DMTC

Capability through Collaboration

2019 ANNUAL REPORT

Contents

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Siblings, Australian Army soldiers (left) Sergeant Bronwyn Spencer and Lance Corporal Geoff Spencer on deployment to the Middle East region in 2019, in front of an Australian Army Bushmaster Protected Mobility Vehicle. Industrially-focused research and development activities relevant to the Bushmaster vehicle platform have been a feature of DMTC's successful, long-term relationship with industry partner Thales Australia.

The Hon. Melissa Price, MP
Minister for Defence Industry

As I travel across Australia visiting businesses in our diverse defence industry, it is plain to see how the Morrison Government's investment in defence capability is transforming the sector.

We are empowering small businesses in our defence industry to take advantage of the opportunities being created. Harnessing their innovation and entrepreneurial spirit is helping us build a defence industry that is robust, resilient and internationally competitive.

We believe our small businesses in the Australian defence sector are among the best in the world. We are relentless in our pursuit of opportunities for them to succeed and grow, and to work with organisations like DMTC and the larger defence companies.

DMTC plays an important role as a leader within Australia's defence industry sector. DMTC has earned a very strong reputation for its work across many technical disciplines, and for its focus on bringing out the best in each of its partners.

From partnering with industry to enhance joint force capability, to building international research communities, DMTC is ***delivering tangible outcomes for Defence and Australian industry***.

I welcome the signing of a new contract between DMTC and the Defence Innovation Hub for the delivery of research, development and innovation services.

On behalf of the Government, I acknowledge DMTC's significant contribution to technology development and innovation, and to building Australia's industrial capability.

I commend Dr Mark Hodge and his team for their efforts, not just in the year covered by this Report but since the establishment of the company more than a decade ago.

HMAS *Parramatta* was the testing ground for a corrosion prognostic monitoring system developed under DMTC's Maritime Program.

> "Together, the Naval Enterprise and Industry have an unprecedented opportunity to contribute to nation-building and, in doing so, we will build a maritime capability that will underpin the long-term security and prosperity of Australia and our region."
>
> **Chief of Navy VADM Michael Noonan, AO, RAN**

Dr Sheridan Kearnan
First Assistant Secretary
Defence Industry Policy Division
Department of Defence

To meet current and future challenges to our national security Australia needs a strong, sustainable and secure defence industry. One that can deliver and sustain the capabilities our defence force needs now and into the future.

The 2016 Defence Industry Policy Statement (DIPS) set out the Government's expectation for Defence industry policy to focus on: delivering Defence capability; a new approach to Defence innovation, including streamlining its engagement with industry and academia; driving Australian industry competitiveness and export potential; and cutting red tape and streamlining tendering and contracting procedures.

Three years on, the support and opportunities being made available through Defence industry and innovation programs are growing an ecosystem of defence, industry and academia. The Defence Innovation Hub is supporting small businesses by providing them with the opportunity to work directly with Defence in developing innovative technologies. This program is delivering strong outcomes for defence capability and defence industry.

An innovative and engaged local industry sector will enable Defence to develop and sustain the advanced capabilities it needs to meet future challenges, and the key to solving some of Defence's increasingly complex technology problems is collaboration. This is why DMTC is an important partner for Defence and for Australian industry.

DMTC is providing collaborative research and development and innovation services through its partnership with the Defence Innovation Hub. This arrangement recognises that DMTC has unique capabilities and an established network with leading industrial and research partners to ***support and enhance Defence capability***. The role that DMTC can play in helping make Australian small businesses Defence ready and build Australian industry capability is particularly important.

I congratulate DMTC and its partners on the collective achievements showcased in this report, and look forward to continuing to work together with DMTC for the benefit of Defence and Australia's defence industry.

Key Message Industry

Mr Neil Matthews
Senior Manager Additive Technologies
and Engineering Services
RUAG Australia

Small businesses must aim for success, and they are better positioned for success if they remain open to collaboration, ensure a company culture that prioritises technology development and progress on behalf of the customer, and ascribe to the values of a 'stronger together' mindset.

Earlier this year I was humbled to be presented with a Defence Industry Service Commendation by the Minister for Defence Industry for RUAG Australia's contributions in the area of additive metal technologies. Our approach to additive repair technology solutions is definitely the result of a collaborative effort between academic institutions and includes Defence itself – in particular, the Royal Australian Air Force (RAAF) and Defence Science and Technology (DST) Group – and DMTC.

RUAG Australia has engaged with DMTC since 2009, in 'core' R&D programs, such as additive metal technologies, as well as in education and supply chain development initiatives. DMTC's flexible, collaborative model accommodates the needs of both small businesses and larger firms. For RUAG, the business-to-business framework that underpins DMTC's model is a key incentive.

RUAG Australia is highly regarded, both domestically and globally, for its precision manufacture of landing gear and other hydraulic actuators, as well as for its proven expertise in the application of additive metal repair technologies. RUAG has successfully reduced life cycle and sustainment costs while enhancing operational availability for Defence platforms.

DMTC's collaborative model has been a key driver in these efforts and achievements, bringing additional expertise and perspectives to the fore, and contributing towards the further development of skills and capabilities within our national workforce. DMTC understands Defence, the commercial imperatives of industry, and the process of developing and delivering premier R&D worldwide.

Importantly, DMTC prioritises innovation, providing a clear management framework, based on transparency, for maintaining full flexibility in support of an environment that reinforces technology advancements and encourages and nurtures new ideas and approaches.

The benefits of implementing additive repair technologies are ensuring the innovative approach is finding growing global acceptance, especially as these technologies are recognised for providing excellent value for money without compromising performance or structural integrity. Aerospace has championed the development and implementation of this technology, yet opportunities in other domains are many, including for land, space and maritime applications.

For defence customers, innovative approaches to sustainment and adopting new technologies is crucial, especially in light of the cost pressures associated with life cycle support on military platforms. DMTC has been ***an integral partner in helping to generate a sovereign industrial capability*** in Australia for laser repair technology, that companies like RUAG can offer to defence customers. RUAG Australia has shown repeatedly that repairing components, rather than replacing them, enables Defence to achieve the desired structural performance rates and fleet availability results at a fraction of the cost, and in fractions of the time.

Successfully enabling customers to benefit from direct savings, in both time and costs, is also the result of earning the customer's confidence and trust. RUAG Australia continues to demonstrate success with legacy military systems, for example, S-70B-2 Seahawk helicopters, F/A-18 A/B Classic Hornets, and others. In this way we are also building a knowledge base, an in-house and in-country specialist capability, and a platform for furthering success on new programs like the F-35 Joint Strike Fighter.

RUAG Australia continues to be a top performer in innovation in Australia. Working together with DMTC has directly proven that this passionate pursuit of innovation and collaborative research and development ensures solid benefits for all stakeholders.

Chair's Report

Mr Tony Quick

Chair, DMTC

It is said that in a time of rapid change, standing still is the fastest way to go backwards. DMTC is certainly not standing still, as this Report attests.

With the continuing evolution of Australia's defence posture, and of the defence industry policy landscape, the company has ensured that the outcomes it is achieving are aligned and relevant to the realities of today and the challenges of tomorrow.

As highlighted in this report, DMTC's place in the defence innovation system remains a strong and unique one. Our continued support of the National Naval Shipbuilding Enterprise, coupled with the new services contract with the Defence Innovation Hub confirmed in late June and our continued partnership with DST in delivering new capabilities in the medical countermeasures arena each represent a further evolution in the strategic and contractual framework. This gives the Board confidence that the fundamentals of DMTC's relationship and connection with not only Defence, but increasingly across the broader whole-of-Government National Security posture, are sound.

Collaboration is the way DMTC goes about its business, and the support of our partners in Defence, industry and the research domains is both critical to our approach, and a continuing validation of it.

The Board of Directors has continued to set high expectations in terms of governance, financial management and programmatic outcomes. Along with the other members of the Board, I believe this underpins the delivery of value to all DMTC partners.

I take this opportunity to thank my fellow Directors for their respective contributions and for their ongoing commitment to a collegiate, consensus-driven and outcome-focused Board. The effectiveness of the management team enables the DMTC Board to remain solidly focused on ***steering a course for continued success***.

One of the strong and non-negotiable positions held by the Board is in relation to DMTC's Education Program. The Board remains of the strong view that the involvement of early career researchers in DMTC activities, including PhD and Masters candidates, is key to delivering the twin objectives of promoting effective collaboration between industry and academia and boosting the industrial relevance of academic research in Australia.

Since its establishment, DMTC has played a strong role in increasing the pool of PhD graduates with skills and experience relevant to Defence and defence industry. The Board is delighted to note the awards conferred on, and successes achieved by, these talented young researchers in their study and in their transition to the industrial workforce.

It is my great pleasure to present the DMTC Annual Report for 2019.

CEO's Report

Dr Mark Hodge

CEO, DMTC

DMTC continues to play a strategic and important role in defence innovation. I am enormously proud to lead the company, and perhaps even more proud of the team and its collective achievements.

For me, the balance between what we do and how we do it is critically important. It is one of the hallmarks of our team's success.

In terms of what we do, this Report can really only give a taste of the breadth and depth of our portfolio of activities. The company continues to invest in the development of underpinning, platform-independent technologies and systems. New project commencements and bringing together new and existing project partners is both refreshing and exciting.

As for how we do it, one area of ongoing importance to DMTC is our business framework and our operating model, exemplified by the catchcry of ***capability through collaboration***. Our success in achieving ISO 9001 Quality Management accreditation has been highlighted previously. This year, we achieved accreditation to the new ISO 44001 Collaborative Business Management Systems standard, the first company to achieve this in Australia.

Taken together, these accreditations are further indicators of our commitment to quality and collaboration, our determination to achieve better and more transparent management of resources and our continued drive to ensure that DMTC remains a best practice business partner for Defence, Government and the industry and research sectors. They have already proven to be a net positive in terms of DMTC's credibility, in Australia and internationally, as a leader in innovation and program management.

DMTC remains strongly of the view that the 2016 White Paper and particularly the accompanying Defence Industry Policy Statement were game-changers for defence industry, highlighting the notion of sovereignty and a more robust local defence industry.

The long-term outlook of these documents, and the level of bipartisan support they have enjoyed, has been welcomed almost universally by the sector. A long-term view mitigates the risk of transactional approaches and short-termism that, in areas like innovation, are roadblocks to success.

DMTC's mission statement goes to the heart of our role in the creation, consolidation and advancement of sovereign industrial capability to support, and give effect to, science strategy and priorities. We have developed, and maintained, strong connections across our partner group in delivering on that mission statement. I am delighted that we continue to engage productively with both prime contractors and small businesses, who have different but equally valuable roles in the industrial ecosystem.

