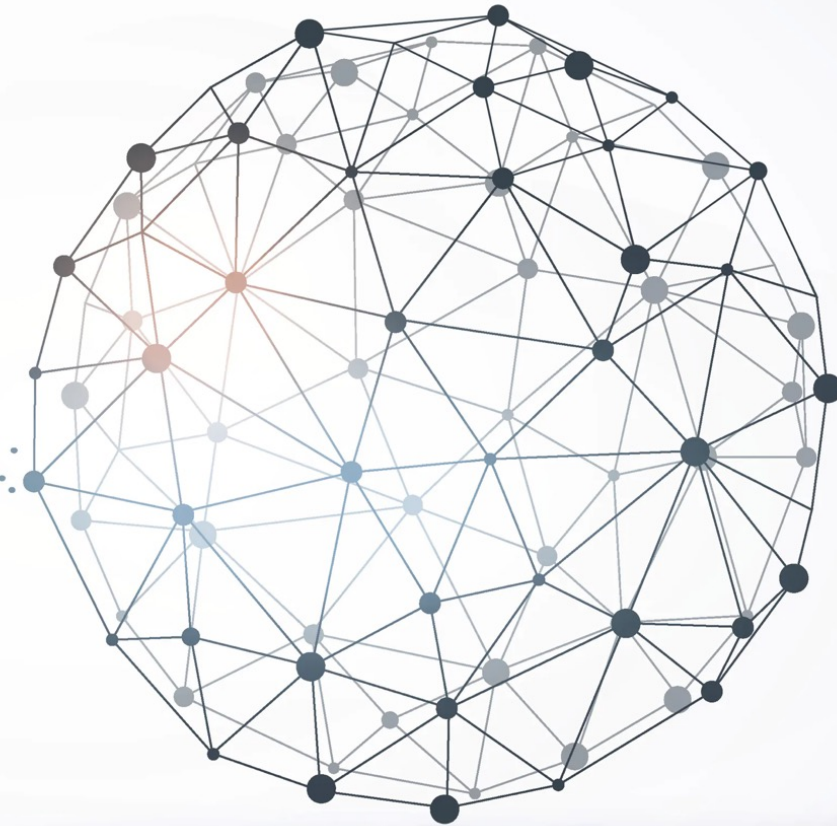


# Additive Manufacturing

Cooperative Research Centre

Fostering collaborative investment in additive manufacturing and innovation that will help transform the Australian Manufacturing sector.



Australian Government  
Department of Industry,  
Science and Resources

**AusIndustry**  
Cooperative Research  
Centres Program

ADDITIVE  
MANUFACTURING  
AUSTRALIA MAKES



# Australia Makes – AMCRC Partner Overview Webinar

- Welcome
- Acknowledgement
- Introductions – Bid lead team
- Purpose of webinar
- Webinar is being recorded  
Recording plus slide deck will be available on the [amcrc.com.au](http://amcrc.com.au) website
- Q&A session at the end
- *Please mute your microphones in the meantime*



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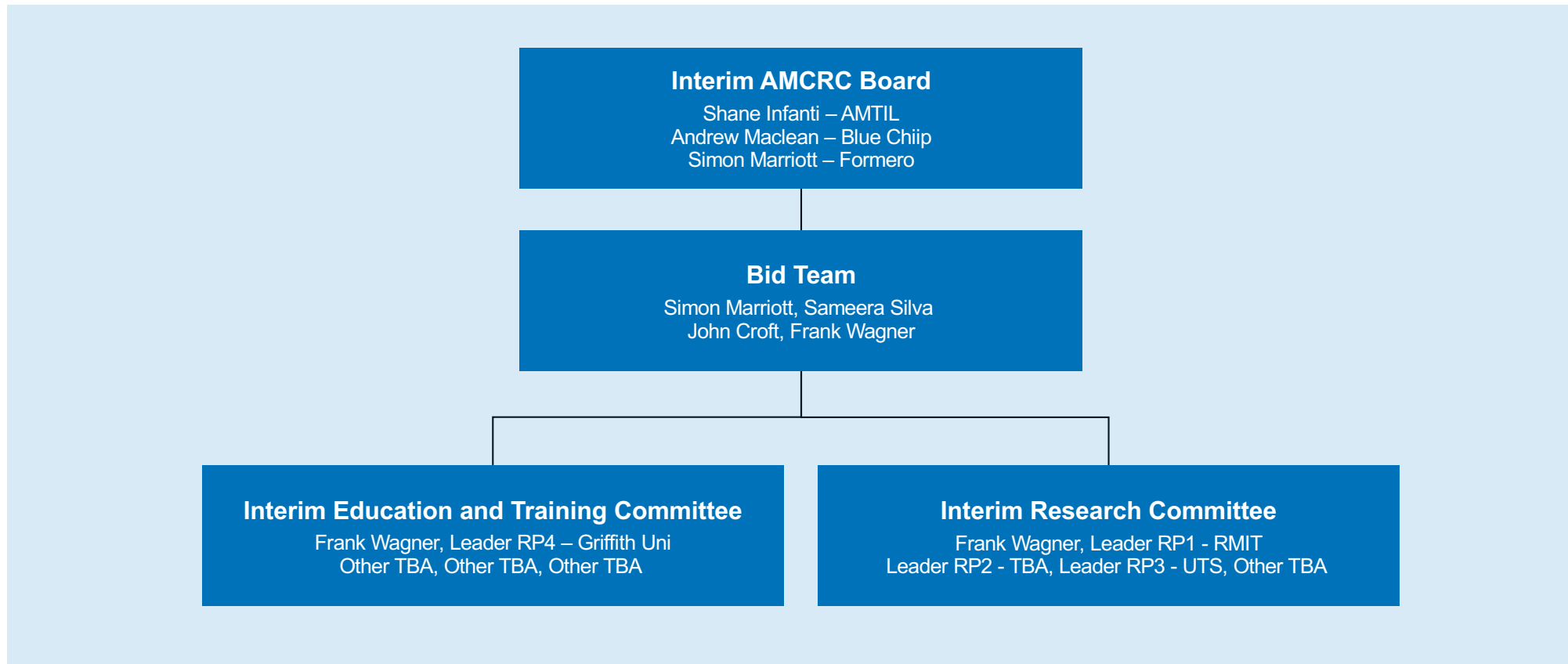


