



Research Leadership: why we need it, how we develop it

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Chair, Carina Biotech Pty Ltd

Research Leadership:
why we need it, how we develop it

- Can universities do better at accessing industry funding for research?
- Do universities focus sufficiently on big challenges?

Breakdown of R&D Expenditure in Key Industry Sectors in Australia

Business >> Government

- Total Govt HERDC: \$2.7B
- Total BERD: \$16.5B

Business & Higher Education have different R&D focus:

- Business R&D Expenditure: 70% in ICT & Engineering
- Public research funding:
 - Biological sciences dominate, and especially medical:
 - NHMRC: \$820M
 - ARC: \$760M

Sectors with most R&D tax incentive funds	Sectors with most Higher Educ R&D income
Mining	
Electricity, gas, waste & water	
	Agriculture and veterinary science
	Medical & health sciences
	Biological sciences
Manufacturing	
Construction	Engineering
Services	
	Environmental sciences



Opportunity for research leadership:

- Better match with Australian industry needs
- Access more of the BERD

Changes in National Higher Education Research Funding: 2012 - 2017

	National HERDC Revenue 2012	National HERDC Revenue 2017	Change in HERDC Revenue 2012-2017
Category 1 :ACG including NHMRC and ARC	\$1,603,629,742	\$1,586,343,385	- 1.1%
Category 2: Other Commonwealth, State and Local Territory	\$864,873,950	\$997,191,205	+15.3%
Category 3:Australian & International Industry and Philanthropic	\$827,483,736	\$1,226,686,394	+48.2%
Category 4: CRCs Commonwealth and Partner	\$116,820,739	\$132,083,613	+13.1%
TOTAL HERDC REVENUE	\$3,412,808,169	\$3,942,304,597	+11.6%



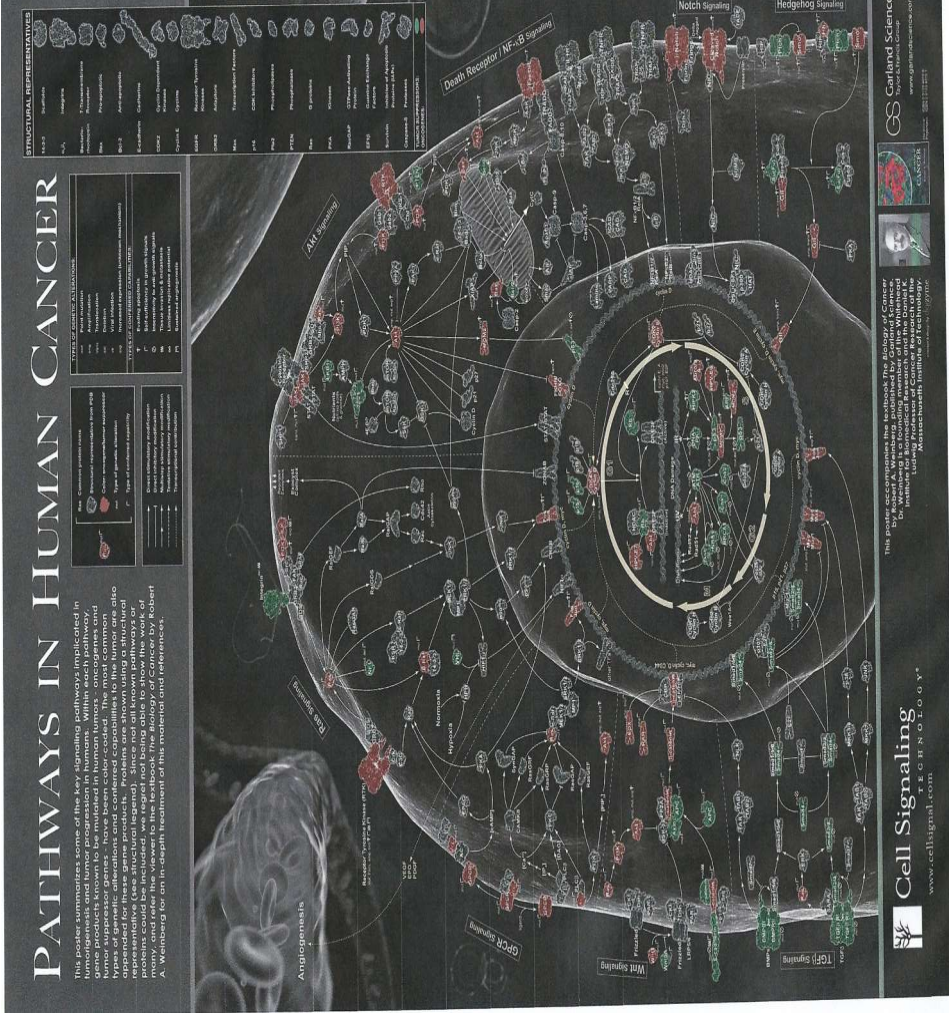
Reinforces the growing opportunities for universities to tap:

- Non-government R&D funding
- Government funding outside traditional project grants

Bottom-up research is important, but on balance we could increase the focus on identifying and solving big challenges



*Simplified assays
for cellular analysis*



Australian universities do bottom-up research well.....but the future is more about large-scale, problem-driven research

Need 4 things:

- Top down, not bottom up approach
- Bring together the best researchers/end-users to address the challenge (even if they do not currently work in the field)
- Funding with scale, longevity and flexibility (eg CRC)
- Leadership



Key challenge is leadership

carina
bio tech
cellular immunotherapies

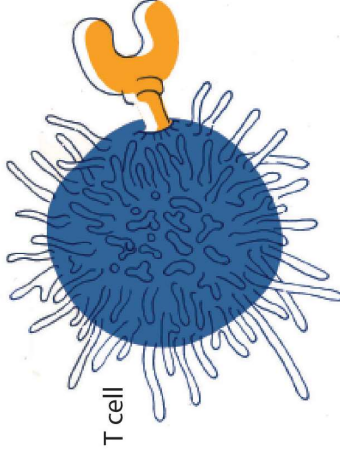
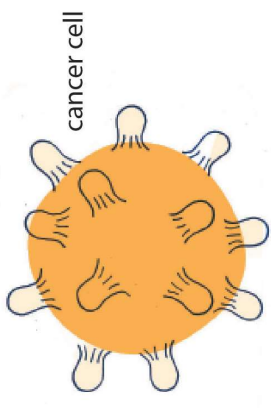
TekCyte
ADVANCED BIOMEDICAL COATINGS

**Cell Therapy
Manufacturing**
Cooperative Research Centre



CureWorks
A NEW WAY TO BETTER CURES

CHIMERIC ANTIGEN T-CELL (CAR-T) THERAPY



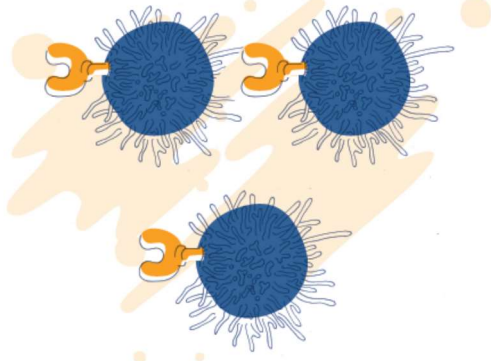
BLOOD TAKEN



T CELL
ISOLATION



GENETIC ENGINEERING OF T
CELLS SO THEY EXPRESS
CARS ON THEIR SURFACE



EXPANSION OF
CAR-T CELLS



EXPANDED CAR-T
CELLS INFUSED
BACK INTO PATIENT

History of CAR-T therapy

Emily Whitehead:
the first child treated with CAR-T
(Novartis Kymriah™)

