Australia in Space

Expectations & Opportunity

Parliamentary Library Seminar

13 October 2021

Dr Brett Biddington AM

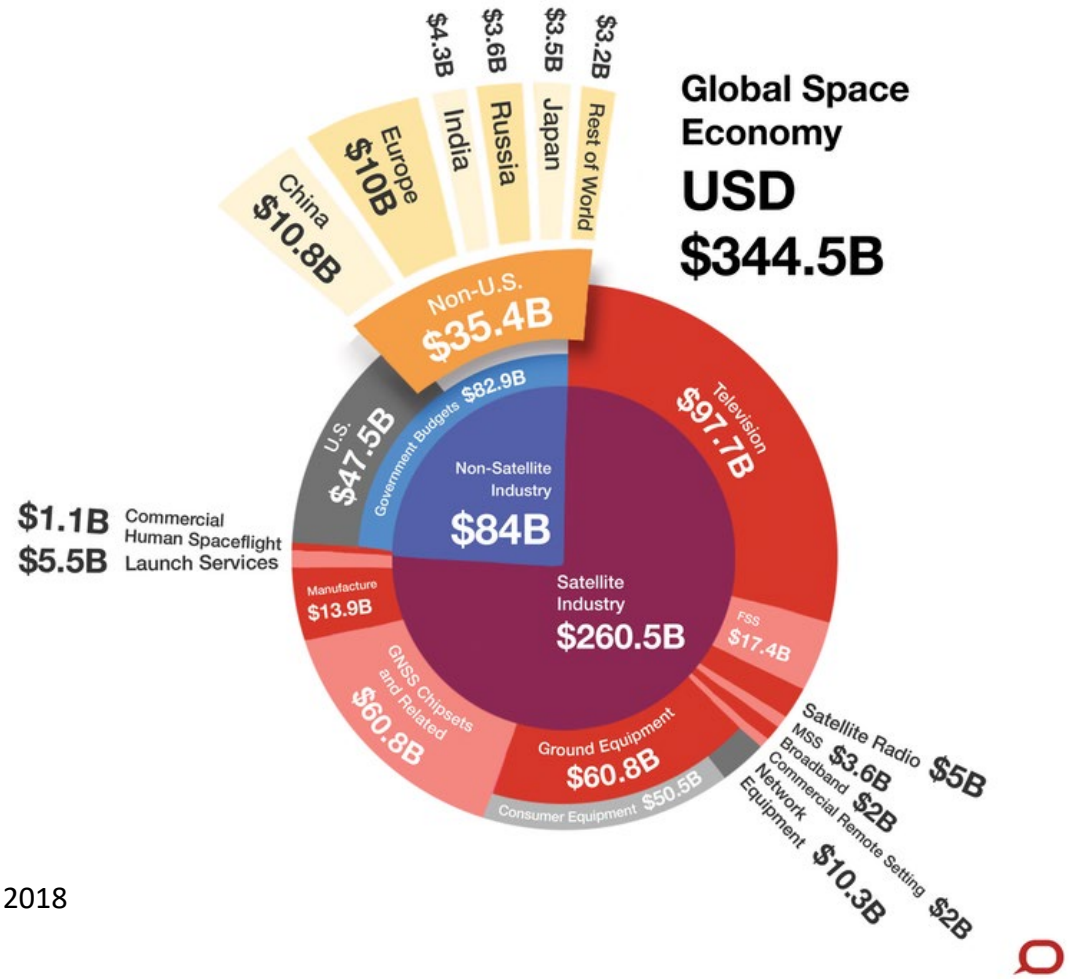
Representing the Australian Council of Learned Academies (ACOLA)

Agenda

- Context:
  - Australia's place in the global market
  - The changing nature of space
  - Australia's advantages and disadvantages
- Upstream and Downstream - available jobs and careers
- Policy complexities
- Domain agnostic technologies
- Growing the workforce
- Sovereign capability – necessity and sufficiency
- Educational challenges and opportunities
- Questions

The Australian space market – what share of $1 Trillion by 2040?