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# AMCRC Australian Research Partners



# AMCRC Bid Governance Structure



# Committee Brief

## Interim Education and Training Committee

- Support the design of Research Program 4: Education, training and transformation
- Develop a concept for an Industry-based PhD program and a Certificate III Additive Manufacturing Apprenticeship.
- Assists to create an Industry Transformation program enabling Industry 5.0 capabilities
- Develop a Social responsibility program to support community-based projects and Indigenous enterprises.

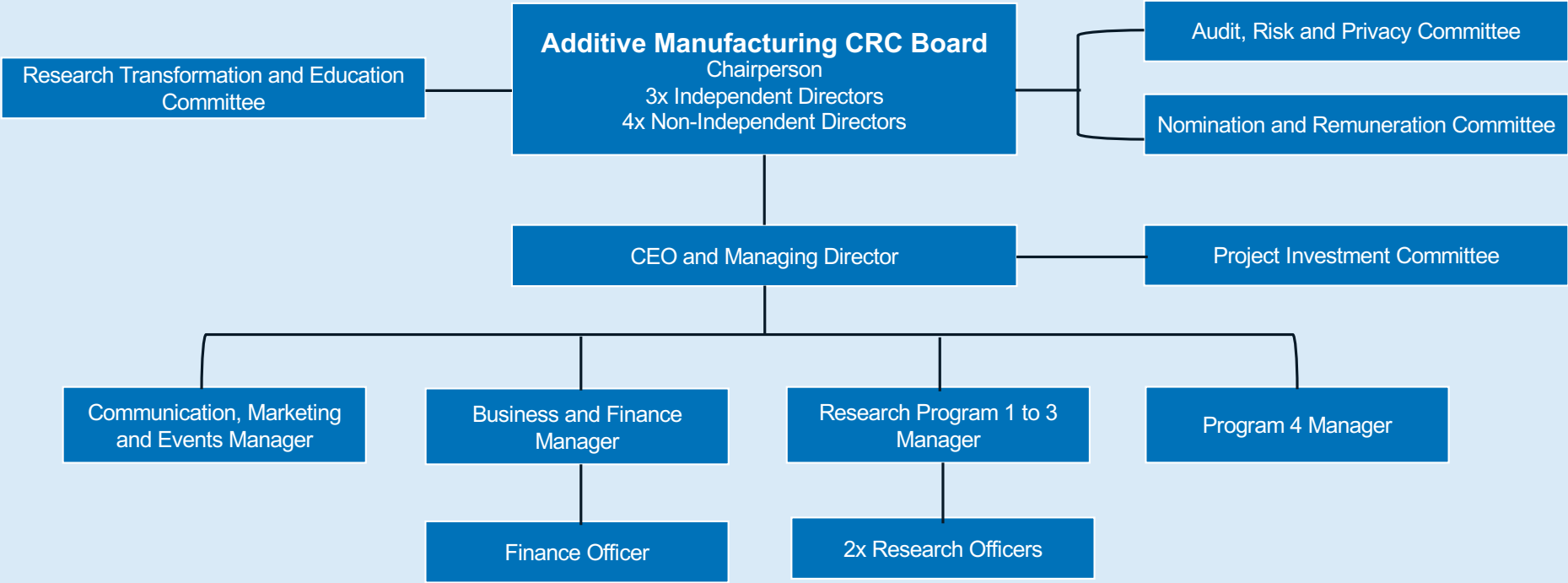
## Interim Research Committee

- Ensure the research programs correctly align to industry needs and problems and the Governments priority areas as outlined in the National Reconstruction Fund and Industry Growth Program.
- Provides expertise and help to design the content and impact of the research programs in the stage 1 and 2 applications.
- Oversight and support for the short and long descriptions of the proposed projects in the bid document
- Consist of the Research Program 1-3 leaders plus few (1-3) research and industry partners

Both committees will help to guide the application process through stage 1 and stage 2

Once the AMCRC will be established, both committees will be transformed into the **Research Transformation and Education Committee** (RTEC) – that will provide science and technology direction to the CRC (including into each Research Program), the CRC Program and more widely to both the industry and research communities.

