



Australian Government



Australian
Space Agency

National Space Program for Earth Observation Overview

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General Manager National Missions

Gateway Review Planning Meeting
09 Dec 2022



Agenda

1000 – 1020 Review Team Leader Introduction

1020 – 1120 Program Briefing and Presentation

1020-1030 Opening Remarks (Head Australian Space Agency)

1030-1120 Program Overview (General Manager National Missions)

- NSPEO Formulation and Justification
- NSPEO Scope And Plans
- NSPEO Governance and Status

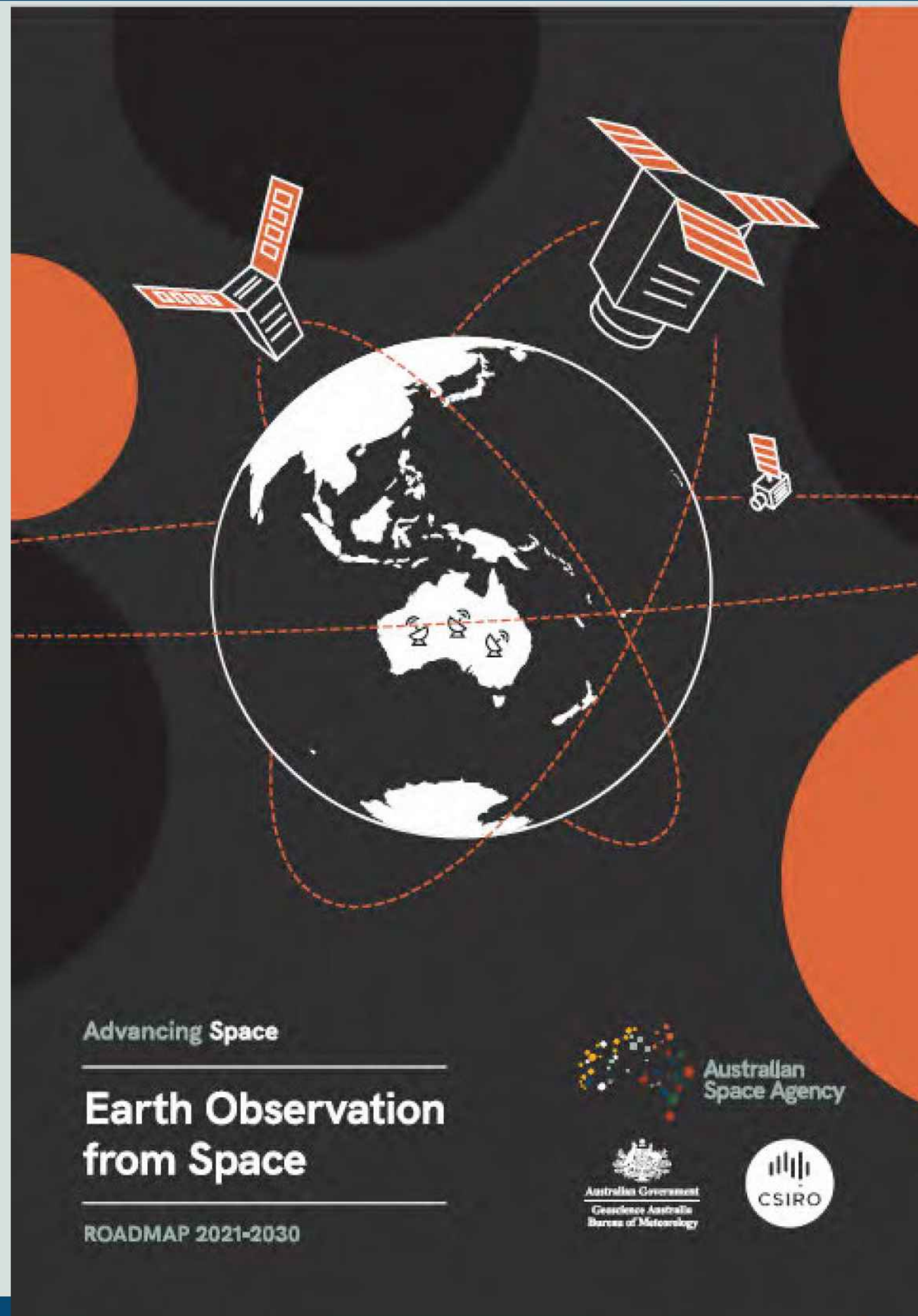
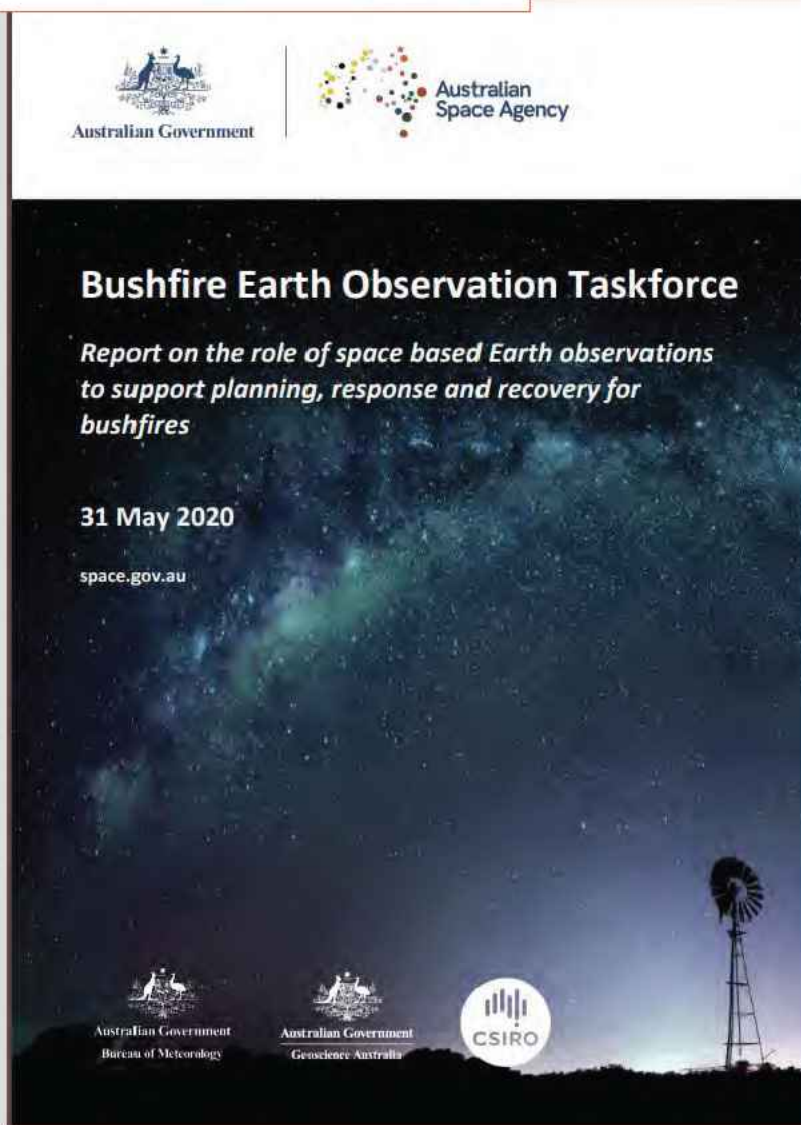
1120 – 1130 Quick Lunch Break

1130 – 1300 Planning for the Review Week (Review Team + Program Team)

