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Australia in Space: a draft decadal plan for Australian space science

It is an exciting time to be involved with space, as transformational changes create new opportunities in and beyond the space sector. Space-derived activities and services are already integral to Australia's economic, social and national security. They enable our communications and data networks, weather forecasting and emergency management, environmental monitoring, position information for transport and autonomous operations, and timing of financial services. Upstream and downstream space-related activities stimulate the development of new skills and capabilities which enhance Australia's productivity and international competitiveness.

The Academy of Science's draft decadal plan, *Australia in space*, outlines a framework for space science to advance Australia's interests and priorities by contributing to discovery and innovation, the economy, security, society, and the workforce. Space science is a fundamental enabler for space industry and applications, and Australia's expertise in space science is critical for effectively leveraging new opportunities and mitigating risks. Space science engages STEM disciplines and intersects many diverse fields, growing the high value workforce. Space science is the common language that brings together national agencies in joint mission projects.

The objective of the Plan is to advance national needs through a sustainable, productive space sector enabled by world standard science, technology and education and embracing core values of innovation, collaboration and equity. The following recommendations are headline enabling priorities.

1. A national research priority in space science to align with the National Manufacturing Priority in Space, and encourage discovery, collaboration and innovation of national benefit and international impact.
2. A trusted voice for Australian space science, to strengthen science capacity and engagement across the space sector.
3. Commitment to and investment in a national capability in space science and technology, enabling development of a sustainable, focused, space research and development program which capitalises on existing strengths, supports national space objectives, engages and stimulates the knowledge-based sector of the economy, and inspires the next generation.

The Plan is built around mission-oriented goals focused on developing space capability contributing to discovery and innovation, the economy, security, society, and the workforce. These are enabled through the following interconnected recommended actions.

4. Establish a space mission program to advance knowledge and discovery, foster and leverage international collaboration, accelerate development of new technologies and applications, help grow sovereign capability, diversify employment pathways, and grow workforce capability. This should be the responsibility of the Australian Space Agency, with NCRIS or similar support.
5. Develop and implement an integrated Earth observation satellite program to mitigate data supply risk, grow expertise in upstream and downstream domains, develop necessary sovereign capability, increase contributions to large international EO programs, expand user applications and industry and market opportunities. Responsibility for this should be with the Australian Space Agency in collaboration with CSIRO, Geoscience Australia, the Bureau of Meteorology, and the university sector.
6. Commit to supporting cross-disciplinary collaborative pure and applied research on secure, resilient, high bandwidth communications technologies, next generation secure position navigation and timing services, ground station infrastructure, and advanced data processing capabilities. It is important that Australia is engaged in the ongoing development of these sectors which will continue to transform our economy and society.
7. Establish a national space environment research program focusing space weather research activities to provide a world-leading forecasting system, help protect critical infrastructure and space-related assets, and support space domain awareness programs. This should be based around a Research Institute or Centre.
8. Commit support for the Australian Human Research Institute for Space and Extreme Environments (AHRISSE) to provide national leadership and coordination, facilitate international engagement, and foster multidisciplinary collaboration, ensuring maximum effective translation of research from space for the benefit of the Australian community.
9. Develop an integrated national space innovation and education strategy spanning the outreach, primary, secondary, tertiary, VET and industry sectors. This should include strategies to grow STEM participation and increase diversity and inclusion, improving career pathways and opportunities for underrepresented groups. The Australian Space Agency should carry primary responsibility for implementation of this strategy in collaboration with other organisations and stakeholders.

Successful implementation of the Plan is expected to deliver benefits including:

- A sustainable national space program
- Innovation-led growth of the space sector and broader economy
- More effective science-industry partnerships
- Necessary sovereign space capability
- Ability to capitalise on new opportunities in the evolving global space ecosystem
- Ability to engage with and contribute to international space programs and missions
- Mitigation of risks to critical infrastructure from space weather hazards
- Next generation communications and secure positioning services
- Improved telehealth delivery and public health outcomes
- Enhanced growth of a diverse, inclusive and valued STEM-engaged workforce