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Beyond the paddock: Reflecting on APSIM's legacy and reimagining its future – A panel session

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Abstract: Over the past three decades, the Agricultural Production Systems sIMulator (APSIM) has grown from a specialised crop model into a globally recognised platform that underpins decision-making across agricultural and environmental systems. Bult on process-based biophysical science, APSIM has continually adapted to shifts in research priorities, emerging technologies, and evolving policy landscapes.

Today, in a world increasingly being shaped by machine learning and artificial intelligence (AI), political and economic uncertainty and changing climate and consumer preferences it is timely to reflect on APSIM's enduring role and future trajectory. APSIM has a key role in navigating farming systems through this uncertain future. However, tensions exist in the future development of the model: between interpretability and complexity, between generalisation and local relevance, and between computational speed and scientific trust.

The challenge ahead is not simply to apply the model, but to design systems that harness its strengths, along with the strengths of other tools and applications ensuring agricultural decision-making remains both rigorous and responsive in an uncertain future.

This interactive panel session will explore APSIM's future trajectory, focusing on the opportunities and challenges that will shape its next phase of development such as:

- Designing governance, funding, and community structures to sustain the next generation of users and developers
- Understanding the development needs so that APSIM's role in addressing social, environmental, and climate challenges can be expanded
- Building models of community-driven software development that promote accessibility and global collaboration
- Strengthening the process-base in the soil model including improved connections with soil microbiology and capturing new understandings in soil carbon and nutrient processes
- Solutions for applying APSIM across scales, from individual fields to regional and global systems
- What developments are required to position APSIM as a central engine of digital agriculture
- Using of APSIM with emerging technologies such as AI and machine learning

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