Dollar view



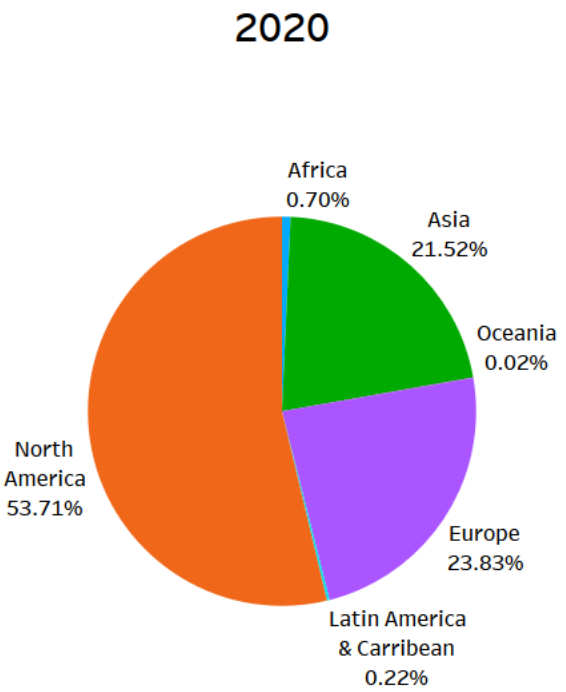
Source: Bryce, 2018

The Global Industry: Northern Hemisphere Focus

Space budget in USD millions PPP 2013		
Nation	**US$m**	**%**
USA	39,332.2	52%
China	10,774.6	14%
Russia	8,691.6	12%
India	4,267.7	6%
Japan	3,421.8	5%
France	2,430.8	3%
Germany	1,626.6	2%
Italy	1,223.3	2%
South Korea	411.5	1%
Canada	395.9	1%
United Kingdom	338.9	<1%

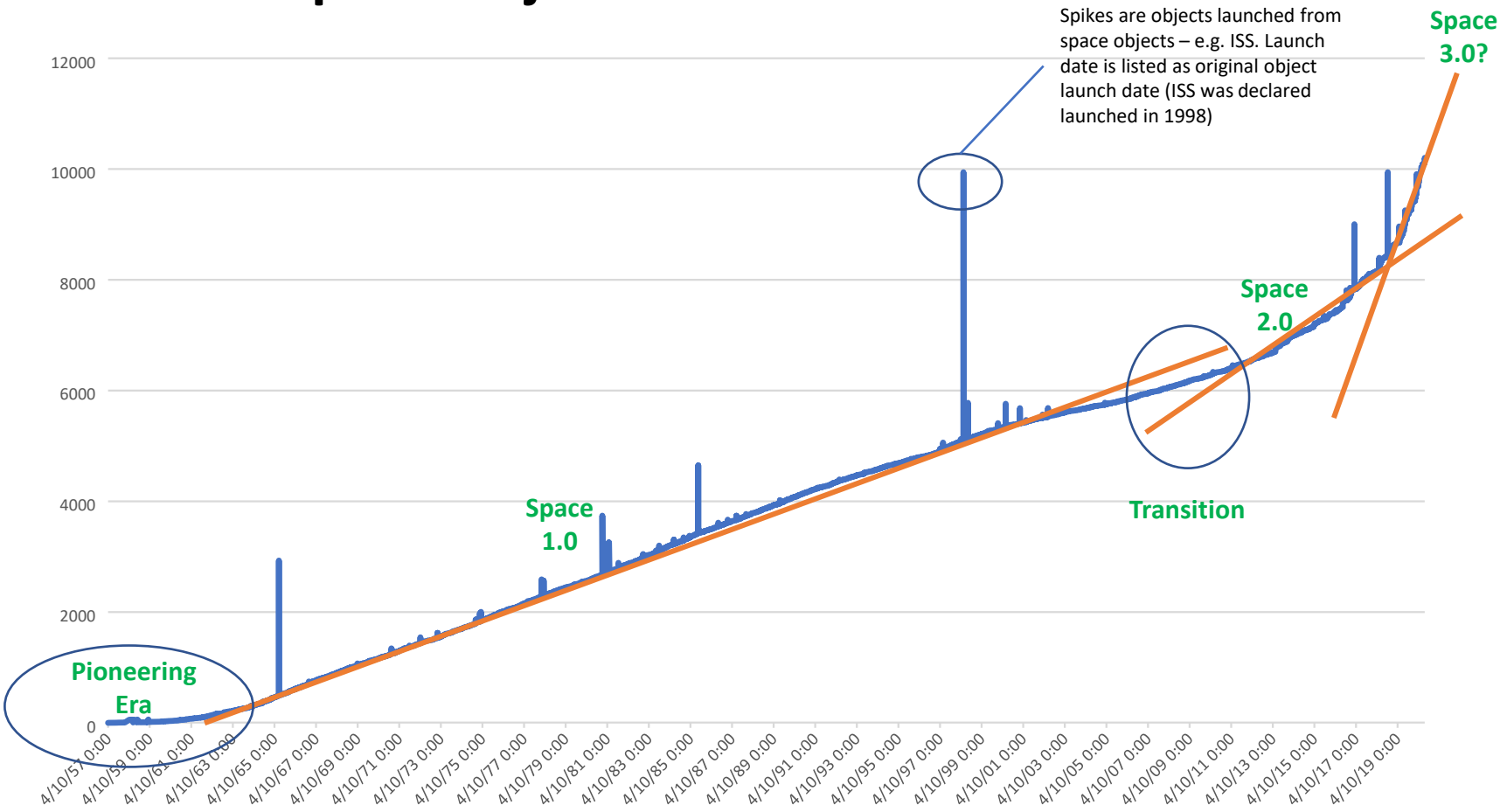
Washington
Beijing
Moscow
New Delhi
Tokyo
Paris
Berlin
Rome
Seoul
Ottawa
London

