Critical Supply Chain CRC

A Cooperative Research Centre for Medical Supply Chain

Invitation to Participate

July 2021

OUR VISION

To establish a globally competitive and highly resilient supply chain for medical products.

OUR MISSION

The Critical Supply Chain CRC represents a 10-year mission to use Internet of Things and other technologies to revolutionise Australia's medical products supply chain to be more resilient, more efficient, more responsive and more transparent.

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THE INDUSTRY NEED

The COVID-19 pandemic has exposed the long-standing fragility of the medical products supply chain. Global shortages of medical products resulted in high prices, an increase in suspect suppliers and disruptive interventions by various stakeholders in desperate attempts to secure dwindling supplies. While attention has focused on personal protective equipment (PPE), shortages extended to testing supplies, ventilators, pharmaceuticals and other medical supplies (including those not directly related to COVID-19).

Decades of driving efficiencies in the supply of medical products has established a long and highly globalised supply chain that simply cannot cope with 'black swan' events like COVID-19. The successful adoption of Internet of Things, Artificial Intelligence, Blockchain, and Supply Chain Management technologies will completely change the way businesses operate across the medical products supply chain, shaping the future of our supply chain. These technologies will address the challenges in the supply chain by:

- **Greater end-to-end transparency** of critical ingredients, components and materials;
- Better **management of inventory** across the entire system;
- More **coordinated procurement** across the health system;
- **Reduced dependency** on particular suppliers;
- Better information to assist in **product design for a more agile supply chain**;
- Greater capacity to **rapidly repurpose manufacturing** capacity and capability in emergency situations; and
- **Lower cost of local manufacture** to ensure a strong viable export oriented medical products industry.

The delivery of health care relies on the reliable supply of four essential categories of products:

- Pharmaceuticals;
- Personal protective equipment (PPE);
- Medical devices; and
- Medical supplies.

Each of these categories has a distinct supply chain, and the failure of any one of these chains can have catastrophic impacts on the system as a whole.

While the Critical Supply Chain CRC will focus on the medical products supply chain, the technologies and knowledge developed will also be applicable to supply chains for other manufactured products. As such the impact of this CRC will likely extend beyond the focus industry.

Critical Supply Chain CRC will deliver an innovation ecosystem that supports the redesign of Australia's medical products manufacturing supply chain

VALUE PROPOSITION

Critical Supply Chain CRC will deliver an innovation ecosystem that supports the redesign of Australia's medical products manufacturing supply chain. It is critical that all stakeholders come together to provide end-to-end solutions.

FOR INDUSTRY - Participation in the CRC will ensure you have Australia's best researchers solving your organisation's supply chain issues. By coming together, we will save millions in R&D by pooling resources and develop outputs that are highly integrated, robust and resilient.

FOR GOVERNMENT – A resilient medical products supply chain is critical for our national security and ability to provide the health care needed when 'black swan' events occur. The CRC will contribute to a number of Australia's national initiatives and priorities.

FOR RESEARCHERS - Participation in the CRC will help build capability, critical mass and prominence for your organisation in the medical product manufacturing sector and provide you with valuable industry connections and opportunities for collaboration.

THE CRC PROGRAM

The Critical Supply Chain CRC represents a systemic approach to redesign and strengthen Australia's medical products supply chain. The CRC Program provides a vehicle for all stakeholders in the system to come together and co-design solutions.

The CRC Program is a significant funding component of the national innovation system, which supports medium to long-term collaboration between the producers and end-users of research.

The aim of the CRC Program is to build critical mass in research ventures between industry and researchers which tackle major challenges that deliver significant economic, environmental and/or social benefits to Australian industry.

Government funding typically ranges between $20M to $55M for each CRC, matched by equal participant cash funding. In addition to the cash funding from participants and the CRC Program, participants provide in-kind contributions.

PARTICIPANT BENEFITS

By participating in the Critical Supply Chain CRC, you will be able to:

- Make your supply chain stronger and more resilient.
- Reduce risks and costs for your organisation.
- Access a highly innovative network of suppliers and customers.
- Be branded as an innovative company leading Australia's medical products industry.
- Leverage additional funding for R&D (reducing risk and increasing returns).
- Co-design products with your customers.
- Influence the skills and training for our future workforce.
- Access to talent through the education and training program.

