

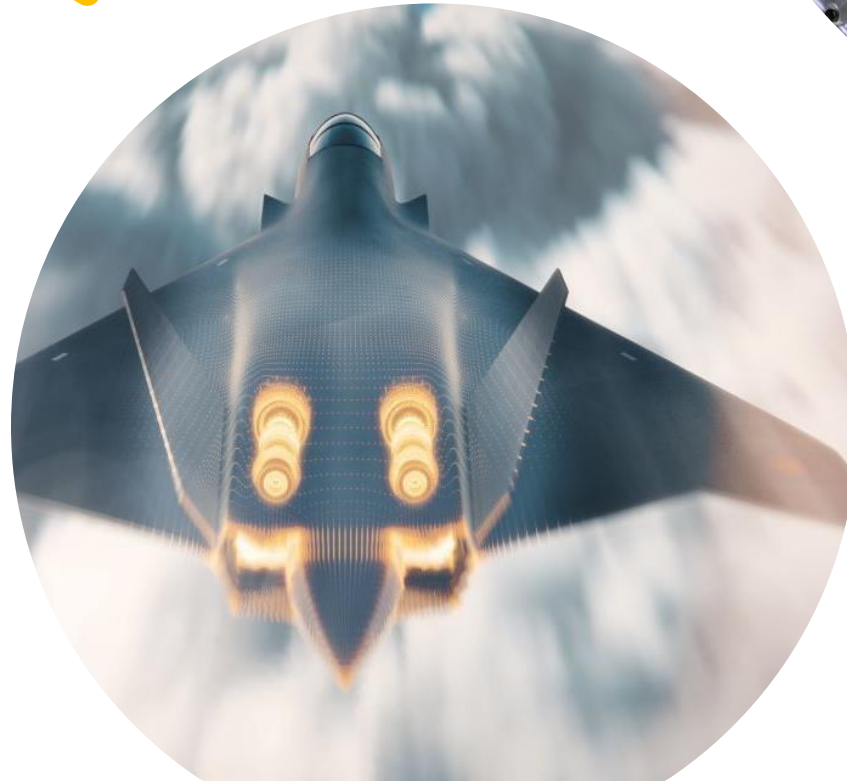
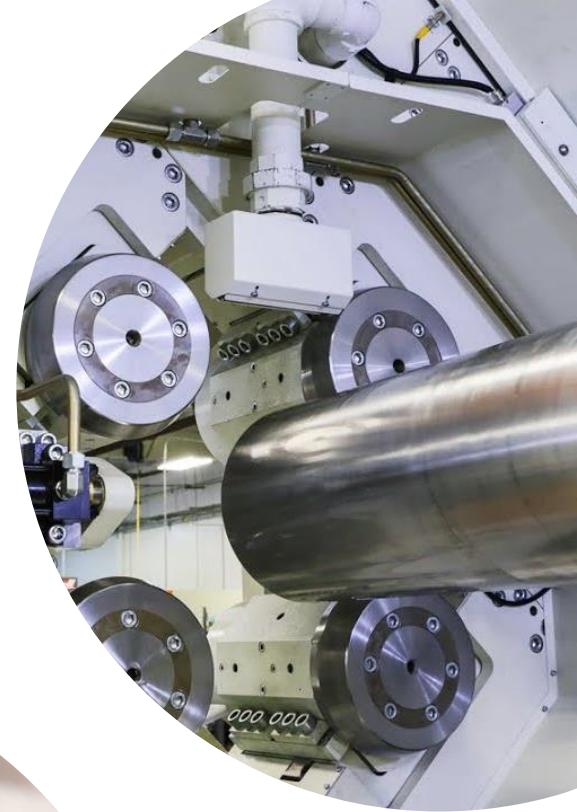
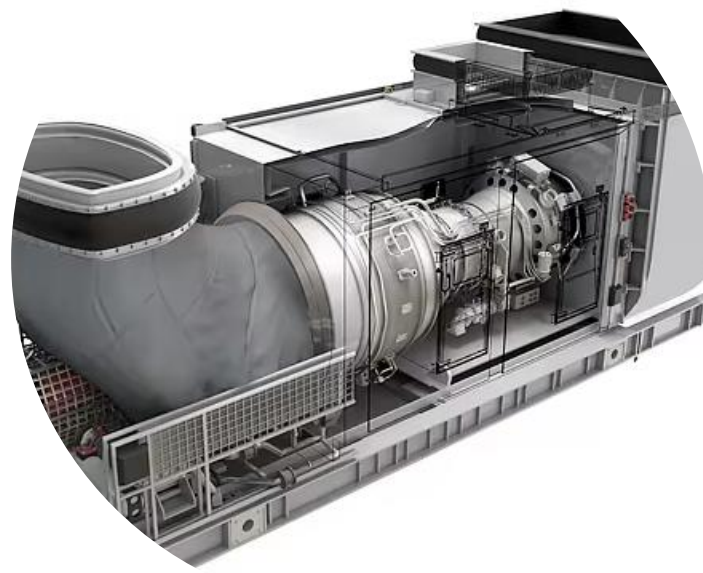


# Design for Industry 4.0

Introduction to Industry 4.0 and Design Evolution

# Fred Cooper

- Studied Materials Engineering at Swansea University
- Engineering company manufacturing industrial heating systems
- Postgraduate research in advanced metal forming of high strength steels, sponsored by Rolls-Royce plc.
- Started work for Rolls-Royce Defence
  - Materials Engineer
  - Naval Team Lead
  - Future Programmes Lead