ALL capitals north of the Tropic of Cancer



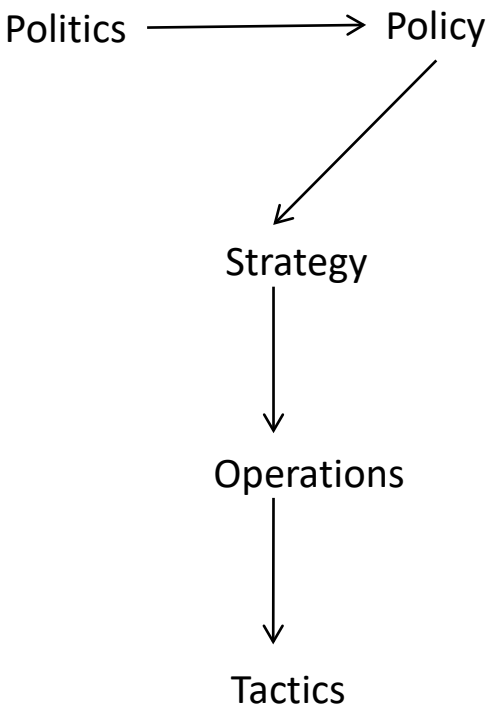
Source: OECD

Launch of Space Objects: 1957-2021



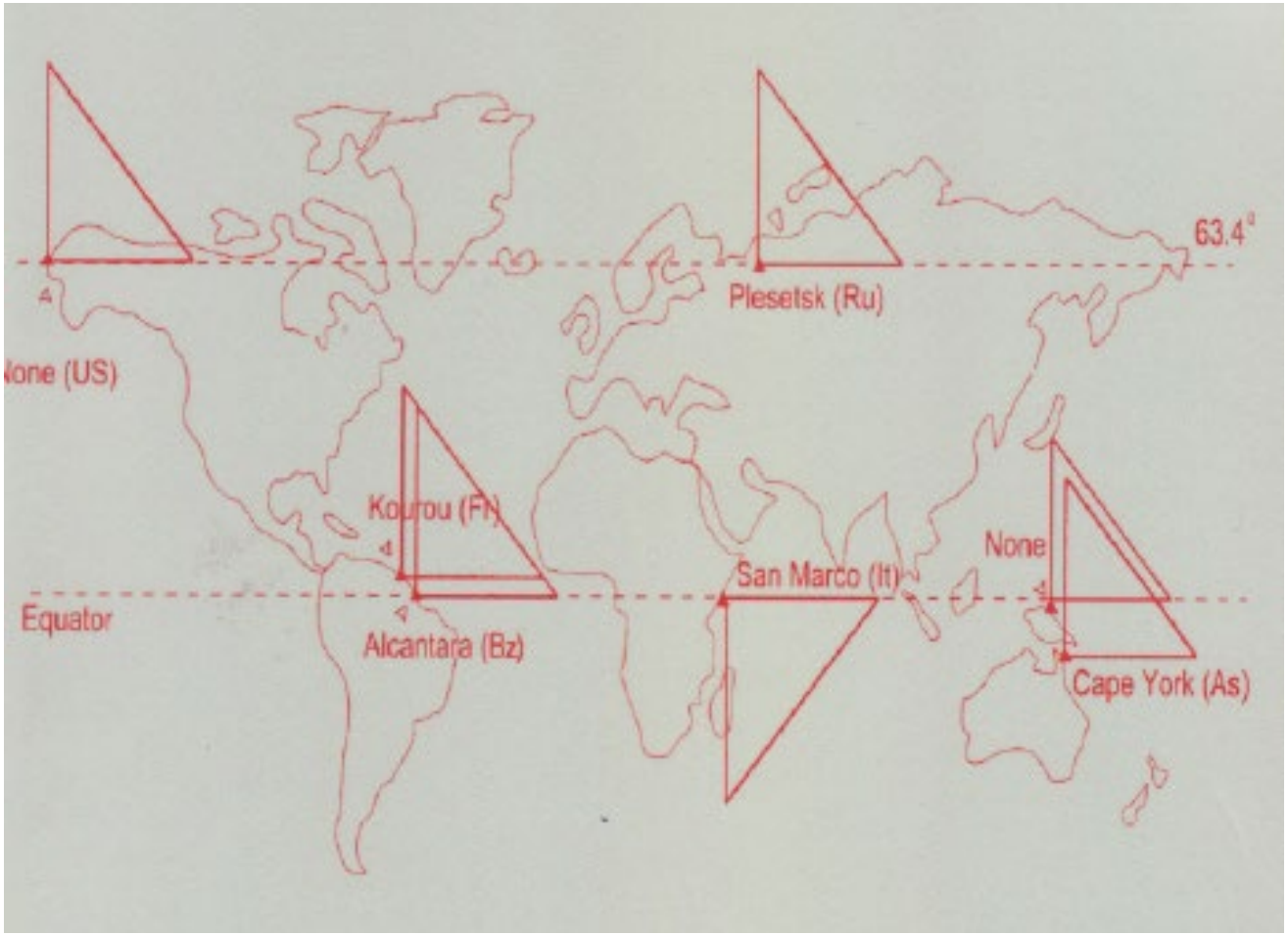
Strategic Geography: Lat and Long