2012



2017



93%

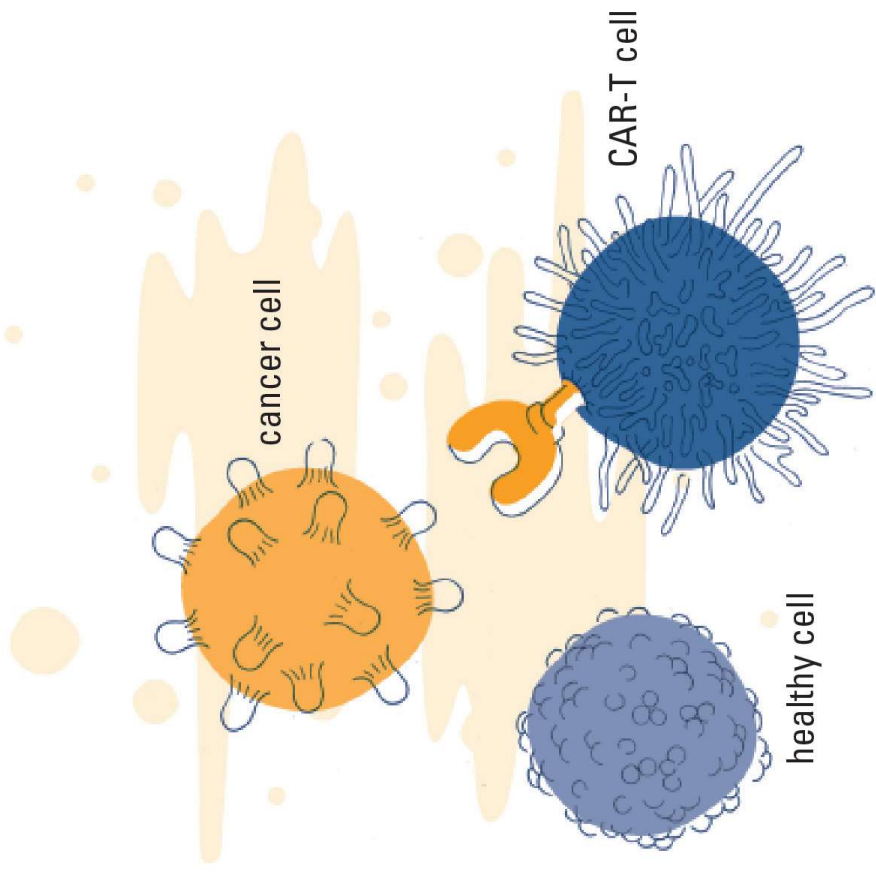
**OF PATIENTS ACHIEVED
COMPLETE REMISSION IN
CAR-T CLINICAL TRIALS TO
TREAT ACUTE LYMPHOBLASTIC
LEUKEMIA (ALL)**

THE HOLY GRAIL FOR CAR-T THERAPY ...

