CAMBRIDGE ZERO

Hard to Decarbonise Technologies
Special Interest Group

How can digital twins help save CO2 in the manufacturing industry?

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Panel

Markus Kraft (Chair), Professor of Chemical Engineering | CARES Director, University of Cambridge

Simeone Zomer, Scientific Director - Process Analytics, GSK

Peter El Hajj, Infrastructure Advisory at KPMG | Former National Digital Twin programme lead at CDBB.

Sarah Hayes, Climate Resilience Demonstrator (CReDo) Strategic Engagement Lead, Connected Places Catapult

Rapporteur: *Cadence Hsien*

For more information, contact
decarbnetwork@admin.cam.ac.uk

Discussion Points

- Digital twin is a digital replica of a physical asset, process, or system. Using a digital twin, data from the physical world can be used to generate insight, support decision making, and allow us to intervene in the physical world. A digital twin can reflect interdependencies across systems and how changes cascade to other parts of the system.
- Digital twins can be used to help make decisions about climate change and sustainability more quickly. Use cases relevant to sustainability include (1) high level investment prioritization strategy and planning, (2) R&D to efficiently experiment and develop processes, and (3) assurance reporting and transparency.
- In terms of manufacturing, digital twins can help to identify improvement in operation, delivery, and maintenance to reduce emissions. They can also identify resource flows, and how inputs and outputs can enable circularity.
- The national digital twin is an ecosystem of connected digital twins. To be able to connect and share digital twins, a distributed data sharing architecture and agreement on access to data is important.
- Artificial intelligence (AI) can be used to extract knowledge models to develop digital twins. However, digital twins must be usable by humans, who are using the digital twin to make decisions, and who will be impacted by the decisions made using the digital twin.
- In developing a digital twin, it is important to have a goal of what the digital twin is supposed to do to determine the level of complexity of the digital twin. It should be purpose driven, where there is a clear problem statement that the digital twin is intended to support.
- Interoperability should be considered as a part of the core design principal of a digital twin. AI can be used to support mapping across different digital twin systems to tackle interoperability challenges.
- The environmental cost of data and dark data should also be considered as data stored on severs requires electricity to maintain.
- Building trust among people to use digital twin is important, how data will be used and different digital twins can be used to solve different problems. Showing use cases that demonstrate direct use can play a big role in highlighting the benefits of using and connecting digital twins.

Challenges

- One of the complexities of digital twin is due to the interconnectedness of things.
- Sharing of data across supply chains and sectors is required and elaborated in Data for the public good. This remains challenging especially when different language is used across sectors, and when sensitive data is involved.
- There are interoperability challenges when developing and connecting digital twins. Not just technological interoperability challenges but also non-technical challenges including legal, commercial incentives, security, and trust.

Opportunities

- Use of digital twin technologies to increase collaboration in pre-competitive spaces.
- Use of AI to support development of digital twins.
- Digital twin is the future. In thinking and developing digital twins, be open minded and explore how data can be used.
- Share what you're doing, what's working well and what's not working well. This supports learning and the development of best practices.

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