RAAF: Air Staff Planning Chart



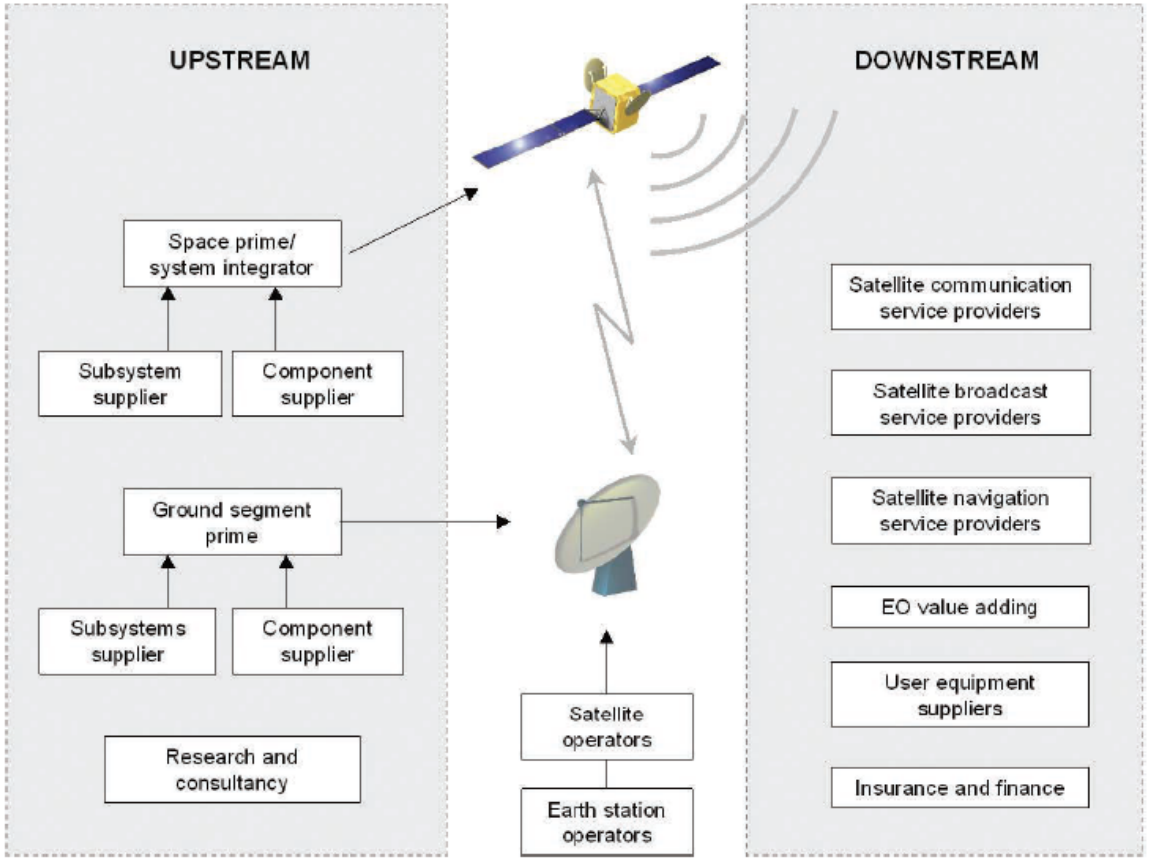
From Gray, 2015

Launch



Source: Dolman

Upstream and Downstream



Source UK Space Agency

Careers and most job opportunities are in the applications space, eg.