Innovation with a purpose, and in a collaborative setting, will achieve and deliver dividends in relation to technology transfer and sovereign industrial capability. As detailed on p16 of this Report, conceiving, managing and directing innovation in a systematic, structured framework is a specialist undertaking in its own right. DMTC has for several years now worked with its partners in Defence, Government and across the research and industrial sectors to ensure that we represent trusted, effective and agile value. Our commitment in this regard will never waver.

I commend the Report to you.

VALUES

INCLUSIVE
COMMITTED
INSPIRING
TRUSTED
INTEGRITY

OUR VISION

To provide technology solutions enabling industry to enhance Australian Defence and national security capability.

OUR MISSION

DMTC creates and enhances Australian industrial capability by leading, facilitating and managing collaborative research and development and innovation activities in the defence and related sectors in manufacturing, engineering and applied science. The Defence and national security customers, industry and research sectors are key stakeholders.

OUR PARTNERS

DMTC's work is enhanced by the capabilities and expertise of partner organisations who co-invest and collaborate on applied research and development tasks, technology transfer projects and Australian supply chain development.

Working together in a collaborative environment backed by DMTC's internationally accredited program management framework delivers real value to industry and research partners alike, and provides the Defence customer with assurance of the sovereign industrial capability needed to support the Australian Defence Force (ADF).

The FilmArray Warrior Panel, a rapid diagnostic tested by Australian Rickettsial Reference Laboratory as part of a DMTC-led project in collaboration with DST to evaluate its accuracy in identifying *C. burnetii*, the pathogenic agent which causes Q fever.

Mr A.P (Tony) Fraser, AO, CSC

Deputy Secretary Capability Acquisition and Sustainment Department of Defence

"To DMTC and its industry and research partners, thank you for what you do in support of our troops. DMTC has contributed to technology development across a range of disciplines, helping to give our fighting forces a competitive advantage, and to equip them to complete their missions and come home safely.

Defence and the Australian Government are committed to the development of a robust, resilient and internationally competitive Australian industry base. Durable relationships between Defence and industry – and collaborations such as those led by DMTC that bring diverse teams of industry and research experts together – are critical enablers of our work to optimise defence capability outcomes."

Professor Tanya Monro

Chief Defence Scientist Department of Defence

"The work that DST and DMTC have done together for over a decade has repeatedly shown what can be achieved when we harness the capacity of the Australian research system and collaborate with a shared purpose.

Coming together, we can deploy bigger and more diverse teams of strong researchers to tackle a smaller number of bigger problems. We are calling these our 'Starshots'; inspiring and exciting national missions that will focus our strategic partnerships and deliver leap-ahead capabilities. Our warfighters can then know they are backed by the best people, coming together from research backgrounds and from Australian industry to create the kind of scale of investment that's needed to tackle those really big challenges.

The relationship between DST and DMTC is already strong, and we will continue to develop it."

Performance Snapshot

CREATING INDUSTRIAL CAPABILITY

- ✓ Flexible and scaleable program structure
- ✓ **350+** technologies transferred to industry

COMMITTED PARTNERS WITH DEEP EXPERTISE

11 new project starts in 2018-19

40 multi-party collaborations under management

CO-INVESTMENT IN INNOVATION

- ✓ Compound Annual Growth Rate **7%**
- ✓ Surpassed **$200 million** in total activity since 2008

ENGAGING ACROSS AUSTRALIA

100+ prime and small businesses engaged

DMTC

VALIDATIONS OF OUR APPROACH

- ✓ ISO 44001 achieved in 2019
- ✓ International credibility and assurance

EXEMPLAR EFFORTS

3 national awards in 2019

10 national innovation awards since 2008

INVESTING IN RESEARCH IMPACT

16 Australian universities engaged

2 PhD awards in 2018-19

49 PhD /Masters supported since 2008

Calendar Highlights

2018

JULY

- Sustainment of emerging manufacturing materials project commences
- Capability Acquisition and Sustainment Group investment in DMTC Maritime Program is confirmed
- Thales Australia Managing Director Chris Jenkins cites successful, long-term collaboration with DMTC as a critical success factor in Thales Australia's R&D efforts
- BAE Systems Australia credits DMTC's role in building Australian industrial capability and supply chain for machining titanium
- Tasmanian small business Penguin Composites joins DMTC Hybrid Composites project
- DMTC project leader Dr Yen Truong awarded prestigious CSIRO fellowship (career development) prize

AUGUST

- Q Fever project commences

SEPTEMBER

- Sutton Tools credits "crucial" collaboration with DMTC as one reason for their business growth
- DMTC DMTC Medical Countermeasures (MCM) project diagnostic device project wins National Innovation Award in the Combat Equipment and Mobility category at the Land Forces 2018 conference and exposition

OCTOBER

- Swinburne researcher Andrew Ang wins Fresh Science competition (Victoria) for work on DMTC project to prevent biofouling build-up on Navy ships
- DMTC Student Conference held in Melbourne
- Senator The Hon. David Fawcett describes DMTC as an 'exemplar' of collaboration and managing IP in NSW Defence Innovation Network speech
- Phase 1 JEV novel vaccine project commences

NOVEMBER

- Project to extend development of Australian single crystal production and supply chain capability commences
- DMTC AGM and Participant workshop held in Melbourne

DECEMBER

- Project to scale-up manufacturing of novel vaccine commences
- PhD candidate Emily Kibble wins AIDN WA Young Achiever of the Year
- The 2018 Major Projects Report (jointly produced by the Australian National Audit Office and the Department of Defence) acknowledges DMTC's role in technology developments related to major acquisition programs

2019

JANUARY

- N-FAST collaboration with Thales Australia and research partners commences
- High-temperature super conductor technology project commences
- Further DST investment in DMTC MCM Program is confirmed

FEBRUARY

- PhD candidate Jimmy Toton wins Young Innovator Prize at the Avalon Airshow
- DMTC CEO Dr Mark Hodge records interview with *WA Defence Review* discussing DMTC's track record in technology development

MARCH

- DMTC Annual Conference and Awards dinner held in Canberra
- BAE Systems Australia CTO Brad Yelland publicly confirms BAE continued support for DMTC engagement – including Hunter Class Frigate Program work on prototype modules
- Minister Reynolds keynotes at DMTC Annual Conference and announces new Defence Innovation Hub project, describing DMTC as "a leader within the Australian defence industry sector"

APRIL

- Vulnerability reduction (maritime steel) project commences
- Call for collaborative project proposals released – the fourth round of national industry engagement under the MCM Program

MAY

- Nicholas Orchowski (RUAG Australia) wins Young Manufacturer of the Year at Victorian Manufacturing Awards
- Jimmy Toton wins national Endeavour Award
- Additional CASG investment for DMTC to conduct Naval Shipbuilding Horizon Studies
- DMTC hosts small business delegation (Industry Capability Development (ICD) Program participants) at National Manufacturing Week (NMW) in Melbourne
- DMTC's Factory in a Box project showcased at NMW

JUNE

- DMTC's successful rollout of ICD programs in five regional centres of Queensland was mentioned in a op-ed by the Queensland Premier in *The Australian*
- DMTC Limited signs contract with Defence Innovation Hub for delivery of collaborative research and development services in 2019-20

DMTC in the Innovation System

L to R: DMTC CEO Dr Mark Hodge presenting as part of a discussion panel at the 2019 D+I Conference, alongside AVM Steve Roberton, Head Force Design, Department of Defence and Dr Todd Mansell, Chief Science Strategy and Programs, DST.

> “DMTC has unique capabilities and an established network with leading industrial and research partners to support and enhance Australian Defence Force capability.”
>
> **Department of Defence Media Release: 12 September 2019.**
> ***Contract signed with DMTC for development of cutting-edge technology***

For more than a decade, DMTC has developed and refined its model, becoming an increasingly important part of the fabric of the Australian defence sector.

DMTC and its partners deliver value for money in capability outcomes achieved for Defence, underpinned by improved Australian industrial capability and cutting-edge technology delivered through DMTC’s best practice collaborative model. This dual contribution to achieving Defence’s policy aims – to strengthen sovereignty and to increase the capacity of a robust and resilient local defence industry – lends strategic weight to Australia’s global standing and geo-political interests.

One of the ways in which DMTC’s role is unique is its far-reaching engagement across every agency or function shown on Defence’s depiction of the innovation landscape in the 2016 DIPS*. This includes the force design, capability management and technology foresighting processes that set Defence priorities; the three major funding programs for innovation; and the research and industrial sectors including the Government’s sector-based growth centres.

While the Next Generation Technologies Fund, the Defence Innovation Hub and the Centre for Defence Industry Capability (CDIC) were the headline funding announcements from the 2016 DIPS, there are many other elements that contribute to the innovation system and have a stake in its success.

DMTC’s involvement in the National Naval Shipbuilding Enterprise is one example of CASG taking a very serious role in innovation. DMTC and its partners are working with the Program Office, with colleagues at DST and with industrial partners, including BAE Systems Australia (the prime for the Hunter Class Frigate Program under SEA 5000) and its supply chain.

A focus on innovation and collaboration throughout the design and build phase of the program is ensuring that issues can be addressed and mitigated as they arise, rather than after the risk to capability delivery has been realised.

In June 2019, DMTC signed a new contract with the Defence Innovation Hub to undertake collaborative research, development and innovation activities aligned to Defence’s priorities. The contract requires DMTC to leverage its experience, expertise and networks in relevant research fields to support Defence and national security outcomes.

In addition to the new services contract described above, DMTC and its partners have delivered on innovation contracts awarded by the Defence Innovation Hub.

DMTC’s strong focus is on the creation of industrial capability. The projects managed by DMTC are typically focused on the maturing of platform or domain-level capabilities and technologies. This is a key differentiator from the product-level R&D undertaken by current or prospective defence suppliers that offers less opportunity for genuine collaboration.

In its dealings with the defence customer, and with partners, DMTC seeks to be an exemplar of the behaviours agreed in mid-2019 by Defence and Industry. The engagement principles provide a platform for the enduring relationships between Defence and industry, based on trust and transparency critical to the development and growth of defence industry and ultimately to Australia’s defence capability goals.

* 2016 Defence Industry Policy Statement, Page 31, Figure 3:
Principal elements of Defence innovation

Technology Progression

Technology Readiness Levels (TRLs) are a standardised mechanism to plan, track and monitor technology development and are an internationally accepted project management tool. The table highlights DMTC project activity for the 2018-19 financial year.

