PLANTS FOR SPACE (P4S)

In 2022, Plants for Space was announced as an Australian Research Council Centre of Excellence, and has commenced in January 2024, with funding secured until 2031.

Read the press release here:

https://www.adelaide.edu.au/newsroom/news/list/2022/11/03/research-centre-to-grow-space-food-expertise

Summary and scope

Long-term off-Earth habitation is on the horizon. By 2028, an established presence on the moon will be a precursor to crewed Mars missions but key challenges for mission planners still exist, such as:

- Providing a nutritious, varied food supply to sustain physical and mental well-being for humans during long-term Space habitation – the current mass and volume restrictions for food inhibit mission feasibility, and resupply is not a current option.
- The technology to provide robust, reconfigurable and on-demand generation of resources such as pharmaceuticals and construction materials.

In many respects, Space habitation amplifies the multi-faceted sustainability challenges we face in food and biomaterial production on Earth.

P4S' mission is to re-imagine plant design & bioresource production, through the lens of Space, to enable off-Earth habitation & provide transformative solutions for improving on-Earth sustainability.

P4S represents a strategic opportunity to expand the global biomanufacturing sector, working with government, industry, and academia to develop a vibrant and successful Space sector that leverages our world-class R&D capacity, connects us to the global Space economy, and attracts 'spin-in' from the food and beverage sector. Globally, biomanufacturing is an industry that has been predicted to reach a market value of US$30T by 2030, and controlled environment agriculture is an industry that is growing by 29% per annum. P4S will populate these industries with a new generation of researchers and innovations to drive productivity.

P4S will drive transformational benefits for on-Earth industries and sustainability outcomes

P4S breakthroughs will offer new plant efficiency solutions for challenging Earth environments, e.g., low-water, high-saline agriculture, and low-input productivity options for food processing, storage, and distribution. Intensive, but sustainable, CEA (Controlled Environment Agriculture) production of plant-based foods can reduce agriculture's carbon footprint when linked to renewable power. In creating IP, commercial and collaborative opportunities, and workforce skills to boost sustainable food and bioresource production.

P4S designs will create the flexible, plant-based solutions needed to support human physical and psychological well-being during deep Space travel and settlement. Simultaneously we will deliver a step change in plant efficiency, productivity, and processing technologies here on Earth. P4S success will be defined by:

- Establishing P4S as an international authority and focal point for plant-based Space food, material, and engineering advances;

- Creating new technologies and capabilities in plant modification, with valuable IP and pipelines for successful research translation to on- and off-Earth applications;

- Training over 400 researchers to form the foundation of a new generation of internationally connected and industry-focused researchers;

- Accelerating growth of the burgeoning national and international CEA and biomanufacturing industry to support high-value on- and off-Earth ventures.

P4S' four integrated, globally connected, and transformative research Programs (P1–4; Fig. 2) are designed to address gaps, drive sector co-ordination, build workforce, & innovate industry-ready solutions.

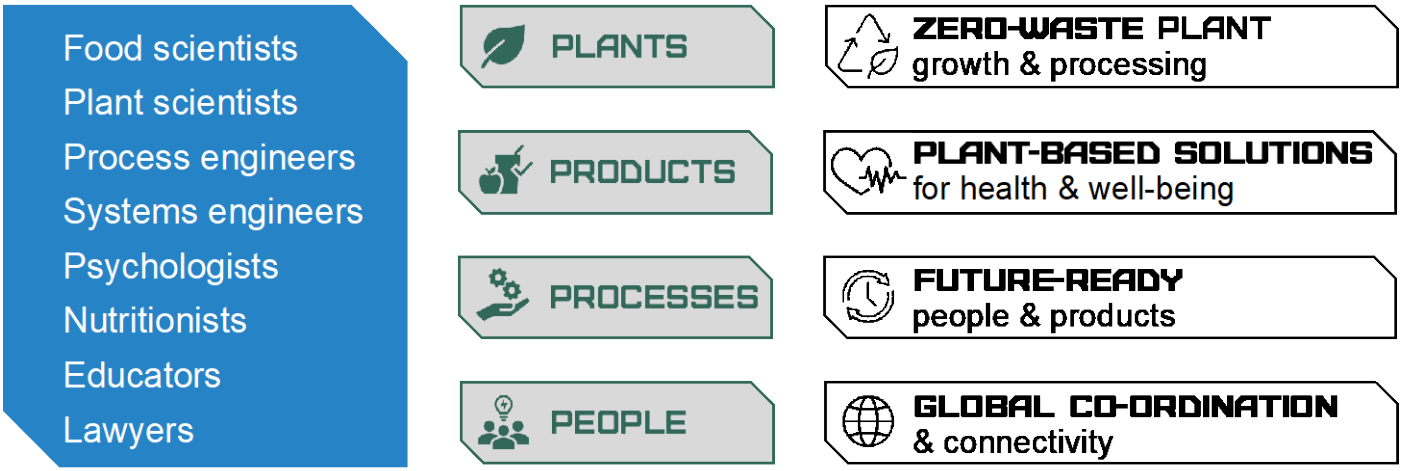

Figure 1: *P4S' vision & impact (from left to right): team skillsets, programs, & transformational outcomes.*

P4S will build critical mass and public interest in STEM fields

P4S is a major global collaborative transdisciplinary venture partnering 13 academic institutions, 5 Space agencies and enablers, 3 CEA companies, 5 education providers, and 7 government and technology partners which collectively harness a global fit-for-purpose critical mass not found elsewhere (Fig. 2 and Fig 3). **P4S represents a major contribution to the Artemis goals, and with NASA and Axiom as key stakeholders, we have hard-wired connections into current mission needs and planning.** Our collective multidisciplinary expertise within P4S will lead innovation in Space plant production systems, and realise the Centre's multi-faceted legacy to fulfil the ambition of humans to go, rather than just look at opportunities beyond Earth.

