Invitation to Participate

JOIN US IN THE

SMARTSATCRC

UNLIMITED RESILIENT DIGITAL CONNECTIVITY

Invitation to Participate

The Global Space Economy is worth more than $400 billion and set to grow dramatically. The SmartSat Cooperative Research Centre is an opportunity for Australian Space Industries to join this fast moving sector.

The Vision

Our Vision is to be a leading contributor to Australia's Space Economy through Satellite Technologies and Analytics.

The SmartSat CRC is a collaborative research effort that will provide enhanced connectivity, navigation and monitoring capability of our country and its resources by solving major satellite system and advanced communications challenges.

It will catapult Australia as a leader in niche areas of intelligent satellite systems, advanced communications and earth observation driven data analytics.

The impact of this research will be to develop intellectual property and specialist industry ready expertise that will spawn new businesses, create export economic value and generate new high-tech jobs for all Australians.

It will strengthen our economy through the application of advanced space technologies and space related data.

The Challenge

Disruptive space technologies are revolutionising the way we move, connect and communicate.

As a result, our daily lives are becoming reliant on satellites and our economy is increasingly dependent on space capabilities. Across Australia traditional telecommunications are still difficult and expensive, and consumer broadband services are limited, making it difficult for all Australians, especially in remote areas, to access global markets and services. There are three dominant areas of space activity that are increasingly important to Australia's national interests.

These include:

- **Communications and connectivity** enabling access to high speed telecommunications;
- **Earth Observations from space** enabling us to understand and predict weather and extreme climatic events and helps us monitor our rivers and oceans, urban developments and national assets such as the Great Barrier Reef; and
- **Positioning, navigation and timing** which are increasingly utilised in our transportation systems in logistics, search and rescue, security, precision farming and mining.

Australia is currently reliant on other countries for these space systems and space related data, making us vulnerable and at risk of being left behind in the fast- moving sector.

SMARTSAT CRC





GOVERNMENT
Supporting R&D and Innovation

RESEARCH PROVIDERS
Providing novel solutions

INDUSTRY
Defining Needs, Creating Value





APPLICATIONS

The global space industry is growing at a rate of 9.5% compared to the global economy of 2.5%. It is expected to reach more than $1 trillion the next few years.

The Opportunity

Advances in space technologies and the proliferation of small commercial satellites have resulted in a dramatic lowering of the barriers to entry to the global space industry.

This has enabled the smallest of companies to enter this fast–growing sector. The emergence of cyber-physical systems and the Internet of Things (IoT) embedding billions of sensors in just about everything will generate Big Data and an insatiable thirst for analytic insights.

Presently the Australia space sector employs in the order of 9,500–11,500 people and produces an annual revenues of $3–4 billion. This represents 0.8% of the global space economy, yet Australia has a 1.8% share of the world's total economy. This suggests the Australia space sector is underperforming. In addition only 8% of Australia's space revenue is generated from exports.[1]

Capitalising on the application of upstream technology innovations on downstream satellite-based services will stimulate the growth in current and future Australian space industries which will define new markets for space enabled services. The application of these would impact a number of priority sectors for Australia, including agriculture, mining, defence, and transport, amongst others.

A CRC is a proven mechanism for building Australian capability and growing our economy through research-inspired innovation and knowledge creation. This CRC will adopt an industry-led, milestone driven approach to transition new technology solutions into commercial reality. It will take a pragmatic approach to IP ensuring maximum impact for industry is achieved. IP arrangements will be project based and will vary according to the level of industry commitment with higher participation resulting in increased IP rights.

1. A Selective Review of the Australian Space Capabilities ibid p. 26, 41

The Research

Our strategic orientation in this CRC is to ensure we play to Australia's current strengths as well as to areas of space research that offer the highest potential for capability building and value creation.

After extensive consultation with industry, this CRC is currently considering the following research themes on which to focus its industry-led research:

1. Advanced Communications;
2. Intelligent Satellite Systems;
3. Earth Observation Data Analytics; and
4. Space Regulatory & Policy Environment.

We invite our industry participants to work with us to refine and test these research themes to ensure that this CRC is solutions-focused and remains flexible and responsive to the industry needs & challenges.

Scope of Impact

The Research continued

A brief description of each research theme is given below.