NSP-EO Formulation and Justification



Earth Observation from Space Roadmap



Focus Areas



AUSTRALIAN EO MISSIONS AND PAYLOADS



DATA QUALITY ASSURANCE AND INTEGRITY MONITORING



ENHANCED DATA MANAGEMENT

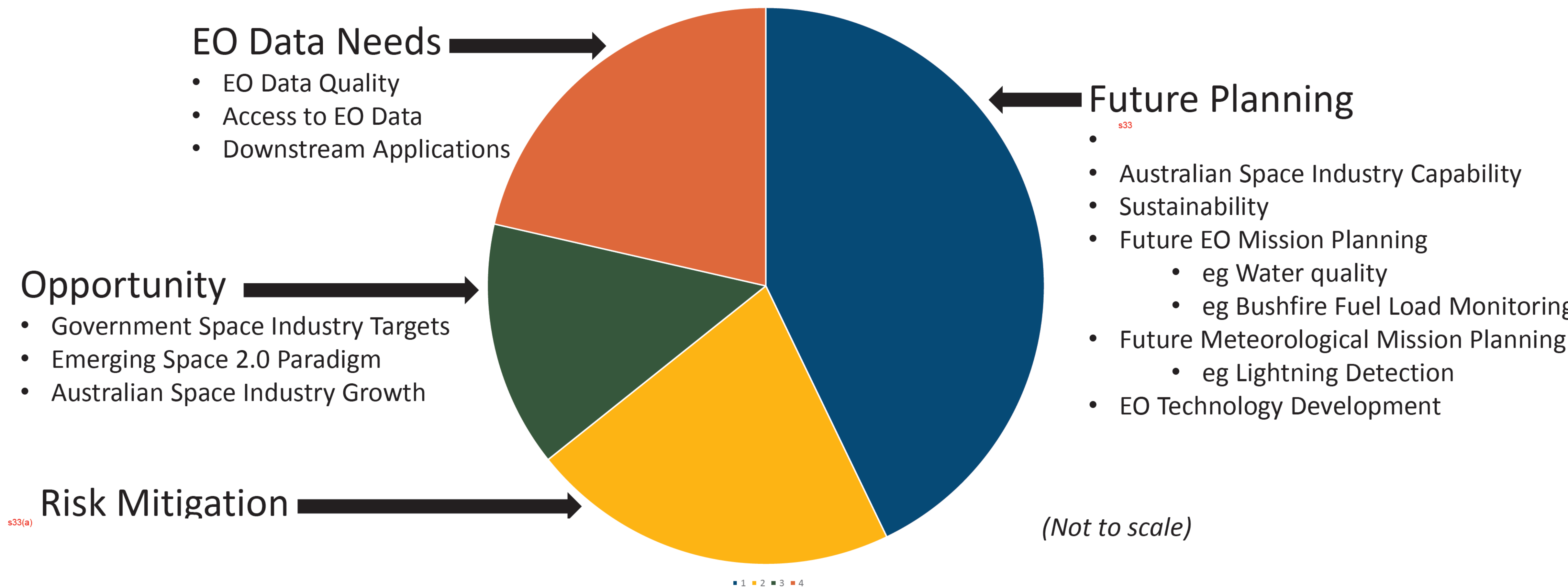


INTERNATIONAL EO PARTNERSHIP AND LEADERSHIP



ACCESS TO INTERNATIONAL DATA AND MISSIONS

NSP-EO Drivers



EO Data Needs

- EO Data Quality
- Access to EO Data
- Downstream Applications

Opportunity

- Government Space Industry Targets
- Emerging Space 2.0 Paradigm
- Australian Space Industry Growth

Risk Mitigation

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Future Planning

- ^{s33}
- Australian Space Industry Capability
- Sustainability
- Future EO Mission Planning
 - eg Water quality
 - eg Bushfire Fuel Load Monitoring
- Future Meteorological Mission Planning
 - eg Lightning Detection
- EO Technology Development

(Not to scale)

1 2 3 4

NSP-EO Elements

- **Satellite Cross-Calibration Radiometer Mission**
- **AusCalVal Capability**
- **Earth Observation Data Hub**
- **Ausventure Innovation Program**
- **Meteorological Mission Studies**

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NSP-EO Benefits

Earth Observation Capability Benefits

- Improved EO data quality, availability and interoperability
- Reduction of single-point data source failure risks

Benefits to Australian Industry

- Economic stimulus from improved utility of EO data
- Job creation
- Development of Australian Space Sector
- Scalable model for space programs
- Inspiration of future STEM workforce

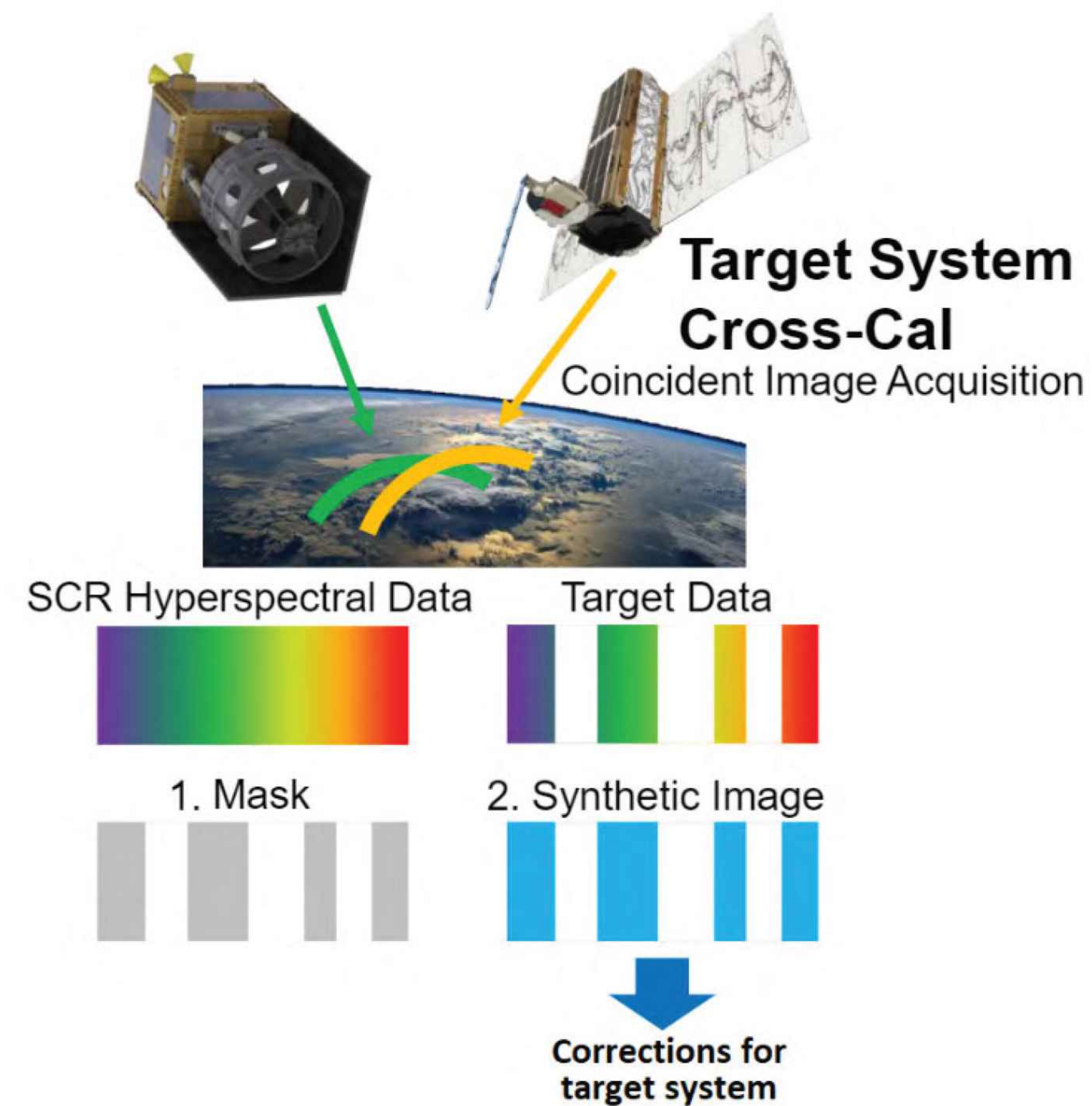
NSP-EO Scope and Plans



Satellite Cross-Calibration Radiometer (SCR)