# Proposed Governance Structure for Additive Manufacturing CRC Limited



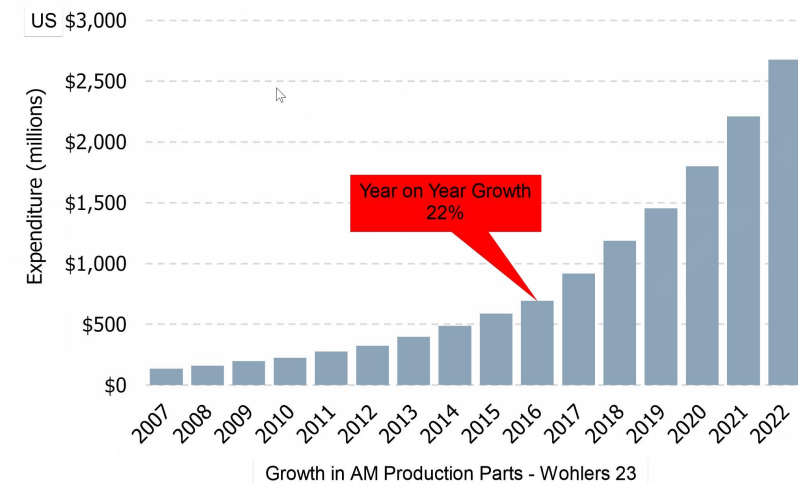
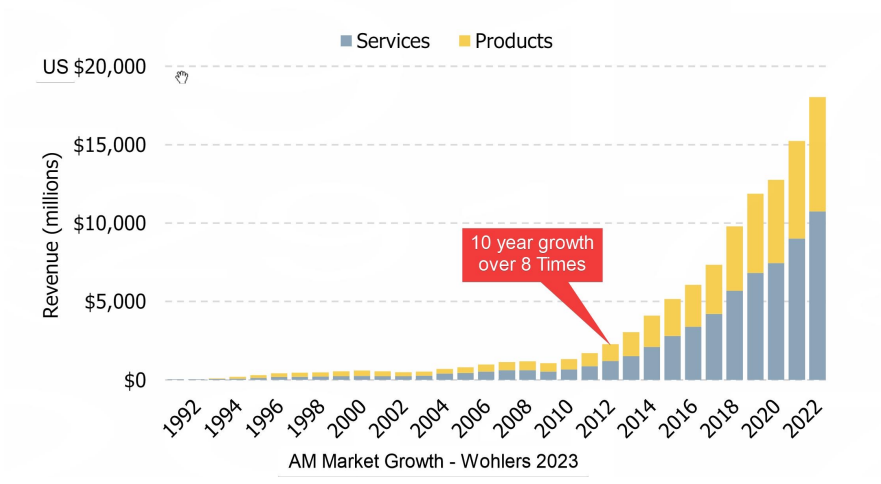
Establishing a clear ESG – Environmental, Social and Governance - framework.

# Why the new CRC for Additive Manufacturing CRC

- A healthy and growing manufacturing sector is vital for Australia's economic prosperity
- Urgent need to build scale, agility, resilience and select self-sufficiency, with a focus on research, technology, design and manufacture
- Need to create higher value, complex products, processes and services for global markets
- Support the National Reconstruction Fund (NRF) with its priority areas
  - renewables and low emissions technologies
  - medical science
  - Transport
  - value-add in the agriculture, forestry and fisheries sectors
  - value-add in resources
  - defence capability
  - enabling capabilities.
- The NRF has identified funding for areas such as
  - **medical manufacturing**
  - **advanced manufacturing**
  - **critical technologies with Additive Manufacturing, including 3D printing**
- As part of the 2023-24 May Budget, the Australian Government announced a new \$392.4 million **Industry Growth Program** for small and medium enterprises (SMEs) and startups.

# Additive Manufacturing building critical mass.

- Globally the industry grew to US\$18B – Year on year growth of 18%
- In 2022 over 29,000 Industrial Systems were sold – 10% were Metal platforms.
- Service Bureau’s produced US\$2.7B worth of AM Production Parts.

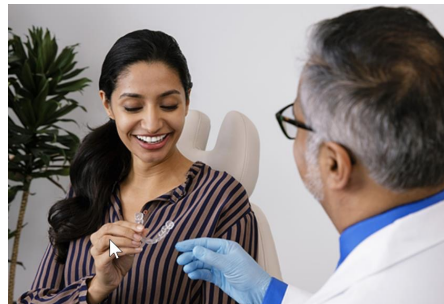




## Medical Manufacturing - Personalisation Milestones.



- Last Month announced that 1 Million aligner moulds were being printed every day.
- Over 15 million clients in the last 10 years.
- Currently 1.6 million active clients.
- Recently announced the purchase of Cubicure to print the aligners.



- In May Stryker announced that they has printed 1 million Knee Implants and over 2 million AM implants.
- Focused on glue less & porous implants.
- Expanding AM facilities globally (including Australia) for localised manufacture.



# Transport - Low Emission Technology

Sakuu Start-up Li-Battery Manufacturer.

- New Lithium Metal Cell with High energy density, High discharge capacity and increased safety.
- Pilot Plant is currently 3D printing batteries on Sakuu's Kavian Platform.
- Multi Material Binder Jetting Process.