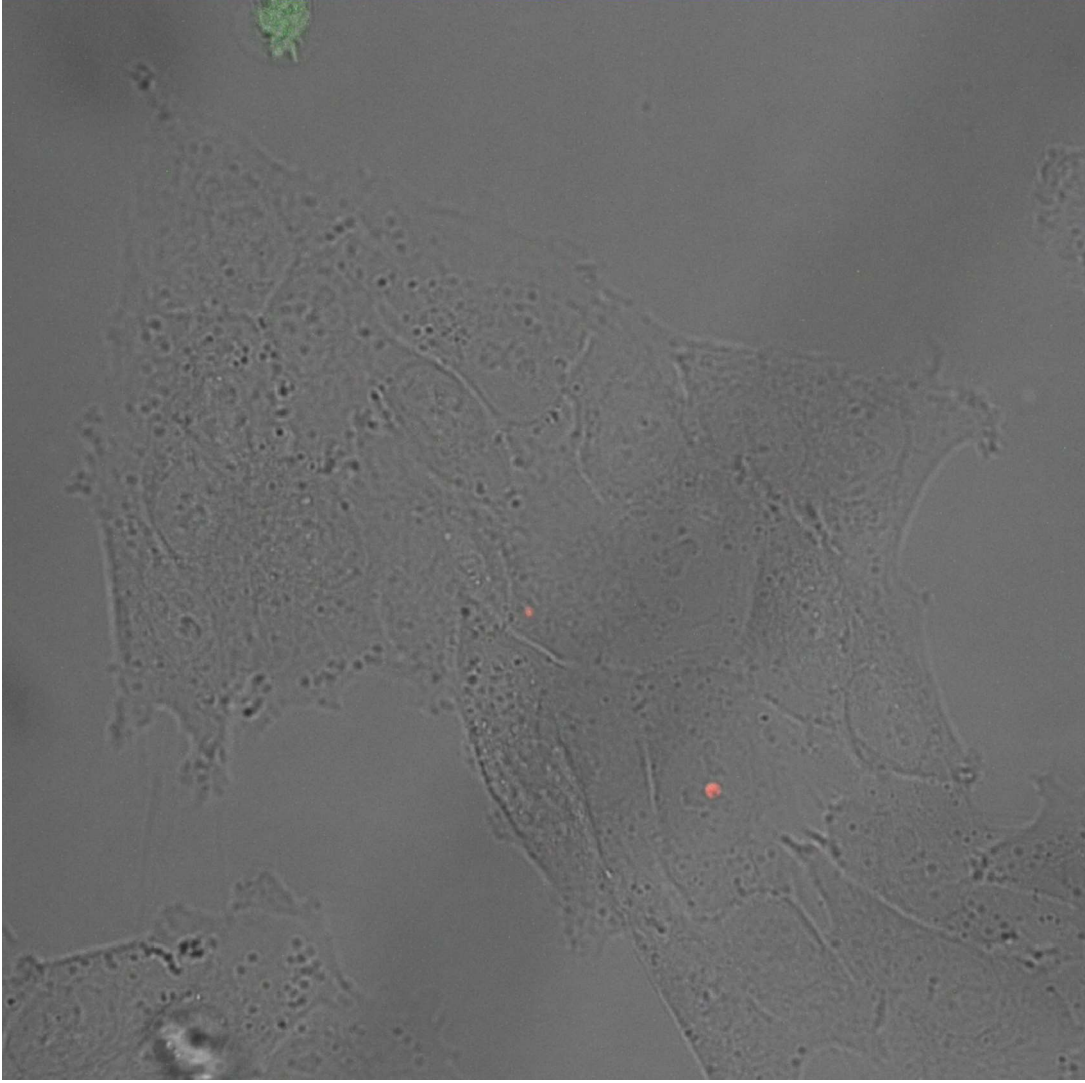
- Only affects cancer cells
- Works on solid tumours, not just blood cancers
- Effective against many cancers