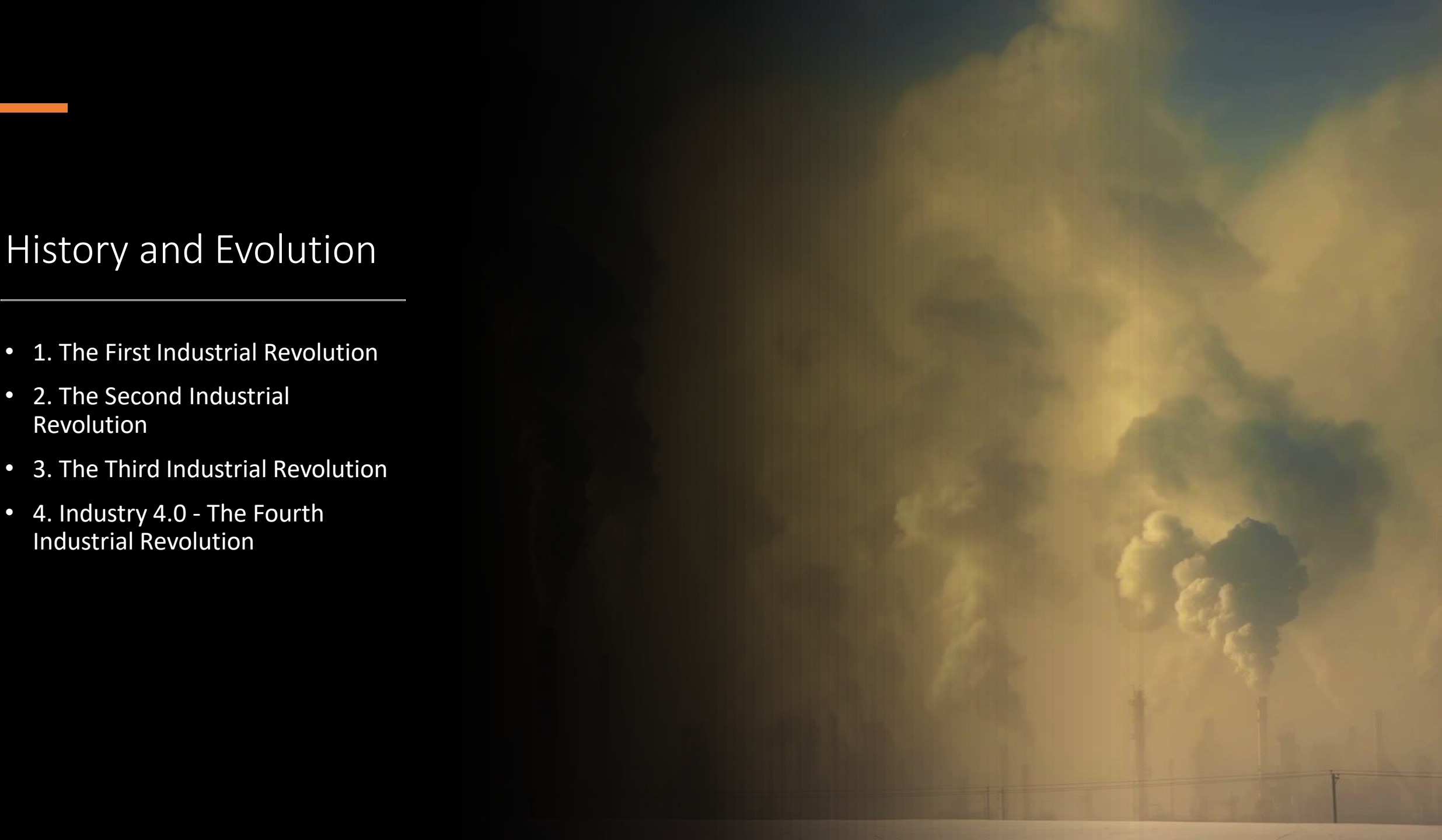




# History and Evolution

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- 1. The First Industrial Revolution
- 2. The Second Industrial Revolution
- 3. The Third Industrial Revolution
- 4. Industry 4.0 - The Fourth Industrial Revolution



# What is Industry 4.0?



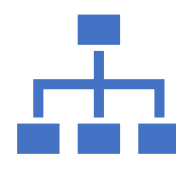
1.  
Interconnectivity



2. Information  
Transparency



3. Technical  
Assistance



4. Decentralized  
Decisions



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## Role of Design in the Industrial Revolution

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- 1. Design: More than aesthetics and function
- 2. Mass Production vs. Mass Customization
- 3. Batch Size of One



## Conclusion and Look Ahead

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- Industry 4.0 represents a shift in mindset as much as in technology. Design plays a pivotal role in this evolution. Join us as we explore more in upcoming lectures.





# Design for Industry 4.0

Introduction to Industry 4.0 and Design Evolution

# From Steam to Cyberspace

- Imagine a world powered by steam, where mechanized production was the pinnacle of innovation. Today, we stand at the doorstep of Industry 4.0.



# What Awaits in Industry 4.0?

- Industry 4.0 is about the marriage of physical and digital technologies. Think of smart factories, interconnected systems, AI, and more.

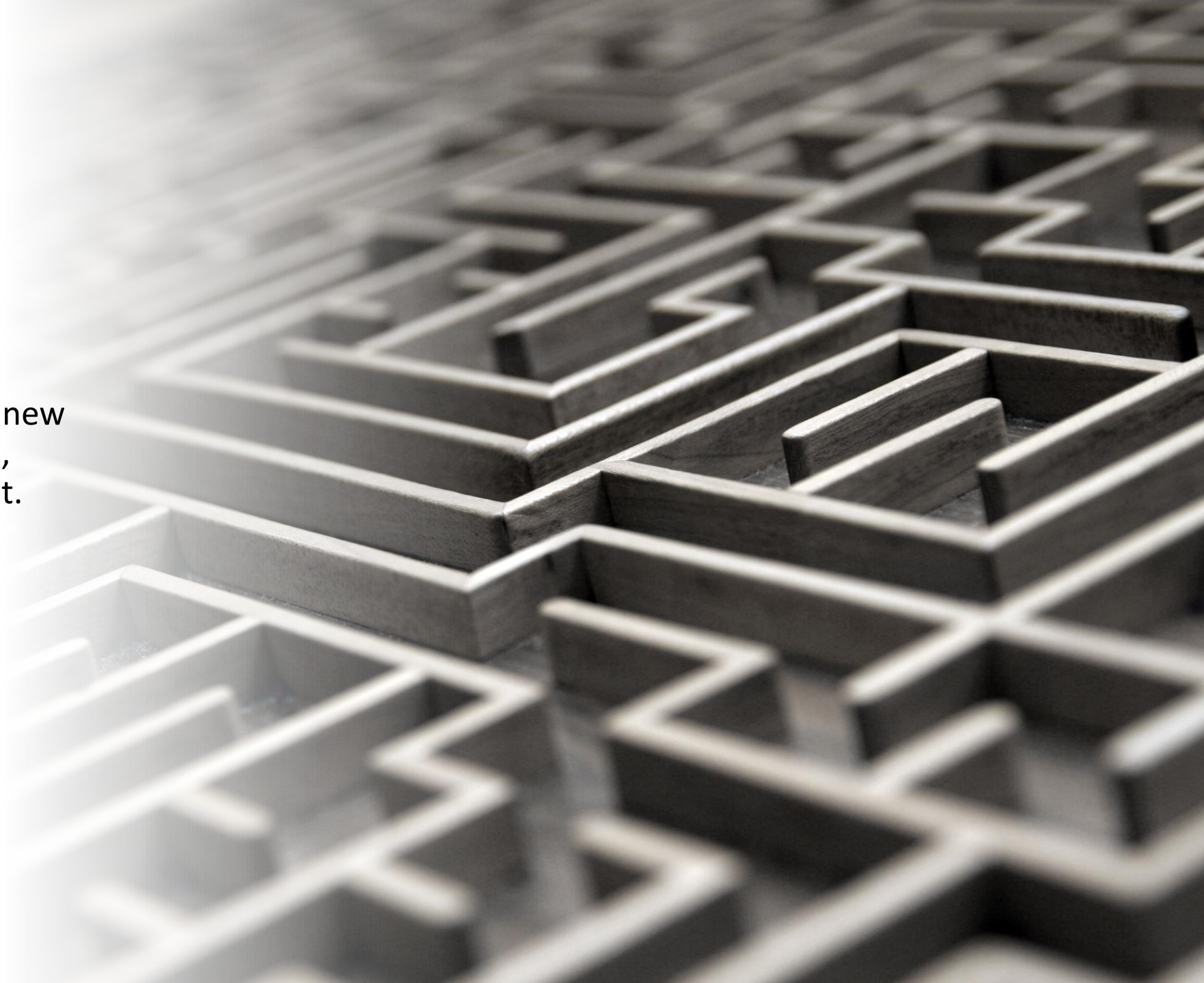
# But Why 'Design' for Industry 4.0?