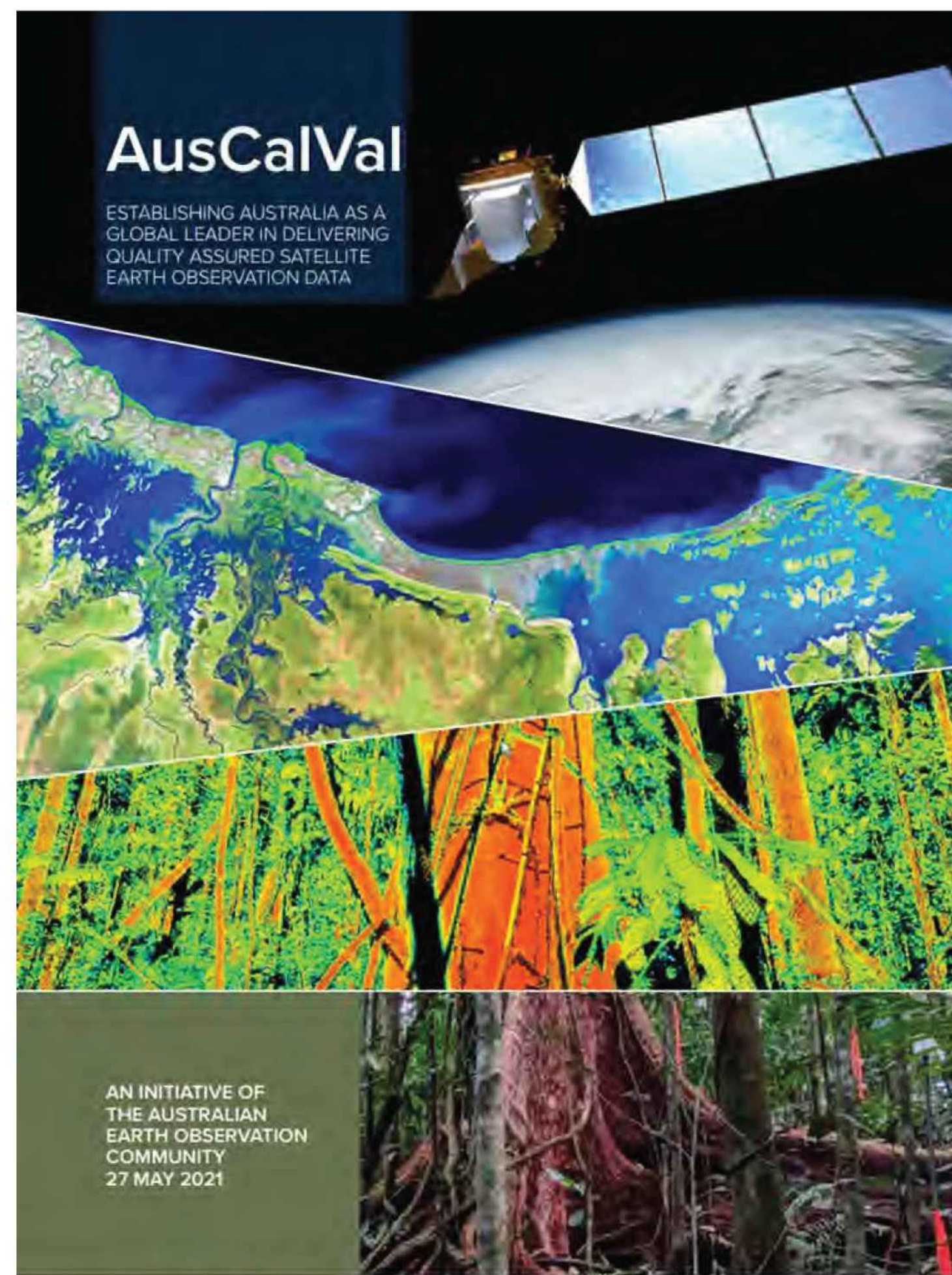
- **Objective:** Deliver a service for improving the quality of data from the world's Earth Observation satellites
- **Scope:** Design, manufacture and operate 75-100kg hyperspectral smallsats in Australia



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AusCalVal

- **Objective:** Trusted satellite data quality assurance through calibration and validation
- **Scope:** Upgrade a selection of existing research infrastructure and fill gaps to deliver an operational services which underpin government programs and private sector activities
- **Motivations:** Calibration fills a need for trust as a key ingredient for EO applications. Combined with SCR, positions Australian as potentially the world's "test track" for satellite applications, services like the weather forecast



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EO Data Hub



Objective: To provide free and open access to quality EO data for research, industry and government applications.

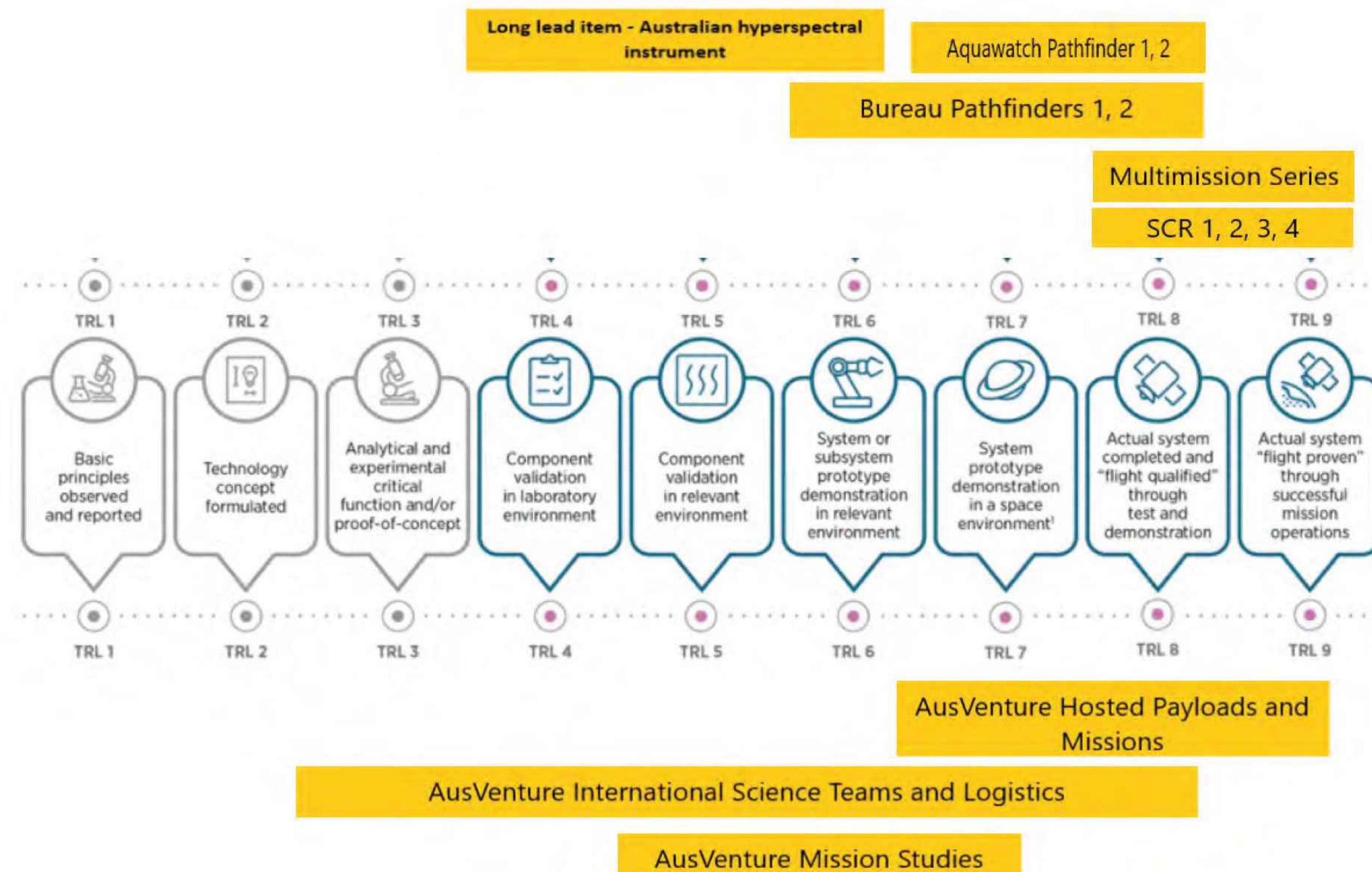
Scope: Develop a secure cloud-based EO Data Hub