1. Advanced Communications

In a world with an insatiable thirst for Digital connectivity and the explosion of machine-to-machine communications, the need for reliable, high speed secure communications is critical to the economic competitiveness of Australia. This theme may produce new technologies, signal processing algorithms and communications architectures to ensure that Australia meets its needs for universal digital connectivity and help create new commercial opportunities.

Topics of this theme may include:

- Advanced Communication;
- Architectures;
- Optical communications;
- Hybrid RF/Optical communication systems;
- Ad-hoc Satellite-enabled communication systems;
- Satellite augmentation of 5G networks;
- Satellite relay networks;
- Advanced Communications Security; and
- Advanced signal processing.

2. Intelligent Satellite Systems

The ever-increasing number of satellites being launched into space will pose significant challenges in tracking satellites, avoiding collisions in an increasingly crowded space and integrating different technologies and systems. As satellite technology becomes physically smaller and are deployed in constellations, increased opportunities exist for significant processing and Artificial Intelligence (AI) techniques to be put on-board satellites so that some advanced analytics are carried out on-board satellites to enhance the efficiency and effectiveness of data gathering and analysis.

Topics of this theme may include:

- Intelligent satellite constellations;
- Resilience under uncertain and unexpected events;
- Congestion & traffic management;
- Positioning and timing;
- Satellite system integration;
- On-board processing algorithms;
- Advanced Field Programmable Gate Arrays (FPGA); and
- Satellite self-awareness.

3. Earth Observation Data Analytics

Advanced communications and more intelligent satellites will give us the ability to generate higher resolution, higher frequency data. This will enable us to generate image data from sensors and high resolution real-time video so that we can monitor

our land, oceans and our environment in real time. AI, deep learning and other advanced analytics techniques will enable us to build analytical models and AI systems that can analyse satellite generated data and provide insights or trigger actions in real time.

Topics of this theme may include:

- Satellite and High Altitude Platforms and UAV multi-sensor data fusion techniques;
- Deep Learning techniques for automated image and satellite video analysis;
- AI techniques for on-board analytics;
- Data analytics for real time surveillance systems; and
- Advanced techniques for hyperspectral data analytics.

The Research continued

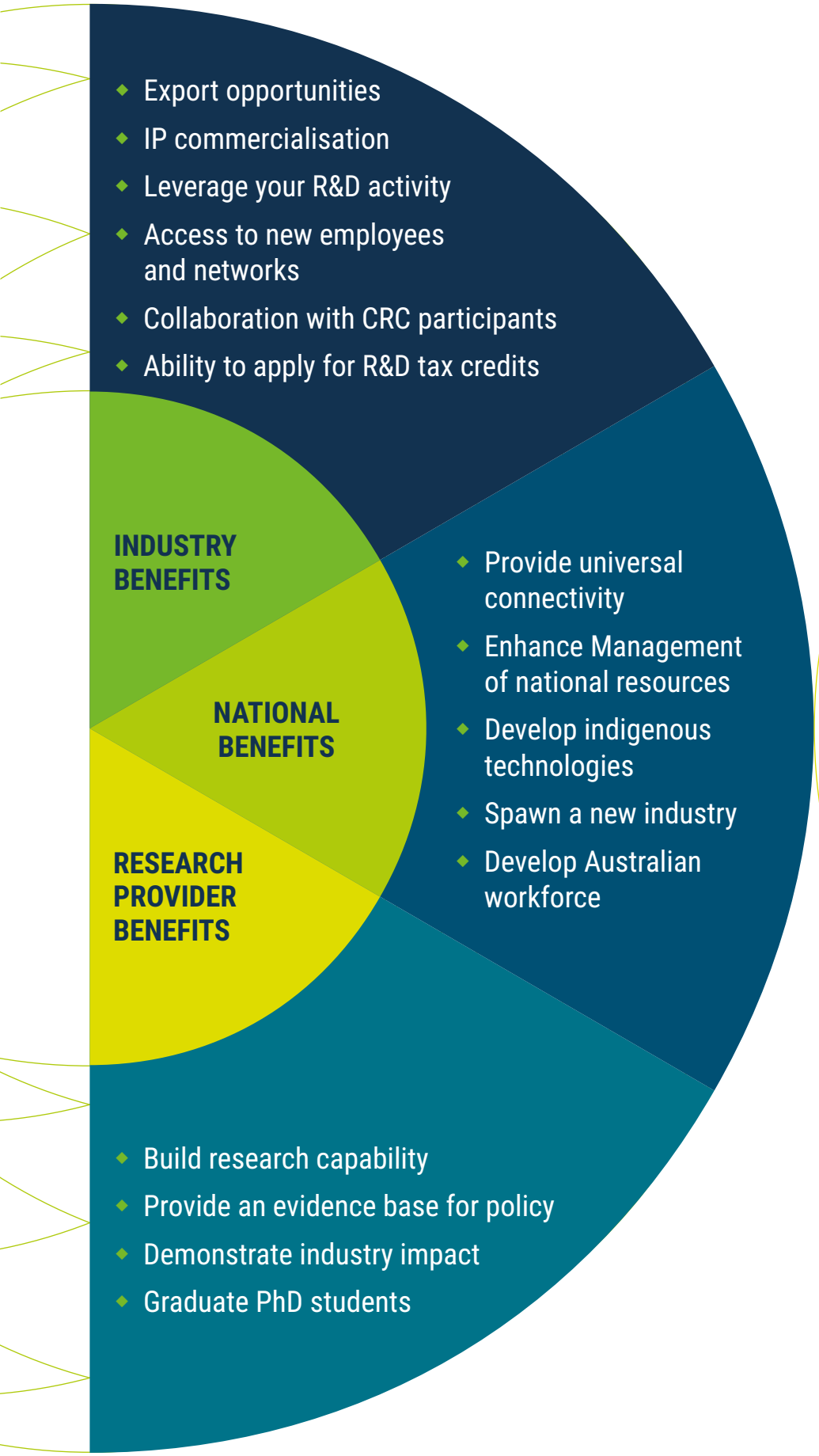
4. Space Regulatory & Policy Environment