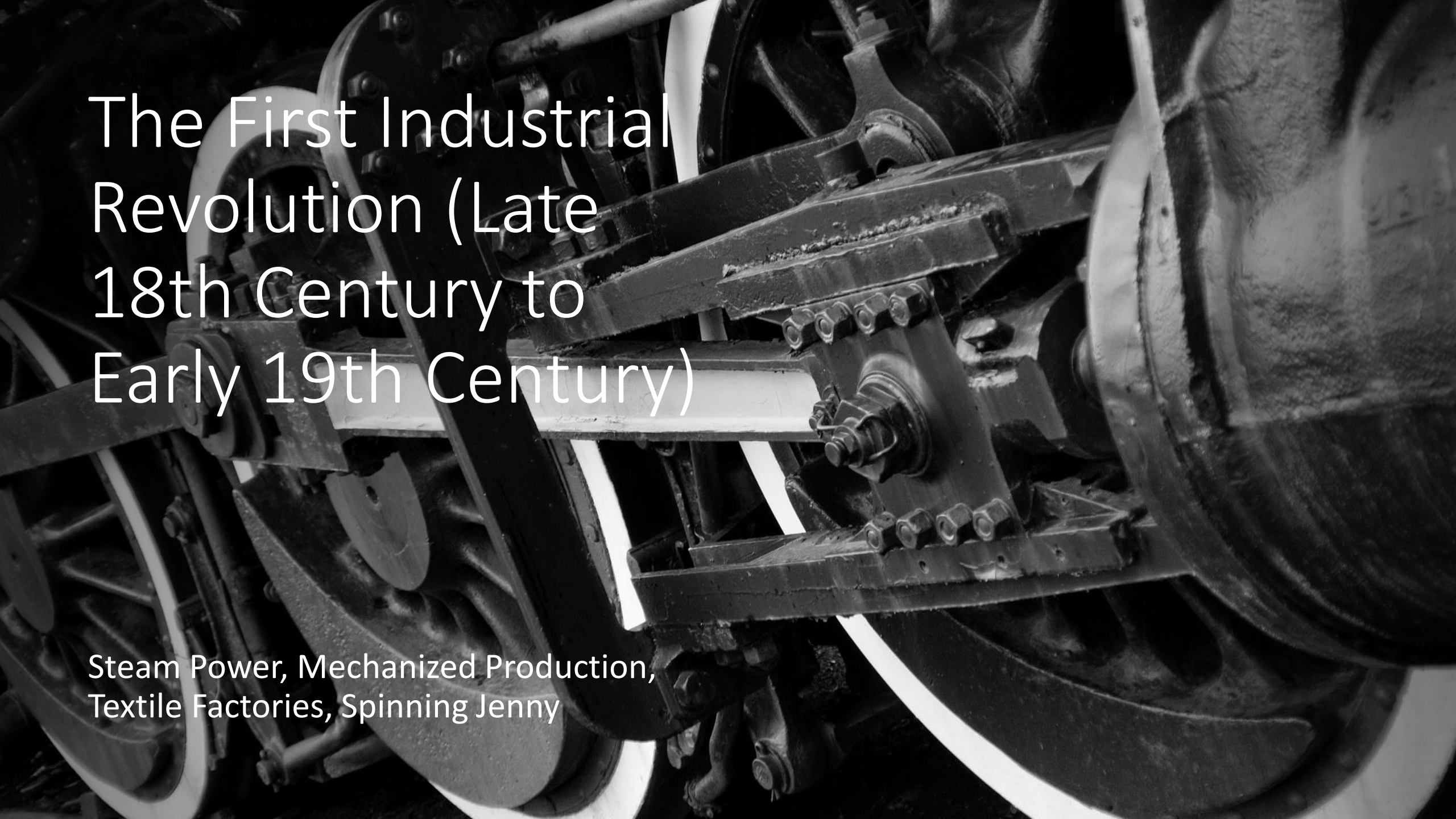
- Design is more than aesthetics. It's how products function, integrate, and communicate in an interconnected environment.



# Our Journey Ahead

- As we delve deeper, we'll explore designing for this new age. Challenges, potential, strategies, and more await.





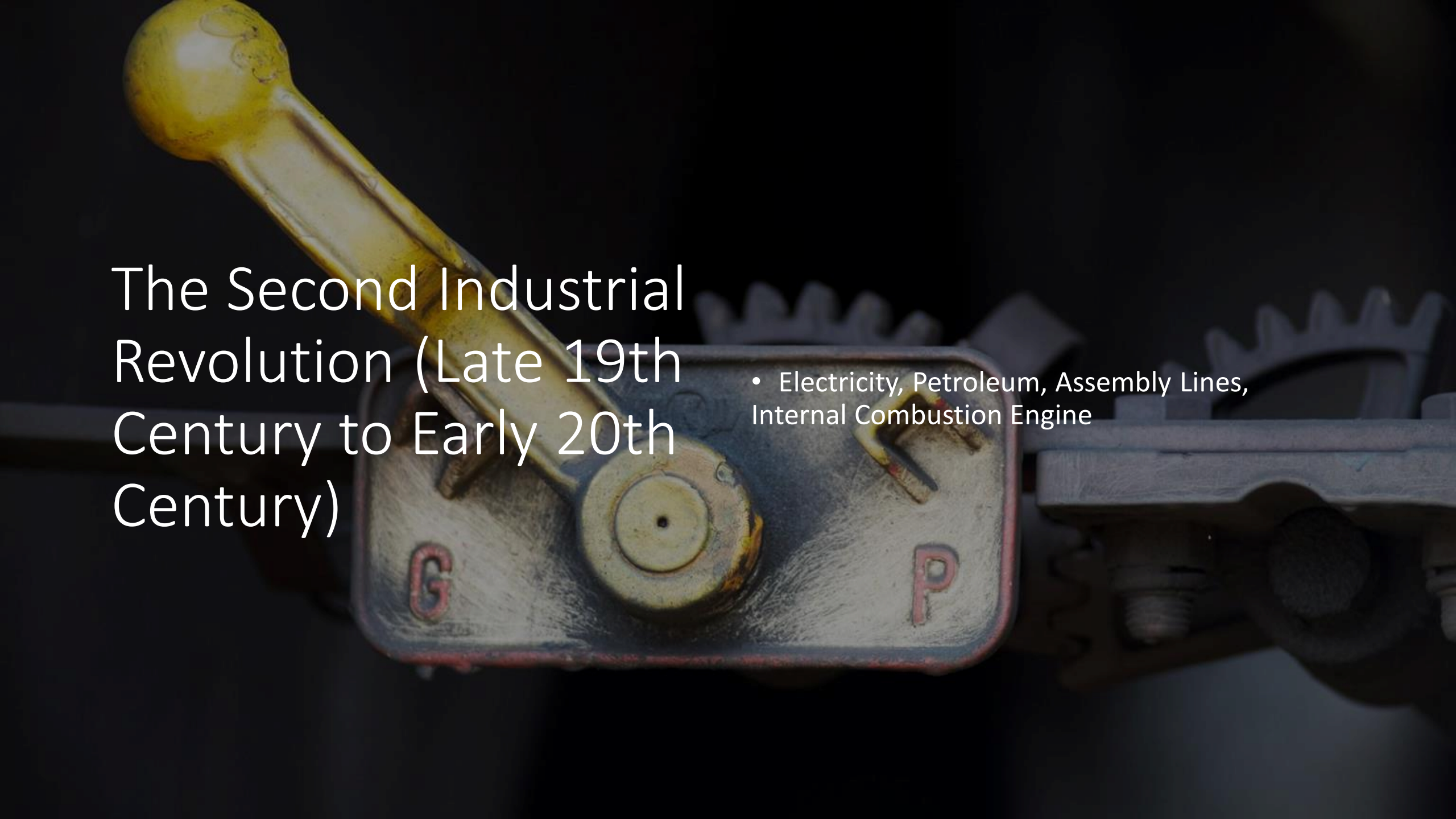
# The First Industrial Revolution (Late 18th Century to Early 19th Century)