Motivations: Accessibility of quality EO data underpins data-driven analysis and optimisation in many sectors of the economy. Advances demonstrated in data management technologies including secure cloud storage and compute, advanced analytics using AI, ML and integrated pipelines will support development of Australian industry expertise in a global industry.



Ausventure

- **Objective:** Research and development program to drive Australian research into space qualified exportable products
- **Scope:** Mirror international equivalent programs using an expert panel to fund activities relevant to the Earth Observation from Space Roadmap.
- **Motivation:** Drives technology improvement, develops future workforce for the program and creates commercialisation opportunities



Meteorological Mission Development



- **Objective:** Develop concepts for Operational Australian meteorological satellites by 2035
- **How:** The pathway towards operational missions is to build capability in the Australian space industry and develop national pathfinder missions within the next 5 years.
- The following pathfinder missions could be built in Australia in the next five years:
 - **Microwave sensor** – essential data input for weather models
 - **SAR mission** - for Antarctic ice monitoring

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Program Budget



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NSPEO Governance and Status



Principles of Shared Program Governance

- 1. Each Partner Organisation is accountable to Government to deliver the scope assigned to them in the approved policy proposals.**
- 2. Where practical, Partner Organisations will use their extant governance systems to manage and deliver their assigned program elements.**
- 3. All Partner Organisations will support the coordination and management of the program as a whole.**
- 4. The Australia Space Agency leads coordination of activities of all partners and management of the program as a whole.**

Governance Framework



Program

The Program level is comprised of the NSP-EO Program Board, supported and enabled by the NSP-EO Program Office. This level of governance is responsible for Programmatic communications and assurances with government, the alignment of the NSP-EO with the needs of government and Programmatic decision-making.

Sub-Program

A Sub-Program is a grouping of related smaller Projects in to a configuration that supports a more efficient management of the NSP-EO by the Agency. Headed by the lead organisations for the relevant Sub-Program, they have cross-organisational involvement and provide an escalation path for Projects through to the Program level of governance.

Includes: SCR, AusVenture, Multi-Mission Imagers, Met Mission and AusCalval

Projects

A Project is a discrete body of work, approved by government and is accountable to one government organisation for its delivery. A project is comprised of its own internal work elements and working groups. Project decisions are made in Project forums or Integrated Project Teams (IPTs)

Includes: MoC, GNE, DPAS, Data Platform, Mission Studies, GEO Paper

NSP-EO Agency Heads Forum

The NSP-EO Agency Heads Forum provides sponsorship, strategic direction and oversight of the program ensuring forward planning and progress against outcomes are aligned with strategic and ministerial guidance.

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Sub-Program Boards

Sub-Programs are formed around the key elements of the Program and typically require the involvement of multiple organisations to be delivered. These groupings afford dedicated management of key elements within the Program without affecting other unrelated Sub-Programs and Projects.

There will be a Sub-Program Board (SPB) for each of the identified Sub-Programs. The SPBs are chaired by the relevant lead agency specific to the Sub-Program.

SPBs provide a select grouping of Projects with dedicated oversight and decision making support for matters that extend beyond a single Project's ability or tolerance to manage. Those matters that require socialisation with other Sub-Programs or the Program as a whole are referred to the NSP-EO Program Office by the SPB.

Projects

Projects will be delivered by the organisation with the accountability to government for the specified capability. Where overlaps, cross-Project dependencies or impacts exist, Project Managers and leads will seek guidance and support from their designated Sub-Program at the Sub-Program Board.

The forums and governance to deliver Projects are not prescribed at a Program level and are the responsibility of the accountable delivery organisation. There is a requirement for a nominated person responsible for Project delivery to represent the Project as required at governance forums.

Projects may have multi-organisational involvement, or be executed and delivered by an individual NSP-EO organisation.

NSP-EO Program Board

The NSP-EO Program Board drives delivery of the program and the intended benefits through establishment and oversight of the identified Sub-Programs. The NSP-EO Program Board is chaired by the Senior Responsible Officer (SRO), and integrates program performance and manages the interfaces with government and external program stakeholders.

NSP-EO Program Office

Operating under the direction of the Program Board, the Program Office is responsible for managing the overall Program in accordance with approved Plans. This includes support for coordination and assurance of subprograms, and integration of the various program elements.

- 1 SCR (ASA, GA)
- 2 AusVenture (ASA, CSIRO)
- 3 EO Data Hub (CSIRO, GA)
- 4 Met Mission (BoM, ASA)
- 5 AusCalval (CSIRO)

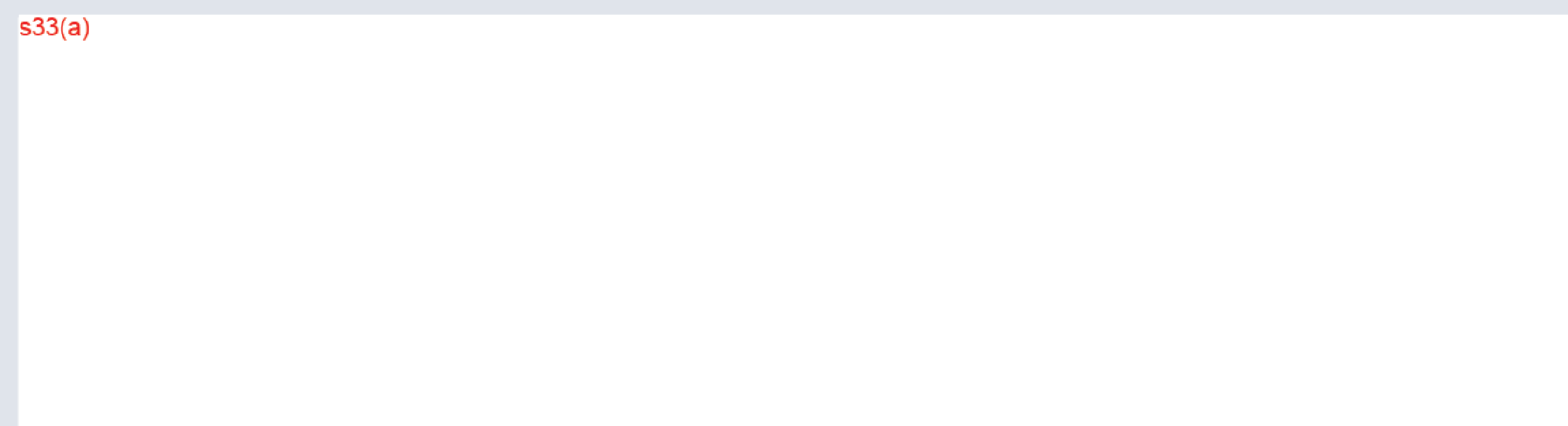
Agency Heads Forum



NSP-EO Agency Heads Forum

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Program Board



NSP-EO Program Board (in development)