DESCRIPTION	Continuation of previous DMTC work	Performance against milestones in 2018-19	Schedule	Technology roadmap	
				TRL Journey (project life)	TRL Snapshot (as at June 2019)
MARTIME PROGRAM					
Corrosion prognostics health monitoring	Yes	Milestones achieved	On track	4-6	5
Additive manufacturing of ship components (including machining optimisation)	Yes	Milestones achieved	Extended to allow for further analysis and development	4-6	5
Blast and shock modelling • Complex numerical models to assess vulnerability	Yes	Milestones achieved	Extended to allow for further analysis and development	2-6	6
Develop fabrication techniques using ferroelectric ceramics	No	Milestones achieved	On track	2-4	3
Characterisation and development of single crystals (SSCG method)	No	Milestones achieved	On track	1-4	2
Field trial of hydraulic actuator incorporating HVOF technology	Yes	Milestones achieved	On track	6-8	8
Technology maturation of superconducting cryocooling systems for a naval environment	No	Milestones achieved	On track	4-6	4
Steel characteristics and grade selection for vulnerability reduction in future frigates	Yes	Milestones achieved	On track	3-5	3
LAND PROGRAM					
Alternative vehicle power packages • Fuel cell technology • Energy recovery & conversion • Regenerative shock absorber system	Yes	Milestones achieved	Project now complete	2-4 2-4 2-4	4 4 4
Automated offline manufacturing - weld monitoring and defect identification system	Yes	Milestones achieved	Extended to allow for further plan and design work for offsite installation	5-7	6
Advanced nanostructured fabrics for low burden personal protection	No	Exceeded expectations	Complete	3-5	6
N-FAST collaboration • Materials • Sensors • Modelling (digital twin)	Yes	Milestones achieved	On track	3-6 4-7 3-6	4 5 5

DESCRIPTION	Continuation of previous DMTC work	Performance against milestones in 2018-19	Schedule	Technology roadmap	
				TRL Journey (project life)	TRL Snapshot (as at June 2019)
AIR AND SPACE PROGRAM					
Sustainment of emerging materials • Laser cladding (steel) • Laser cladding (titanium) • Laster cladding (nickel)	Yes	Milestones achieved	Complete	3-6 3-4 3-4	6 4 4
New corrosion coating technologies for light metal components	Yes	Milestones achieved	On track	2-5	4
Wire arc additive manufacturing of aluminium alloy components • Path development and programming • Large material geometry	Yes No	Milestones achieved Milestones achieved	On track On track	4-5 2-4	4 3
Topological optimisation for metallic additive manufacturing – component design	No	Milestones achieved	Complete	4-6	6
Selective laser melting – lightweight components	Yes	Milestones achieved	Complete	3-5	5
Utilising reflectometry to enhance satellite imaging capture and processing	No	Milestones achieved	Project extended to allow for further development	4-6	6
Developing a compact, Spatially Agile Spectral Sensor (C-SASS)	No	Milestones achieved	On track	3-5	4
Advanced manufacture of CubeSat components • Casting route • Additive manufacturing route	No	Exceeded technical expectations	Substantially complete	3-6 3-6	8 6
MEDICAL COUNTERMEASURES PROGRAM					
Deployable point-of-care diagnostic system • Reader • Multiplex cartridge	No	Milestones achieved	Completed on schedule	6-9 3-5	9 5
Developing novel treatments to inhibit bacterial pathogens	No	Milestones achieved	On track	3-5	4
Rapid diagnosis of microbial infections without culture	No	Milestones achieved	On track	3-5	3
JEV Advax Phase 1 clinical trial	No	Milestones achieved	Delayed start but project now on track	5-6	5
Synthesis and scaleup of novel antibiotic drug	No	Milestones achieved	On track	4-5	4
ENABLING TECHNOLOGIES PROGRAM					
Investigating hybrid composite materials & structures • Testing methodologies • Manufacturing processes • Properties database	Yes	Milestones achieved	On track	4-7 3-4 3-6	4 3 4
Developing 'Factory in a Box' sensor and manufacturing process enhancement capability	No	Partially met	Delayed / moved into 2019-20 due to resourcing constraints	5-8	8
Lightweighting – modelling and testing of casting prototype and production techniques - vehicle components (antenna, locker, side step)	Yes	Milestones achieved	Complete - some elements delayed due to unforeseen technical complexity	3-6	6

Australia is engaged in one of the most extensive and ambitious naval shipbuilding programs in the world with the aim of modernising and sustaining naval capabilities.

L to R: Along with their team, Queensland University of Technology's (QUT) Mr Robert Hickey, Senior Technician, and Mr Peter O'Brien, Research Fellow, testing cryocooler equipment to ascertain whether the benefits of high temperature superconductors can be harnessed by naval fleets.

Maritime Overview

DMTC's Maritime Program ensures that our industrial R&D programs are appropriate, aligned and applicable across the continuous naval shipbuilding enterprise and has five guiding principles, namely:

- reducing manufacturing costs (eliminating rework and distortion by implementing modern joining techniques and automation)
- increasing material strength requirements (weight savings, broader operating environments)
- increasing performance (next generation sonar, high strength steels, corrosion resistance, multifunctional materials, power and energy)
- supporting current fleet availability (corrosion management, repair, life extension) and
- providing detailed defence sector studies including industry and research capability and capacity to meet specific naval continuous shipbuilding requirements.

This aligns with the Government's stated ambition for Defence to establish a sovereign and sustainable shipbuilding capability for Australia.

DMTC's involvement also aligns with the Chief of Navy's vision for Navy, industry and academia to become trusted partners with deep and transformational relationships that are optimised to deliver better capability outcomes. Critical elements in Navy's Industry Engagement Strategy include developing shared understanding of challenges, and more meaningful conversations about emerging technologies.

DMTC's Maritime Program is guided by a series of Defence-commissioned Horizon Studies that cover the full Hunter Class Frigate Program lifecycle, and take into account considerations from the broader continuous naval shipbuilding program. The Horizon Studies identify key industrial R&D initiatives and interventions spanning materials, system equipment technology and industry development goals such as competitiveness and resilience.

DMTC is well placed to provide significant expertise to a reinvigorated Australian naval and maritime sector, including both surface ship and submarine programs.

DMTC's role is to deliver relevant technology outcomes for the sector that can be adopted by industry. This is achieved through coordination with Defence (CASG, RAN and DST) and collaboration with a range of stakeholders including industry primes, small businesses and research partners.

Maritime Highlights

Next-generation sonar materials

Continuing research and supply chain development is paving the way for Australia to match, if not lead, the world's best in sonar material manufacturing techniques.

These developments complement the transformational work being done by Thales Australia and ANSTO on piezoelectric properties of materials used in sonar devices.

Piezoelectric materials, and a specific subset of these materials known as ferroelectric materials, offer great promise because of their unique structural and electrical properties.

Piezoelectric materials have a unique ability to change shape when subjected to an electric force and, conversely, to produce electric current when they are deformed. It is this reversible phenomenon that allows them to be used in acoustic transducer devices that have a broad range of defence, public health and commercial applications.

Ferroelectricity is a characteristic of certain piezoelectric materials that have a spontaneous electric polarisation. The exceptional performance output of these materials in terms of sensitivity and conductivity is hampered by the complexity and cost associated with production at a commercial scale, and challenges in compositional uniformity and reproducibility.

DMTC's research is focusing on texturing – a complex process to modify the microstructure of ceramic or single crystal materials so that the atoms mirror the microstructure of single crystals.

Researchers are utilising template grain growth and domain engineering techniques, powered by complex mathematical and computational modelling. This work will advance the understanding of potential improvements in the reliability of these materials, and the consequent sensitivity and performance of specialist naval sonar equipment of which they are a critical element.

Demonstrating large-scale processing capacity and repeatability will ultimately ensure a sovereign industrial capability exists in Australia to design and produce next-generation sonar equipment.

Steeling for the next challenge

DMTC is enhancing steel manufacturing for naval vessels and providing critical insights into how steel toughness can be improved to provide capability benefits for the next generations of naval surface ships.

DMTC initiated a two-year project in May 2019 in collaboration with industry partner BlueScope Steel and researchers at University of Wollongong (UoW) and DST, to enhance steel manufacturing for naval vessels. This project builds on previous experimental work at DST. This considerable body of knowledge on blast and shock modelling, including high strain-rate testing results, is contributing to the development of new steel processing routes with the aim to improve naval shipbuilding steel and exceed current industry performance specifications.

Steel selection is typically based on strength and toughness requirements at a particular qualification temperature, but across different manufacturers, microstructural variation within the same grade can lead to different properties and performance. An understanding of the factors controlling higher strain strain-rate performance will allow a more robust steel selection criteria — in addition to the grade type — and ultimately improve the operational capability of naval surface ships.

Cool heads prevail

Engines and power systems that are smaller, lighter and more energy-efficient open the door for major energy, cost and environmental savings but also – in the Defence context – for significant capability improvements in terms of optimising the design and performance of the next generations of Navy ships.

DMTC's Maritime Program is broadening its technical focus to align with the needs of future Naval programs. One such area of new activity is under the *Power and Energy* theme.

A new three-year project has commenced, extending a productive partnership between industry partner Siemens and research partners QUT and DST.

Cryogenics refers to the behaviour of materials at very low temperatures, specifically to temperatures below -150 degrees Celsius, using liquid helium. Australia already has a broad research base and expertise in these areas. Cryogenic systems are necessary to support high temperature superconductor (HTS) equipment that is proven to deliver significant savings in a ship's energy demand.

HTS systems have many and varied applications in the maritime sector from more efficient power systems to supporting sonar and mine hunting capabilities.

Cryogenics and superconductor technologies are not new and are already utilised and exploited in a range of land-based environments. These fielded applications of the technology, however, rely on very stable operating conditions. Their application to the naval environment is untested and requires a large body of development work, in order to meet more challenging and volatile operating conditions.

DMTC's involvement signals a shared focus on the Defence need; on maintaining the industrial relevance of the research; and ultimately the delivery of sovereign shipbuilding capability.

The project aims to select a potentially suitable cryocooler for further risk reduction work and for progression along the TRL development scale. The overall project objective will be to take the cryocooler equipment from a TRL 4 in the naval environment through to TRL 6, with a clear path to implementing and trialling a demonstrator (TRL 7) on a maritime platform.

Initial work has included a comprehensive literature and industry study to identify and evaluate existing developmental cryocooler systems – and the completion of requirements documentation to drive the testing regime.

Building on the partners' previous work and expertise in HTS technologies, this project seeks to demonstrate advances in technology that will enable superconductor engines and other HTS systems to withstand the harsh and unstable operating conditions on board a Navy vessel at sea.