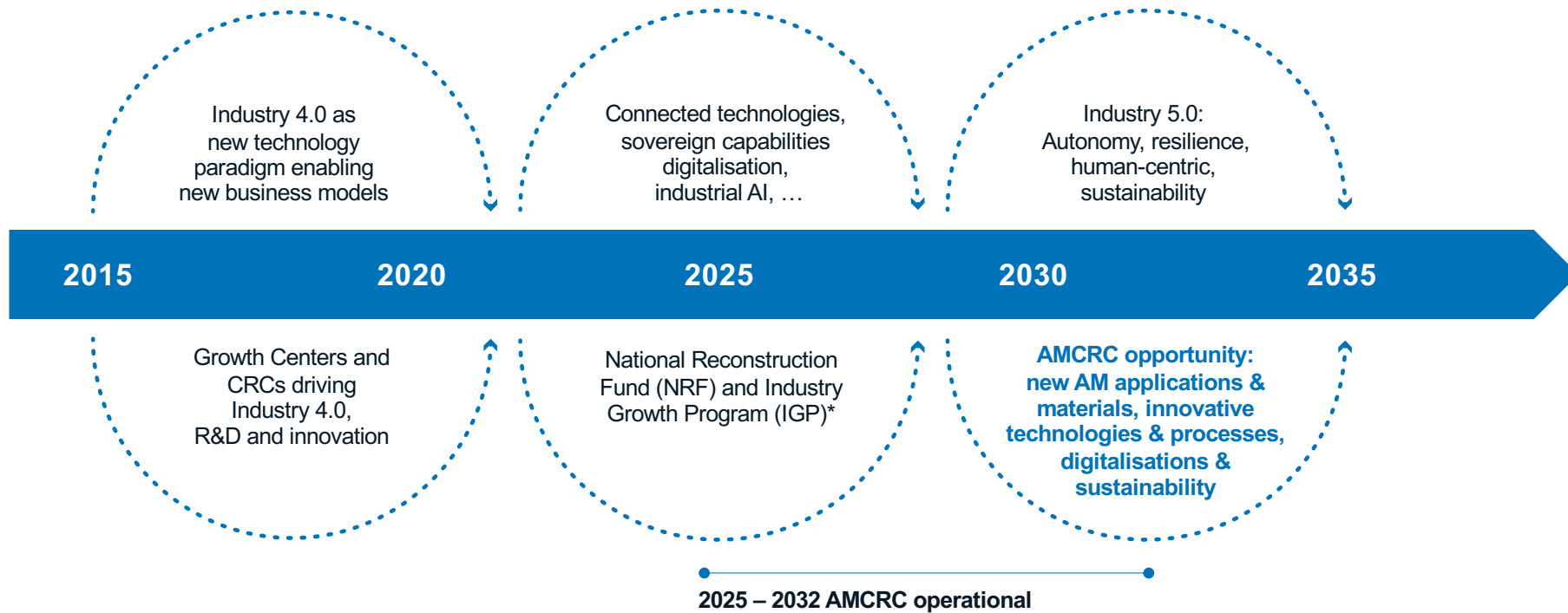
# Defence Capability – New AM Technology Platform.

## SPEE3D

- Research Collaboration with CDU, UTS and SUT
- Sustainment Platform for front-line R&M
- Multiple Platforms now deployed globally to support defence supply lines

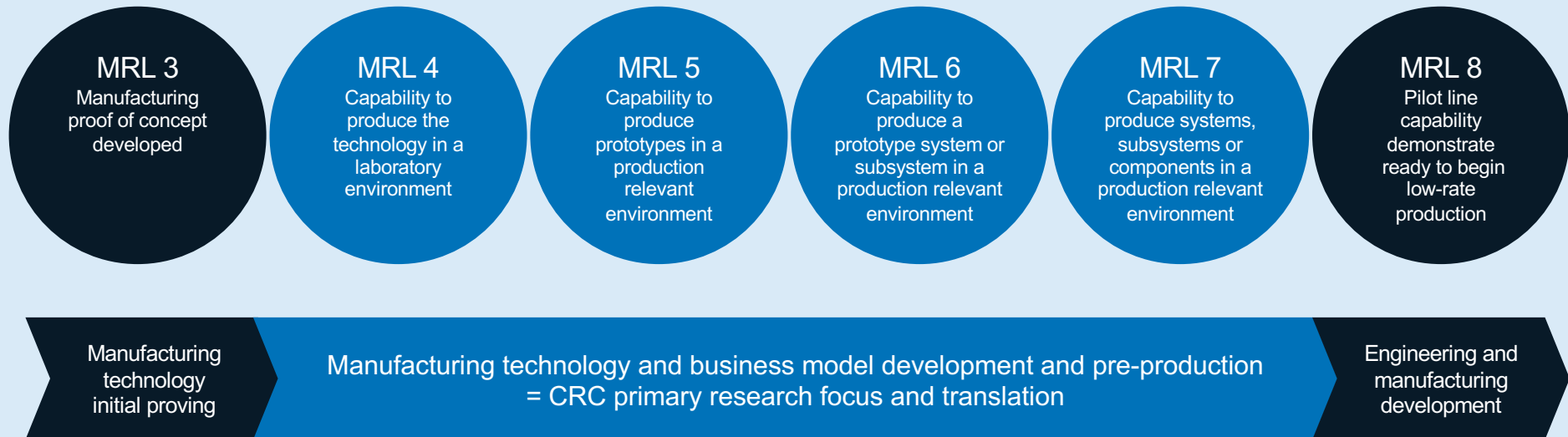


# Advanced Manufacturing Technology Outlook



\* NRF and IGP targets – “diversifying and transforming Australia’s industry and economy” as well as “support innovative small and medium enterprises to commercialise ideas and expand their businesses”

# Research Focus – Manufacturing Readiness Levels



# Research Programs



**Research Program 1**  
Application and materials development



**Research Program 2**  
Technology and process development, production qualification and validation



**Research Program 3**  
Digital Eco System – Data management, AI and Digital Twins



**Research Program 4**  
Education, training and transformation



## Research Program 1

# Application and materials development

The program aims to develop new and unique applications for AM technologies across key priority industries for Australia creating new Circular Economy business models.