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Sub Program Boards

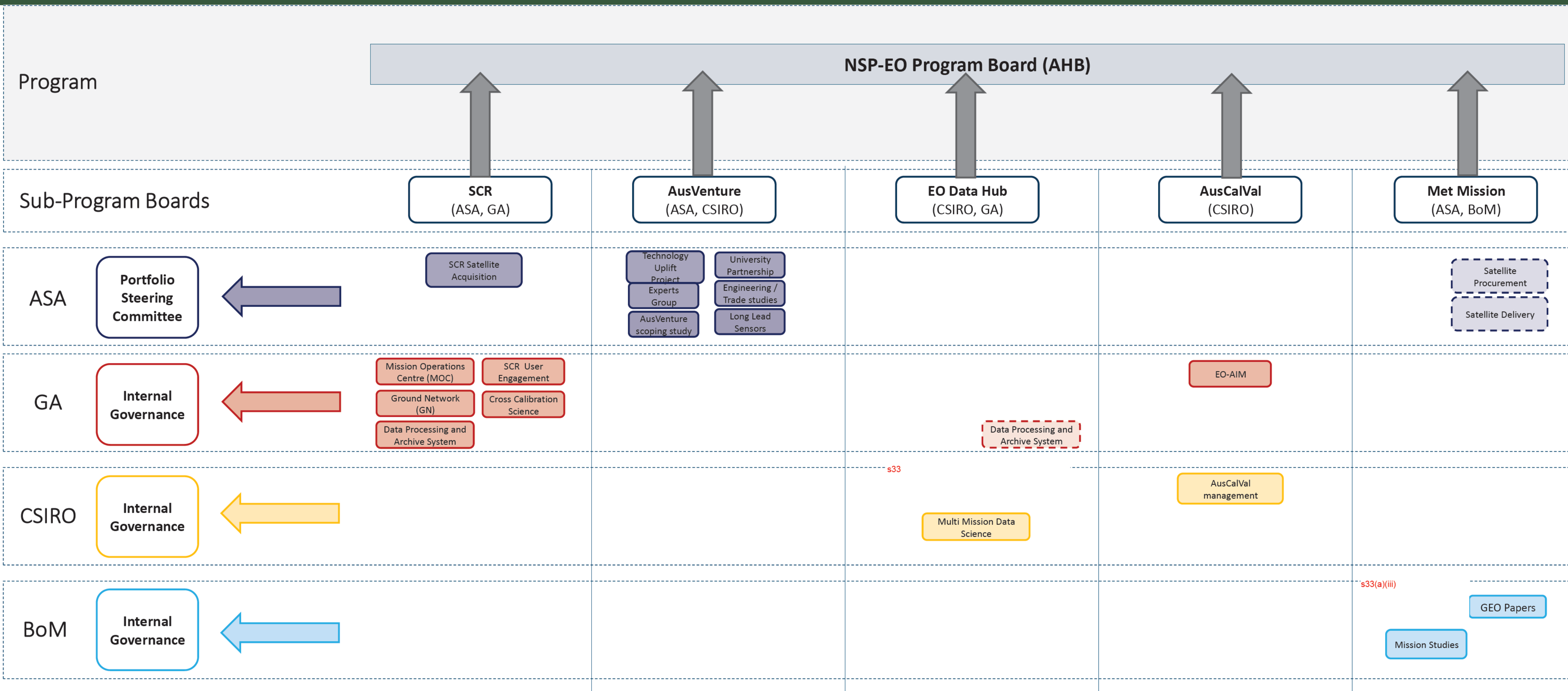


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Program and Organisational Governance



Status

Program Management

- Established Program Office
- Established Governance Framework and Agency Heads Forum

SCR

- Filled Key Positions
- Established Sub-program Board and Governance

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- Engaged legal support for probity advice and contract drafting
- Developing joint tender for SCR satellite, ground segment and Mission Operations Centre

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EO Data Hub

- Data Hub Project Manager engaged
- Data Hub Request for Information developed

AusCalVal

- Manager appointed, Technical Advisory group formed.
- 2 site upgrades and new site modelling in progress.

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AusVenture

- Filled Key Positions
- Established Sub-program Board and Governance

Met Mission

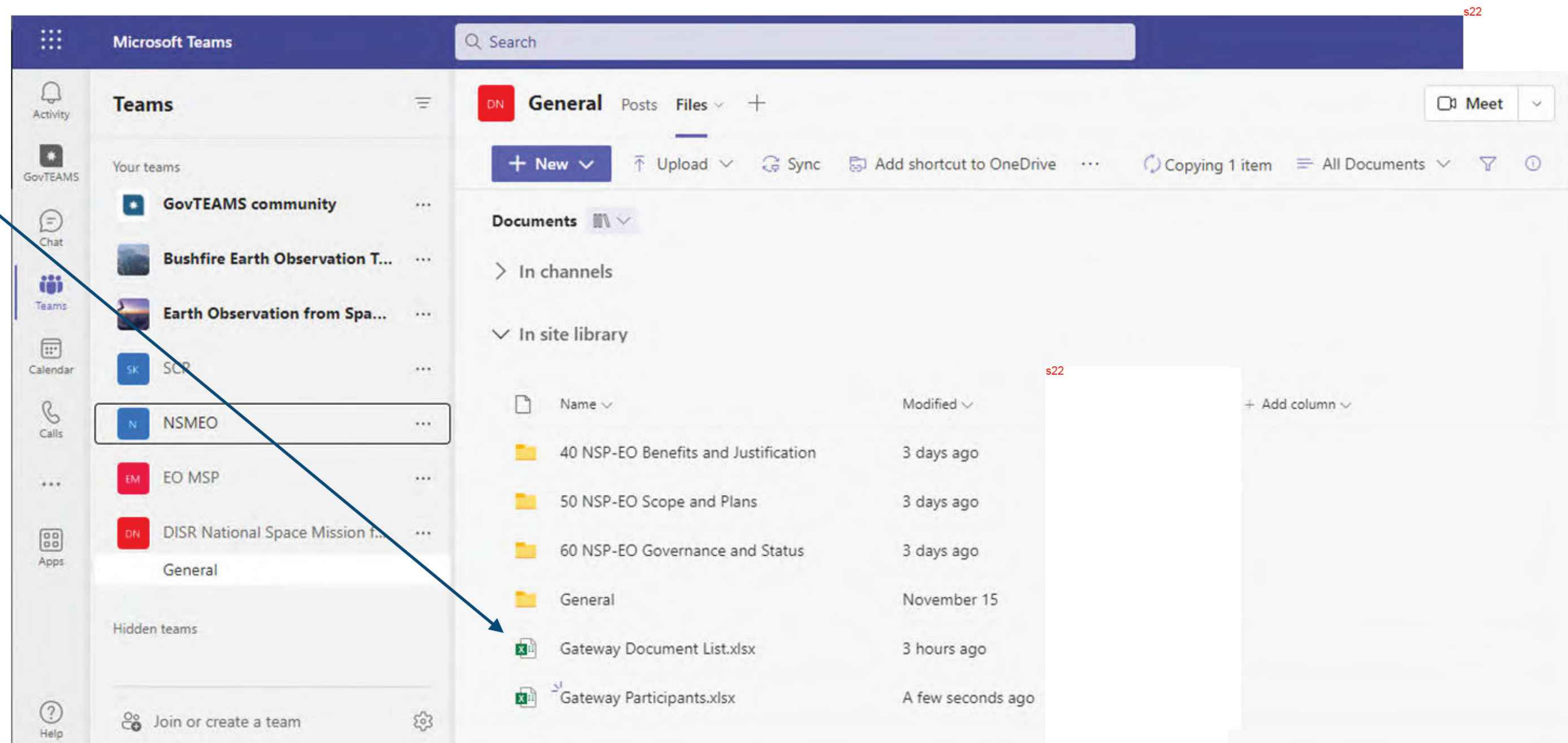
- Initial Mission studies established, and in progress.