This project represents an exciting new area of research and industrial development for DMTC's Maritime Program. Other areas of HTS application, as well as technologies in energy harvesting, will also be reviewed for potential future projects as these align to and can potentially address the ever-increasing energy demands of Australia's naval fleets.

The Australian Army acknowledges that while technology is only one of the determinants of battlefield success, its effective utilisation is critical to achieving the twin aims of land capabilities that are ready now and future ready.

Lightweighting for next-generation small arms: carbon filament passes through a resin bath and is wound in a pattern best suited to the intended loading directions of the component.

Land Overview

Technology trends and challenges that the Army is actively monitoring include:

- increasing computational power
- new forms of human-machine interaction
- interplay between the digital and physical worlds and
- new materials.

The Army seeks opportunities to collaborate and explore emerging technologies across all the fundamental inputs to capability. It aims to build stronger partnerships with industry and particularly small businesses.

DMTC's Land Program assists the defence industry sector to ensure its work is world-class. The Land Program has traditionally focused on improving protection and survivability through enhancements in materials, and on other underpinning, platform-independent technologies including power and energy.

Of the initial list of sovereign industrial capability priorities released by Defence in 2018, the elements that most closely align with the Army's needs and DMTC's Land Program include:

- munitions and small arms research, design, development and manufacture
- combat clothing survivability and signature reduction technologies
- land combat vehicle and technology upgrades
- surveillance and intelligence data collection, analysis, dissemination and complex systems integration and
- test, evaluation, certification and systems assurance.

The Army intends to complement major platforms delivered through the Defence Integrated Investment Program (DIIP) with smaller, more numerous systems that can be purpose built for specific missions and offer mechanisms to incorporate new technologies at a lower cost.

Land Highlights

Industrialising research outcomes

In partnership with industry partner Thales Australia, DMTC is conducting research and development into networking equipment carried by soldiers, including advancement of small arms capability and future battle systems.

In this project, Thales and DMTC are working with research partners at the Royal Melbourne Institute of Technology (RMIT) and the University of Queensland (UQ) as part of a broader portfolio of activities led by Thales Australia. Known as the Networked Future Augmented Small-arms Technologies (N-FAST) program, the project is focused on a series of parallel technical investigations in areas ranging from lightweighting to digitisation and advanced manufacturing. The DMTC project is backed by investment from the Defence Innovation Hub, announced in March 2019 by Senator the Hon. Linda Reynolds CSC, who was then the Minister for Defence Industry.

RMIT's contribution to the project centres on modelling to support design activities for improved thermal management and lightweighting; and advances in the networking and integration of sensors.

The UQ contribution includes a PhD student working on materials selection for improved thermal management and lightweighting of mission systems. (Read more on Page 51).

Early work to identify opportunities for lightweighting and optimised thermal management of the current small arms design has informed extended material selection studies. Candidate materials and manufacturing processes for rifle components, are being rigorously tested to assess the potential to achieve weight reductions without compromising performance.

Simulation and modelling is another key area of activity. Following the development of low fidelity simulation models to test initial design concepts, the focus of the work has now shifted to a more advanced, high fidelity baseline. Modelling techniques being employed include computational fluid dynamics, and machine-learning architectures being utilised to optimise the modelling outputs.

A key objective of this project is to establish an Australian supply chain to support the design, engineering and production of world-leading, next-generation soldier systems in Australia.

Concept exploration: the future soldier

A focus on iterative development and improvements to the ADF's soldier combat system and ensemble highlights the importance of DMTC aligning its work to both the Army's modernisation priorities and Defence's overarching science and technology strategy.

Keeping pace with emerging operational threats provides opportunities for Defence, industry and the research sector to collaborate on maturing new materials and technologies for longer-term integration.

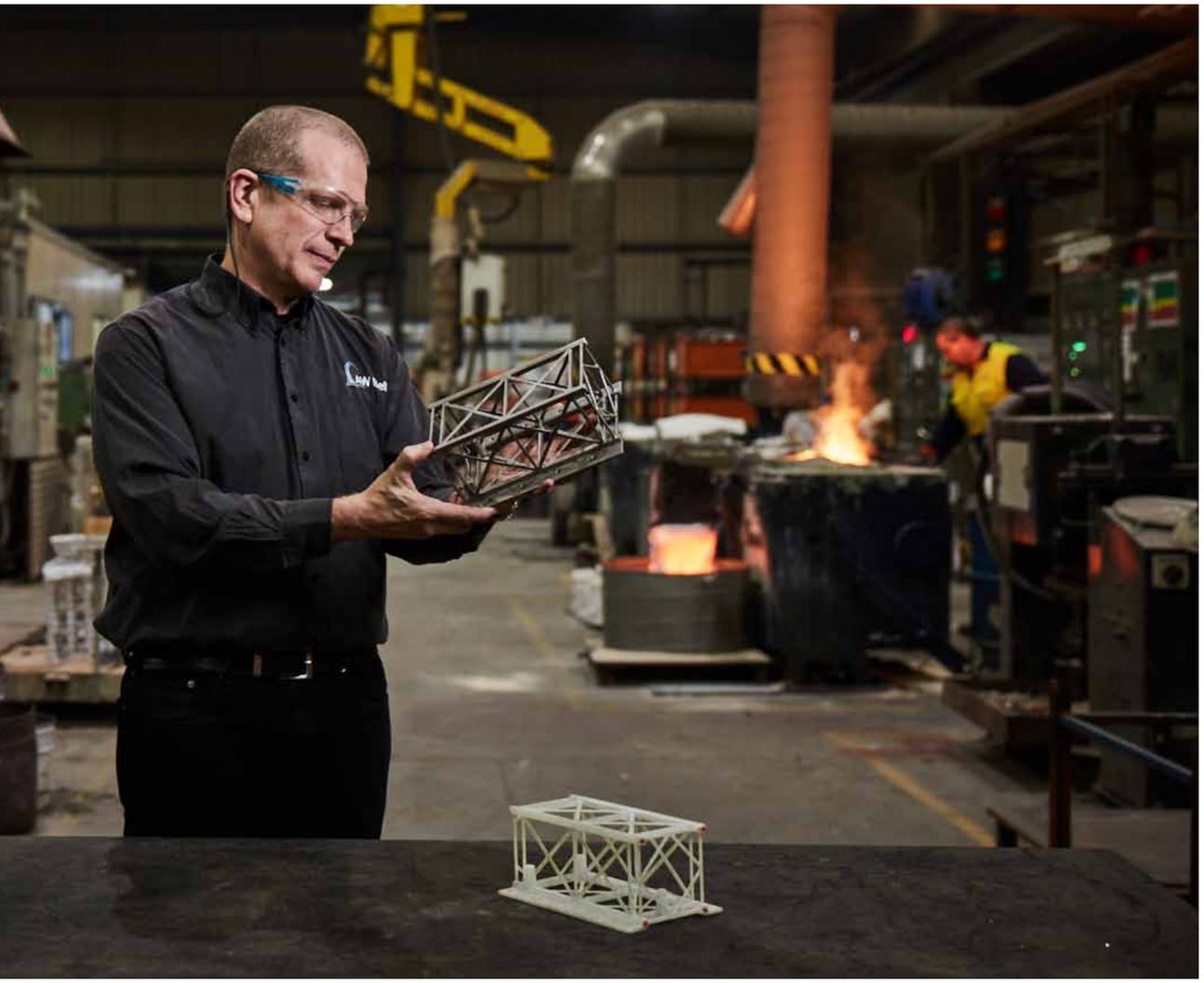
A DMTC team led by Griffith University and including industrial partners ADA and The Smart Think and researchers from RMIT and Deakin universities undertook a complex concept exploration activity to identify, prioritise and recommend technologies for further research, investigation and development.

In the context of the broader work on soldier protection technologies, this short-term exploratory work has provided critical information on system requirements, technology options and intended Defence capability benefits.

The study identified a range of overlaps and intersection points in relation to technologies and functionalities, and proposed a range of mechanisms to ensure that advances in specific technology areas (for example, in manufacturing methods, textile selection and power integration) are achieved within an overall architecture that facilitates integration and minimises redundancy.

> "Teaming with DMTC enables Thales to work collaboratively with the wider Australian academia, research and small business communities. Having world-leading technology development capability in Australia – like the work we are doing with DMTC to industrialise research outcomes – goes a long way to strengthen Defence's sovereign industry capabilities."
>
> **Thales Australia Director Soldier Weapons Systems, Mr Graham Evenden**

Defence conducts military operations and provides civil aid and assistance as a joint force. One of the areas in which integration as a joint force is most critical is in developing future capabilities in air and space domains.



Dr Roger Lumley, Senior Technical Specialist, inspects a CubeSat chassis that was precision-cast in A.W. Bell's foundry (see Page 31).

Air & Space Overview

Defence is investing in strengthening space capabilities such as satellite communications, space situational awareness and geospatial-intelligence sensors.

DMTC and its partners are working to build Australian industry capability to capitalise on new technology horizons including satellite imaging, while also continuing to exploit advances in manufacturing to optimise the through-life support of current RAAF aircraft fleets.

DMTC's work is focused on building the underlying capacity and competitiveness of Australia's national industrial base, supported by research expertise and knowledge.

Our program efforts are aligned with DST's technical objectives and with Defence's overarching airworthiness requirements. Successive projects under DMTC's Air Program have made substantial contributions to embedding new capability and capacity into Australian supply chains.

Examples include advances in on-board processing; optimising size, weight and power (SWaP) for reduced payloads; and sovereign industrial capability developments.

Alongside the priority afforded to intelligence, surveillance and reconnaissance (or ISR) technologies in a Defence context, Australia is also expanding its focus on the space industry and related technology disciplines.

A greater industrial footprint, with a particular focus on Australian small businesses and start-ups, needs to be developed to exploit the research expertise that resides in our publicly-funded research institutions and universities and support the in-country supply chains of prime contractors.

DMTC's HASS Program was established in 2017 with seed funding from CSIRO. With its focus firmly on developments in the Australian defence and national security context, the High Altitude Sensor Systems (HASS) Program has made good progress against a range of short- and longer-term objectives and milestones.

Advice and direction continues to be sought and received from a range of stakeholders across Defence, including DST.

Air & Space Highlights

Expanding our horizons

Australia has a proud history in satellite communications, but in an area of such rapid technological advances, historical success can count for very little.

In developing research themes and validating its approach to the HASS Program, DMTC has commissioned state-of-the-art reviews of developments and trends in niche technology areas as well as related industrial needs and challenges.

One such study by industry partner Inovor Technologies and research partner CSIRO examined local and global industrial developments, and analysed the technical risk involved in developing high data rate communications links proposed by CSIRO.