Steam Power, Mechanized Production,  
Textile Factories, Spinning Jenny

# Benefits and Limitations of the First Revolution

- Prosperous Cities, Labor Demands, Urbanization Challenges





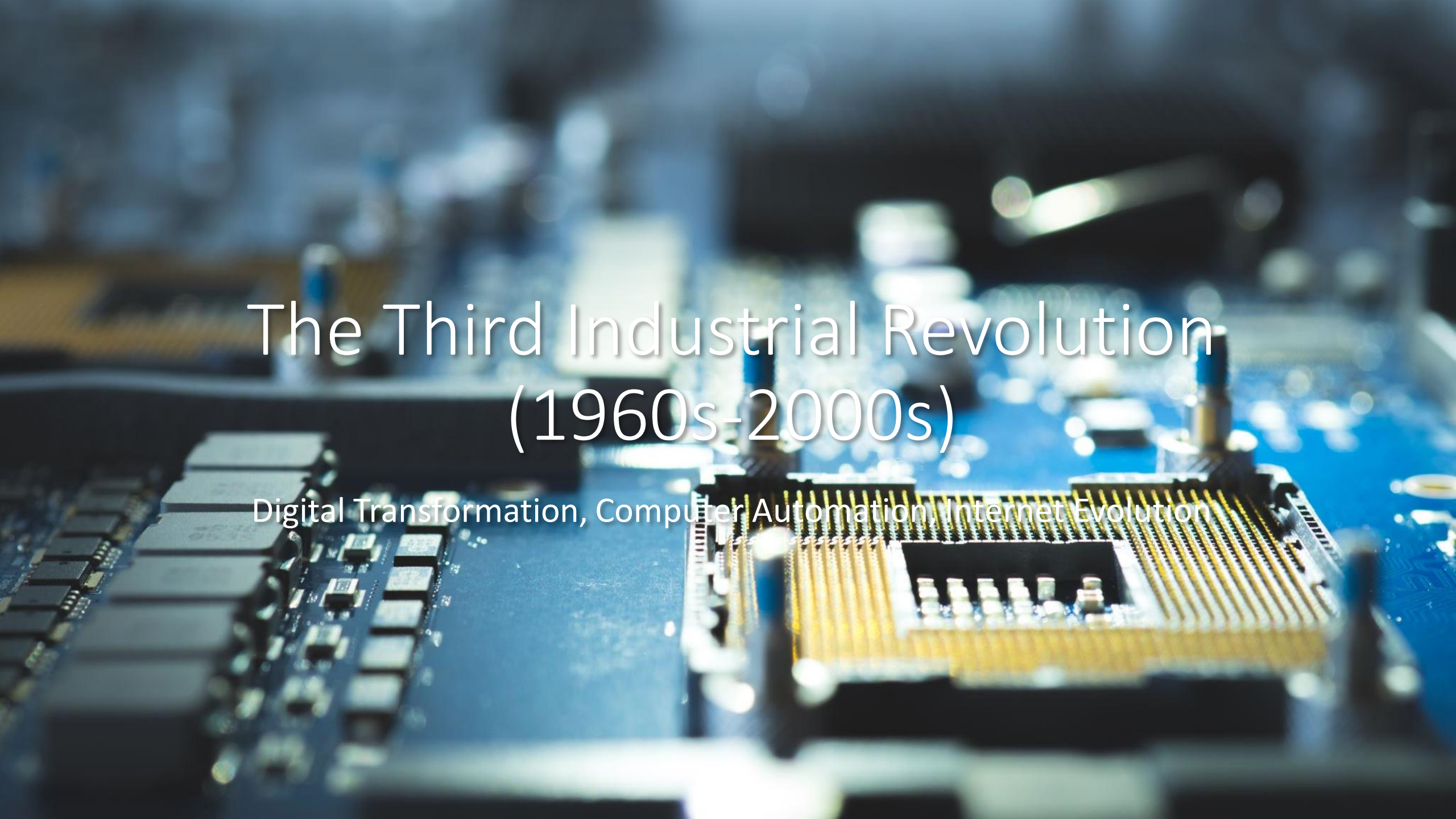
# The Second Industrial Revolution (Late 19th Century to Early 20th Century)

