Host: Prof. Kannan Govindan, CSORC, University of Adelaide

Facilitator: Prof. Allan O'Connor, C-EDGE, University of South Australia

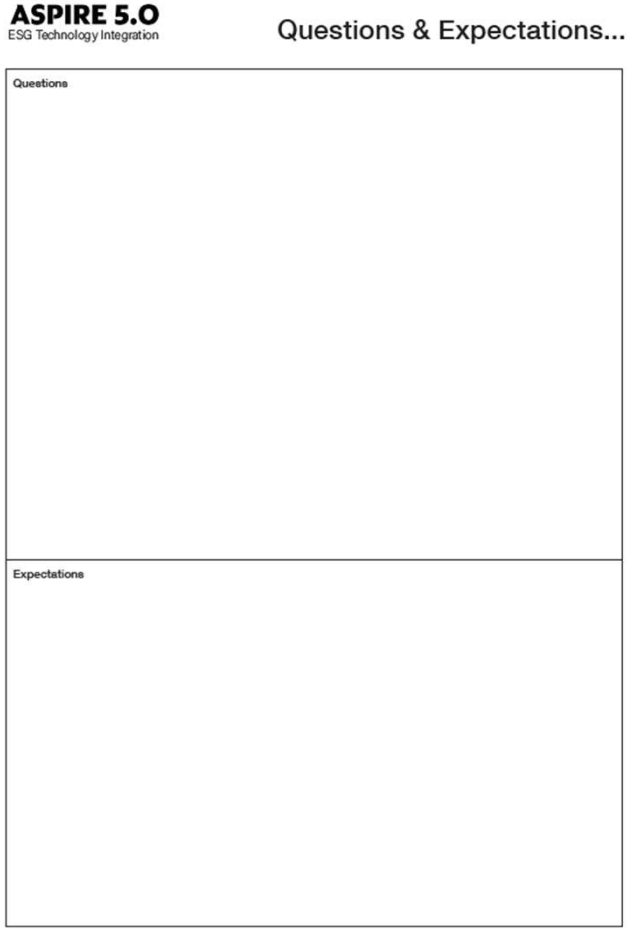
Aims, Objectives, and Overview

Prof Allan O'Connor

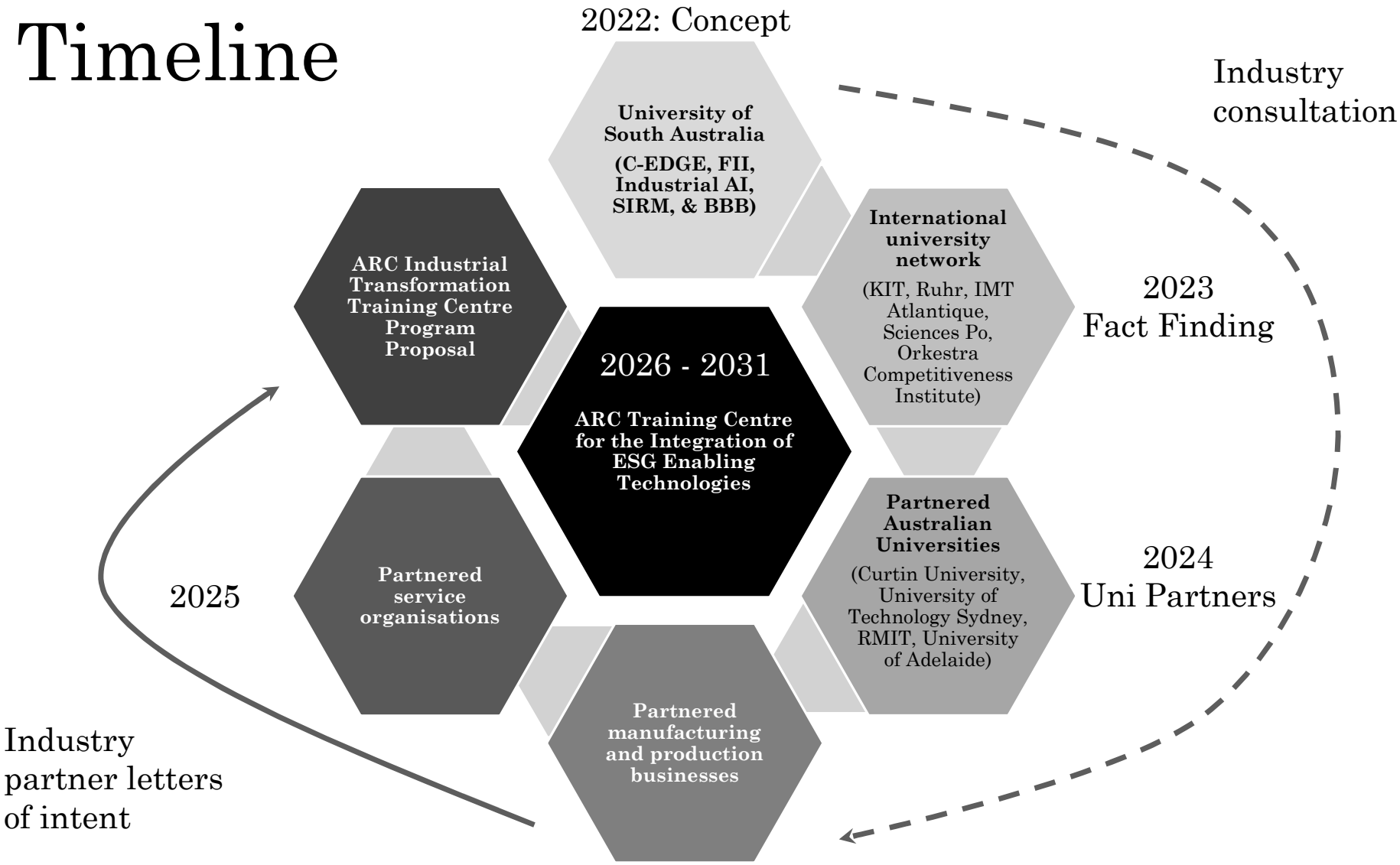
How & why we have arrived here…

Industry 5.0 Technology to ESG

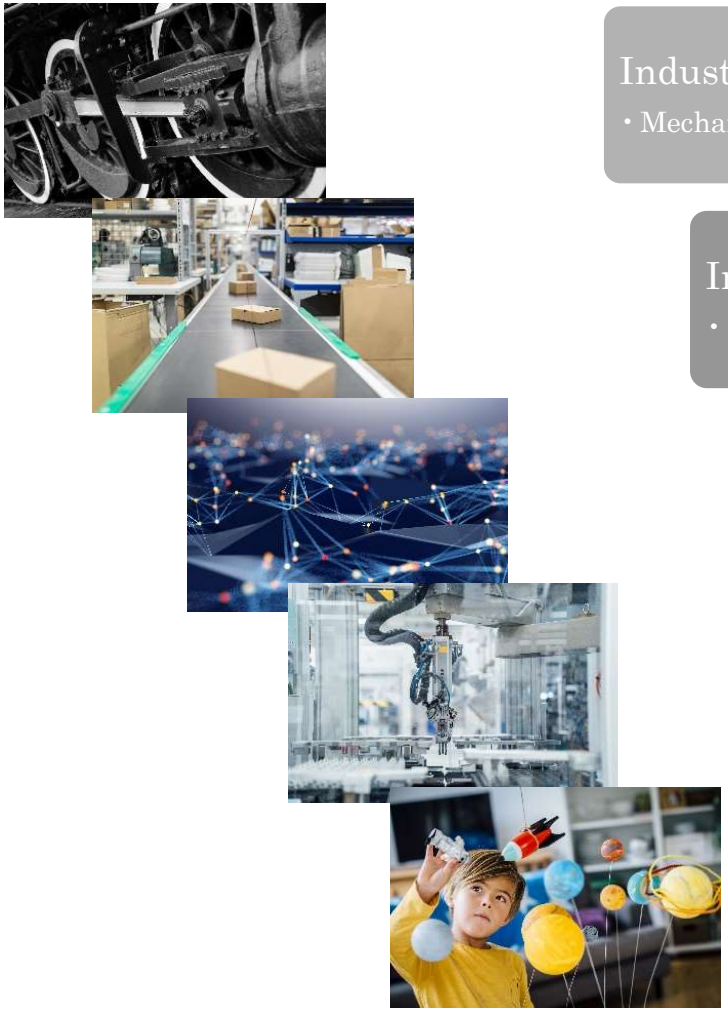
Record your questions and expectations:



Timeline


2022: Concept
University of South Australia
(C-EDGE, FII, Industrial AI, SIRM, & BBB)
Industry consultation
ARC Industrial Transformation Training Centre Program Proposal
International university network
(KIT, Ruhr, IMT Atlantique, Sciences Po, Orkestra Competitiveness Institute)
2023
Fact Finding
2026 - 2031
ARC Training Centre for the Integration of ESG Enabling Technologies
Partnered service organisations
Partnered Australian Universities
(Curtin University, University of Technology Sydney, RMIT, University of Adelaide)
2024
Uni Partners
2025
Partnered manufacturing and production businesses
Industry partner letters of intent

The origin: Industry Evolution



Industry 1.0 : Steam power

- Mechanical production

Industry 2.0: Electrically powered mass production

- Electrical machinery, skills and capital intensive,

Industry 3.0: ICT Revolution Automation

- Integration of global value chains

Industry 4.0: Digitalisation and Smart Factory

- Value Chain Optimisation, Servitisation, Customisation, Productivity

Industry 5.0: Human-centric, sustainable, resilient

- Human-machine interaction, Industrial robustness, Hyper-customisation, Ecosystem interdependence

Industry 5.0 Definition

"Industry 5.0 recognises the power of industry to achieve **societal goals** beyond **jobs and growth** to become a **resilient** provider of prosperity, by making production respect the **boundaries of our planet** and placing the wellbeing of the **industry worker** at the centre of the production process."