The study examined global developments in airborne and spaceborne sensing and communications that are vitally important in a range of areas including environmental monitoring, defence and national security and telecommunications.

The performance of current systems for sensing and communications is typically limited by challenges and tradeoffs between the sensitivity of the receiver and its size, weight and power burden.

Ka-band and Terahertz (THz) systems operate within defined series of radio frequencies to facilitate communication with, from and between satellites. Compared to lower frequency bands, Ka-band and THz systems offer opportunities for significantly increased data-transfer and processing rates. For these opportunities to be realised in long-range and high-altitude applications, the front-end receivers must be extremely sensitive while still keeping the system compact and light.

THz systems operate at a higher frequency than current communications and sensor systems, but concerns with performance reductions in atmospheric environments when compared to spaceborne applications meant that industry lacked a baseline from which to accurately gauge commercial potential.

The feasibility study addressed gaps in industrial capability and highlighted areas where DMTC's HASS Program could sponsor further developments along TRL pathways in developing compact, high-performance receivers for potential use on unmanned aerial systems and/or small satellites with small payload capacities (between 5 and 10 kg).

Beyond the arc

Elsewhere in the DMTC Air Program, a collaboration with Lockheed Martin Corporation is seeking to extend DMTC expertise in wire arc additive manufacturing (WAAM) processes.

The focus for this project is the application of the WAAM process to specific aluminium alloy materials.

Procedures for the welding of challenging branch intersections have been optimised and robotic path planning capabilities are being evaluated through the build and testing of a demonstration article at UoW.

Ready to fly

A DMTC project team has successfully demonstrated a novel approach to accelerating the production of satellite components using Invar, a low thermal expansion alloy of nickel and iron.

The additively-manufactured components produced by industry partner A.W. Bell at its Melbourne foundry have passed a series of rigorous tests to demonstrate the viability of utilising investment casting (otherwise known as precision casting) techniques to successfully produce a high-performance, thin-walled prototype CubeSat chassis, weighing just 1.3 kg.

The use of Invar seeks to directly address the challenge of significant temperature variations on small spacecraft. The stability of the structure under these conditions is critical to the performance of optical payloads (components that produce and deliver mission-specific data), including for a future University of New South Wales (UNSW) Canberra CubeSat mission in cooperation with the RAAF, known as the M2 mission.

This DMTC project is led by UNSW Canberra and includes CSIRO, La Trobe University and A.W. Bell. UNSW Canberra and A.W. Bell collaborated on the design of the CubeSat chassis, after which A.W. Bell commenced manufacture, informed by a La Trobe University literature review on the castability of Invar. UNSW conducted a range of metrology and vibration test on the manufactured components to validate the design integrity and simulate the effect of launch conditions. CSIRO has manufactured six prototype optical benches using alternative additive-manufacturing techniques (electron beam melting and cold spray). These optical benches are designed to fit on the CubeSat chassis produced by A.W. Bell.

This project is a further demonstration of the capacity and expertise of Australian industry and research organisations to meet a growing demand for high-performance small satellite structures and componentry.

Emerging technology pathways

The ability to achieve reductions in weight as well as stripping time and cost out of manufacturing processes are key drivers behind the adoption of additive manufacturing.

Innovative approaches to lightweighting include iterative design methods such as topological optimisation. These iterative methods explore and test many possible design solutions to produce new components that mimic the performance and attributes of the original structure.

A DMTC project team including industry partner BAE Systems Australia and research partners Swinburne University of Technology (SUT) and UQ has successfully applied the topological optimisation process to the additive manufacture of a defence component. For this project, a generic cube satellite structure was chosen.

The team has achieved what is believed to be a first in Australia by demonstrating improved resonant frequency at minimum weight in a manufactured and tested lab-scale demonstrator. A key to the project's success was the employment of a modelling approach known as Bidirectional Evolutionary Structural Optimisation (BESO) to optimise manufacturing process efficiency. Additive manufacturing removes the need for separate and sequential fabricating, joining and machining processes.

Vibration tests and numerical models were applied to both an original model part and to the additively-manufactured structure to validate dynamic properties. For aerospace components generally, and small satellite structures in particular, reducing or eliminating vibration is a critical enabler of the performance of on-board electronic systems.

The project team has documented each step of the process to ensure repeatability and to expedite training and technology transfer outcomes for Australian industry.

While a cube satellite structure was chosen as the demonstration article for this project, the positive results show the potential for additive manufacture of selected defence componentry on other platforms to achieve weight reductions while maintaining or enhancing functional performance.

Enabling Technologies Overview

A strong and consistent focus of DMTC's work for over a decade has been on enhancing platform-independent technologies that have potential application across more than one of Defence's operating domains.

DMTC's Enabling Technologies Program works with a broad range of industry and research partners, small and large, to build capacity and resilience in Australian industrial supply chains.

DMTC's work on advanced composites and functional materials is providing vital performance data on the suitability of a range of hybrid composite materials. This work directly informs decisions with regard to their potential use on current and future Defence platforms.

Composite materials are widely used in the aerospace industry and in other sectors including automotive and infrastructure. Among the main drivers for their adoption are improvement in mechanical and environmental performance as well as promises of substantial production cost reductions. The rate of uptake of composite materials in the defence sector has been far slower. This is largely due to the fact that, although there is a growing body of evidence of advantages of composites, the unique and exacting quality standards and requirements of defence equipment platforms are not yet fully addressed.

DMTC also seeks to identify opportunities to develop and upskill Australian supply chains for hybrid composite materials. Limitations in supply chain integration are one of the main cost drivers inhibiting the take-up of these materials in Defence projects, along with the low volume of parts typically required for the production of specialist military equipment.

This is extremely challenging but also vitally important work. The combination of research expertise and industrial pedigree is delivering results that promise dramatic decreases in manufacturing time and cost while maintaining or enhancing quality and functionality.

Pictured: SUT's Dr Azadeh Mirabedini inspects a sample of graphene. The project team is investigating possible scalable technologies for this unique material, and its optimal processing conditions.

Enabling Technologies Highlights

Measures to provide additional protection for defence personnel typically also increase the weight burden, whether in the case of the dismounted soldier or land vehicles. In the case of vehicles, increased weight can adversely impact not only mobility and transportation options but also fuel economy, speed and other elements of performance.

This predicament highlights the importance of DMTC's research into hybrid composites – that is, material compounds that are lighter in weight while offering comparable or enhanced levels of strength, functionality and durability. Cost is another critical concern.

Novel solutions being progressed in the current DMTC collaboration include both laminate structures and compounds with nanoparticles embedded to improve mechanical and environmental properties and enhance functionality.

The DMTC project is focused on developing a detailed understanding of their functional performance. Composite materials are mapped against a range of criteria including weight, impact resistance, durability, electromagnetic and thermal performance as well as raw material and processing cost.

Researchers from Deakin and UQ are working together on novel laminate structures offering similar or improved mechanical performance but with a significantly more cost-effective production profile. One of the options currently being considered is the potential to replace carbon-based fibres with basalt or fibre-metal laminates.

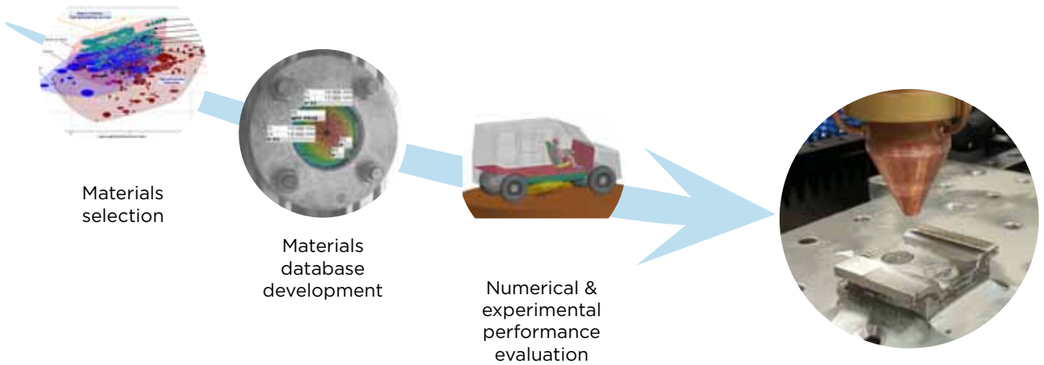
The other theme of activity in this project is nanoparticles. SUT and RMIT are leading research in the development of multi-wall carbon nanotube and graphene nanoparticle structures that can deliver significant advances in signature controls. The aim is to simultaneously address both electromagnetic and thermal signature reduction with one modified polymer material.

In conjunction with the research expertise contributed by SUT, RMIT, Deakin and UQ, industry partners Thales Australia, Penguin Composites and Imagine IM are providing the industrial context that will maximise the beneficial outcomes of the project.

This is particularly important as a major challenge still ahead of the project team is to take the newly developed processes beyond lab environments to the scale and manufacture of demonstrator parts for further rigorous testing.

Every alternative to currently fielded platforms or equipment, including those being designed to incorporate new materials, must be comprehensively tested against a complex set of scenarios including threat survivability, mobility, functionality and durability to withstand a variety of terrains and harsh operating environments. The input from industry partners is also vital to understand the compromises or trade-offs that an advance in one area of performance might require in another area.

INVESTIGATION & DEVELOPMENT PATHWAY



Pictured above: DMTC project teams are investigating emerging technologies that can inform the development of new materials and manufacturing solutions with the potential for cross-domain application in the defence sector. The value proposition for this work includes materials that offer enhanced mechanical or environmental performance, added functionality and improved cost-effectiveness.

> "Identifying and developing alternative material solutions is rarely a quick-win exercise. Following a common and well-understood process requires technical discipline and rigour. DMTC's approach ensures that all of the important considerations around functional performance, structural integrity, safety and integration are taken into account."
>
> **Dr Matt Dargusch, CTO, DMTC**

Medical Countermeasures Overview

The DMTC MCM Program has had a productive year focused on building Australian manufacturing capability for diagnostics and therapeutics, as well as developing clinical trial capability in-country.

The DMTC Medical Countermeasures (MCM) Program continues to advance the development of Australian vaccines, therapeutics and diagnostics against Chemical, Biological and Radiological (CBR) threats, emerging infectious diseases and pandemics. There have been four rounds of proposals in the program to date, involving 27 unique industry and research partners, collaborating to develop Australian medical countermeasures.