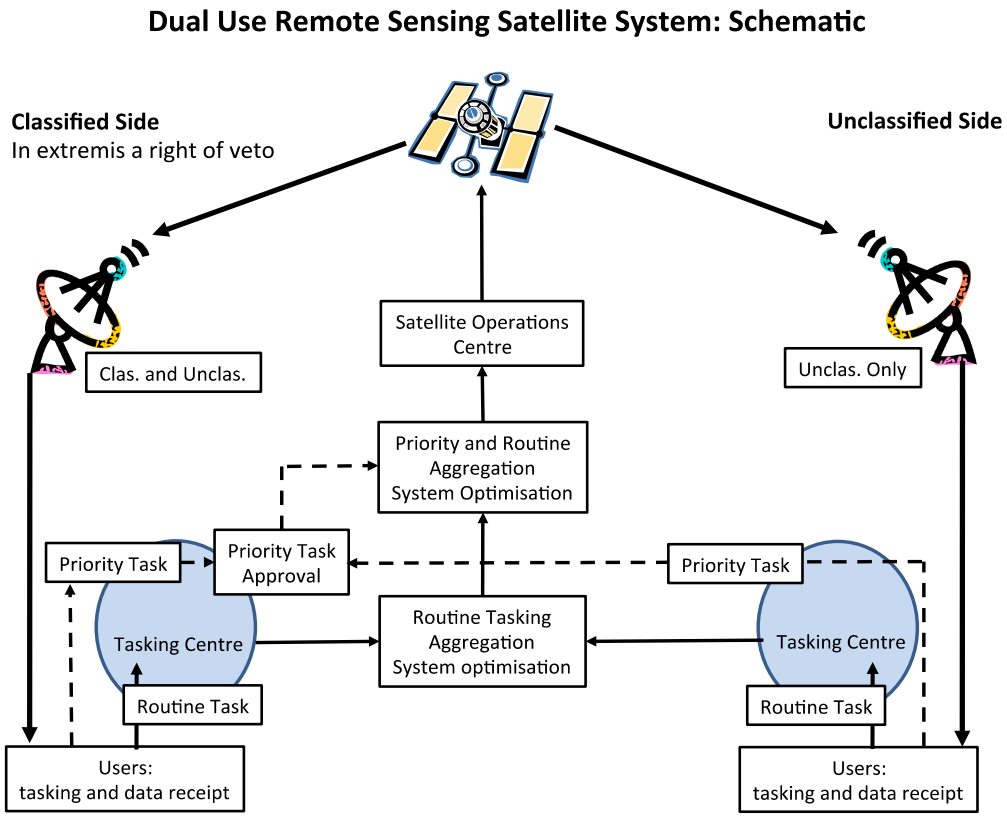
- Communications
- Precision Agriculture
- Mine automation
- Logistics

Policy and regulatory expertise needed across the board

Much work is screen-based

Dual Uses

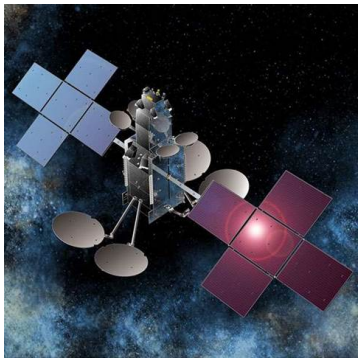
Raises policy, regulatory (diplomatic, licensing, export approvals, etc), and technical challenges



Source: Biddington & Sach, 2010. Indicative of Cosmo Skymed

Australian Space: Bifurcated

- Defence National Security
  - Woomera
  - Nurrungar, Pine Gap
  - Space Surveillance Radar and Telescope at NW Cape
  - Vital enabler for the ADF, central to the US alliance



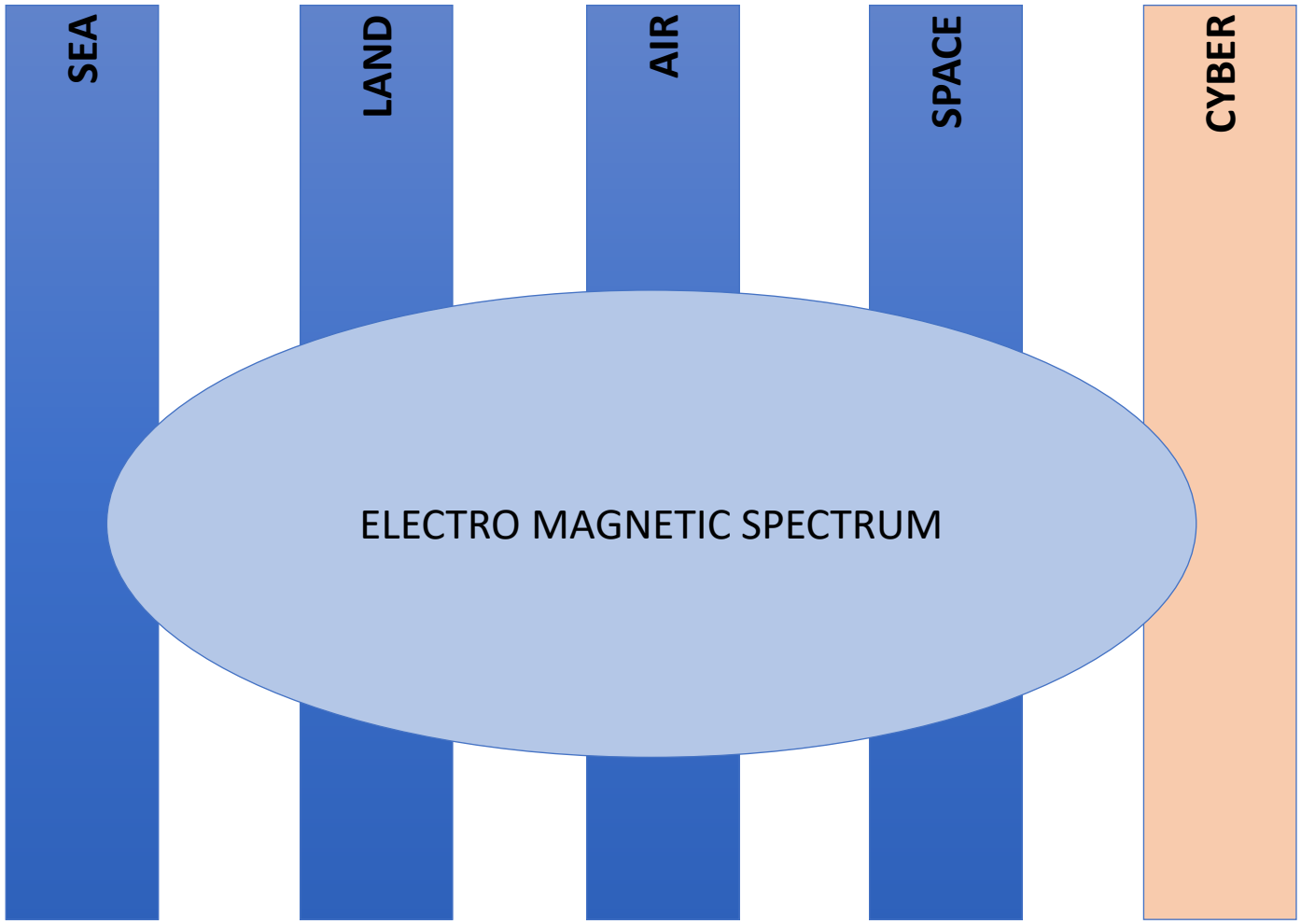
- Civil/Commercial
  - BoM, GA, CSIRO
  - NBNCo, Optus
  - Space 2.0 start-ups – tech push, not market pull