This theme will also investigate the satellite and communication standards as well as the legal and regulatory environment; The research program would be an excellent mechanism for industry, government and researchers to work together in developing legal, regulatory & policy frameworks. Such frameworks would provide science-informed policy support to regulators and space agencies.

Topics of this theme may include:

- Space Law;
- Space Asset Management;
- Space Security;
- Spectrum Management; and
- Mitigation & Remediation of Space Debris.

Benefits of Participation



CRC Governance Model

The CRC will be a company limited by guaranteed with an independent skills-based Board. The Company will be registered as a non-for-profit and will be exempt from income tax.

Partner Investment

While there is no standard contribution for any individual partner, we would anticipate that contributions would be in the range of $100,000 to $1 Million per annum. The final amount will depend on the individual partner and the amount of benefit they expect to derive from the CRC. It is expected that participants will be able to leverage their investments in R&D through matched funding (approximately 1:1 matched funding) for company specific projects.

Start-Ups and SME Engagement

Start- Ups and SMEs are a critical component of the Australian Space industry and play a central role in the uptake of research and innovation. The SmartSat CRC is attracting a number of leading-edge SME's to join its program of planned activities and will implement a proven engagement mechanism that provides a platform for SME's to work with the CRC at a variety of levels.

The CRC will create this Innovation Cluster, which will:

- Provide an opportunity for SME's to participate in, and nominate, research projects, and
- Promote networking, training and knowledge transfer opportunities amongst SME's.

It is expected that the Cluster will operate as a partner in the CRC and will engage SMEs via an MOU, or similar agreement, to enable them to participate in the CRC. Cluster members will provide inputs to the CRC, via cash and in-kind contributions provided to the Cluster. In addition, members will also provide feedback towards the priority research direction of the CRC.