The DMTC MCM Program is guided by a whole-of-government approach, with stakeholders from key government departments providing input into the program. This Stakeholder Group endorses project proposals and enables strong coordination of national capability in response to emerging CBR threats. The Group includes representatives from the Department of Defence, DST, the Department of Home Affairs, the Department of Health, the Department of Foreign Affairs and Trade, CSIRO and the Medical Technologies Industry Growth Centre known as MTP Connect.

As at September 2019, the MCM Program is running five projects, and has four projects in the project definition pipeline. Of the five projects underway, two are therapeutics, two are diagnostics and one is a vaccine. Six projects have been completed. Notably, the MCM team had an article published in ASPI's The Strategist, highlighting the threat of antimicrobial resistance to Australia's national health security.

In May, the program's leader, Dr Felicia Pradera, chaired a panel discussion at the prestigious 3rd International CBRNE Conference in Nantes, France, titled 'Medical Countermeasures and Health Emergency Preparedness and Planning: An Australasian Perspective'. The panel included key representatives from Japan, France and Australia and it was the first time representatives from the Asia Pacific region had presented at the conference. Key discussions surrounded the role of modelling and simulation in the decision-making processes for MCM development and deployment, as well as the importance of strengthening public-private partnerships and cross-national collaboration in the South-East Asian and Pacific regions.

In June, Dr Pradera ran a workshop on MCM, in collaboration with DST, at the Military Health Security Summit in Sydney – an invitation-only segment of the Global Health Security Conference 2019. This workshop covered the role of bio-surveillance in informing utilisation of medical countermeasures. It also included information on data fusion, epidemic modelling and simulation and how these tools could be applied to early warning scenarios.

Dr Adam Meyer of CSIRO and his team have developed a new process to batch-produce a novel antibacterial drug candidate developed by a small Perth-based pharmaceutical company.

Medical Countermeasures Highlights

Tackling antibiotic-resistant pathogens

This DMTC collaboration between Boulos & Cooper Pharmaceuticals and CSIRO aims to establish a new manufacturing route for scaling-up the production of a novel antibiotic, enabling its testing in clinical trials.

Boulos & Cooper, based in Perth, has developed a first-in-class antibiotic, Ramizol®. With antibiotic resistance on the rise, and few novel classes of antibiotics being successfully brought to market globally, it is critical that new antibiotics are developed to effectively treat antibiotic-resistant pathogens.

This antibiotic targets bacteria by causing deprivation of the key factors it uses to survive. It has also been shown to be an antioxidant and to reduce inflammation associated with infection.

Ramizol® has demonstrated effectiveness against several gram-positive bacteria and some gram-negative bacteria. The primary treatment target is *C.difficile*, a spore-forming anaerobic bacteria, which is difficult to treat and causes colitis and diarrhoea.

Early studies have shown Ramizol® to be effective against drug resistant strains of *C.difficile*, including those resistant to antibiotics such as vancomycin, fidaxomicin and metronidazole. The team has also shown that the antibiotic is highly stable, which reduces storage and transportation costs. This also means it can be safely transported to and used in remote locations, servicing Defence's need for field-deployable therapeutics.

The project is developing Australia's large-scale manufacturing capability, in particular flow chemistry, through CSIRO. Development of Australian manufacturing capability has always been core to DMTC's programs.

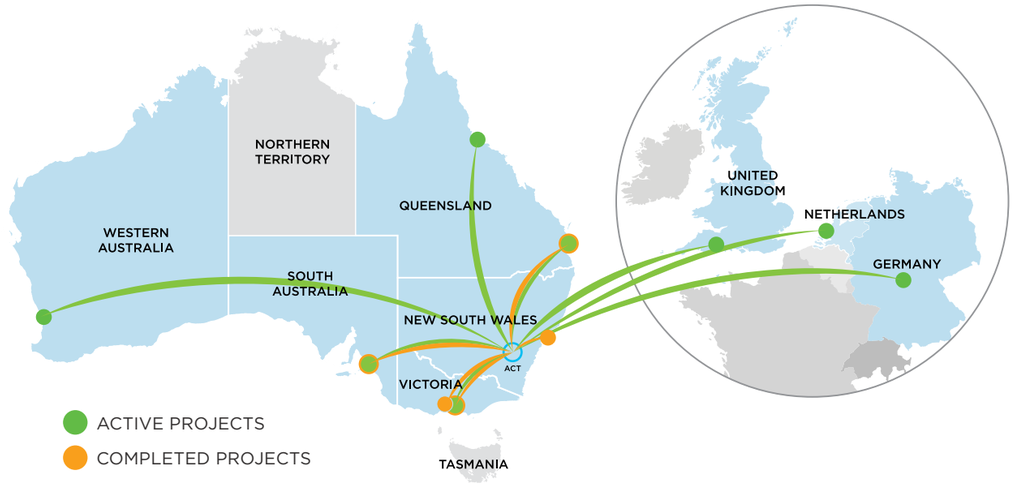
To date, the DMTC project team has made significant developments towards the target production of 10 kg of Ramizol®, and has so far manufactured up to 2.5 kg of the antibiotic.

The success in scaling up production of Ramizol® will allow Boulos & Cooper to undertake a clinical trial with the outputs from this DMTC project.

"An important element of national security is ensuring nations are prepared to prevent and respond to threats to human health, such as disease and epidemics."

Dr Tracy Smart, AO
Air Vice-Marshal
Surgeon General of the ADF

PROGRAM PARTNERS



Highly sensitive rapid diagnostic

DMTC has collaborated with QUT, Australian company Microbio and DST, to refine the sensitivity and specificity of a diagnostic to identify seven security sensitive biological agents (SSBAs) without culture, so that the technology can be used in field deployable clinical settings.

Rapid diagnostics have the potential to save lives, as they detect the specific pathogens causing infection allowing for a precise treatment to be tailored.

The diagnostic, called InfectID®, was developed using novel and innovative bioinformatic tools to genetically identify blood/plasma borne bacteria. The process relies on characterising the single nucleotide polymorphisms (SNPs) from the DNA sequences of pathogens. InfectID® is able to detect pathogens in low bacterial loads of 7 to 15 pathogen cells per mL of sample, meaning the technology is highly sensitive.

From a public health perspective, InfectID® has been able to characterise a range of pathogens, such as: *Staphylococcus auereus*, also known as 'golden staph' which can cause a range of antibiotic-resistant infections and *Neisseria meningitidis*, which is responsible for causing both meningitis and sepsis.

It is predicted that InfectID® will also be able to differentiate between bacteria, fungi and viruses, and if successful this could be an important step in reducing diagnostic delays in clinical practice. This deficit has contributed to an over-prescription of antibiotics and the rise of antimicrobial resistance.

DST's collaboration on this project will be through providing strategic guidance to the project team and validating the sensitivity and specificity of InfectID® against security sensitive biological agents.

If this DMTC project is successful, it is anticipated that industry partner Microbio would conduct a clinical trial with Pathology Queensland. The expectation is that the technology can then be commercialised for civilian purposes to target sepsis in pathology labs throughout Australia. However, the DMTC project outcomes could also enable InfectID® to become a reliable field-deployable diagnostic tool that can be used by the ADF in remote settings, enabling rapid responses to both infection and deliberate biological attacks.

The InfectID® project is one of a number of activities under the MCM Program that is applying new technologies to target a diverse range of pathogens.

Industry Capability Development

Supporting the next generation of defence suppliers

DMTC's leadership in industry capability development and technology transfer has been pivotal in building local supply chains and has resulted in global opportunities for Australian industry.

DMTC's ICD Program aims to create a national network of 'Defence-ready' companies with benchmarked, globally competitive capabilities. It is a natural fit with DMTC's strong focus on engaging small businesses across our portfolio of programs.

Following previous work in areas such as computer numerically controlled (CNC) machining and additive manufacturing, efforts in 2018-19 focused on enhancing Australian industry's welding capabilities with a particular emphasis on working with the high-strength steels used in both land and maritime domains.

The multinational prime contractors delivering major equipment programs for Defence are looking for highly skilled, regional SMEs with valuable experience in industries such as mining and natural resources that could, with the right information and guidance, transition to the defence sector and boost the capacity of Australia's defence industry.

DMTC's ICD Program provides both process benchmarking and technological expertise to help these Australian companies to enhance their 'factory floor' operating procedures and demonstrate their potential to compete for defence sector opportunities.

The DMTC team leading the workshops involves research partners from the UoW and SUT with assistance from the CDIC and relevant certification partners including Weld Australia.

Experts engaged by DMTC provide mentoring and evidence-based feedback on what the workshop participants need to do to lift themselves up the skills curve.

The ICD workshops also aim to expose small businesses to the exacting quality requirements of major prime contractors, and to broader industrial trends in precision manufacturing.

Australian small businesses like Brisbane-based Jade Engineering are bringing their manufacturing experience, expertise and capacity to the nation's defence supply chains.

Industry Capability Development

Welding companies test their mettle

DMTC's ICD Program has helped more than 20 Queensland-based small businesses to test their mettle and meet benchmarks required for work in defence industry supply chains.

This provides opportunities for continuous improvements in welding capabilities for businesses, positioning them to compete for future work on future frigates, submarines and armoured vehicles.

Following a successful pilot in the Mackay region in 2017, additional workshop activities targeted companies in Cairns, Townsville, Rockhampton and Brisbane. The workshops were supported by funding from the Queensland Government through its *Defence Industries 10-Year Roadmap and Action Plan* launched in 2018.

The final workshop for the current cohort of industry participants in the Brisbane/Ipswich region was held at the TAFE Queensland *SkillsTech* facility in June.

Workshop participants reported a range of benefits from the programs including a greater understanding of the latest welding techniques and processes, the value of technical accreditations and the steps needed to reach competitiveness benchmarks and position their companies for future growth.

In regions such as Cairns where there was already a better understanding of the defence sector's unique requirements, participants still viewed the engagement with DMTC favourably in providing insights into new technologies, including smart automation and augmented reality.

Adopting smart automation, even in iterative phases as the confidence and capability of the workforce increases, can significantly enhance a small business' productivity, particularly in sustainment or refurbishment tasks. Benefits of automation include reductions in manufacturing cycle times and step increases in precision and accuracy. Cost savings through reducing rework or reject rates can help small businesses to re-evaluate their company's capabilities and find a competitive edge.