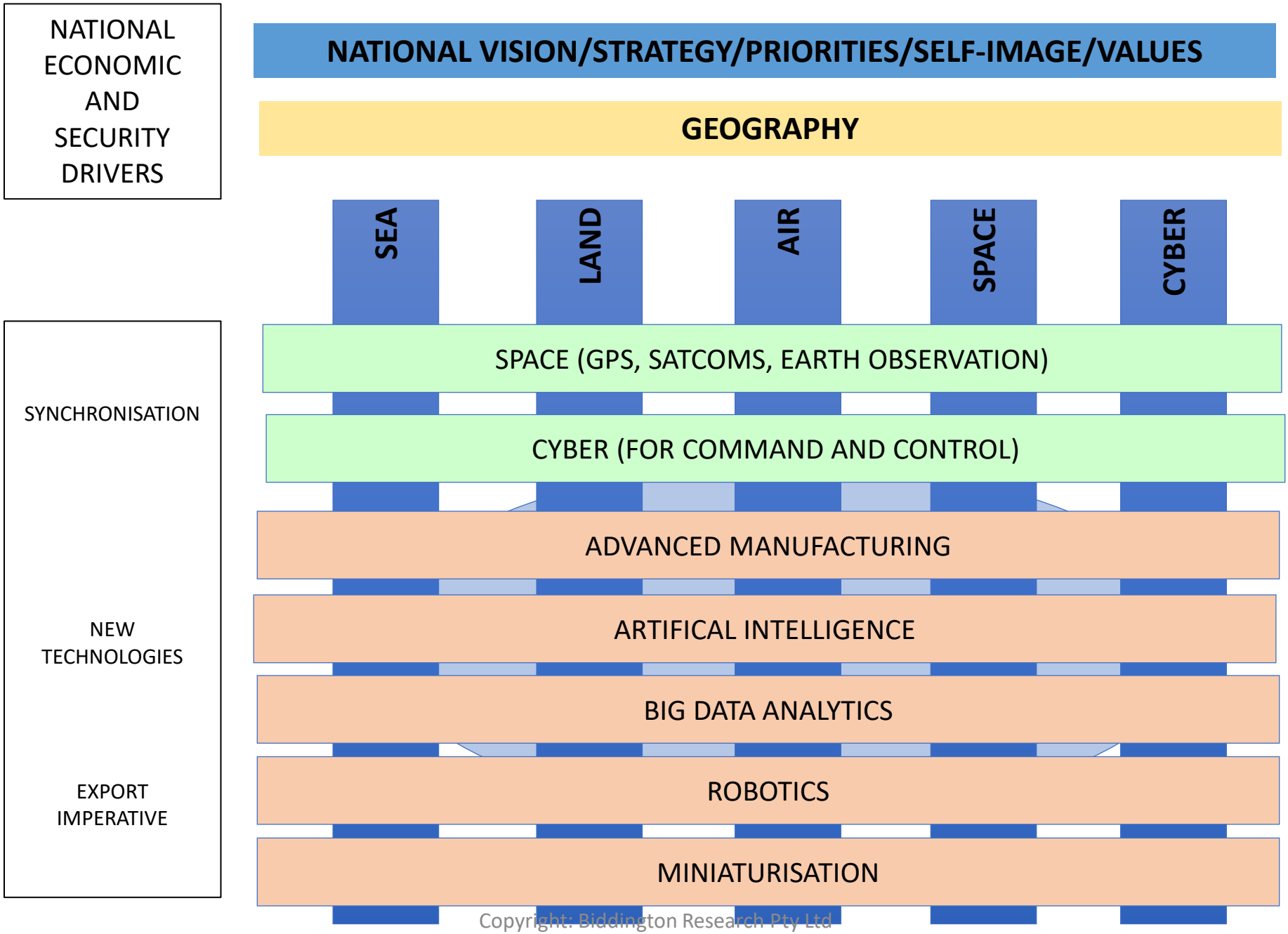
The Australian Space Agency

- Long Overdue – must succeed
- Set-up opportunistically – absent a national space policy and strategy
- "Jobs and Growth" mantra – useful, not compelling
  - Does not address opportunity costs
  - Overstates the size of the opportunity (c/f Canada)

- National security is one compelling reason
  - Hide in plain sight (diplomatic good manners)
  - Develop necessary and sufficient sovereign industry capacity.