- Researchers work on identifying and understanding the specific requirements of different applications to optimize the use of additive manufacturing.
- The program focuses on exploring novel ways to leverage additive manufacturing for complex geometries, personalisation, and advancing new materials.
- Application development includes areas such as aerospace, automotive, healthcare, consumer goods, construction and more.

The program emphasizes the development of sustainable new and reusable materials suitable for AM processes.

- Researchers aim to create the next generation the range of materials available for additive manufacturing, including metals, polymers, ceramics, composites, and biomaterials.
- Material development for advanced metals and polymers involves exploring nanomaterials and nanocomposites. Nanotechnology offers unique opportunities to tailor material properties at the nanoscale level by manipulating the size, shape, and composition of nanoparticles. Nanocomposites exhibit superior mechanical strength, electrical conductivity, and thermal stability compared to their bulk counterparts.
- The program also focuses on improving material compatibility with specific additive manufacturing technologies like; laser powder bed fusion (LPBF) selective laser sintering (SLS), fused deposition modeling (FDM), and stereolithography (SLA) etc.

## Research Program 2

# Technology and process development, production qualification and validation

This program will focus on the development of new additive manufacturing technologies and novel processes to grow our advanced manufacturing sector, including;

- New development and modification of existing additive manufacturing technologies and processes to use new and /or recycled materials.
- Creating the next generation of process parameters to enhance part quality and performance.
- Development of multi-material and hybrid additive manufacturing techniques.
- Development of software tools for design optimization and process simulation to support zero waste and zero emission opportunities.
- Development of new standards and guidelines for qualifying additive manufacturing processes.
- Validation of additive manufacturing processes to ensure part quality and consistency.
- Development of Certification protocols for additive manufacturing systems, materials, and processes.
- Development of test methods for evaluating mechanical, thermal, and chemical properties of additively manufactured parts.
- Characterization of microstructure and defects in additively manufactured parts.
- Assessment of the impact of process variations on part quality.
- Verification of part performance through mechanical testing and analysis.
- Development of efficient and environmental-friendly post-processing techniques (hard surfacing/cladding/ heat-treatment etc.) for improving surface finish, dimensional stability and part performance.

### Research Program 3

## Digital Eco System – Data management, AI and Digital Twins

A Digital Ecosystem will be crucial for the productive use of AM in an industrial environment. Digital AM solutions enable the Australian industry to exploit the full potential of AM.

- Data management, control and protection  
Digital solutions for the full AM data life cycle are critical. From embedded sensor providing real-time data to the management and sharing of product and process data via secure and reliable infrastructure and including Big Data analysis for quality management multiple new solutions are needed to fulfill Cybersecurity standards, improve efficiency and participate in international supply chains.
- Scanning and 3D-image recognition and interpretation  
Real-time digital modelling devices, new image and voxel recognition and interpretation are needed to integrate the physical with the digital world and increase the productivity of industrial AM. The combination of digital prototyping and physical testing cycles will be significantly accelerated.
- Process automation, Human Assistance and Industry 4.0 integration  
Partial or full process automation and digital support for human operators are necessary to harness the full productivity potential of modern AM. The integration in smart Industry 4.0-based production systems and supply chains will give the manufacturing and related sectors a competitive advantage.
- Machine Learning and AI  
Based on validated data innovative Machine Learning and AI models and algorithm will support operators of AM systems with real time advice, product, process and quality control. This includes performance improvements based on product design, multi-material selection, process selection and post-processing.
- Digital Twins for processes, product and materials  
Digital Twin solutions consisting of full 4D models enriched with additional features and multi-physics simulation will enable the AM based production and life-cycle maintenance of complex, individualized and specialized components, products and systems. Innovative Digital Twins combined with AM will enable new value-creation such as local and personalised Manufacturing on Demand.
- Design optimisation and sustainability accounting  
Leveraging product and process data will optimize the product design and increase sustainability by reducing resources and life-cycle cost and impact. A full sustainability accounting is essential to participate in modern international supply chains such as medical devices, defence, food or transport.

### Research Program 4

## Education, training and transformation

This program aims to provide training and support for Australia manufacturers in adopting additive manufacturing technologies. It focuses on enhancing knowledge, skills, and capabilities related to additive manufacturing to drive transformational change in the way new products are developed. Ultimately helping our industries be more sustainable and lifting our global competitiveness.

The program facilitates technology transfer by providing guidance on intellectual property rights, licensing agreements, and commercialization strategies. It helps participants navigate the complexities associated with bringing additive manufacturing innovations from the research stage to commercialisation.

