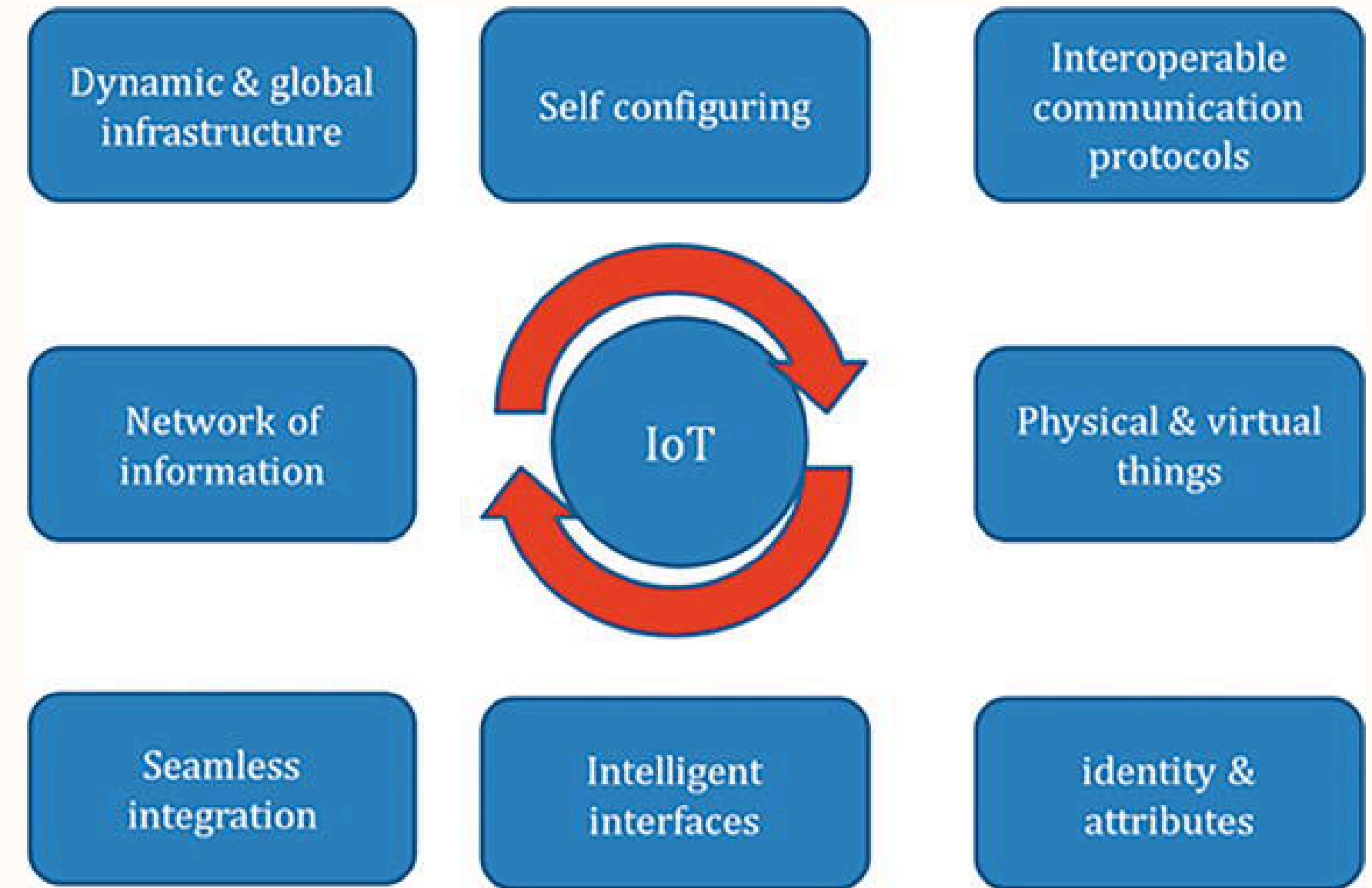
Navigating the next industrial revolution

Revolution	Year	Information	
	1	1784	Steam, water, mechanical production equipment
	2	1870	Division of labour, electricity, mass production
	3	1969	Electronics, IT, automated production
	4	?	Cyber-physical systems

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Major Approaches for 4 IR transformation