EDUCATION AND TRAINING PROGRAM

The education and training program will address current skill shortages, demographic change from a retiring workforce, and new skills demanded by this digital age. The Critical Supply Chain CRC's partners from industry, VET, universities and government will work together to understand the training and education requirements for today's jobs in the sector.

These requirements will inform and shape new training opportunities which will leverage advanced technology to provide new jobs and career pathways. The CRC will establish industry-led programmes increasing partnerships between VET and universities. These partnerships will deliver the next generation of highly-skilled and innovative manufacturing leaders in the medical products sector.

OUR RESEARCH PROGRAMS

Program 1: Accelerate Digital Transformation

A key component to making Australia's medical products supply chain more resilient is to ensure that increased domestic manufacturing is viable into the long-term. This program will create the stakeholder ecosystem to co-develop integrated solutions that provide Australian manufacturers with the intelligence, agility, scalability and flexibility needed to rapidly adapt to a changing world. It will deliver a number of strategic outputs, namely:

- **Data Sharing and Marketplace Platform** - This platform builds a virtual value chain map, where suppliers, manufacturers, logistics and transport providers and end users are mapped into, to facilitate sharing of data and insights. The platform will also establish a safe marketplace by which the owners of data can receive benefits (monetary or other) to incentivise the sharing of data and insights. This platform essentially uses digital twins and digital threads based on IoT, AI, and blockchain to build a virtual ecosystem that allows end-to-end supply chain transactions for faster demand sensing, shorter production cycles, higher quality products through innovations.
- **IoT Framework for Total Supply Chain Connectivity** - Deliver a design framework to realise end-to-end connectivity of medical supply chains for end-to-end transparency and visibility, leveraging on IoT sensors and smart devices. At micro level, this framework enables connectivity between raw materials, inventory items, machines, finished products within an organisation; at macro level, it connects suppliers, manufacturers, and distributors across the entire supply chain.
- **Design Framework for IoT-enabled Medical Products** - This design framework will enable medical device/product makers to design and produce IoT-enabled products. This design framework is a game-changing technology that will advance healthcare service delivery from traditional products to usage-based billing, remote monitoring and service. Specific advantages include rich health data available to be shared between these products and a health data network, better diagnostic capability, and facilitating automatic regulatory compliance processes.
- **Dynamic Roadmap of New Technologies Adoption** – Deliver a system for collation and assessment of new technologies and breakthroughs to provide Australian industry with the most up-to-date, connected intelligence on the trajectory for the development and adoption of supply chain technologies embedded into medical products.

Program 2: Intelligent Risk Management

Medical products have very long and complex supply chains that are exposed to a range of risks from small scale to large scale events. This CRC will develop IoT, AI and blockchain based solutions that automatically identify and assess vulnerabilities and changes in demand and supply. This program will deliver a number of strategic outputs, namely:

- **Early Risk Identification Tool** - This software tool maps out and assesses the value chains of all major product lines. Each node of the supply chain—suppliers, plants, warehouses, and transport routes—is then assessed in detail to identify all possible risks using advanced early identification models. The tool will be powered by advanced analytics and machine learning to constantly monitor and identify risks within the supply chain landscape including unstructured data sources.
- **Dynamic Risk Assessment Tool** - This module provides the assessment of risks using advanced machine learning technology. Every risk will be quantified by a consistent scoring methodology based on their impact on the organisation if the risk materialises, the likelihood of the risk materialising, and the organisation's preparedness to deal with that specific risk. This allows for prioritising and aggregating threats to identify the highest-risk products and value-chain nodes with the greatest failure potential.
- **Integrated Risk Response Tool** – Deliver a machine learning based risk mitigation decision-making tool for a cross-section of medical products that can identify vulnerabilities, dynamically assess risks and direct actions on risk mitigation. This tool integrates the risk identification tool and risk assessment module, and it can be used to automate some minor adjustments or augment human decision-making for major interventions.