European Commission, 2021

Human Centricity | Sustainability | Resilience

Where does ESG fit in?

Industry 5.0

- **Human Centric** Approach
- **Sustainable** industry
- Build **Resilience**
- Industry **authenticity and transparency** building trust with stakeholders

ESG

- Incorporates social responsibility and **human centric** workplaces designed for employee well-being
- The environmental **sustainability** is central and integrates with social responsibilities
- Governance emphasises **resilience** through robust risk management and long-term planning
- Governance requires business **authenticity and transparency** with open reporting of accurate and comprehensive information about **environmental** and **social** practices while maintaining financial resilience

Global Threats and Opportunities

	Industry 5.0	Society 5.0	Strategic Plan 2022-2026
			
Origin	2017-2018 – European Commission	2016 – Japan Cabinet Office	2022 – U.S. Department of Commerce
Duration	Long term	Long term	2022-2026
Scope	Sustainability Human-centricity Resilience	Super-smart society Society as a whole	Innovation Equity Resilience
Key concepts	Competitiveness and Sustainability	Resolution of social issues The best interest of individuals	Strengthening competitiveness
Policy development	EU Industry 5.0 Roundtable 2022	Science, Tech & Innovation Basic Plan 2021	Strategic Plan 2022-2026
KPIs	Industry 5.0 could be measured by the EU Transitions Performance Index (TPI): • Economic transition • Social transition • Environmental transition • Governance transition	Habitat Innovation Framework: • Structural Transformation • Technological Innovation • Quality of life (QoL)	Based on each goal

Other parts of the World: China and India

China's President Xi declared at the Twentieth Party Congress in October 2022 that New Industrialization is among China's top development goals for 2035.

- Leveraging China's leadership in green tech for economic and competitive ends
- Limiting local protectionism and unifying the Chinese market
- Building leading-edge manufacturing capabilities and infrastructure availability, such as 5G and optical fibre networks
- Employing industrial greening to improve efficiency and reduce waste

Source: Schaefer and Combs (2024)

The Indian government has taken a holistic approach to the adoption of Industry 5.0 to compete in the global market, launching several programs:

- The National Policy on Industry 4.0
- Mission on Internet of Things (IoT)
- National Mission on Quantum Computing and Technology
- Digital India Mission
- National Mission on Artificial Intelligence
- National Mission on Robotics

Source: Ansari and Khan (2025)

UN 2030 Sustainable Development Goals (193 Nations)

So, what is the problem?

- Traditional growth economics, (perpetual growth, ingenuity, technology innovation, and market opportunities), is being challenged by the limitations of earth's resources, carrying, and regenerative capacities, and social disparities.
- Consequences:
  - Environmental limits ignored
  - Delayed actions
  - Inequities in access and impact
  - False sense of security

Not an 'either' / 'or' solution but an 'AND'

Challenging assumptions (Odum & Barrett 1971)

Attribute	Economics	Innovation	Ecology
School of thought	Cornucopian	Regenerative & green	Neo-Malthusian
Currency	Money	Integrated systems	Energy
Growth form	J-Shaped	Sufficiency and Life Impact Models	S-Shaped
Selection Pressure	*r* – selected (opportunism)	Optimising holistic opportunities	*K* – selected (durability)
Technological approach	High technology	Selective technology	Appropriate technology
System Services	Provided by economic capital	Provided by co-operative capital	Provided by natural capital
Resource use	Linear (disposal)	Ecosystemic business models	Circular (recycling)
System regulation	Exponential expansion	Social (environment) licence	Carrying capacity
Futuristic goal	Exploration & expansion	Exploring & expanding sustainability	Sustainability & stability

Key Messages

- There is still a lot of work to do
- Industry 5.0 means we need to look at and consider the connectedness between technologies, firms, economies, environment, people, and society
- Australia's sovereign capabilities are linked to the major trading economies adopting protectionist positions
- It is beyond trade-offs, and it is not a zero-sum game
- We need to make positive impacts across all measures using advances in technology
- Environmental, social, and governance (ESG) legislation, regulation, standards, and consumer expectation will fuel Industry 5.0 progress