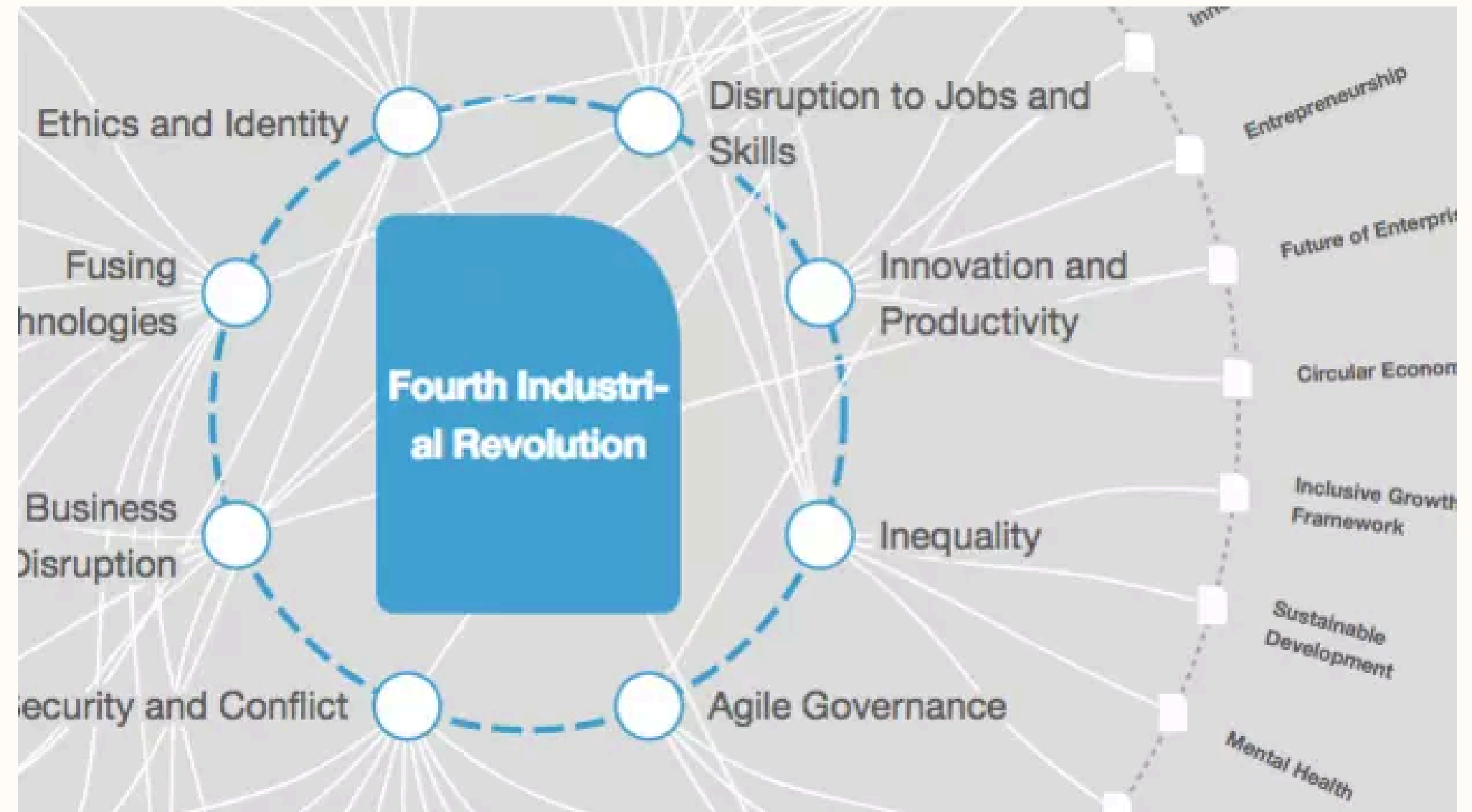
- Agile Approach
- Agile Digital Studios
- Industrial Internet of Things(IIoT) stack
- IIoT academy
- Tech ecosystems
- Transformation offices



Pilot Purgatory- Starting IR 4 but
no scaling up

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- Energy
- Transportation
- Social Mobility
- Socio-Economics
- Business
- Emerging Technologies
- Science
- Materials
- Communications
- Geography



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Aspects of industrial revolutions- Energy

- Modernise Energy Usage - Green Global
Energy, Climate Change
- Amount of Wasted Energy and other Inefficiencies
- Eco-Friendly Energy Sources
- Smart Sensors
- Digital home assistant-Alexa or Google Home
Turning
- Real Time Connection - 5G