Program 3: Digitised Compliance, Quality and Safety

Medical products operate in a highly regulated environment. However, the application of regulation and compliance reporting makes supply chains very inflexible and costly. At the same time, there is a need to ensure that safety and efficacy is maximised. Industry 5.0 technologies, designed to work with humans, such as IoT, AI and blockchain offer opportunities to automate the compliance and regulatory approvals process with high levels of trust and accuracy (proven to be better than paper-based and human controlled processes). This program will deliver a number of strategic outputs, namely:

- **Policy Roadmap for Smart Compliance, Quality and Safety** - This output will provide a policy roadmap that has been co-developed with Government, communities and industry to identify a pathway and prioritisation of policy amendments to facilitate the adoption of a more automated approach to compliance and regulation. This will also be needed to help guide the development of the underpinning technology.
- **Trusted Chain of Custody Platform** - Healthcare supply chain is a complex network of entities that include raw material suppliers, manufacturers, distributors, healthcare providers and patients. Using IoT sensors and blockchain technologies, this output will provide an immutable record of the products and their movement through the chain (including coldchain and treatment). This will help address counterfeiting and handling issues.
- **Smart Distributed Quality Control Systems** Deliver systems and tools to integrate IoT sensors into product lines to streamline product monitoring and flaw detection tasks, including real-time detection of off-spec conditions among running equipment and processes, automatica adaption to unwanted fluctuations in variables like environmental conditions, to achieve the consistent product attributes. The systems and tools will allow manufacturers to better understand where quality control issues stem from, and take proper actions.
- **IoT-Assisted Pharmacovigilance** - Combining blockchain, IoT, AI and machine learning this tool will seek to automate the pharmacovigilance and postmarket surveillance process. The tool will be built to extract information from a range of structured and unstructured sources, classify the data, assess patient risk and benefit. The use of blockchain will create an immutable and auditable data chain and help reduce counterfeiting. It will reduce case cycle time, increase accuracy and reduce administration.

Program 4: Inventory Optimisation

Inventory management of medical products is subject to a broad range of variables and considerations. It needs to balance the risk of shortage against the cost of stockpiling. The availability of many products is literally the difference between life or death for a person. This CRC will co-develop solutions that automate inventory management decisions based on better tracking of products, monitoring of conditions, appraisal of risks based on supply and demand factors. This program will deliver a number of strategic outputs, namely:

- **Data-Driven Demand Sensing Tool** - Deliver a tool which includes advanced inventory forecasting models to drive accurate demand forecasts. The machine learning algorithms will be able to extract and classify data (structured and unstructured) to interrogate them for impact on demand for medical products. These will include life cycle, seasonal, epidemiology, trends and other qualitative factors. This output aims to provide a quantum shift in the ability to predict demand of a range of critical medical products for optimised supply.
- **Real-time Inventory Track and Trace Platform** - This platform is delivered to track and trace inventory items (i.e., products, components, materials, machine and equipment) in all stages of movements in real time using advanced tracking and positioning technology including RFID, mobile robot or drone enable sensing systems.
- **Customised Inventory Management Tool** - Allows a customised solution to track and manage delivery orders, dropshipping requests, backorders, receptions, and transfer requests for inventory items, stock tracking and counting. The software tool provides the support for just-in-time inventory which reduces excess inventory and product to keep what is needed in stock and on hand, as well as just-in-case inventory which keeps large inventories on hand in case of a large and sudden increase in demand.

PARTNER CATEGORIES

The CRC has three partner types as described in the following:

Major Partner

Core partners will commit both cash and in-kind investment over the term of the CRC. They have an opportunity to shape the CRC's business model, including:

- Governance and operational structure.
- R&D programs, strategy and key milestones.
- Legal and fiscal structures.
- IP and commercialisation agreements.

Major Partners make a significant cash and in-kind investment to the Critical Supply Chain CRC over a 10-year timeframe. In practice, this means a cash investment of over $150,000 per year and commensurate in-kind contributions. The exact contribution of Major Partner organisations will be determined by the research, commercial and education needs of each organisation.

Up-front contribution to bid costs (excluding GST) for major partners will be:

- Major University partners - $20,000 for stage 1 and $10,000 for stage 2.
- Other major partners - $3,000 for stage 1 and $2,500 for stage 2.