HUMAN ACTIVITY OCCURS IN SIX DOMAINS
FIVE NATURAL AND ONE OF HUMAN CREATION



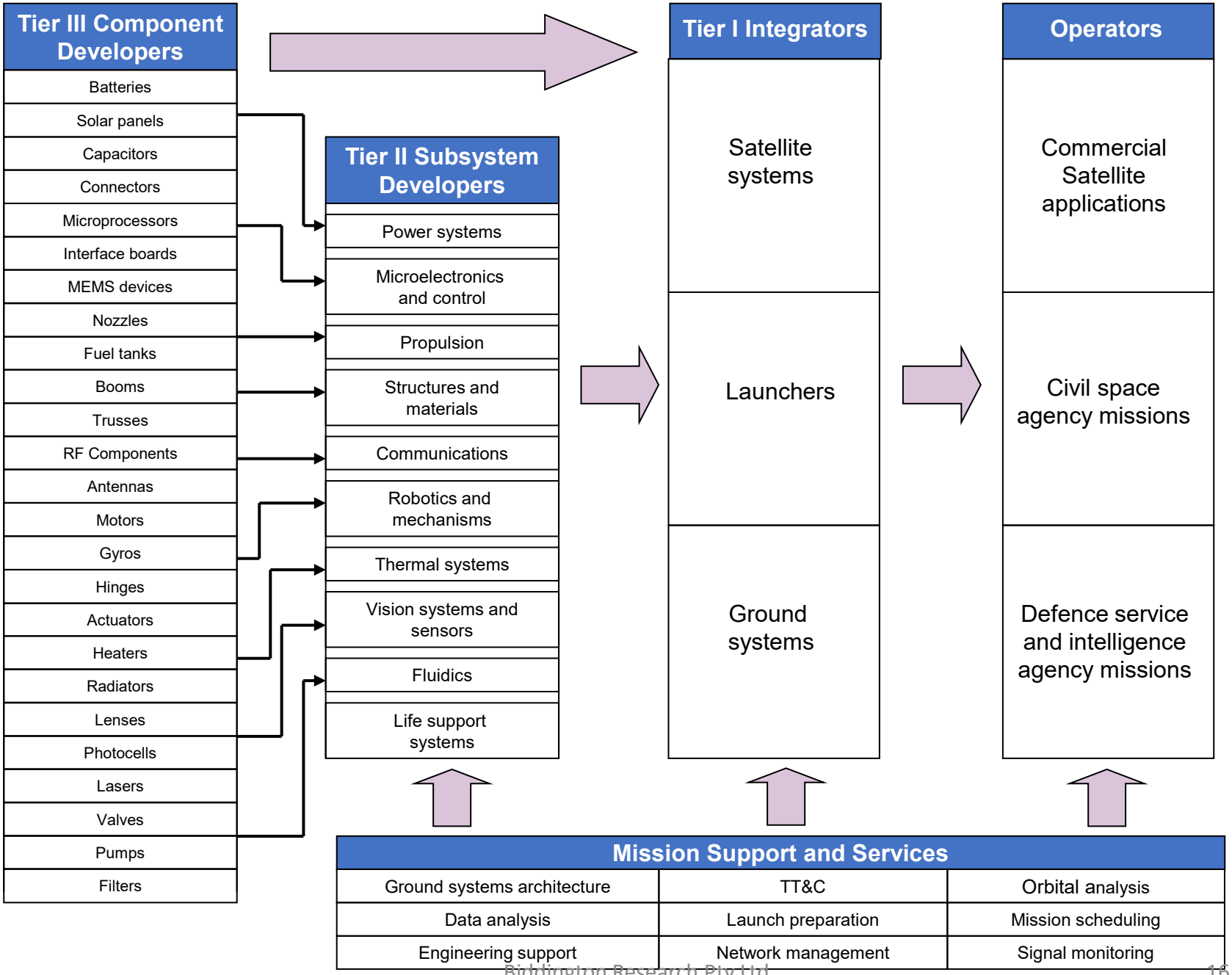


Workforce - Space

319 skill types – shortages in all but 9

Learned Academies' Report to Chief Scientist to the PM
Rapid Response Information Report
1 July 2021

"To deliver 20,000 new space-related jobs by 2030, around 300 new qualified scientists and 900 engineers, as well as 800 non-STEM graduates, are required to be trained each year for a decade."