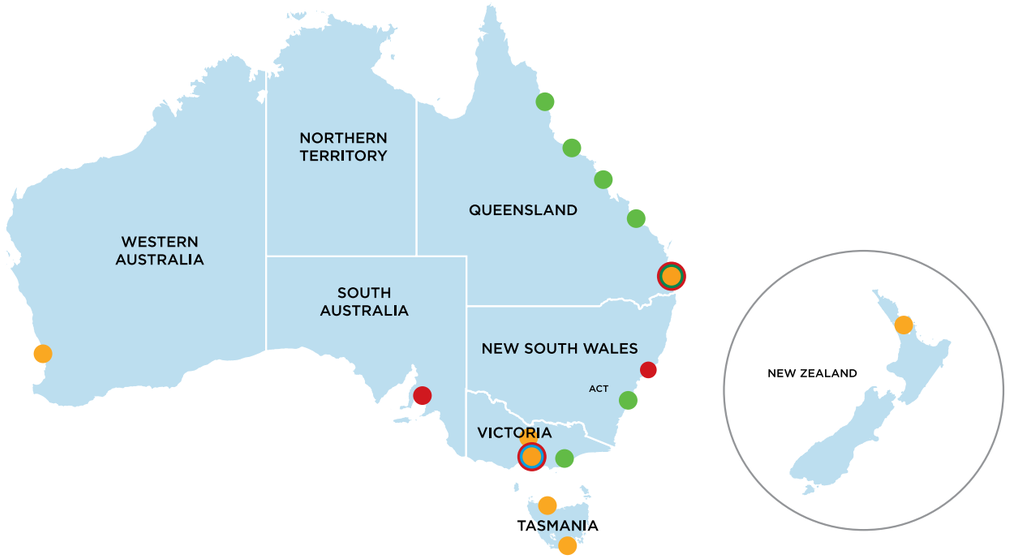
LOOKING AHEAD

DMTC's new services contract with the Defence Innovation Hub, signed in June 2019, is strongly focused on supporting DMTC's continuing efforts in knowledge and technology transfer to Australian industry. The key aim is to overcome barriers for Australian industry and increase the size and diversity of the Australian supply chains of prime contractors.

Through this new contract, DMTC plans to extend its ICD program activities to include technologies such as precision manufacturing, welding of high-strength steels and, in collaboration with RMIT, the adoption of Industry 4.0 technologies. Workshops are planned for 2019-20 in Queensland, Tasmania and Victoria, and future activities in Western Australia and New Zealand are also being developed. (*For the purpose of measuring local content in major defence contracts, and consistent with the Australia–New Zealand Closer Economic Relations Trade Agreement, the definition of Australian defence industry includes New Zealand entities.*)

Through the expansion of this program into new manufacturing technology areas and themes, DMTC is demonstrating its ongoing commitment to building the capacity of Australian small businesses, many of whom have critical capabilities to offer to the major defence prime contractors.

BUILDING SUPPLY CHAIN PARTICIPATION



- Titanium supply chain project
- Additive manufacturing benchmarking
- Welding high strength steel
- 2019 - 2020 engagement

PROGRAM PHASES

1. Focusing on regional clusters of capability – companies with readily transferable skills to move into the defence sector (e.g. resources, automotive).
2. Setting regional clusters within a national network of capability, and engaging with the primes to embed the Defence sector context.
3. Continuing optimisation, innovation and technology insertion to supply chain partners, maintaining best practice.

Annual Conference 2019

Ms Nicole Bradley and Dr Mark Hodge present Mr Michael Saleh of ANSTO (centre) with the DMTC Collaboration Award.

DMTC hosted a successful technical conference in Canberra in March, providing the DMTC community with a range of perspectives and information on developments in the Defence innovation system.

The conference was formally opened by Mr Brad Yelland, Chief Technology Officer of BAE Systems Australia, who highlighted the significant role DMTC would play in his company's implementation of its Australian Industry Capability (AIC) Plan for the Hunter Class Frigate Program.

Keynote speakers included the then Minister for Defence Industry, Senator the Hon. Linda Reynolds CSC (now the Minister for Defence); the Shadow Assistant Minister for Defence Industry and Support the Hon. Dr Mike Kelly AM, MP; the Head of the National Naval Shipbuilding Office Mr Peter Chesworth; and DMTC CEO Dr Mark Hodge. Thirty-five technical presentations were delivered across seven streams, and project and student posters were also on display for the duration of the Conference.

Three concurrent streams of activity were a highlight of the second day of the Conference, including a stream facilitated and delivered by the Defence Innovation Hub.

Awards for Excellence 2019

Project teams, individuals and early career researchers leading the way in technology innovation across the DMTC community were honoured at DMTC's 2019 Awards for Excellence, held at the National Gallery of Australia.

The guest speaker was the co-captain of the 2018 Australian Invictus Games team, Ms Nicole Bradley; her inspirational speech was one of the highlights of the evening. Ms Bradley joined DMTC CEO Dr Mark Hodge to present the awards.

Mr Michael Saleh, a senior structural engineer with ANSTO, won two awards including the Collaboration Award, for his leadership and contribution to the development of advanced and innovative blast and shock modelling regimes. These regimes will inform and improve the safety and functionality of future Defence equipment platforms.

Other award winners were:

- A project team comprising BAE Systems, DST, QUT and SUT that is enhancing corrosion monitoring on Navy surface ships
- ANSTO researcher Dr Inna Karatchetseva, for a long-standing DMTC partnership with ANSTO and Thales Australia to develop an Australian supply chain for critical components of sonar transducer equipment
- Dr Brodie McDonald from RMIT University, who won the Early Career Research Award for his expert input to DST's work on complex numerical models to predict the performance of high-strength steels used in military vehicles. Young researchers Ms Emily Kibble (UWA) and Mr Ben Southwell (UNSW) received commendations. (Ms Kibble's work features on Page 50)
- A team working on the identification and development of hybrid composite materials and structures, for the Best Project Poster (read more on Page 34)
- Ms Scarlet Kong, for the Best Student Poster
- Dr Yen Truong for the Best Conference Presentation, providing an update on critical work to enhance the structure of fabrics used in protective military suits and uniforms.

1. Senator the Hon. Linda Reynolds CSC
2. Delegates discuss student posters on display
3. Mr Peter Chesworth.

Diagnostic device wins National Innovation Award

A highlight of 2018-19 was the success of DMTC's MCM Program at the international Land Forces Exposition, held in Adelaide in September 2018.

The prestigious National Innovation Award in the Combat Equipment and Mobility category was presented to a DMTC project team for its development of a field-deployable, handheld diagnostic device. DMTC's CEO Dr Mark Hodge, MCM Program Leader Dr Felicia Pradera, Dr Sacha Dopheide of Lumos Diagnostics and Dr Charlie Huang of Anteo Technologies were presented with the award by the then Minister for Defence, the Hon. Christopher Pyne MP (pictured above).

The development of different types of cartridges will enable medical professionals to rapidly identify life-threatening diseases that can detect and differentiate between multiple infectious disease agents at the point of care.

Industry partners Lumos Diagnostics (a wholly-owned subsidiary of Australian medical technology firm Planet Innovation) and Anteo Technologies collaborated with research partner Deakin University on the project. The platform reader has now been commercialised.

The award is a further reflection of DMTC's resolute focus on the needs of the Defence customer and the warfighter.

The industrial partners engaged in this project, as with many across the MCM Program, are not 'traditional' defence sector suppliers. In this regard, the project is not only providing an important national health security capability, but also growing the capability and capacity of Australian industry to meet Defence's needs as well as pursuing public health and even export opportunities.

DMTC's MCM Program (detailed on Page 37) is investigating novel technology improvements to help build a sovereign industrial medical countermeasures capability for Australia, so that the nation can effectively respond to natural or man-made threats, diseases and pandemics.

Young DMTC researcher takes top Avalon prize

RMIT University and DMTC PhD candidate Jimmy Toton has achieved national and international recognition for his research, winning the 2019 Young Defence Innovator Award at the Avalon International Airshow.

The metals used in defence and aerospace are so strong that making high quality tools to cut them is a major, and expensive, challenge. Jimmy's innovative work means that the highest quality cutting tools can now be 3-D printed, potentially saving time and money for aerospace and defence manufacturers.

"In defence circles, the convergence of quality, cost and scheduling pressures is sometimes referred to as the holy trinity of defence acquisition," explains Jimmy.

"For the defence industry, additive manufacturing has the potential to hit all three of those markers – to increase performance, reduce costs, and to cut lead times when it comes to the production of high value, low batch, complex shaped components."

This collaborative project, which involved industry partner Sutton Tools and was conducted at RMIT's Advanced Manufacturing Precinct, demonstrates that 3-D printed steel tools can match or out-perform conventional tooling when used to cut titanium alloys.

According to DMTC CEO, Dr Mark Hodge, there is a clear benefit to Australian manufacturers through increased productivity and cost-efficiency.

"Supply chain innovations and advances like improved tooling capability all add up to meeting performance benchmarks and positioning Australian companies to win work in local and global supply chains," he said.

"The costs of drills, milling cutters and other tooling over the life of major defence equipment contracts can run into the tens, if not hundreds, of millions of dollars. This project opens the way to making these high-performing tools cheaper and faster, here in Australia."

Working with Sutton Tools under the DMTC model ensured Jimmy's research delivered industry-relevant outcomes, and was also a strategic investment that developed and retained intellectual property and industrial expertise in Australia.

Additive manufacturing technologies are on the rise globally and Jimmy's project highlights a market where it can be applied because of the benefits that this technology offers over conventional manufacturing methods.

In addition to his success at Avalon, in 2019 Jimmy also won an Endeavour Award during National Manufacturing Week for his research, and travelled to Germany as a finalist for the international 3-D Pioneers Challenge. Jimmy is now employed as a cutting tool expert with ANCA, a Melbourne-based global supplier of CNC tool and cutter grinders, motion controls and sheet metal. ANCA has customers in over 45 countries and is a proud example of an advanced manufacturing Australian company succeeding in global markets.

Education Program Overview

DMTC's Education Program has a longstanding commitment to supporting Australia's next generation of Defence scientists and engineers. To date, DMTC has assisted 49 PhD and Masters Candidates with scholarships, operational funding, travel and conference support. DMTC also has a well-established vacation student program, placing third and fourth year engineering students from partner universities on industrially-targeted projects for up to 12 weeks.

PhD and Masters scholarships are provided based on alignment of the research proposal with future Defence capability requirements and industrial opportunities for Australian industry. This approach ensures the best and brightest can make meaningful contributions to Defence capability throughout both their studies and their careers.

DMTC has a successful track record of transitioning postgraduates into careers in the Defence sector, whether with research or defence industry organisations or with Defence itself. Over the past year, several DMTC candidates have utilised the Australian Postgraduate Research (APR) Intern Program. *APR.Intern* provides a platform for PhD candidates to work on tightly focused research projects, typically for three to five months, giving them the opportunity to apply highly analytical research expertise and gain invaluable experience in an industry setting.