- Electricity, Petroleum, Assembly Lines, Internal Combustion Engine

# The Role of Design in the Second Revolution

Diverse Automobile Design, Mass Production, User Preferences





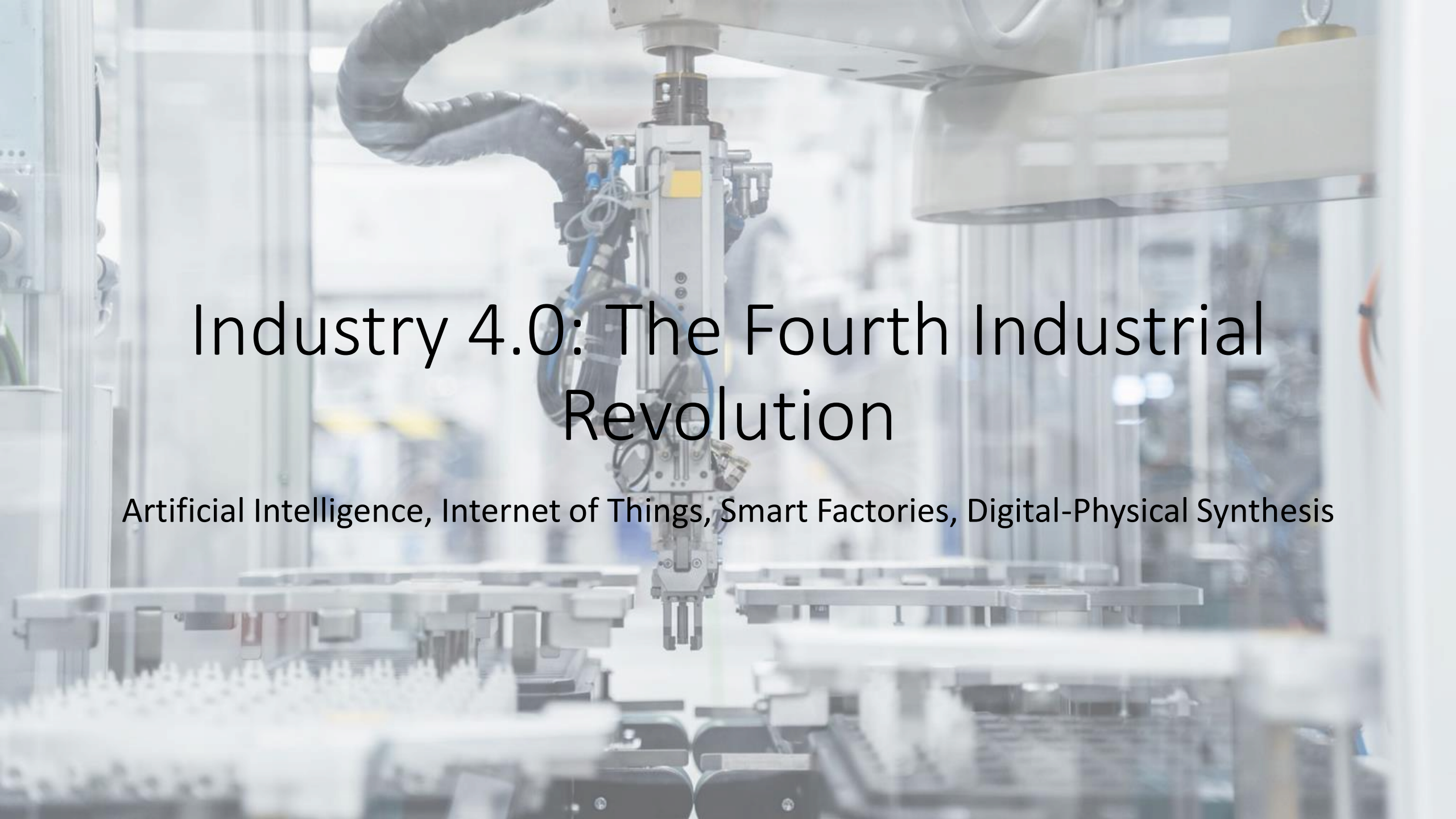
# The Third Industrial Revolution (1960s-2000s)

Digital Transformation, Computer Automation, Internet Evolution

Global Supply Chains, Internet Connectivity, Digital Platforms



Digitization & Globalization

A blurred background image of a modern industrial factory. In the center, a robotic arm with a gripper is positioned over a work area. The scene is filled with various industrial components, conveyor belts, and structural elements, all slightly out of focus to emphasize the text overlay.

# Industry 4.0: The Fourth Industrial Revolution

Artificial Intelligence, Internet of Things, Smart Factories, Digital-Physical Synthesis



# The Synthesis of Design & Technology

Augmented Reality, 3D Printing, Adaptive  
Products, User-Product Interaction

The background of the slide is a photograph of a sky filled with large, dark, and dramatic clouds. The clouds are illuminated from below, creating a strong contrast between the dark upper parts and the lighter, orange-tinged lower parts. At the bottom of the frame, two dark, cylindrical industrial smokestacks are visible, emitting the smoke that forms the clouds above them.

# Concluding Thoughts on Evolution

Steam to AI, Design and Tech Evolution,  
Preparing for Future Innovations

# Introduction to Industry 4.0

The Fourth Industrial  
Revolution, Synthesis of Cyber  
& Physical Systems





## Key Components of Industry 4.0

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- IoT, AI, Robotics, Cloud Computing, Big Data & Analytics



# Internet of Things (IoT)

# Connecting Devices, Real-time Data Sharing, Enhanced User Experience



# Artificial Intelligence (AI)

Machine Learning, Data Analysis, Predictive  
Maintenance, Optimization

# Robotics and Automation

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Cobots, Automated Assembly Lines, Enhanced Precision