Elements of a small satellite industry

Sovereign Capability: Opportunity costs / necessity and sufficiency

Skills shortages across the board

Modern Manufacturing Initiative – Priorities:

- Resources Technology & Critical Minerals Processing
- Food & Beverage
- Medical Products
- Recycling & Clean Energy
- Defence
- Space

kinexus Report

Salaries Rise Again

From 2020 to 2021 salaries have risen by an average of 1.3%, double the rate of the previous year. Employers must be cognisant of this when planning their attraction and retention strategies.

EVP Grows In Importance

Employers are becoming more sophisticated in their broader Employee Value Proposition (EVP) offerings, but must appeal to worker desire for interesting and flexible work as much as financial benefits.

Mismatch of Worker Supply and Demand

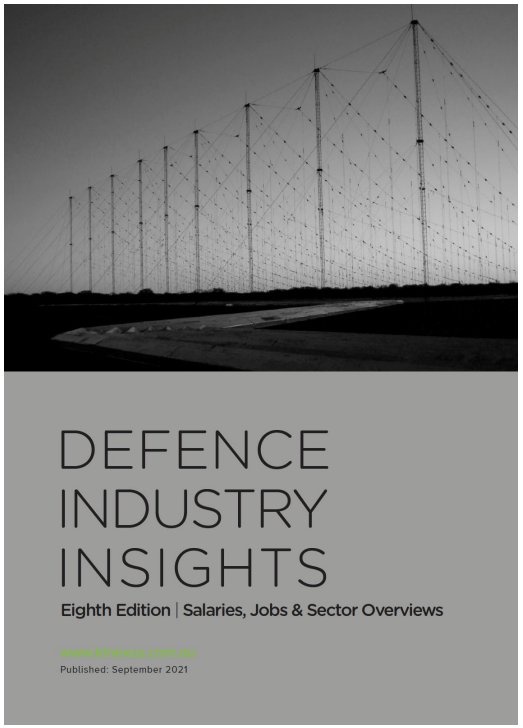
Workforce planners should consider the ramifications of worker shortages and plan for mitigating strategies, such as distributed workforces, alternate site locations and training or partnering initiatives.

Fewer Workers Actively Looking for Work

Over the past five years the workforce has steadily become less likely to proactively look for new employment, although many workers remain passively open to opportunities. This trend means that employers will have to work harder to find and retain suitable talent.

Aging Workforce

The workforce is aging, and employers must plan to facilitate the transfer of critical skills from older to younger workers. There are opportunities to retain access to retirement age workers when flexible engagement methods or task specific work is available.



New Report

Key points

- Declining morale - fatigue
- Casualised workforce
- Static pay and conditions
- Gender discrimination
- 1 in 5 plan to seek alternative employment

Professionals Australia | Professional Scientists Australia | Science & Technology Australia

Research

- Historically, astronomy favoured – organisation, geography
- Space Science now has its own FoR code
- Space weather a strength
  - Geography relevant
  - Defence application (OTH Radar)
  - SuperDARN
- Remote sensing
- Robotics
- New Space Science Decadal Plan ready for launch

Workforce – Space as a STEM vector

VSSEC

Learning by doing (applies equally to HASS)

Programs - years K – 12

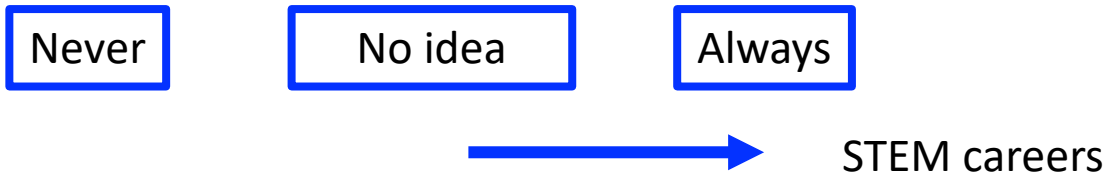
Teacher Professional Development

International Reputation

Science is messy! So is policy!

Apply the science of teaching to the teaching of science

Growing the STEM Cohort



Influencers

- Parents
- Peers
- Teachers

To Overcome

- Poor understanding of the work of scientists and engineers – stereotypes – white coats, lab rats etc.

Shibboleths

- Science and Maths is 'Hard' (Students accept challenges)
- There are no jobs

To Do

- De-mystify the business of science and engineering
- More, STEM educators
- More 'hands on' – challenge to *status quo*

Questions

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