NFP2X7

**A protein on the
surface of many
cancer cells but
NOT on normal
cells**

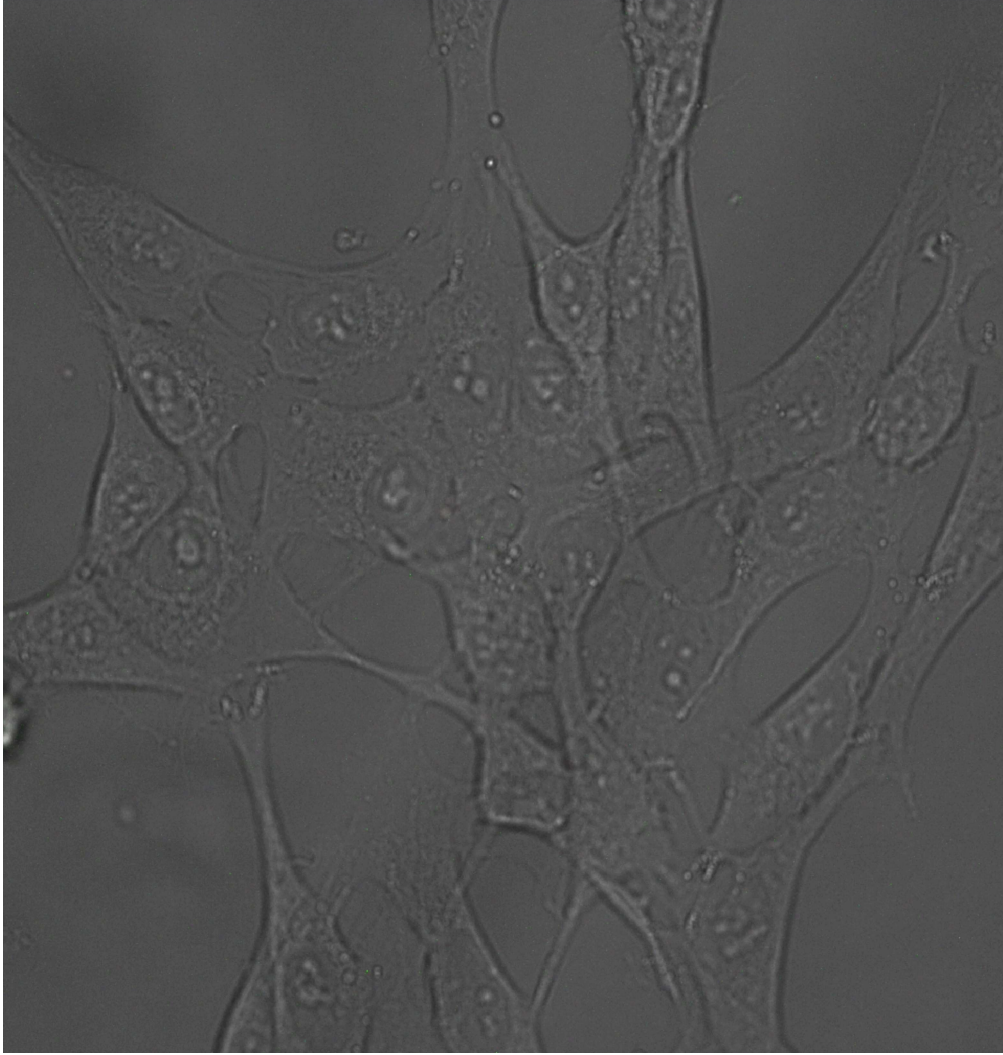


Cancer cells have the
capacity to hide from
T cells





T cells
engineered to
target the cancer-
specific protein,
NFP2X7



Since 2016

- Lead CAR-T cell shows anti-cancer activity 13 different cancer cell lines, and in several in vivo animal trials
- Second CAR-T target under evaluation
- Several other technologies improve targeting to cancers
- Three patent families
- Founded a biotech company – Carina Biotech Pty Ltd
- Carina has attracted \$6M equity investment and grant funding to progress commercialisation
- Establishing Cureworks Australia
- By 2025: the world's first broad-spectrum therapy for solid cancers could be nearing clinical approval

CTM CRC CAR-T Leadership



1. Dr Justin Coombs, GM & IP Counsel CTM CRC, recognised the CAR-T opportunity and nfP2X7's potential

2. CTM CRC submitted a patent application (with very limited data)

3. Justin identified Prof Mike Jensen, academic paediatrician & scientific founder of Juno Therapeutics Inc as an industry leader