Data Storage, Remote Access, Scalability, Integrated Systems

# Cloud Computing





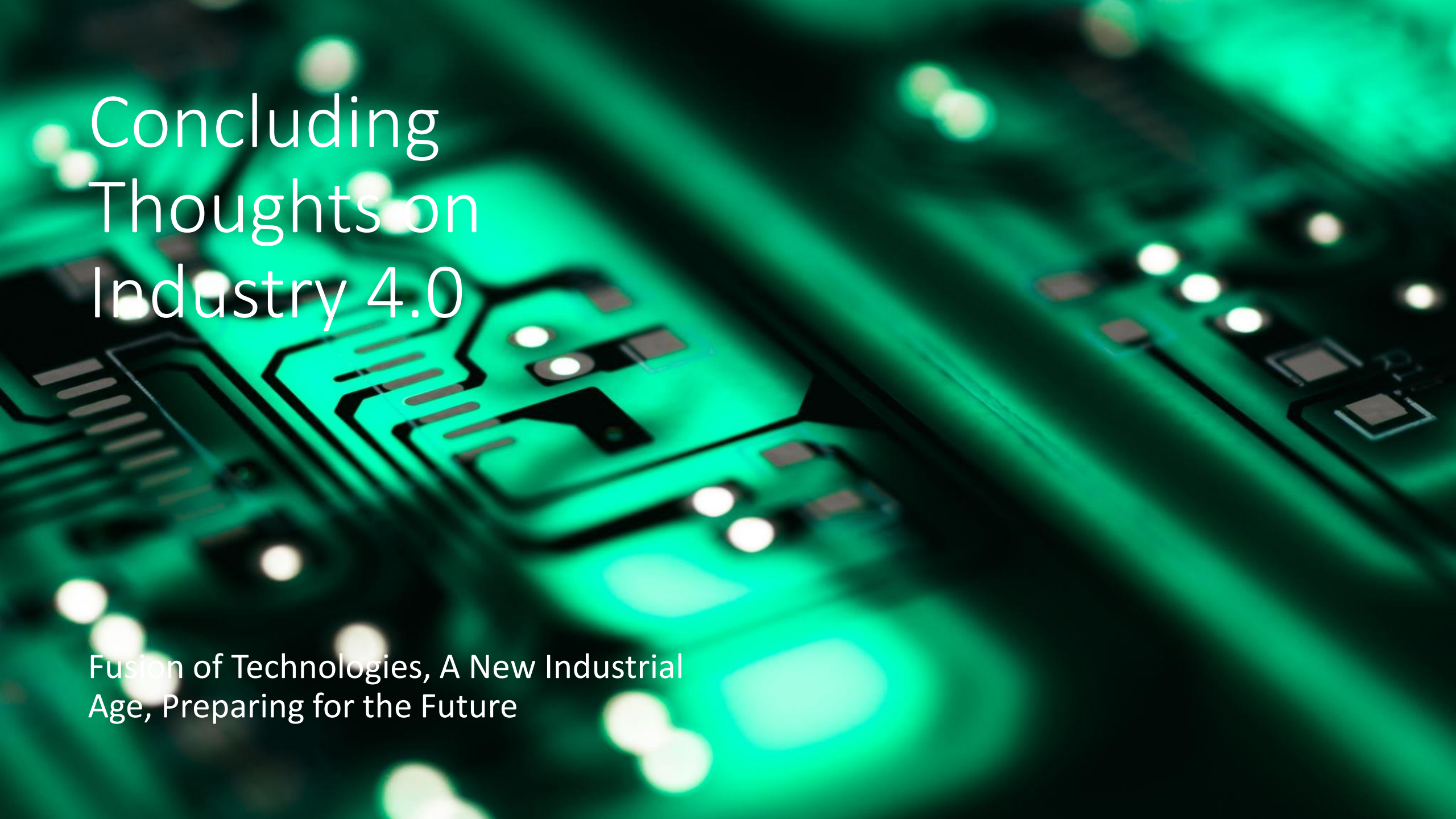
# Big Data & Analytics

Insight-driven Decisions, Predictive  
Analysis, Customer Insights



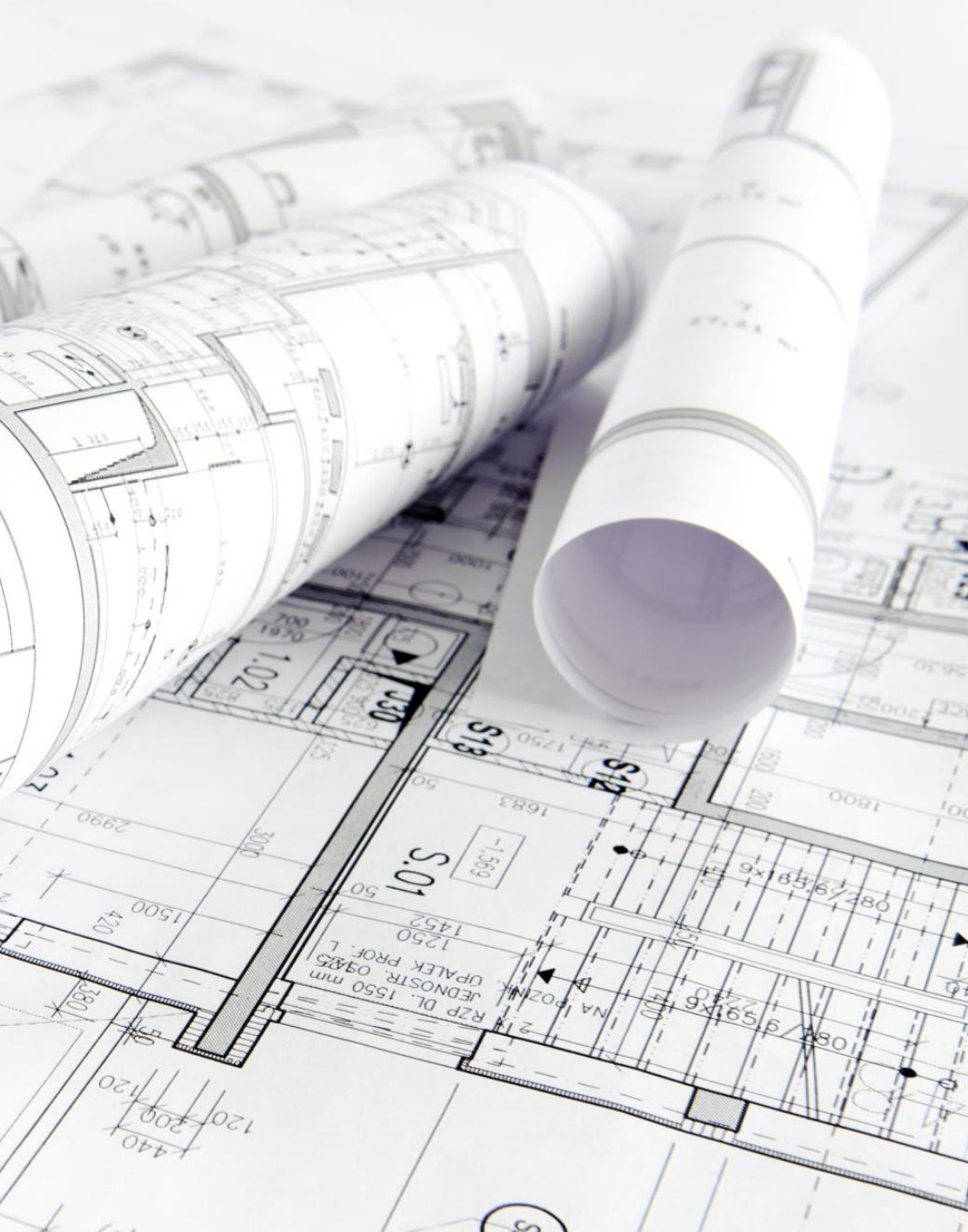
# Challenges and Opportunities

Data Security, Skill Gap, Customized Production, New Business Models



# Concluding Thoughts on Industry 4.0

Fusion of Technologies, A New Industrial  
Age, Preparing for the Future



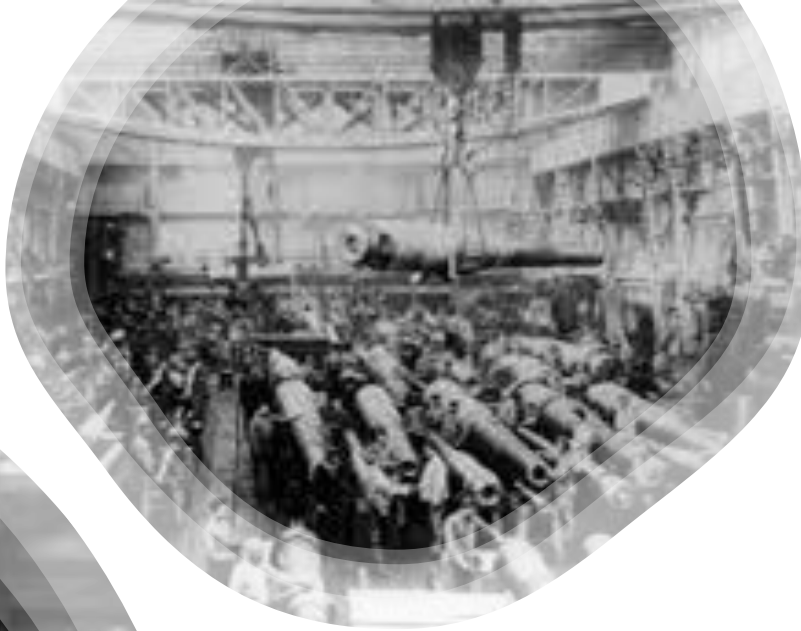
# Introduction to Design in Industrial Revolutions