The program also recognizes the importance of developing a skilled workforce capable of leveraging additive manufacturing technologies. It offers training and certification programs to enhance the employability of individuals in the additive manufacturing industry with certificate III apprenticeship.

A key part of this program is the integration of PhD's into the collaborative research projects. These are partly funded by the CRC and Universities and enable career pathways for researches into industry.



## Industry Engagement Program

- ✓ Smart Sheet Data base established to manage potential opportunities. Also used to on-board the project into the bid.
- ✓ Advertising through Network Groups – AMTIL, SEMMA, Monash Precinct Network.
- ✓ Email Blast through LinkedIn.
- ✓ Industry focused Webinar - October Wednesday 11<sup>th</sup> 10:30am EST
- ✓ Focused Webinars or Workshops for Research Partners to engage existing Industry clients

# Industry partners

We have been actively reaching out to potential industry partners and exploring opportunities for collaboration in various sectors.

- 70+ potential industry partners, contacted and sent our presentation.
- 35 positive responses currently reviewing problems/opportunities that could be projects for the CRC.

Defence	BAE, Thales, Hanwha, Safran, Quickstep, Raytheon, EOS Australia, Rosebank Engineering, Rheinmetall, Babcock
Aerospace	Boeing, Hypersonix, Dronesield, Swoop Aero, Defendtex, Next Aero, Freespace Collins Aerospace
Medical	Surgical Metals, Cochlear, Cook Medical, Additive Surgical, Fustec, Resmed, Signature Orthopaedics, Trajan Scientific, Schotts Minifab
Transport	Alstom, Volgren, Lumen Australia, Helimods, PWR, Zone RV
Mining	CR Mining, Fortescue, Weir Minerals
Construction	Macro3D, Contour3D
Advanced Manufacturing	Róde Microphones, Electrolux, AMP Control, Schneider Electric, Zeiss, Novita

Smart Sheet has been set-up to collate existing Industry partnerships that you propose to bring to the CRC bid.

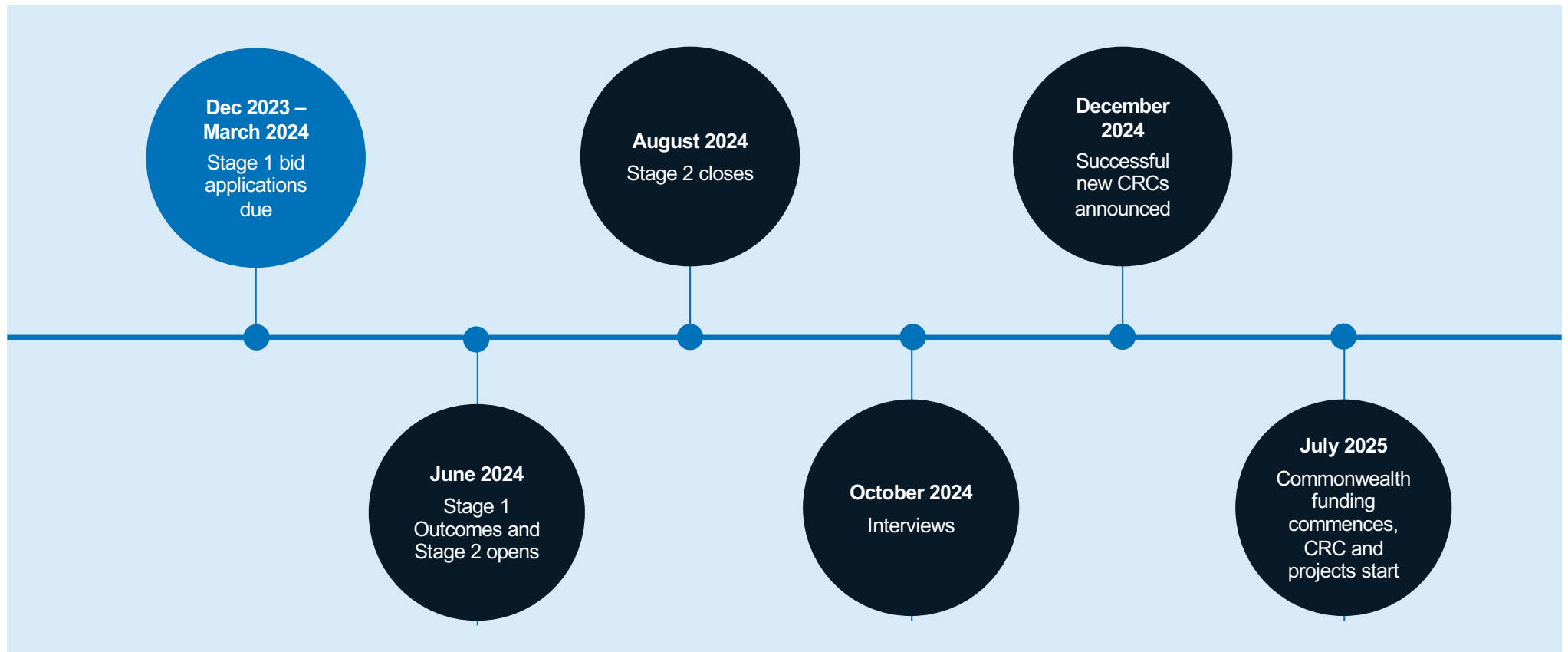
## Industry Partners – is this a good strategic fit?