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Aspects of industrial revolutions- Energy

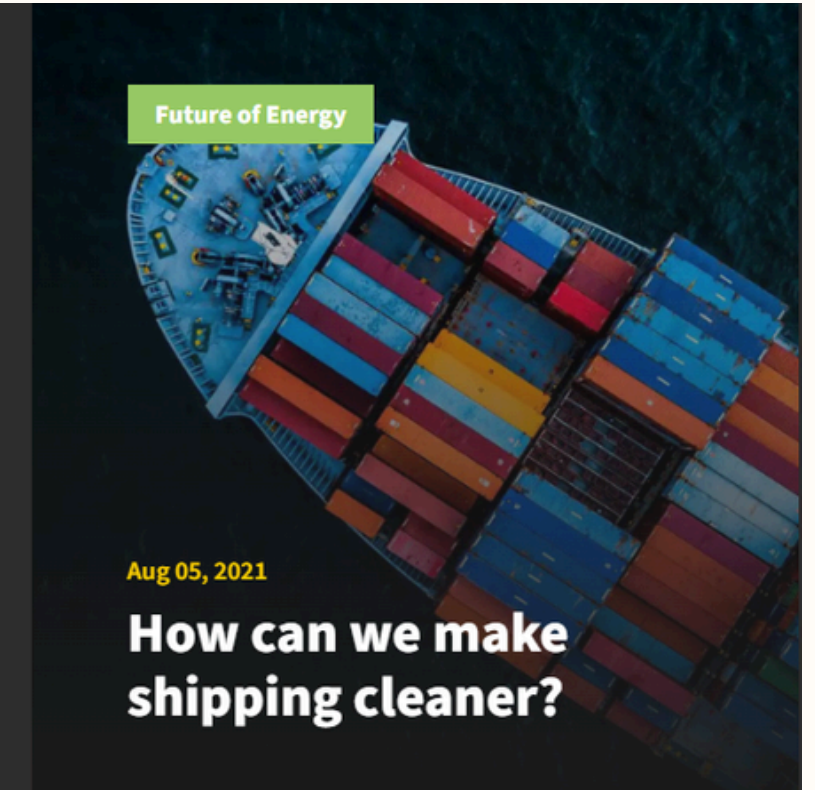
- Peak Energy Consumption - Response
- Digital Gap - Demands for Autonomous Operation
- Industry accounts for 54% of global delivered energy
- carbon footprint
- smart grids- reduce emissions by almost 4% by 2030



**increasing efficiency,
reducing energy costs,
minimizing its carbon footprint
needs to approach Industry 4.0**

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Aspects of industrial revolutions- Energy



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Aspects of industrial revolutions- Transportation