- Pivotal Role, Evolution of Design, Design as an Enabler



# Design in the First Industrial Revolution

- Textile Industry, Mechanization, and Standardization



Mass Production, Assembly Line, Function Over  
Form

## Design in the Second Industrial Revolution



Digital Revolution, Computers, User-Centric Designs

# Design in the Third Industrial Revolution



# Role of Design in Industry 4.0

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Synthesis of Design & Tech, Customization,  
Adaptive Designs



# Design for Manufacturing (DfM)

## Optimizing Production, Reducing Costs, Efficient Designs





# Design for Sustainability

Environmentally Friendly, Reducing Waste, Longevity

# User- Centered Design in Industry 4.0



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Tailored Experiences, Feedback Loops,  
Dynamic Products



# Concluding Thoughts on Design's Role

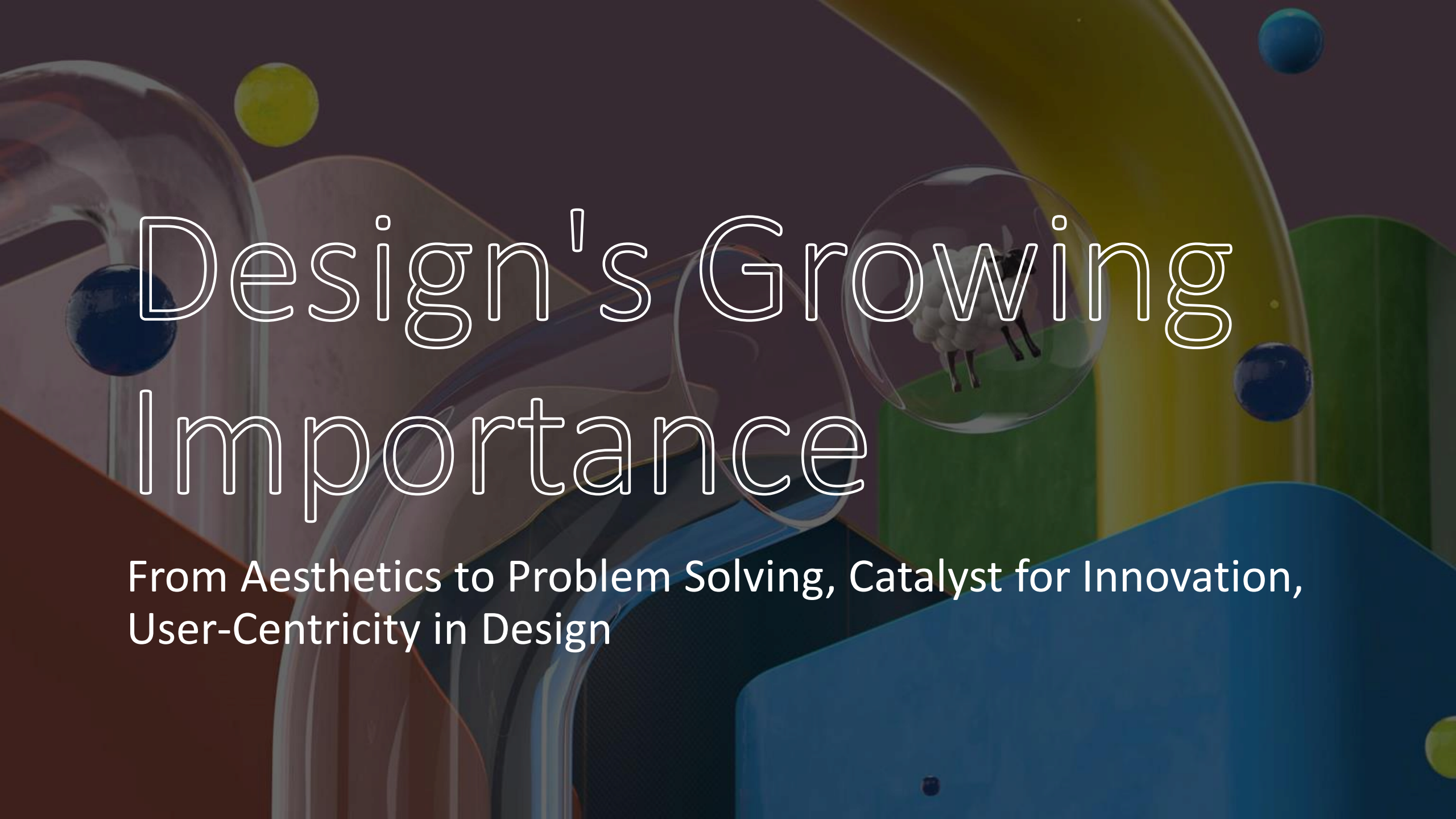
Design as a Catalyst, Reflecting Society's Needs, Future Prospects



