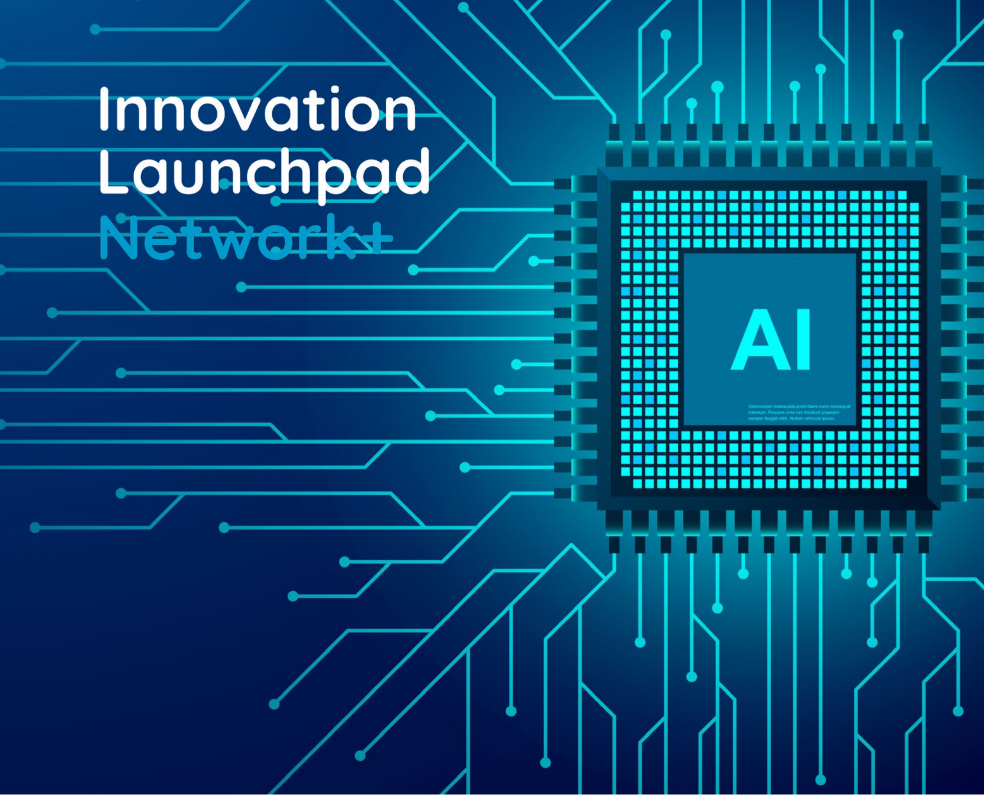
Innovation Launchpad Network+



CASE STUDY

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The Challenge

AI-Agent Supply Chain networks is a pioneering digital solution tackling Big Demand - a sudden increase in the variety, volume, velocity, veracity, and value of items across Beginning-of-Life (BoL) production, In-Life Spare-Parts-On-Demand (SPOD) and End-of-Life (EoL) re-circulation. Big Demand has been driven by societal change in response to a ‘perfect storm’ of global events including market fragility, mass-customisation, Supply Chain uncertainty, Corporate Social Responsibility and legislation, National Security, Net Zero, sustainability, and the Circular Economy. Meeting even a small portion of Big Demand using current Supply Chain approaches can take months or years with individuals negotiating across small numbers of suppliers. In contrast, AI-agents negotiate with everyone in milliseconds enabling them Supply Chains to unite and tackle Big Demand.

This project uncovered the barriers to adopting AI-agents to broker manufacturing system and supply chain work.

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I took to the road to demonstrate AI-Agent Supply Chain networks. Physical and digital demonstrations of an AI-Agent AM Supply Chain were commissioned and presented at Catapult events, workshops, and interactive studies. These hands-on demonstrations served as powerful engagement tools, allowing stakeholders to experience first-hand how autonomous agents can dynamically negotiate, coordinate, and optimise manufacturing workflows across distributed networks. The project's innovation lay not only in showcasing the technology but also in testing its real-world feasibility through immersive, data-driven scenarios. By combining digital twins, simulation platforms, and AI negotiation models, the team created a tangible bridge between conceptual research and operational practice. The demonstrations provided valuable insight into how AI-agent networks could transform the responsiveness and resilience of supply chains — identifying adoption barriers, mapping value propositions, and revealing new opportunities for circular, sustainable, and on-demand manufacturing.

Result

The project delivered a series of impactful outcomes that advance the understanding and practical application of AI-Agent Supply Chain networks. A key output was the creation of a ranked list of adoption challenges, capturing the technical, organisational, and cultural barriers that currently limit the integration of autonomous agents in manufacturing ecosystems. This evidence-based insight provides a clear roadmap for industry and policy stakeholders aiming to accelerate adoption. Several academic publications stemmed from the research, each addressing critical dimensions of distributed and intelligent manufacturing. One study demonstrated that the UK's additive manufacturing (AM) capability could have met national demand for Lateral Flow Devices during the COVID-19 pandemic — highlighting the potential of AI-enabled distributed systems to enhance national resilience. Another explored how AI-agent systems can enable designers to optimise for multiple manufacturing methods simultaneously, avoiding the over-constraining of design space that often limits innovation. Further work revealed that distributed manufacturing networks could reduce logistical CO_2 emissions by a factor of two to three, underscoring their environmental and sustainability benefits. Finally, the project established that Web3.0 technologies - with their inherent transparency and decentralisation - offer a strong foundation for building trust within AI-agent ecosystems. Collectively, these results demonstrate how autonomous, data-driven supply chains could redefine manufacturing agility, sustainability, and collaboration across the UK industrial landscape.

Impact

The project has prioritised the activities of the Gopsill with the objective of building an opensource reference model for trusted AI-agent networks for manufacturing system and supply chain operations. Following the same precedence of the opensource tools, such as Marlin and Sli3cr, that underpin many Additive Manufacturing tools, the reference model will enable academics and industry to start with a common framework to build their own variations of the technology for their need thereby supporting the adoption of the technology into society.

James Gopsill

"The Researcher-in-Residence has been a fantastic opportunity with a great deal of knowledge exchanged and opportunities emerging with both the Catapult and Industry. Having access and consultations with four digital supply chain test beds in supply chains I am not familiar in was a great opportunity to see where AI agents could take beyond AM. Being on the advisory board for the DSCH gave me insights into how large innovation projects are managed and operated. It was great having the opportunity to showcase AIgents through the DSCH membership which exposed the research to a much broader audience. And the consultation on the lighthouse projects was an eye-opener to the emerging digital technologies and how the can being trust, privacy and provenance preserving capabilities to supply chains.
The work has produced a roadmap of Research and Development activities that I will continue to pursue. It has been highly successful in being able to deliver the concept to industry where feedback on the need for trust and articulation of the benefits has emerged. We will continue to pursue research and innovations opportunities together so we can continue to pull-through the concept of AI agent manufacturing system and supply chains."

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