4. Brought together a consortium of world-leading researchers



PROFESSOR SIMON BARRY
Women's & Children's Hospital



PROFESSOR SHAUN MCCOLL
University of Adelaide



PROFESSOR CLAUDINE BONDER
Centre for Cancer Biology

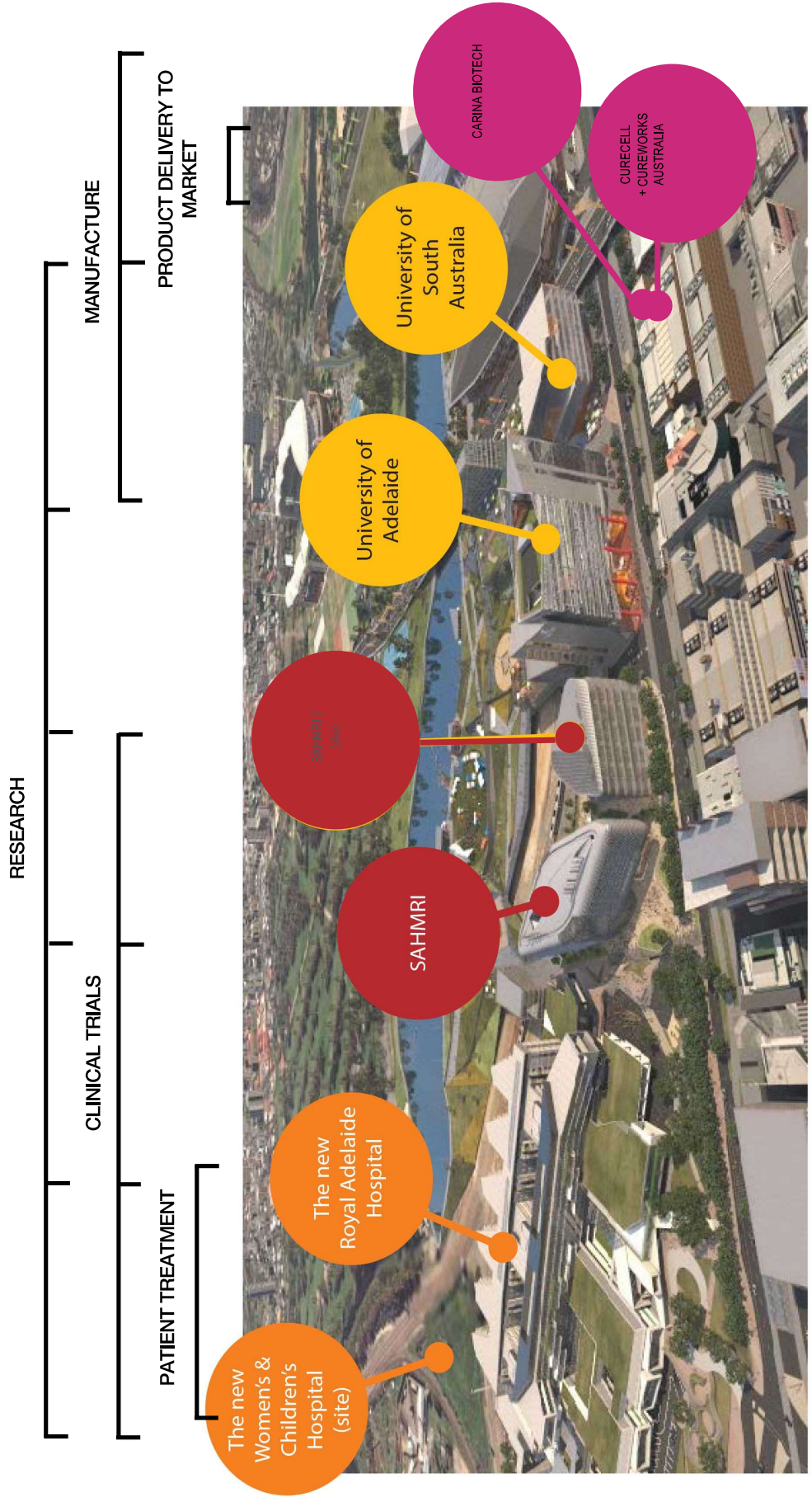


PROFESSOR ALLISON COWIN
University of South Australia



DR ANTON BLENCOWE
University of South Australia

Bio Med City CAR-T Consortium



CTM CRC/Carina CAR-T story:

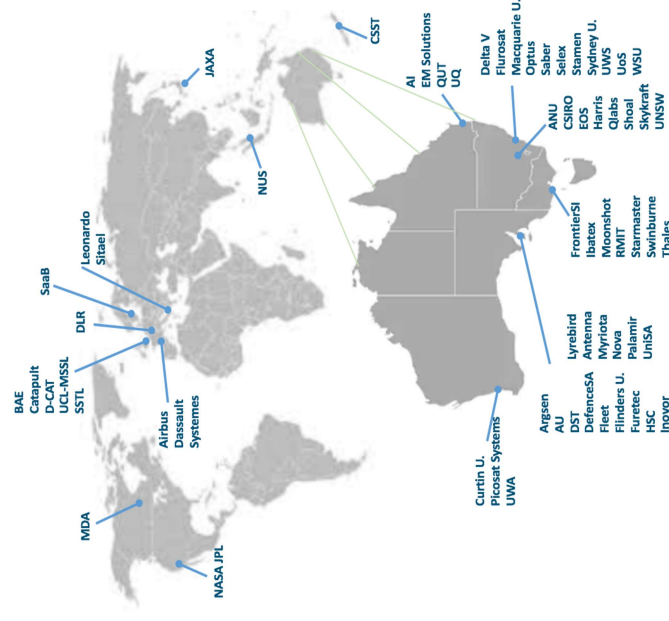
- Benefited from funding with scale, longevity & flexibility – CRC, and now industry (Carina) and industry grants
- Identified the big challenge and took a top down, not bottom up approach
- Brought together the best researchers & end-users to address the challenge (even if they did not currently work in the field)
- Leadership was the main success factor



Smart Sat CRC

The biggest space industry R&D collaboration in Australia's history

- Funded in 2019
- \$245 million partner and CRC funding
- Nearly 100 partners and international collaborators:
 - 13 universities
 - ~25 companies plus 23 start-ups
 - International partners
- Advanced telecommunications and smart satellite systems to build Australia's space infrastructure for advanced communications and connectivity, remote sensing and monitoring for its land, seas and oceans.



Smart Sat CRC

Why was it successful? – my views!



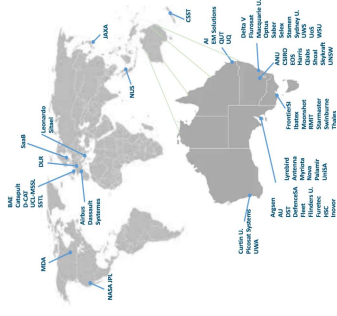
Right time: satellite and space technologies expanding rapidly



Australian Government saw the gap in Australia



Space research and industry community well-connected



Very effective leadership: positioned the CRC as the R&D implementation strategy of the Aust Space Agency



- Sub-optimal connectivity across Australia;
- Technology-limited observation, sensing and surveillance
- Fragmentation of our nascent Space industry; and
- Dependence on foreign governments for access to most essential space assets.

Recognised the key challenges for Australia to address

SA Agtech Advisory Group

- Advise the Minister for Agriculture on strategies to encourage greater adoption of AgTech solutions in our agricultural sector:
 - Leanna Read (Chair)
 - Jim Whalley, SA Chief Entrepreneur
 - Dougal McOmish, COO Sundrop Farms
 - Karen Ross, GM Digital and Innovation, Elders
 - Oli Madgett, founder, AgTech start-up Platform
 - Andrew Grant, founder of multiple AgTech start-ups
 - Tom Rayner, VP Sales at Myriota
 - Andrew Lowe, Director Agrifood and Wine, UniAdel
 - Penny Schulz, VP Livestock SA

Example of types of strategies under consideration



Partnerships between industry, academia and government

Extension and adoption
Bringing together industry and producers to improve adoption of new technologies.

Research and development
Research centres developing innovations that can drive industries

Education
Education and training organisations building capacity in the current and future workforce - from schools to universities

Commercialisation
Industry, startups and investors testing, developing, and commercialising new ideas

Some Points for Discussion....

- How can universities access more of the R&D funding undertaken by industry?
- Strategies to address the changing research funding focus towards large collaborative programs addressing major challenges
- Nurturing of researchers with demonstrated leadership capability
- Training of science research staff and students in IP management