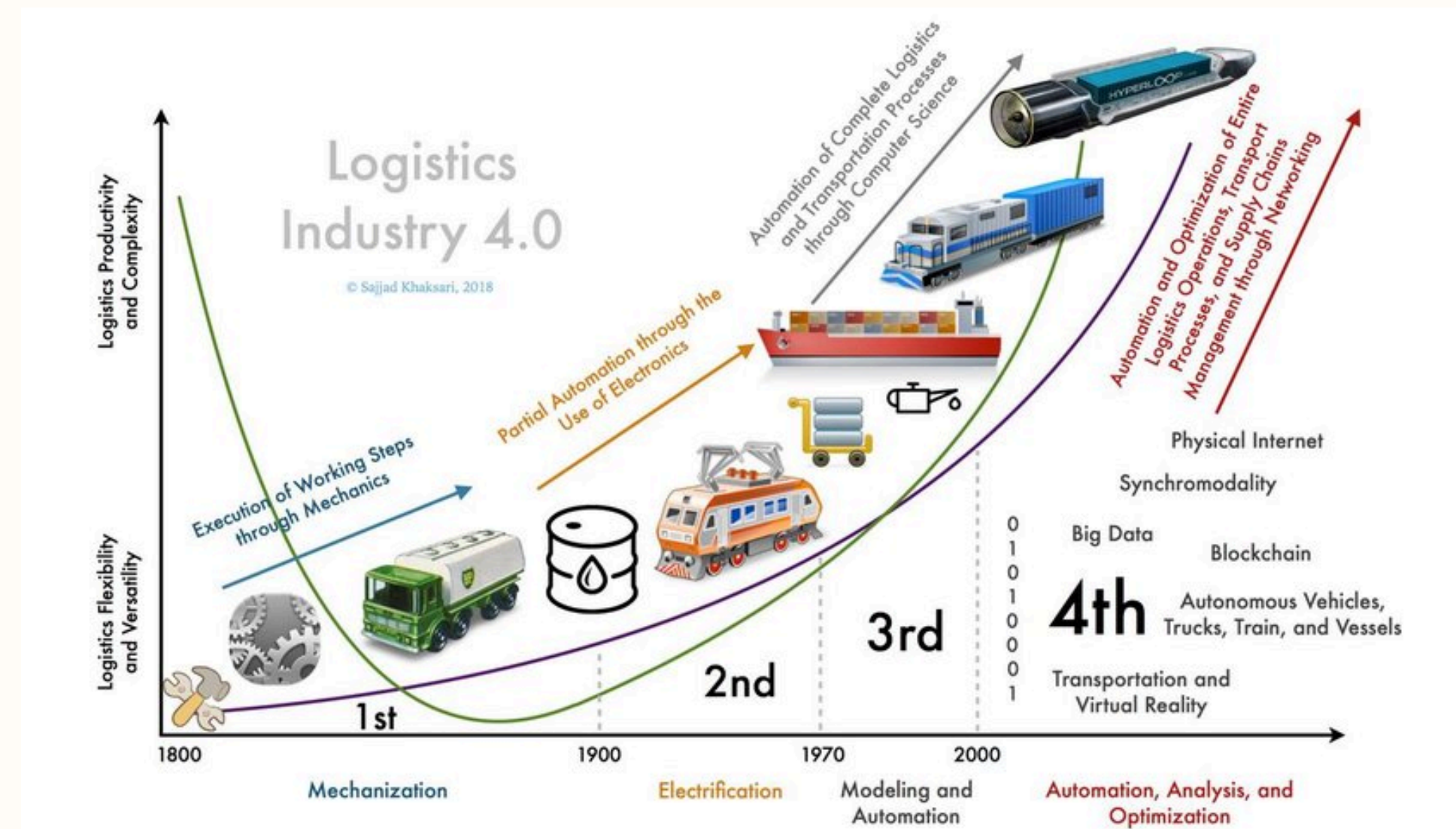
Problems

- Lost shipments, delays, and lack of visibility - customer dissatisfaction and increased costs.
- Manual processes - Time-Consuming, Error-Prone, and Costly.
- Inefficient route planning, unpredictable maintenance, Inaccurate demand forecasting -operational costs
- Lack of transparency and security in the supply chain
- Increasing Environmental Concerns and Regulatory Pressures
- Unplanned equipment failures -downtime and high maintenance costs.

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Aspects of industrial revolutions- Transportation

- Country's Economy
- Effective and Efficient Transportation
- Real-time tracking - GPS & Sensors
- Multimodal transportation
- Fleet management
- Adaptable Shipping
- Routing Alternatives
- Response to Potential Disruptions
- Connectivity - IOT
- Self Driving Cars



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Aspects of industrial revolutions- Transportation