- ✓ Ambition and willingness to invest in an eligible transformative manufacturing R&D project
- ✓ Aligned with the CRC proposed Research Programs in collaboration with a CRC Research Partner(s), and with SMEs during the project of between 2 and 5 years in duration, and from MRL 4 (proof of concept onwards) through to 7 or 8 that can commence from 2H 2025 onwards
- ✓ Spending at least \$250,000 cash per project (which, if eligible, the CRC can match dollar for dollar – i.e. a further \$250,000 to enable a project of \$500,000 cash investment – up to a maximum of \$5 million per Industry Partner)
- ✓ SME Starter program – short-term projects (up to 12 months) total project cash investment between \$100,000 to \$200,000 – aimed at introducing SMEs to collaborative research engagement which funds the cost of researcher salaries and operating costs at a CRC Research Partner
- ✓ Research Partner(s) ideally conducting at least 50% of the overall project research effort
- ✓ Utilising and/or developing new manufacturing technologies and business models
- ✓ To deliver commercial outcomes, including within Australia, ideally within 3 years of completion of the project

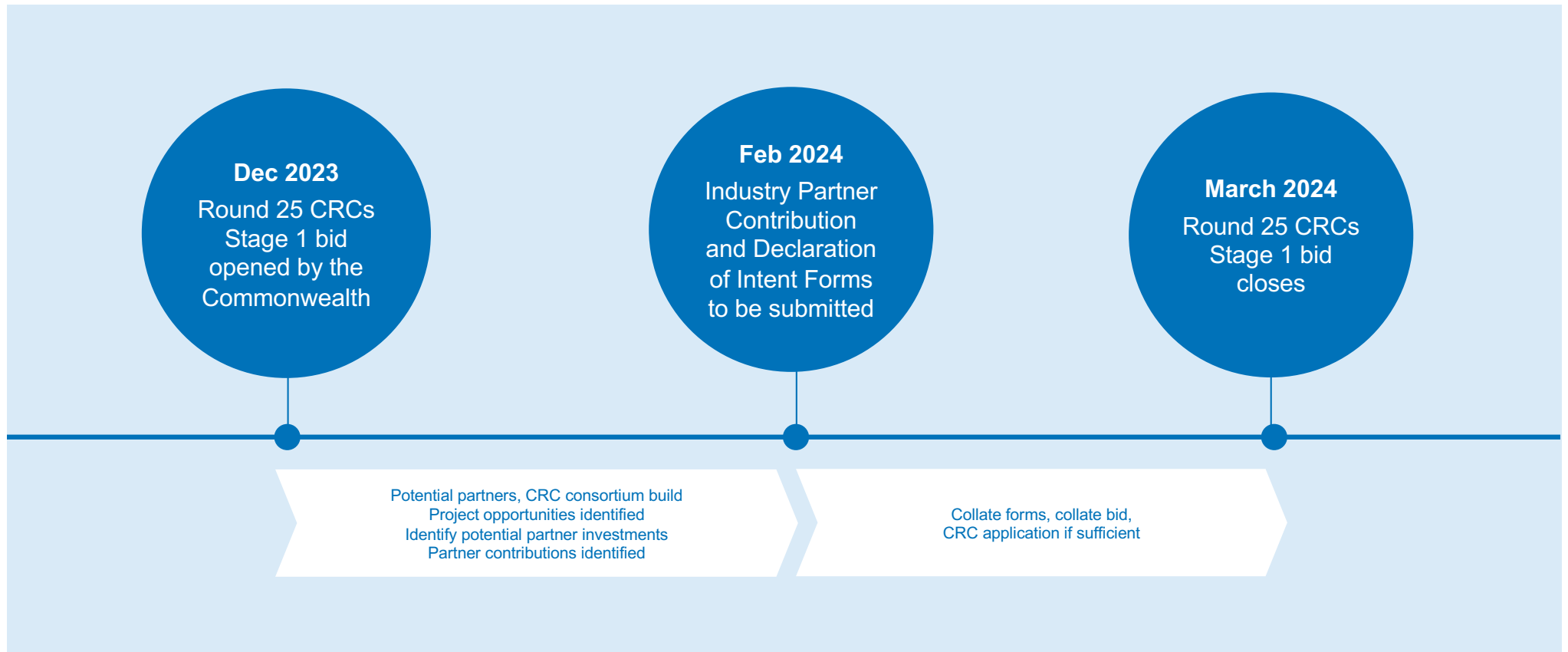
## Industry Partners – is this a good strategic fit?