# Recap of Key Points

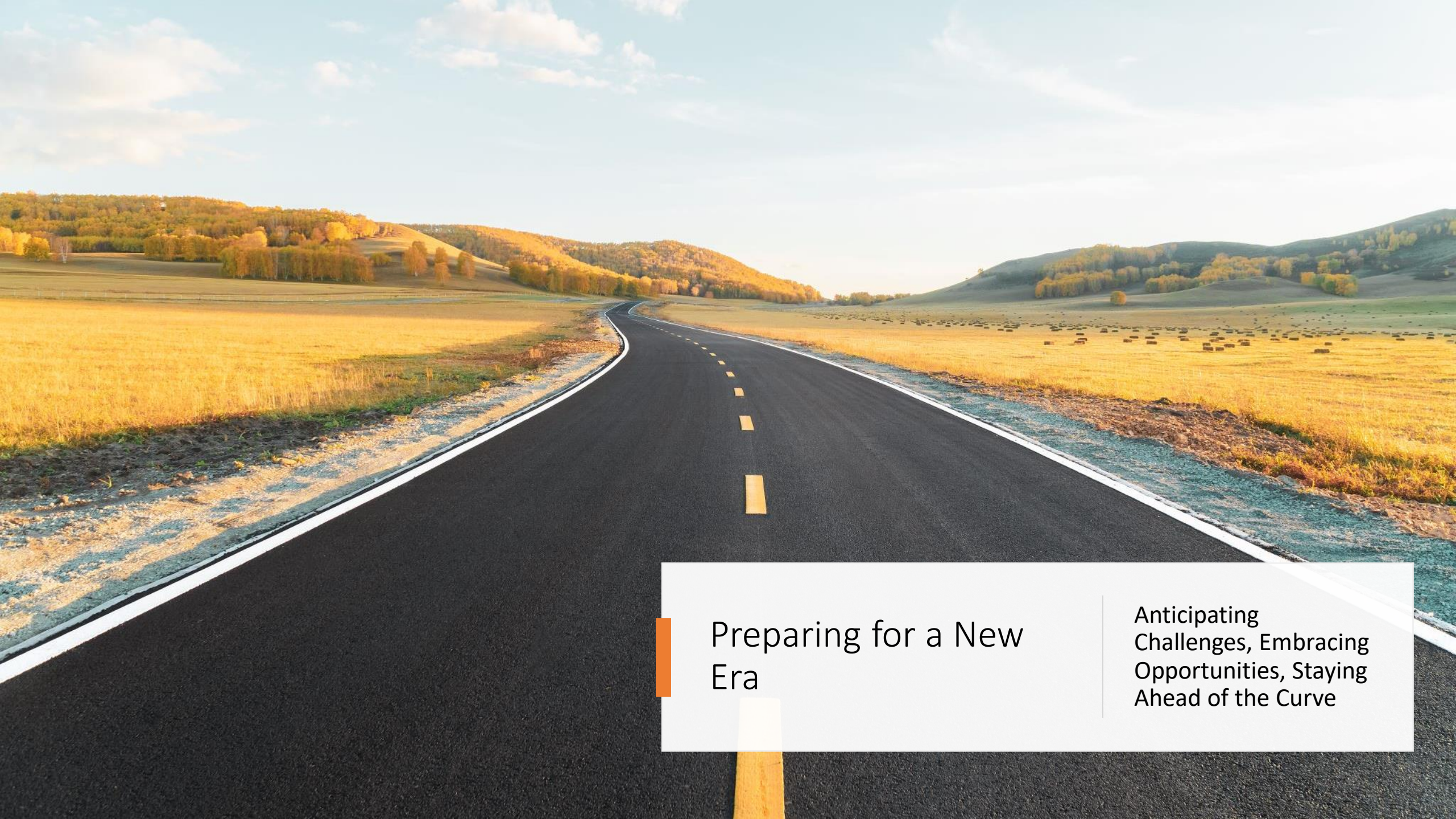
Tracing Design Evolution, Industry 4.0's Implications, Role of Design in Shaping the Future



The background is a complex, abstract composition of overlapping, semi-transparent shapes in various colors including purple, blue, green, and yellow. Several small, solid-colored spheres (blue, yellow, green) are scattered throughout the scene. A prominent feature is a transparent bubble containing a small, white, woolly sheep standing on a green patch of ground. The overall aesthetic is modern and artistic, suggesting themes of design, innovation, and problem-solving.

# Design's Growing Importance

From Aesthetics to Problem Solving, Catalyst for Innovation,  
User-Centricity in Design



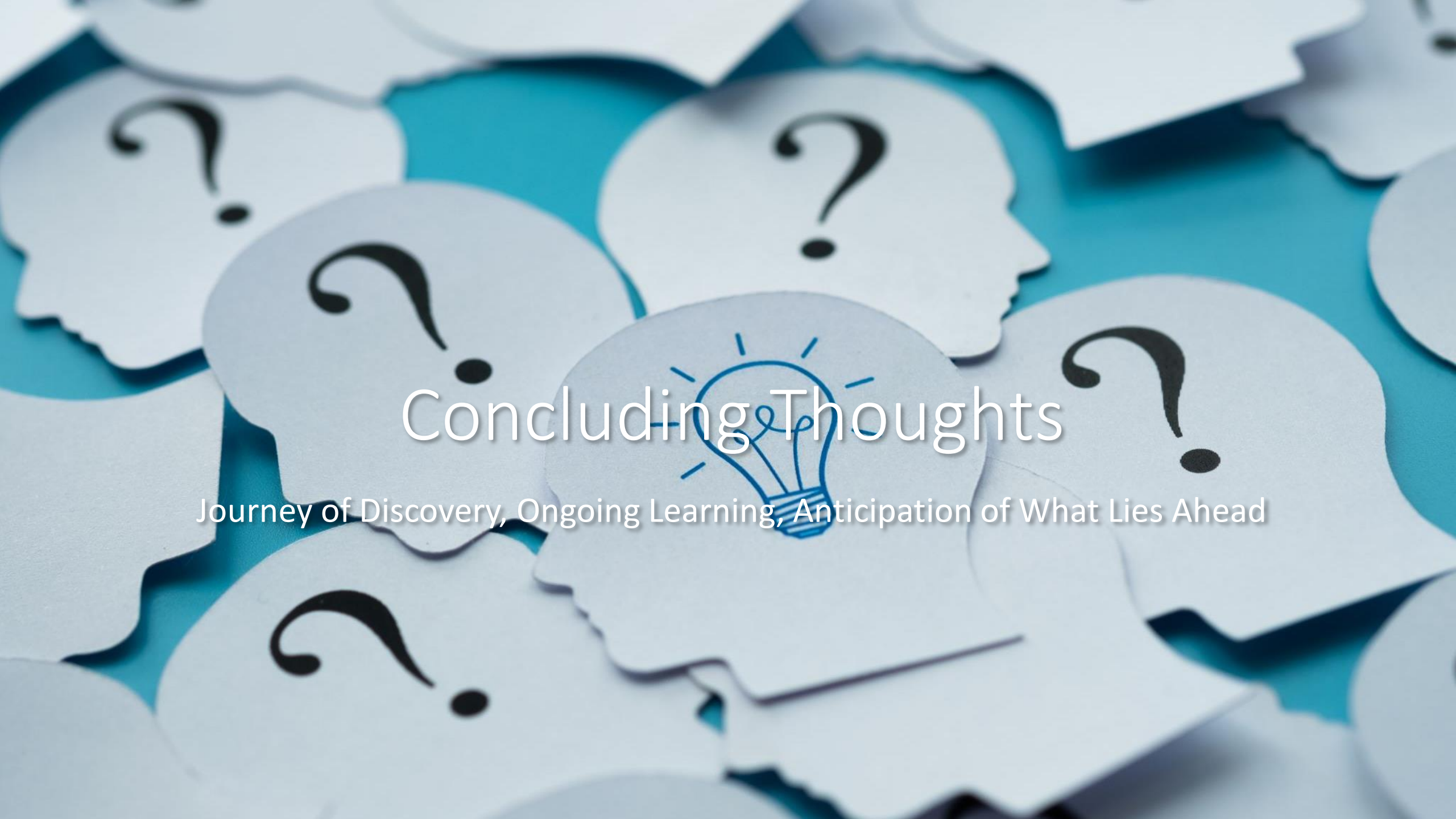
## Preparing for a New Era

Anticipating  
Challenges, Embracing  
Opportunities, Staying  
Ahead of the Curve

# A Glimpse into the Future

- Smart Environments, Tailored Experiences, Ethical Implications of Design



The background features several overlapping, layered paper cutouts of human head silhouettes in profile. Most of these silhouettes contain a large, black question mark. In the center, one of the silhouettes contains a blue line drawing of a lit lightbulb, with short lines radiating from it to indicate light. The entire composition is set against a teal-colored background.

# Concluding Thoughts

Journey of Discovery, Ongoing Learning, Anticipation of What Lies Ahead