Partners

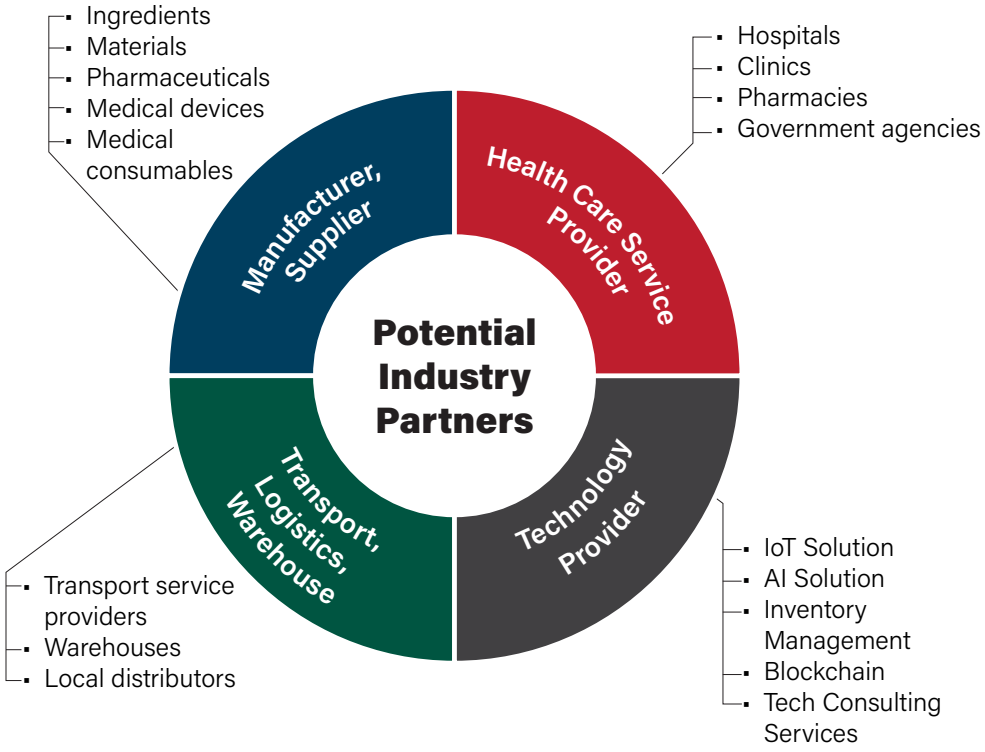
Our Partners have a strong commitment to a particular program or project of the Critical Supply Chain CRC and are investing for a specific set of outcomes. Partners make a minimum cash investment of $100,000 per year and commensurate in-kind contributions. The exact contribution of Partner organisations will be determined by the research, commercial and education needs of each organisation.

Up-front contribution to bid costs (excluding GST) for partners will be $2,000 for stage 1 and $1,000 for stage 2.

Project Partners

The Project Partners category allows SMEs and other collaborating organisations to participate in the Critical Supply Chain CRC on a project-by-project basis. Such partnerships are likely to be a part of a project established with an existing Major Partner or Partner. Project partner organisations make a minimum cash investment of $50,000 per year and commensurate in-kind contributions. The exact contribution of Project Partner organisations will be determined by the research, commercial and education needs of each organisation.

Up-front contribution to bid costs (excluding GST) for partners will be $1,000 for stage 1 and $1,000 for stage 2.