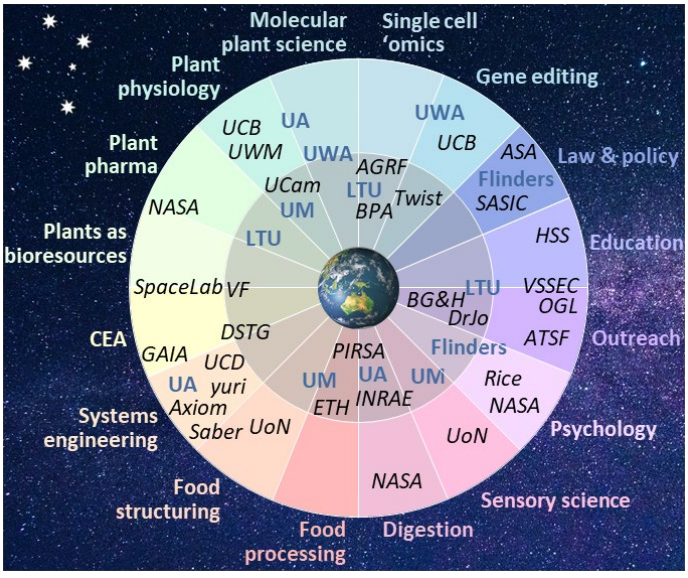

Figure 2: *P4S expertise and partner alignment. Expertise in Space environments is shown towards the outside of the coloured rings.*

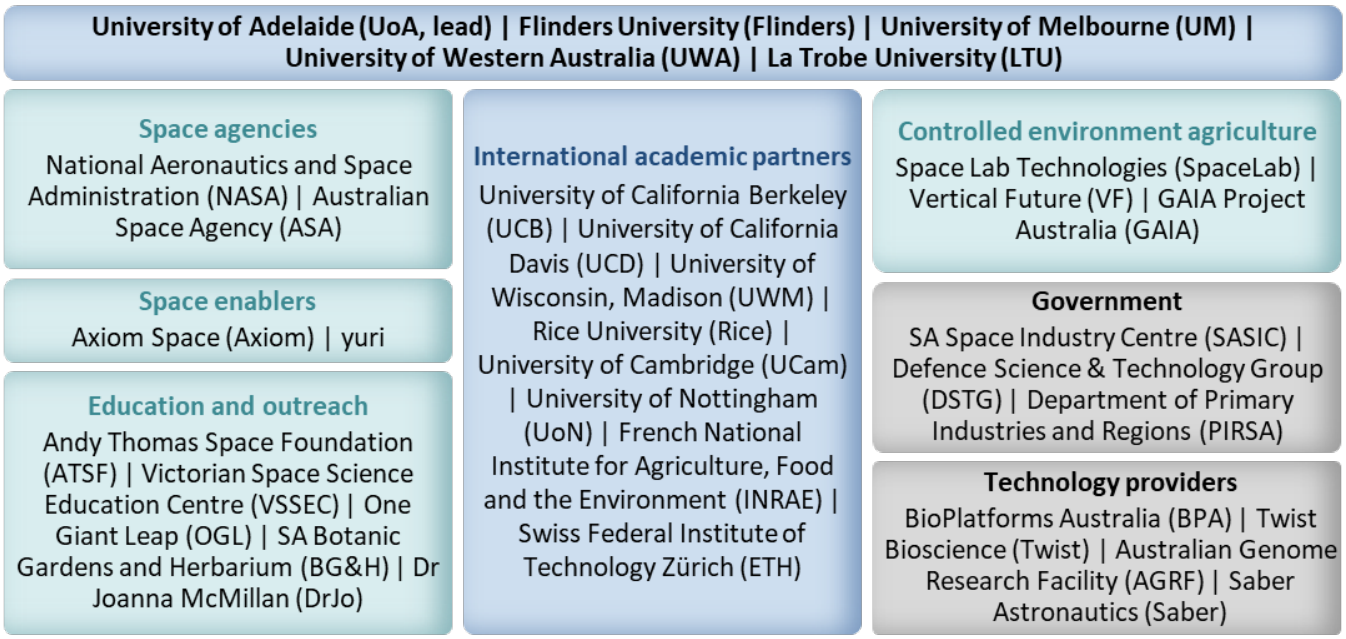

Figure 3: *P4S academic (blue), Space/CEA/education (green), and platform (grey) organisations (and abbreviations).*

Australian University lead researchers involved:

	Name and Organisation
CENTRE DIRECTOR	Matthew Gilliham, University of Adelaide
DEPUTY DIRECTORS	Melissa de Zwart, University of Adelaide
	Sally Gras, University of Melbourne
CHIEF INVESTIGATORS	Harvey Millar, University of Western Australia
	Ryan Lister, University of Western Australia
	Volker Hessel, University of Adelaide
	Kim Johnson, La Trobe University
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	Michelle Watt, University of Melbourne
	Jenny Mortimer, University of Adelaide
	Mathew Lewsey, La Trobe University
	Eva Kemps, Flinders University
	Matthew Tucker, University of Adelaide
	Sigfredo Fuentes, University of Melbourne
	Christine Feinle-Bisset, University of Adelaide

Information on national and international partner investigators involved on request.

For more information email: contact@plants4space.com