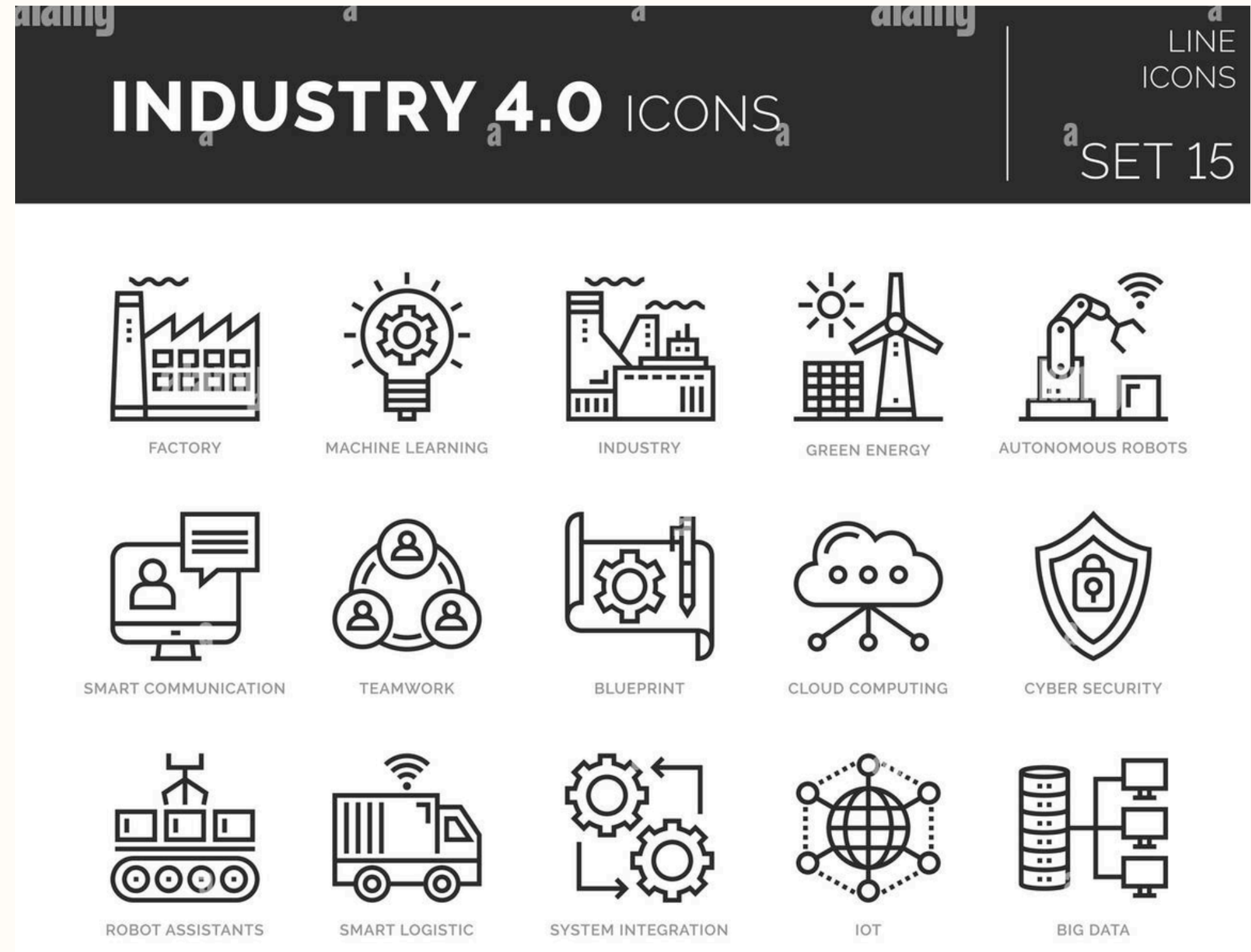
- AI & ML -
 - Optimize Route Planning,
 - Predictive Maintenance,
 - Demand Forecasting
 - Data-Driven Decisions,
 - Minimize Fuel Consumption,
 - Reduce operational costs.
 - Customer Service through Chatbots
 - Virtual Assistants



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Aspects of industrial revolutions- Transportation

- Blockchain Technology
 - Enhanced Traceability,
 - Reduces Fraud,
 - Increases Trust
- Robotics and Automation
 - Reduce Labor Costs,
 - Increase Operational Efficiency
- Sustainability and Green Initiatives
 - Reducing Carbon Emissions
 - Greener Supply Chain
- Data Analytics and Predictive Maintenance
 - Vast Data-Transportation, Logistics
 - Predictive maintenance systems



