

# AI & Digital Twins: The future of Farming

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Imagine multiple experts simultaneously informing food producers about fighting crop pests and diseases as well as improving farm productivity and sustainability through reducing CO<sub>2</sub> emissions and nutrient and pesticide pollution.

Currently this is inefficient process, but it could be with the power of machine-learning. This approach will drive rapid decision-making and outcomes for producers without them needing to crunch through data sets and information.

We are pleased to announce that Environment Institute member and Chief Investigator [Professor Volker Hessel](#) has received \$490,000 of [AEA funding for a project](#) led by the University of Adelaide, "Digital Twins Agriculture: Virtual Farm Model for Enhancing Crop Health, Productivity, and Sustainability". AEA grants are designed to drive key investment areas, specifically targeting value-adding and capability development to further Australia's natural and competitive strengths.

Alongside the University of Adelaide, organisation partner [Serafino Wines](#), a renowned South Australian Family owned and operated Wine Company situated in the McLaren Vale Wine region, will play a key role in this initiative. Led by [CEO, Cavaliere Maria Maglieri](#), [Serafino Wines](#) will contribute by conducting field tests using sensors on their vineyards. These sensors will be installed and operated by a team led by [Profes Harpinder Sandhu](#) of the [Federation University Australia](#) and their collaborators [Constellation Technologies, Melbourne](#). The data will provide crucial information to support the project's goals of protecting viticulture and canola, while defending crop pests, and reducing pollution, and improving crop health sustainability and productivity.

*"Serafino Wines is proud to collaborate with the University of Adelaide and all members of this consortium on this important Research and Development project. We firmly believe that innovation plays a crucial role in enhancing the quality of Australian wine while ensuring that sustainability and environmental stewardship remain top priorities. Through this partnership, we are committed to advancing practices that not only improve wine quality but also safeguard our natural resources for future generations," said Maria Maglieri, CEO of Serafino Wines.*

The [Agora High-Tech](#) team led by [Adjunct Professor Nicola Sasanelli](#), will provide the dissemination of research findings and the development of new industry connections to support and grow a vibrant national artificial intelligence (AI) in Agriculture ecosystem.

Digital Twins (DT) are a virtual model of a physical process, system, or environments that continuously update with real-time data, providing simulation, prediction and optimisation to assist organisations to make data-driven decisions.

This project intends to develop an innovative DT platform for improved decision-making to foster canola and vineyard production. At the forefront of sustainable agricultural innovation, this platform is organised to provide advice from multiple 'virtual experts', so-called multiagent generative system (MAGS). This is a key expertise project partner, the Australian Digital Twin company [XMPPro](#). MAGS leverages Generative AI providing a transformative approach to solve turbulent industrial challenges, reducing the cognitive load on operators while delivering continuous data-driven results using machine intelligence.

The Internet of Things (IoT) is a network of physical devices, appliances, vehicles, or other objects embedded with sensors and software to create, exchange and collect data. Leveraging IoT and DT to create virtual farm models, predictive insights inform decision-making to enhance crop health and farm sustainability.

Their proprietary product uses advanced farm field sensing to deploy a new physical twin concept from Hesse groundbreaking space research performed within the [ARC Centre of Excellence Plants for Space](#) (P4S) a project that also partners with NASA.

Different to current IoT-farm monitoring and mentoring by an Australian DT company, the modern "living" DT orchestrate big data into a mature decision-making tool, including proactive countermeasures for plant health and sustainability. Two leading Australian farm companies will provide end-user feedback to direct the product towards market acceptance.

The environment institute has been instrumental in supporting Professor Hessel's use of pollution science-based research, helping to shape and translate these concepts into digital models (digital twins) for farming in space (P4S) and farming on Earth ([AEA](#)), at the Waite Institute. The ultimate goal is to turn these innovations into real-world applications and establish a company focused on using digital twin technology in agriculture.

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