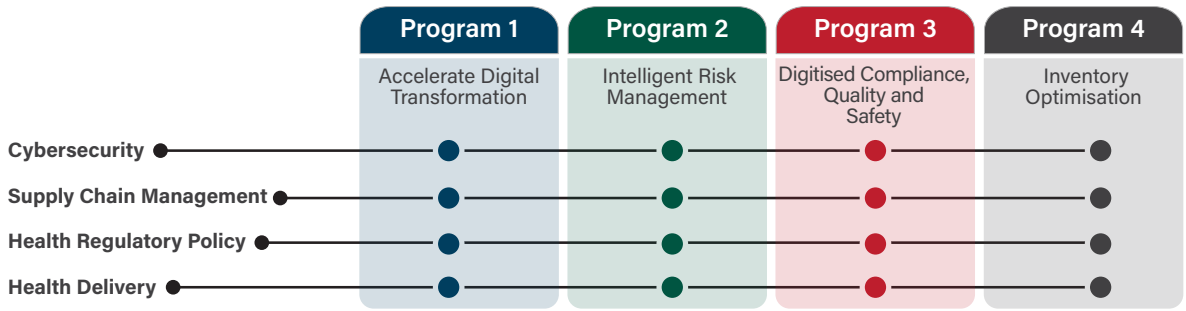


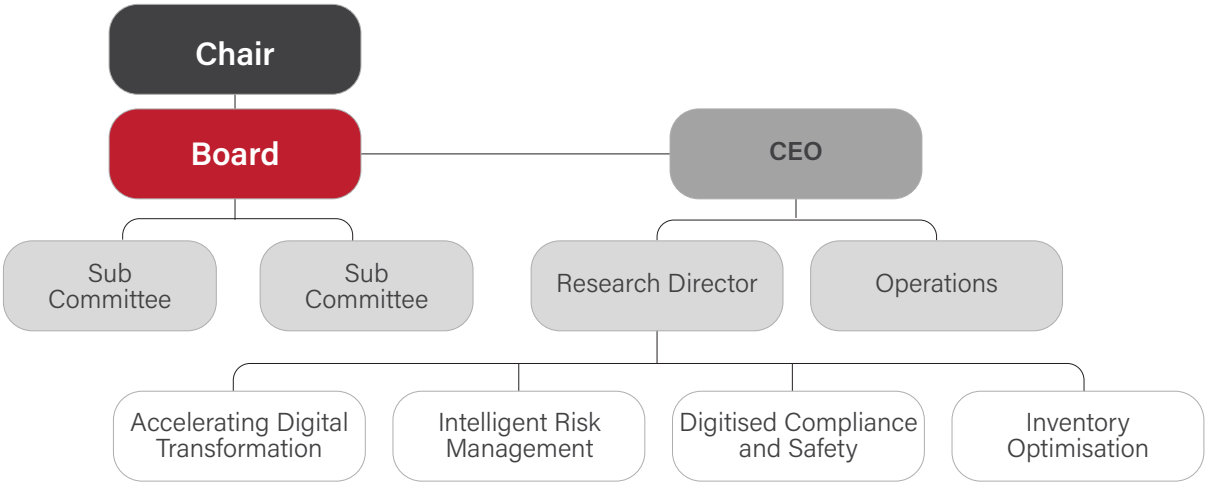
GOVERNANCE AND MANAGEMENT

As a not-for-profit company, the Critical Supply Chain CRC will be limited by guarantee and governed by an independent board selected by the members of the CRC.

Project agreements will be documented prior to project commencement and will outline terms such as partners involved, investment, IP ownership and commercialisation rights, timing and milestones.

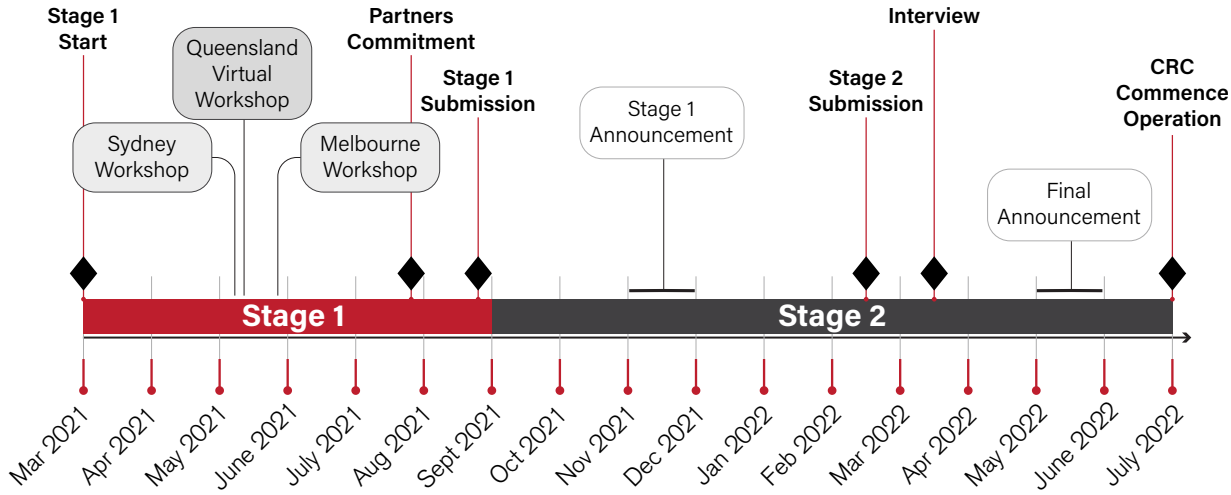
CRC participants will be grouped into three tiers based on levels of cash contribution. Each tier will have different rights commensurate with their level of contribution.





NEXT STEPS

We are working towards the following key dates for our submission to Round 23 of the CRC Program:



CONTACT FOR FURTHER INFORMATION

If you are interested in participating in the Critical Supply Chain CRC, please contact us to register your interest.

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