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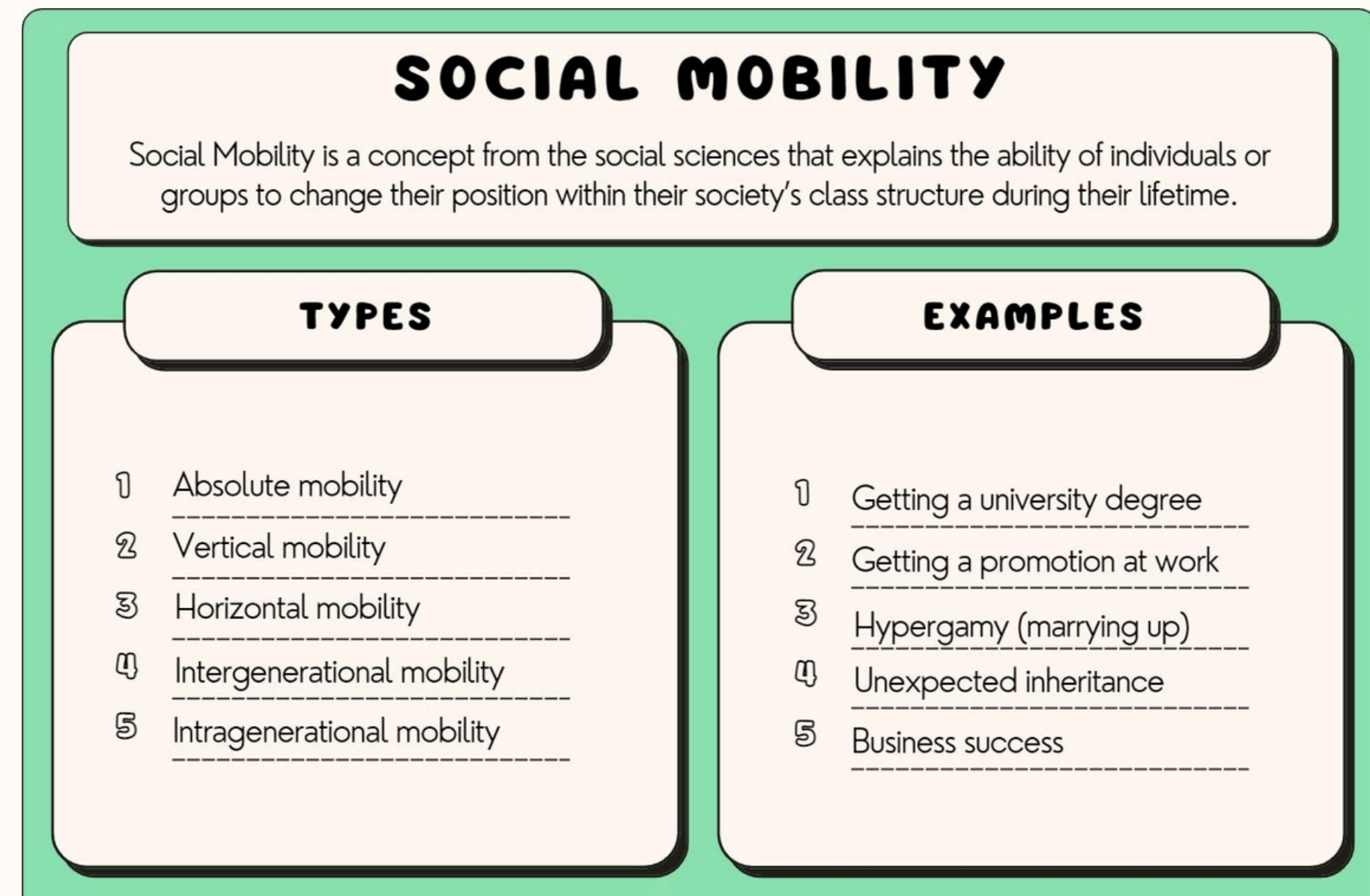
Aspects of industrial revolutions- Social Mobility

Social Mobility

- Opportunities for Movement between different Social Groups
- Reducing the Risk of Poverty
- Increasing Earnings
- Reduce Low-Income Jobs
- Equality of Opportunity

IR 4 influence on Social Mobility

- -ves-No low-skill, low-pay jobs
- Widen Existing Societal Rifts and class conflicts
- +ves -Digitally Augmented Workforce
- No repetitive tasks
- Collaborations between People and Technology
- Smart cities



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Aspects of industrial revolutions- Social Mobility

Social Mobility

- People Life Style - Mobile
- Sharing Economy - Uber
- Increase Social Tensions -Low pay jobs disappear
- 65% of Children - New Jobs
- Adapt to New Job Requirements,Master New Job Skills
- Routine,Reptitive, Predictable Jobs- High Risk
- ML- Production Capacity- 20%, Reduce Raw Material Waste by 4 %
- Amazon Robotic Shelves
- WFH, Sharing Work Space
- Gig Economy - No Permanent Job
- Big Data, Machine Trainers, AI developers
- Interpersonal Skills,Team Work, Leader Ship
- Imaginary, Creativity, Strategetic Thinking

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Aspects of industrial revolutions- Socio-Economics

- Lack of skilled workforce
- Aging society
- Resource efficient and clean urban production
- Mass customization
- Increasing product variability
- Shorter product life cycle
- Dynamic value chain
- Volatile markets
- Cost reduction pressure

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In Class Activity

Free Writing

*Write How Industrial Revolution Transformed a Industry of Your Choice
from IR 1 to IR 4*

*2 Pages Maximum
Duration - 15 Mins*