Review Arrangements



Documents For Review

Documents for Review are transferred to GovTEAMS, and indexed here.



Candidate Interviewees

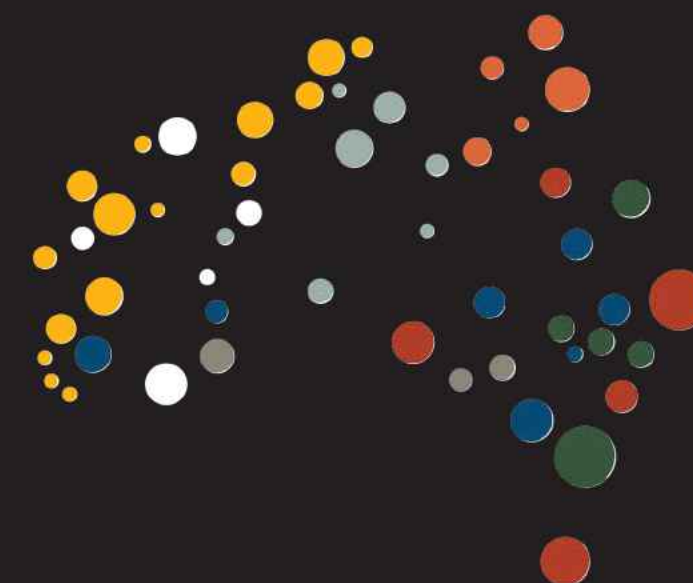
Proposed staff for interview are listed here.

The screenshot shows the Microsoft Teams interface. On the left, the 'Teams' list includes 'GovTEAMS community', 'Bushfire Earth Observation T...', 'Earth Observation from Spa...', 'SCR', 'NSMEO', 'EO MSP', and 'DISR National Space Mission f...'. The 'NSMEO' team is selected. The main area shows the 'General' channel with a document library. The library contains several folders and files, including 'Gateway Document List.xlsx' and 'Gateway Participants.xlsx'. A blue arrow points from the text 'Proposed staff for interview are listed here.' to the 'Gateway Participants.xlsx' file.

Name	Modified
40 NSP-EO Benefits and Justification	3 days ago
50 NSP-EO Scope and Plans	3 days ago
60 NSP-EO Governance and Status	3 days ago
General	November 15
Gateway Document List.xlsx	3 hours ago
Gateway Participants.xlsx	A few seconds ago



Australian Government



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 **AustralianSpaceAgency**

 **Australian-Space-Agency**

 **AustralianSpaceAgency**

OFFICIAL: -----



NSP-EO Program Status Update

Reference: NSP-EO Agency Heads Forum November 2022 – Paper 3

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High Level Summary

The NSP-EO has progressed through the establishment phase of the program over the last 6 months, with focus on the establishment of Program & Sub-Program governance (particularly SCR) and the development of procurement documentation for key procurement activities. s34

Progress Update:

Program

- Establishment of Program Office with key roles filled.
- Definition and implementation of Program Governance
- Key Program mechanisms & documentation development underway (Risk, Security, Benefits)
- Department of Finance Gateway Review (Gate 0 & 1) scheduled for 19-23 Dec 2022.

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SCR Sub-Program

- Key positions filled in Sub-Program (ASA & GA)
- Establishment of SCR Sub-program Board & Sub-Program governance

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- Project planning underway for SCR Projects (ASA & GA)
- Probity advisors procured
- Aerospace Corp services procured for SCR Assurance

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MMI Sub-Program and EO Data Hub

- MMI CDF feasibility study underway, with CDF session conducted

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- Data Hub Project Manager (CSIRO) has been engaged and commenced in October.
- Data Hub Request for Information documentation has been developed and is awaiting funding approval before releasing to market.
- Data Hub project initiation activities are underway with the project commencing stakeholder engagement and the development of project initiation documentation.

Met Mission

- The Bureau's first three mission study workshops were conducted by the UNSW Canberra Space Concurrent Design Facility (CDF) in October.
 - The Bureau scientists developed detailed observation and performance requirements for 1) a SAR sensor for sea ice and land applications, 2) a microwave sounder for use in NWP, and 3) a lightning sensor.
- In early November the CDF team provided a summary report and high level concept designs for these satellite missions. Final reports for the three missions are expected in early 2023.
- In the Australian Space Agency's Earth Observations Roadmap the Bureau articulated an ambition for an Australian weather satellite. As a first step, the Bureau has commissioned a number of studies, including an environment scan to determine the spectrum of issues related to developing an Australian weather satellite in geostationary orbit, and a socio-economic study on the expected benefits of such a capability. This work is progressing, and will be used to inform the Bureau in future

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AusVenture

- AusVenture scoping study procured.
- Concurrent Design Facility activities at various stages of procurement
- Resolving issues related to appropriate legislative instrument for Ausventure
- Hyperspectral instrument AusVenture procurement progressing

AusCalVal

- The Manager of AusCalVal facility started in August 2022. Interviews for a Facility Implementation Lead are in progress.

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- Two sites funded under T0 are on track to be up and running by June 2023 – Pinnacles Terrestrial calibration site in WA and Googong Aquatic calibration site in NSW (near ACT)
- A Technical Advisory Group is being established to provide recommendations to CSIRO on strategic direction for AusCalVal implementation
- Exploring technical solutions for the AusCalVal data access hub, with a view to establishing a prototype under T0
- Undertaking modelling and site selection work for a new calibration site to support SCR

Major Activities over the next 6 months:

- DoF Gateway review (December)
- s34
- SCR RFT release (July)
- s34
- Further recruitment to build teams across all participating organisations.

Risk Management Update

- Program Risk Strategy agreed and published.
- Program Risk and Issues Register workshopped across participating organisations and now under active management, with a monthly review cycle in place to identify changing and emerging risks.

Most Significant Current Issues

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ID	Issue	Impact rating	Comment
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Most Significant Current Risks

ID	Risk event	Risk rating	Likelihood	Impact	Comment
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EOP003	Shared responsibility amongst multiple organisations may produce unclear accountability and authority within the Program.	Medium	Likely	Moderate	Regular Band 1 meetings and Agency Heads Forum addresses, with development of Program governance documentation (i.e. PMP, RACI etc.) underway to mitigate further.
EOP010	Interdependencies between sub-programs and projects not fully understood across the Program.	Medium	Likely	Moderate	Establishment of the Program Office and development of the Program Management Plan, will increase coordination across the various streams.

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EOP006	Government fails to adequately convey the potential benefits and outcomes of the Program to industry and the public.	Medium	Possible	Moderate	Where permissible, active engagement at public and industry events will address, as well as project specific communications (e.g. SCR planned webinars).
EOP007	Supply chain issues for program critical components.	Medium	Possible	Moderate	Long lead times for specialist parts and global conditions may delay delivery. Identification of long lead time items and alternative suppliers used to mitigate.
EOP009	Program fails to deliver expected demonstrable major benefits as the Program progresses.	Medium	Possible	Moderate	Implementation of the Benefits Realisation Plan and amalgamation with the Integrated Master Schedule, will allow progress to be tracked across Program phases.