- ✓ Industry and Research Partners agree on the ownership of project Intellectual Property (IP) prior to the commencement of any project to ensure no barriers will exist to successful commercialisation – *CRC owns no share in IP and encourages the core IP to rest with the industry partners*
- ✓ CRC only uses Industry Partner cash contributions for the approved project
- ✓ Industry Partner payments are paid monthly to the CRC in line with approved project budget and Research Partner expenditure profile (ie cash payments are not required from to the CRC until project commencement)
- ✓ Research Partners are paid at the end of each quarter of research on Industry Partner and CRC approval of completed research and milestones
- ✓ CRC only provides matching cash funding for eligible expenditure at the Research Partner(s) and not for the Industry Partner's own internal project or other expenses (these may be eligible to be valued as in-kind costs)
- ✓ CRC requires in-kind contributions from both the Research and Industry project Partners, and ideally that the total project in-kind (staff in-kind and other non-staff in-kind) is at least 3x the value of the CRC project cash contribution
- ✗ CRC does not provide matched cash funding for capital equipment, production tooling, buildings or facilities

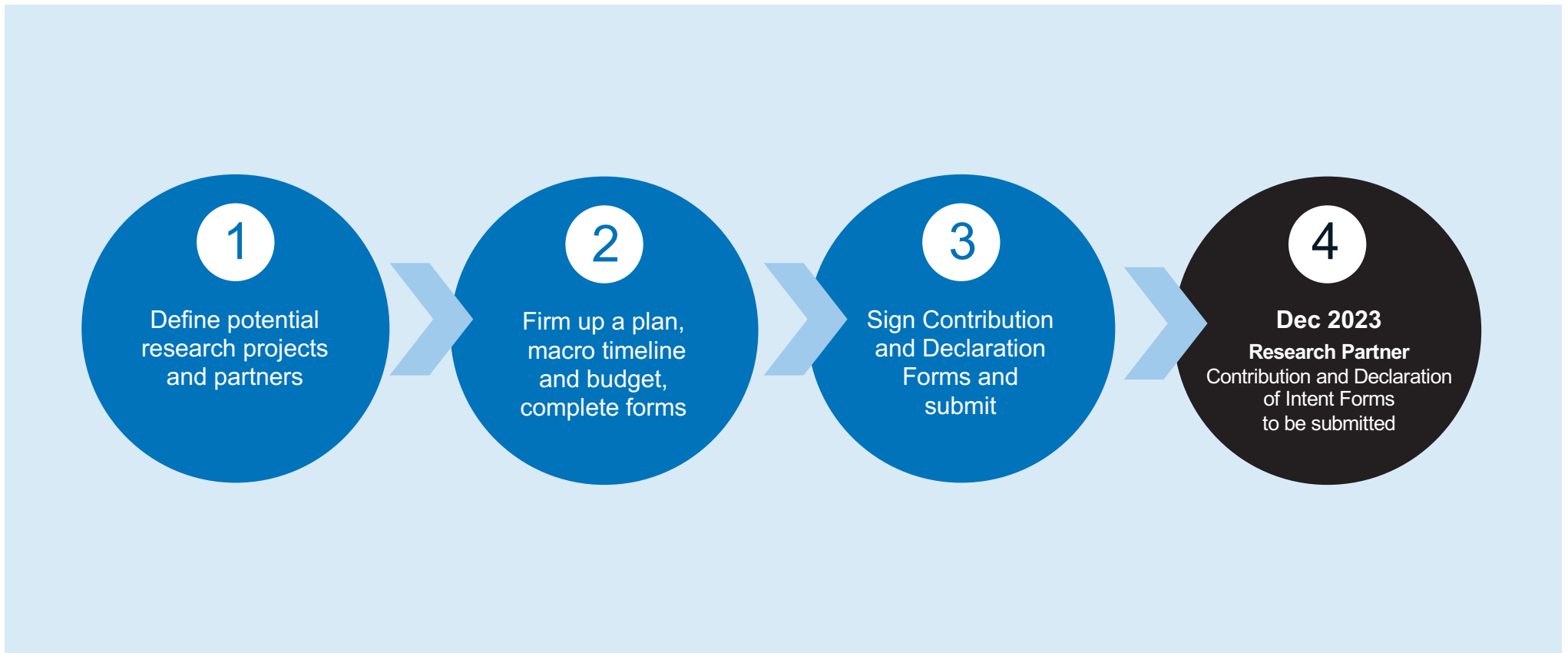
# AMCRC – Round 25 bid timeline



# AMCRC – Round 25 bid timeline



# Potential Partners – what do you need to do?



## Required forms and further information

### Participant Contribution Form

#### Required details

- Business information
- Proposed involvement in the CRC, including potential research projects
- How contributions (cash and in-kind) will be provided
- Quantity and timing by FY of contributions (cash and in-kind)
- Contributions are aggregated to determine Commonwealth fund opportunity

### Participant Declaration Form

#### Required details

- Declaration of *intent* to participate in the new CRC
- Proposed total contributions (cash and in-kind)
- Is signed and is included in the formal bid application by the CRC
- Contributions are subject to the CRC application being successful
- *Partner Declaration is not a contract between the Commonwealth and the Partner – does not create any binding legal obligation on the Partner*

Additive Manufacturing CRC bid team will email the relevant links to complete both forms on smartsheet in November 2023.

**Deadline for submission is 5pm AEST - Wednesday 06<sup>th</sup> December 2023**

**Information available on Additive Manufacturing CRC website - <https://www.amcrc.com.au/resources>**

- Additive Manufacturing CRC Information Brochure
- CRC Round 24 Guidelines, Declaration form and Fact sheet (Round 25 will be available in November 2023)

Coming soon (middle of October)

- Draft Term Sheet
- Draft Contribution Guidelines



## Questions?

Please either

**Post a question using the Teams Chat function**

or

**Use the 'Raise hand' button to ask in person**

**We have a FAQ form on our website [www.amcrc.com.au](http://www.amcrc.com.au)**

