Executive Roundtable: Industrial technology and manufacturing

Issues paper:
This issues paper reports on the ICA Executive Roundtable: Industrial Technology and Manufacturing, held in Adelaide in March 2025. It highlights key trends in the use of technology, and barriers to adoption, and makes recommendations on workforce and policy development.

The roundtable represented businesses from across the industries of health, construction, energy, automation, transport, defence, technology, electronics, and education. It involved companies from clean technology manufacturing to heavy-duty industry, inclusive of startup and mature companies. All were drawn from South Australian businesses or branches of international companies and represented some of the State's leading names.

> This is well and truly, you know, the promise of another industrial revolution, and it feels like that's real.

Issue Definition:
Industrial technology and manufacturing are evolving rapidly, driven by automation, AI, IoT, and sustainability demands. However, digital transformation throws up critical challenges, including skills and capabilities, business cycles and investment, and the capacity to capitalise on the opportunity.

Key uses & trends
Artificial intelligence was the single most mentioned technology trend around the table. In particular, the potential for using AI in quality control processes, and for streamlining both manufacturing and management processes was highlighted.

Predictive analytics and image recognition are currently being used in quality control and assurance, or there is a wish and will to do so. Machine learning and automation were identified for their value in productivity gains, as well as data science and its potential for driving business decisions.

While AI and data science were seen as having the biggest potential impact on both business and production processes, they were also so vast a shift in technology that the proposition can become overwhelming and there is a desire for strategy and expert guidance.

The pace of change in technology has long been a challenge for adoption and embedding in systems, and no less so now. This pace impacts the foundational infrastructure of network capacity, exposing a need for faster speeds and bigger bandwidth. It creates 'generations' of skills in short time frames, and the need for education to match pace.

Contact: Kathryn Anderson Kathryn.anderson@flinders.edu.au
www.flinders.edu.au/innovation-central-adelaide

Potential for new use cases for AI in industry is large, in leveraging data sets, in materials science, integrating the human aspects of AI, and more. The appetite for this change is high, but not without challenges. The potential for quantum computing was mentioned by technology representatives around the table but not discussed in depth from a business application perspective.

ESG considerations are high on the agenda for business as both a key cost of production and a reporting requirement. Use of digital twins for analytics and insights was seen as valuable, e.g., to monitor consumption of energy, or operational capabilities and capacity. Digital twins for simulating potential changes in operating processes and calculating impact are being adopted by some, and smart appliances for efficiency, e.g. turn on and off systems autonomously, are being taken up in industrial spaces.

AI and automation processes can be used to speed up R&D as a competitive edge, offering a basis for faster customer responsiveness. However, this is reliant on the ability to process data in super-fast timeframes, putting pressure on the need for a highly skilled team and effective technology.

Technology adoption barriers

> We've got so much data, it is ridiculous...

In some cases, the amount of data being produced is outstripping the capacity of businesses to convert this data into usable knowledge. The value of data-driven decisions is well acknowledged, but the capacity in terms of skills and time lags. For some, this means that by the time the data has been analysed, the time for an effective decision point has passed.

Cost of computers and technology to deliver the potential comes up against two barriers. The first is cost versus benefit, and this emphasises the need to leverage maximum outcome from technology, e.g. extracting the value from data generated, and realising productivity gains. The second is the cycle of business, at longer and shorter time horizons, which influences the financial ability to invest in new technologies and their implementation.

Trust and acceptance of AI in business and R&D processes holds a level of concern. As part of the quality assurance process for critical use cases, in industries such as healthcare, or transport infrastructure and mobility, there are regulatory barriers and assurance processes of key reliability. The fear, in the large amount of data that can be generated, is of that data being corrupted and giving false insights or being compromised from a safety perspective.

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Thinking through possibilities in the roadmap to the uptake of AI...

Businesses have multiple technologies on board at any one time, these have different use horizons and use cases. Integration of systems is a challenge to effective adoption of technologies in the time and skills it takes to create a full system.

The rate of change in technology, coupled with cost efficiencies are lowering the barriers to entry for new businesses. While some see the threat as delayed, where their production involves other barriers to entry for new businesses, others spoke about this being an enabler of new entrants, but also of new expectations for the speed of R&D and customer deliverables.

Workforce & policy recommendations

See technology as "the fourth utility" – as essential to business and industry as electricity, gas, and water. But there is a gap for business in accessing the expertise needed to scan and scope available and suitable technologies, to embed them into other corporate systems, and to leverage the full value from them.

A need for more knowledge on the level of usage of AI and industrial technologies was identified as critical for policy recommendations. Taking a view of the level of digital infrastructure maturity across manufacturing would be highly valuable here, not only to measure take-up, but to match infrastructure with business objectives, and roadmap people, process, and technology.

There is a high-level need for good governance in technology adoption, to cover cybersecurity, but also acceptable use, and ethical transition. This combines with a need for upskilling management in understanding the technology and use-cases, and in integrating it into management practices.

Their left arm is the AI tools now.

Newer graduates are entering professional work with a high level of comfort with AI, it is embedded in their practices and routines – AI has become as natural as 'your right arm'. This capacity can be further developed to foster high maturity levels of skill and to further enable businesses.

There was some discussion about whose role it is to train. Is it the education sector, self-led training using openly available, online information, or the company. This changed depending on the size and culture of the company. There was a call to embed machine learning in more – or all – engineering degrees, so that it becomes a core capability rather than an expertise.

Moving staff from a 2/10 to a 5/10 in terms of their knowledge and comfort with AI is essential, as is increasing cybersecurity awareness and making this standard as a workplace skill.

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Top priorities for action

For government

- Network infrastructure assurance for high speed
- Leverage critical technology roadmap for business (see DISR)

For business

- Get across the speed of change and bring the knowledge into the business
- Engage in collaborations to advance understanding and application of the technology
- Monetise solutions for business, leveraging the potential into business outcomes
- Move from being opportunistic to being strategic in using AI in the business
- Embed data analytics into business and management systems

For university

- Generate a more effective knowledge base on the use of AI in industry
- Develop business-focused education and training
- Embed AI content across more courses

Conclusion

Emerging technologies such as AI, machine learning, IoT, quantum computing, and automation offer a strong promise to industry and manufacturing of productivity gains driven by data and enabled by digitisation. However, there are persistent challenges to uptake such as business cycles, global competition, regulatory pressures, and access to skills and capabilities. Additionally, these technologies may deliver more capabilities than the capacity businesses have to leverage them, and expert guidance, upskilling, and strategy are needed.

Realising the potential of digital transformation widely, demands strategic industry, policy, and education responses. In the meantime, for those companies on the front edge of this transformation, these technologies underpin a competitive edge in the market.

About ICA

Innovation Central Adelaide (ICA) at Flinders University is a collaboration with Cisco, and one of six innovation centrals across Australia. These anchor the National Industry Innovation Network, an initiative that engages with higher education institutions. ICA's purpose is to collaborate with industry, business, and government to advance digital enablement and uptake. It does this via defined research and innovation work packages, including contract research, concept-to-proof programs, student projects, higher degree engagement, and by generating and fostering issues-based communities.

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