DEPARTMENT OF INDUSTRY, SCIENCE, ENERGY AND RESOURCES

MS22-000785

To: Minister for Industry and Science (For Information)

NATIONAL SPACE MISSION FOR EARTH OBSERVATION

Recommendations:

That you note:

1. The status of the first National Space Mission for Earth Observation (NSMEO) ^{s34}

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3. ^{s47C}

4. ^{s47C}

5. ^{s47C}

Noted / Please Discuss

Minister:

Date:

Comments:

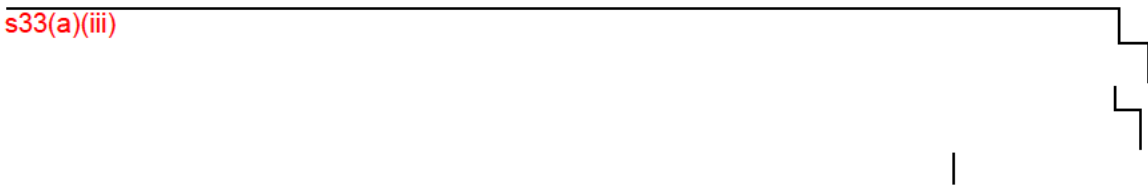
Clearing Officer: Sent: 7/7/2022	Paul Trotman	Deputy Head, Australian Space Agency	^{s22}
Contact Officer:	Chris Hewett	General Manager, Space Strategy	



Key Points:

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- 2. The NSMEO will procure through a competitive process four Australian-built satellites s
The
satellites are being procured by the Agency through a prime integrator, with subsystems
supplied by industry through competitive commercial tenders. s33(a)

- 3. s33(a)(iii) 

- 4. EO includes a broad group of remote sensing capabilities that gather data and spatial information to monitor and examine our planet, its environment, human activities and infrastructure. s33(a)

The measure grows Australian space capability and capacity

- 5. The first phase of NSMEO will include Australia designing, building and operating four Satellite Cross-Calibration Radiometers (SCR) satellites s33(a)
around 100kg s33(a) The SCR satellites weigh

- 6. The spacecraft have been designed to be within reach of the existing technical capability of the Australian space industry, as identified as a priority in the Earth Observation from Space Roadmap 2021-2030 (The Agency, 2021). s33(a)

- 7. Around 94 per cent of the proposal's costs over the build and launch phase will go directly to industry. The remaining costs are for departmental resources to develop capability within Government to act as an informed anchor customer for industry by recruiting and developing space engineers, scientists and digital experts with specialist capabilities. These roles are necessary to ensure accountability, value for money from procurements, and government representation with industry, s33a and the public. Without these skillsets, the decision making and technical expertise required would not be available to deliver the program.



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Sensitivities:

- 19. s33(a)(iii)
- 20. s47C
- 21. s47C

Data referenced:

Australian Space Agency, Earth Observation from Space Roadmap, 2021
Australian Space Agency, Advancing Space, Australian Civil Space Strategy 2019-2028

Consultation: YES

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Attachments

- A:** National Mission schematic
- B:** National Mission for Earth Observation
- C:** s33(a)



DEPARTMENT OF INDUSTRY, SCIENCE, AND RESOURCES

Attachment A

Criteria for Success

- Manufactured and operated by Australian industry

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- Meets unique Australian needs
- Builds the digital economy

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Components

Land imaging satellites for DISER, DAWE, s33a

- 2024-2026 25kg+ for quality and integrity monitoring
- 2027+ 100kg+ include water quality, bushfire fuel load, etc

ka-band 25kg+ 100kg+

Met satellites for DISER, DAWE, s33a

- 2026/27 25kg met Pathfinder satellites towards future operational Australian GEO.

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Pathfinding satellites for DISER, s33a

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Quality assurance infrastructure for DISER, DAWE, s33a

- National operational calibration and validation (field sites) (CSIRO)
- Integrity monitoring of global EO satellites (GA)

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Foundational partnerships

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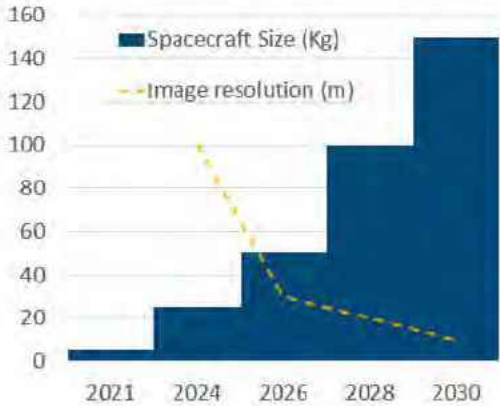
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Contribution

~95% to Industry
~80% to Aussie industry

(Note: 85% of SLI comeback to industry)

Capability



**Attachment B****National space missions**

The Australian Space Agency (Agency) is considering the implementation of the National Space plan through a series of National Space Missions (NSMs). Space Missions are outcome-focused, span different stages of the innovation cycle and cut across policy priorities, industry segments and academic disciplines. Missions build industry and workforce capability and provide a platform for a future made in Australia, develop our self-sufficiency and help industry to demonstrate innovative technologies, opening the door to additional commercial opportunities, with the Government as the anchor customer.

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Principles of national space missions

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To be effective and deliver efficient outcomes from public funding, the missions must deliver a broad range of policy goals. The National Space Mission for Earth Observation (NSMEO) represents an example of these policy principles to guide future mission development.

The successful approach to scoping and commencing the NSMEO shows the validity of the approach to developing a space program in the Australian and the global context. The NSMEO is based on detailed analysis and factual bases from the Agency's Space Roadmaps (Roadmaps) addressing the technological opportunities for Australian companies around each of the Civil Space Capability Priority Areas to provide government with policy recommendations, to grow Australian space capability and deliver additional outcomes across broader government policy domains, achieved and delivered through a technical or technological capability base.

These policy outcomes are critical to delivering benefit for Australia, and represent the key performance indicators for a successful national mission. Additionally, NSMs will provide opportunities for policies and strategies to build the domestic workforce, based on the proposed forecast of procurement of space capability, guided by the agreed national agenda for the Australian Space economy under the National Civil Space Strategy.

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Australian industry and space technology uplift and downstream benefits

NSMs will target domestic Australian manufacturing or a technological base to produce or deliver the mission's requirements. Delivery is derived from the in-depth assessment and market analysis undertaken through the comprehensive assessment of Australia's space industry and its technical paths over the coming decades through the Civil Space Priority Areas. NSMs would create additional jobs, and build Aussie businesses' competency in project delivery for space supply chains, business management and commercialisation skills, use and application on internationally-recognised technical standards. This includes programs designed to help the industry and research sector advance their capabilities along the technology readiness level and feed into the supply chains for NSMs, national and international space markets.

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Whole of government

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NSMs are intrinsically linked to the roadmaps. The roadmaps have delivered a point in time assessment of the current technological and economic capacity in Australia at the level of individual companies to determine opportunities for Australia to grow capability in space. NSMs represent real, factual procurement approaches based on current industry capability to grow the space sector. The NSMs are not speculative and utilise a deep knowledge and evidence base and assessment of Australian capability. If agreed, the NSMs can deliver significant industry growth and national capability, based on the comprehensive assessment of Australian space industry capability.