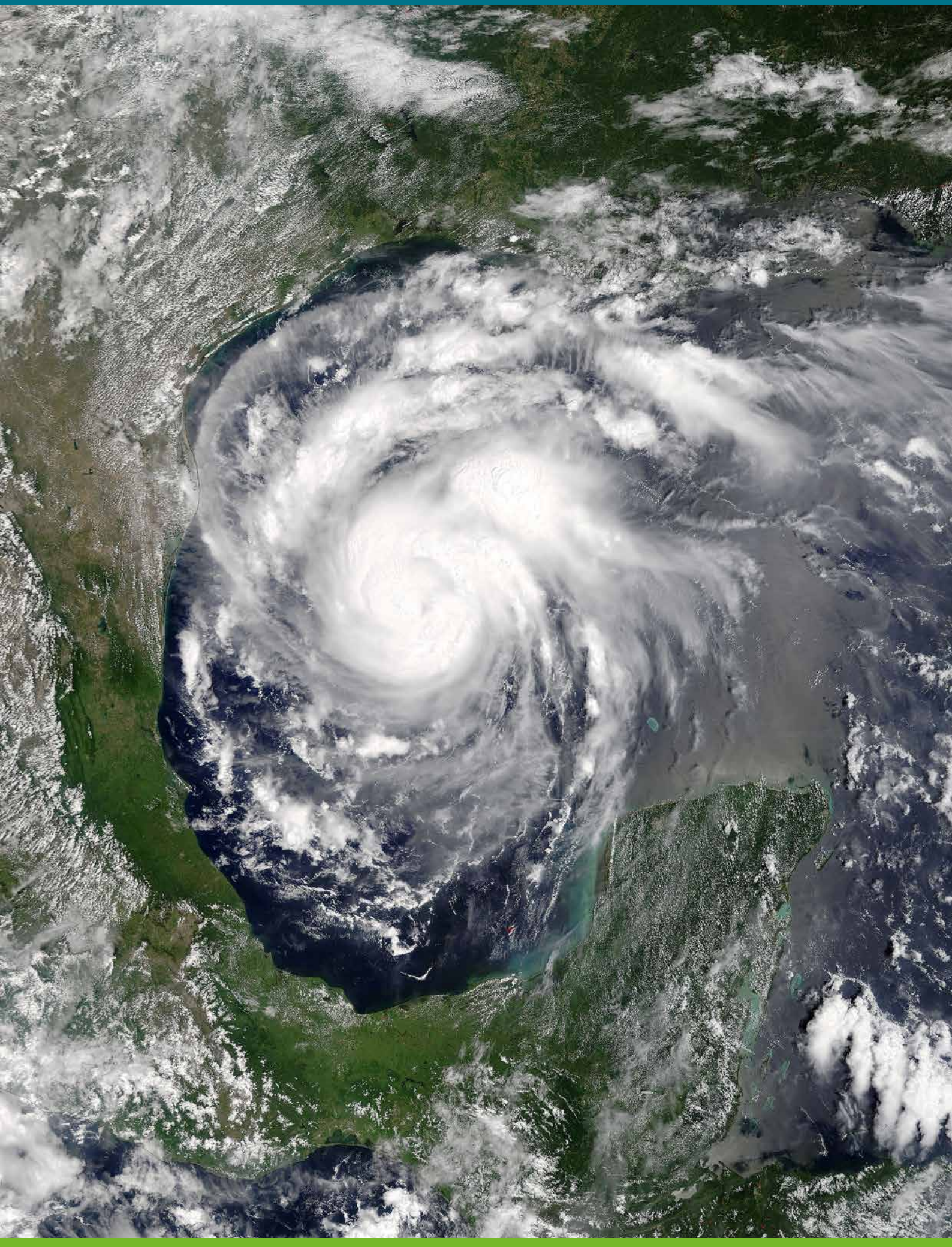
Education and Training

A dynamic, innovative education and training program is a key factor in attracting and retaining the best students to the CRC, strengthening the future Australian space industry workforce. This program will complement the research agenda and build engagement and capacity within Industry participants and other end-users.

The higher degree program aims to deliver up to 70 industry-ready PhD and Masters by Research graduates over the ten year period of the CRC. Other components of the Education Program may include:

- Industry Placement and Mentoring programs;
- Career Management Training;
- Masters, VET and undergraduate programs; and
- a Schools STEM program linking to the national science curriculum.

In addition to education and training activities, the CRC will have a broader communication strategy to maximise the utilisation of the research outputs and improve community understanding of the importance of the space industry and its influence on our everyday lives.



CRC Process Timeline

MAR 2018	APR / MAY 2018	JUN 2018	JUL 2018	AUG / SEP 2018	NOV 2018	JAN / FEB 2019	JUL 2019
CRC Research Program	Partner Commit-ments	CRC Stage 1 Application Development	Stage 1 Submission	CRC Stage 2 Application Submission	Interviews	Funding Decision	CRC Starts

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