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Australian Government



Australian
Space Agency



NSMEO : National Space Mission for Earth Observation

- *Secures data supply for the nation*
- *Meets unique Australian needs*

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- *Made in Australia*
- *Commercialises Australian science innovation*



Australia needs sovereign EO Capability:

- EO data is critical and worth up to AUD29 billion to our economy p.a.
- Australia doesn't produce it's own EO data
- Need to fill gaps and assure supply

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Criteria for Success

- **Manufactured and operated by Australian industry**

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- **Meets unique Australian needs**
- **Builds the digital economy**

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Components

Land imaging satellites for DISER, DAWE, s33a

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Foundational partnerships

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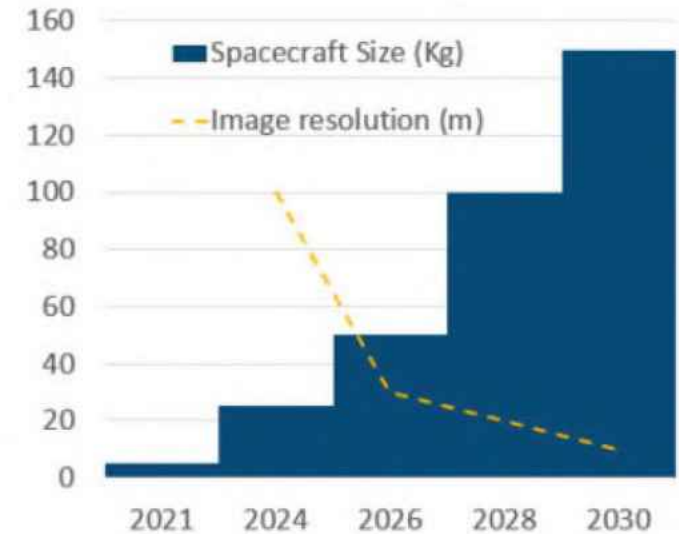
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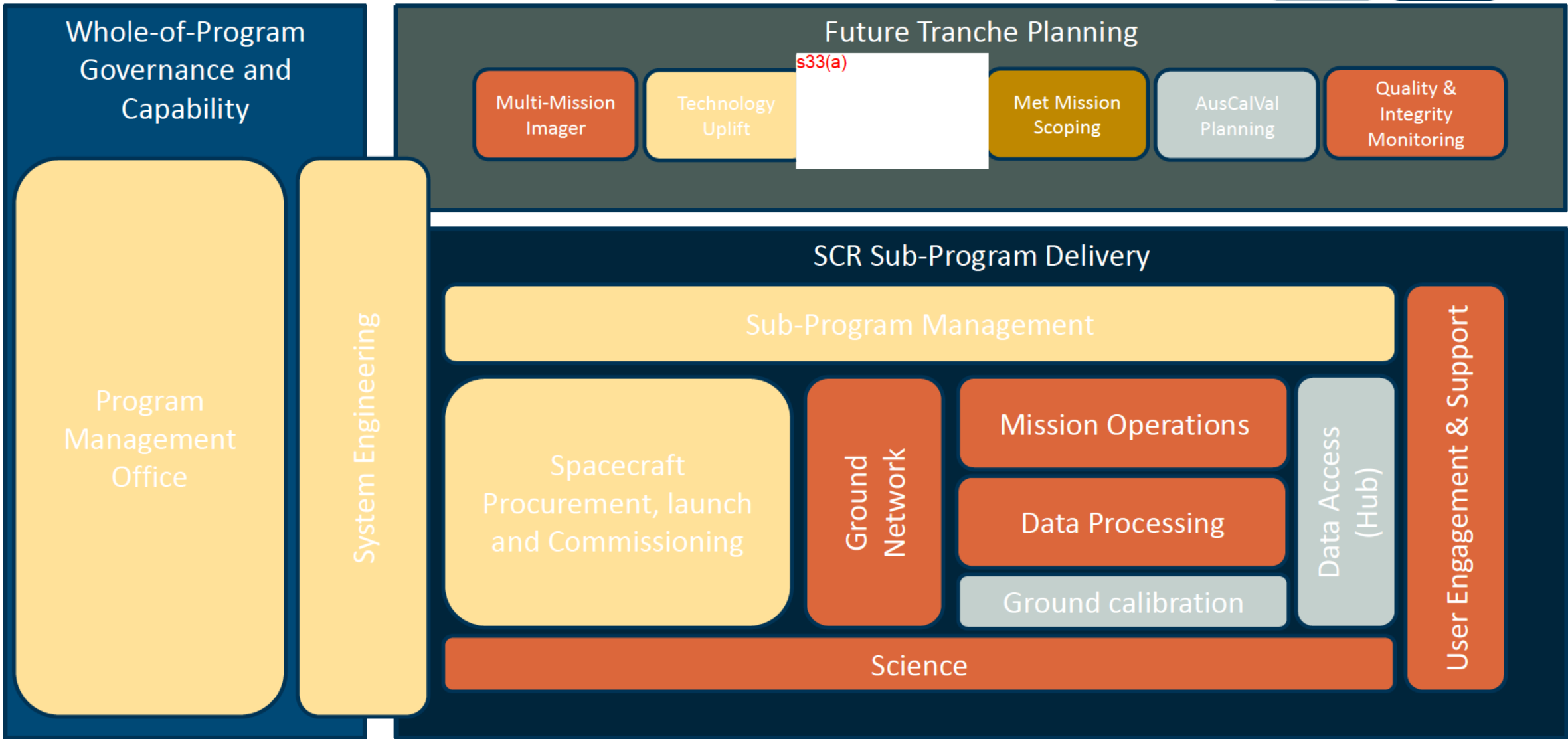
Capability



NSP-EO Components

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LEX 73410 - FOI - Combined Documents





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Across all proposed tranches, NSP-EO supports the following needs (by Agency)

- **Geoscience Australia**

- SCR^{s33(a)}

- Ability to assess the utility of various sources of EO data for integration into Australian national data sets
- Deliver bushfire fuel load EO data sets and operational water quality data sets.
- Provide reliable EO data for government and private enterprise, including Australian value-adding industry
- Builds industry to deliver a backup option should any other sources of EO data be denied

- **Bureau of Meteorology**

- Develop Bureau thinking about the capabilities they need in the 2030's
- Skilled workforce that can source, develop, integrate and exploit data to ensure accurate Australian weather and climate services for civil^{s33(a)} customers
- Develop satellite industry that can support Bureau needs in the 2030's for complex sovereign meteorological data satellites

- **CSIRO**
 - Development of unique Australian water quality data that also supports global water monitoring needs – delivering data into GA for integration into national EO data sets
 - Program to develop internationally competitive EO payloads
 - Ability to delivery calibration and validation capabilities to support civil (especially water quality) ^{s33(a)} commercial operators ^{3(a)}
 - Ability to manage and distribute data from water quality and other scientific satellites
 - Dedicated science team that develop new applications for EO satellite data

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- **Australian Space Agency**

- Support government ability to be an informed and accountable purchaser of space capabilities to meet national critical space access and infrastructure needs that currently exist and will develop
 - Develop the processes that balance government accountability and value for money with the need to empower industry innovation
 - Be the government space capability acquisition centre of excellence
- Foster the commercialisation of Australian scientific innovation through the provision of customer base (government) that moves industry past start-up NRC and enables them to enter global supply chains with space heritage (procurements, not grants).

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More information

1. 2019, Nous Group, *Current and future value of earth and marine observing to the Asia-Pacific region*, 130 pages
2. 2021, Deloitte, *Economic study into an Australian continuous launch small satellite program for Earth observation*, 86 pages
3. 2021, Earth Observation Australia/FrontierSI/SmartSatCRC, *AusCalVal: Establishing Australia as a Global Leader in Delivering Quality Assured Satellite Earth Observation Data*, 28 pages

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5. 2021, UNSW/SmartsatCRC/CSIRO/Curtin Uni, *Preliminary Concept Study for the Satellite Segment of AquaWatch Australia*, 62 pages
6. 2021, UNSW/BoM, *Australian Bureau of Meteorology Pre-Phase A Mission Study Report*, 76 pages
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