DMTC also plays an important role in bringing together a cohort of Defence-focused PhD Candidates across a range of disciplines. The DMTC Education Program incorporates PhD and Masters Candidates from the Research Training Centre for Naval Design and Manufacturing and the Defence Science Institute. This is a great opportunity for students and supervisors from various technical disciplines to network and collaborate on areas of common interest. DMTC continues to engage with aligned Research Training Centres and other state-based innovation networks on opportunities for future collaboration.

DMTC holds an Annual Student Conference as well as professional development workshops each year that allow students to hone their professional skills, enhancing career opportunities in the defence and national security sectors.

Chief Defence Scientist Prof Tanya Monro with DST researcher Dr Brodie McDonald and his DMTC Early Career Research Award for complex numerical modelling.

PhD & Masters Profiles

Ms Emily Kibble

Ms Emily Kibble is a PhD candidate from Murdoch University, where she received first class honours in Biomedical Science in 2016. Her PhD project, supported by a scholarship from Murdoch and supplemented by DMTC's Education Program, is titled 'Macrophage Infectivity Potentiator (Mip) Proteins as novel antivirulence targets in *Neisseria Meningitidis*'.

Emily's research focuses on the pathogen *Neisseria Meningitidis*, which is responsible for meningococcal disease. Specifically, her research investigates the inhibition of a protein called Mip, which appears to be crucial in bacterial development and infectivity.

Inhibition of the Mip protein could undermine its virulence, enabling it to become a target for treatment. Previously, not much was known about the Mip protein function in *Neisseria Meningitidis*, which highlights the importance of this PhD research for the development of future therapeutics.

Emily's PhD research is part of a collaborative DMTC project involving UWA, DST, the Peter Doherty Institute, the University of Exeter in the UK and the University of Wurzburg in Germany. This project is developing a novel technology to enable the identification of new anti-virulence compounds against a range of biological warfare (BW) pathogens.

Emily has developed a novel screening mechanism to significantly reduce the time required to test anti-virulence inhibitors against pathogens. By modifying the assays and equipment used in this process, she has increased the effectiveness of the testing process.

In recognition of Emily's work with pathogenic bacteria as part of the DMTC project, she received the Australian Industry and Defence Network (AIDN) Western Australia Young Achiever of the Year Award for 2018.

Emily's passion for investigating pathogenic bacteria and her desire to improve treatments for infectious diseases have led her to contemplate a future career in defence science, for the benefit of both civilians and military personnel.

**Read more about Emily's awards on Page 45.*

Mr Harry Veivers

Mr Harry Veivers is a PhD candidate at UQ's School of Mechanical and Mining Engineering, where he completed a Masters degree in mechanical and aerospace engineering in 2018. The focus of his PhD project, titled 'Influence of Fibre Length on Carbon Fibre Reinforced Composite Thermomechanical Performance', is to develop a model for how the length of carbon fibre reinforcement affects the performance of composites at high temperatures. Improving the potential for incorporation of short fibre reinforcement will enable enhanced lightweighting, reduced material cost and improved processing time, with applications across a variety of defence equipment platforms.

In partnership with Thales Australia, Harry has worked on materials selection optimisation for improved lightweighting and thermal management of small arms mission systems in support of their N-FAST program. By incorporating cutting-edge, high-temperature composite materials, his research has enabled the development, manufacturing and industrialisation of next-generation lightweight small arms technology. Harry has travelled to Melbourne, Sydney and the Lithgow Arms factory in regional NSW to present his research and participate in technical workshops.

"It's been really valuable to me to be involved in DMTC because I like working on the cutting edge of R&D. It's exciting and it's delivering real capability to companies like Thales," Harry said.

Ultimately, Harry aims to continue his work on incorporating lightweight, high temperature composite materials into ADF platforms and challenging the limits of traditional material performance.

Finance Snapshot

In the reporting period, DMTC continued to focus on the successful delivery of outcomes across a portfolio of new and continuing activities. Ongoing engagement with Defence continued to provide assurance of the alignment of DMTC's industry-focused technology R&D activities.

DMTC received a portion of its income from the Defence Strategic Policy & Intelligence Group under the enabling agreement that concluded on 30 June 2019. Through DMTC's co-investment model, this funding leveraged additional cash and in-kind investment from Australian industry, research agencies, State Government and other Defence Program sources.

Revenue for the financial year totaled $23.4m, reflecting a Compound Annual Growth Rate (CAGR) of 7% over the past four financial years. Total revenue included $13.6m of in-kind contributions from industry and research partners.

DMTC is well positioned to respond to emerging technological challenges as a result of both its business model and careful management of committed funds. The timing and cash flow implications of strategic investment decisions and related payments resulted in a modest surplus of $476k for the year ending 30 June 2019.

Cash reserves totaled $12.1m at 30 June 2019 and included $10.8m of unearned revenue from Defence, CSIRO and DST. These funds have been committed to fulfil existing and new research activities in future periods under Defence contracts, the MCM Program and the HASS Program respectively.

Copies of the company's statutory financial report for the year ending 30 June 2019 are available on request.

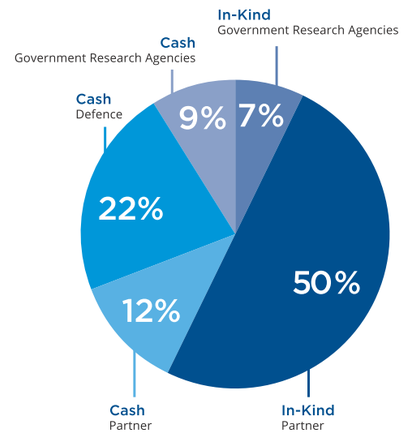
> "As attested by the Government's 2018 Major Projects Report, DMTC's collaborative model has proven essential to our mission of enhancing industrial capability through innovation in this country. It is our pleasure to continue working with our partners to achieve this goal."
>
> **Dr Mark Hodge, CEO DMTC**

YEAR IN SUMMARY

RESOURCES **RECEIVED**

TOTAL
$23.89
MILLION

Cash
$10.31
MILLION



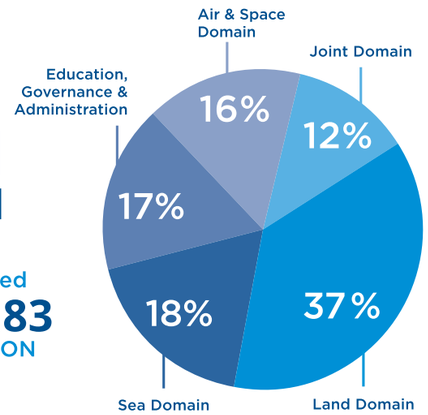
* Government Research Agencies includes CSIRO and DST

RESOURCES **APPLIED**

TOTAL
$23.41
MILLION

In-Kind Applied
$13.58
MILLION

Cash Applied
$9.83
MILLION



* Joint Domain includes Enabling Technologies and Industry Capability Development
* Land Domain includes Medical Countermeasures

Management Team

DR MARK HODGE
Chief Executive Officer

MR STEVE EVANS
Chief Financial Officer

MR JIM ARTHUR
Chief Operating Officer

MR DEEPAK GANGA
Lead Program Manager &
Land (Dismounted) Program Leader

DR FELICIA PRADERA
Medical Countermeasures
Program Leader

MS CHARLOTTE MORRIS
Industry Capability Development
Program Leader

DR MATT DARGUSCH
Chief Technology Officer &
Air Program Leader

DR KIMBERLEY CLAYFIELD
High Altitude Sensor
Systems Program Leader

DR MARTIN VEIDT
Enabling Technologies
Program Leader

DR STEPHEN VAN DUIN
Maritime Program Leader

MR MILES KENYON
Head Maritime Strategy

MS BRONWYNNE MCPHERSON
Executive Coordinator

MR JAMES SANDLIN
Program Development Manager

MS ANTHEA SILOM
Management Accountant

MS ELISA WOODLOCK
Information, Quality &
Program Support Officer

MS MADDY WALTERS
Program Support Officer -
Medical Countermeasures

MR HARRY BAXTER
Head Government Relations

MR GARY SAVAGE
Land (Mounted) Program Leader

* Dr Neil Sims, Program Leader High Altitude Sensor Systems, and Dr Hana Shiraz, Program Support Officer – Maritime, joined DMTC's Management Team in the period between the end of the 2018-19 financial year and the finalisation of this report.

The DMTC Board is responsible for overseeing the management and strategic direction of the Company. Each Director is elected for a two-year term by the Company's Members at the AGM. As required by the Company's Constitution, the Directors have a comprehensive and complementary range of skills and experience covering areas such as Defence systems and procurement, education and research, financial and risk management and corporate governance.

AGM and Participant Workshop

The DMTC AGM was held on 8 November 2018 and in accordance with the Company Constitution, Directors Dr Roger Lough, Mrs Bronwyn Constance, Dr Peter Jonson and Mr Michael Grogan retired by rotation at the meeting. Dr Lough, Mrs Constance and Dr Jonson informed the Members they were not standing for re-election. Mr Grogan was re-elected to the Board of Directors and two new Board-endorsed candidates Ms Patricia Kelly and Mr Marc Peskett were also elected to the Board of Directors.

DMTC members provided unanimous endorsement of variations to DMTC's Constitution to support the ongoing governance and sustainability of the Company in the context of the new contractual environment, as well as endorsing the re-elected and newly elected Board Members.

The DMTC Participant Workshop was held on 8 November 2018. The workshop provided participants with an update on the Company's ongoing and planned program activities.

Audit, Risk and Remuneration Committee

The Audit, Risk and Remuneration Committee is a formal subcommittee of the Board. The Committee assists the Board in its decisions on financial reporting, internal control structures, internal and external audit functions, compliance, governance and risk management systems and remuneration policies. The Committee is comprised solely of nonexecutive Directors of DMTC, the majority of whom are independent.

Environmental and social causes

The DMTC Management Team continues to work towards minimising its environmental footprint and demonstrating its ongoing commitment to corporate social responsibility. During the reporting period, the company continued to implement environmental and sustainability initiatives such as procurement of recycled office paper, eliminating avoidable business travel and purchasing carbon offsets for business air travel. More broadly, individual members of the management team are engaged in corporate volunteering programs. DMTC procures administrative supplies and corporate communications material through social enterprises where possible and is also proud to sponsor several academic prizes and charities.

PROUD SUPPORTER OF SOLDIER ON

Nadrasca Diversity in Industry

MR TONY QUICK
Chair
MA (University of Cambridge)

MS PATRICIA KELLY
Director
BA, GAICD

MR MARC PESKETT
Director
CA (Australia), FTI (Australia)

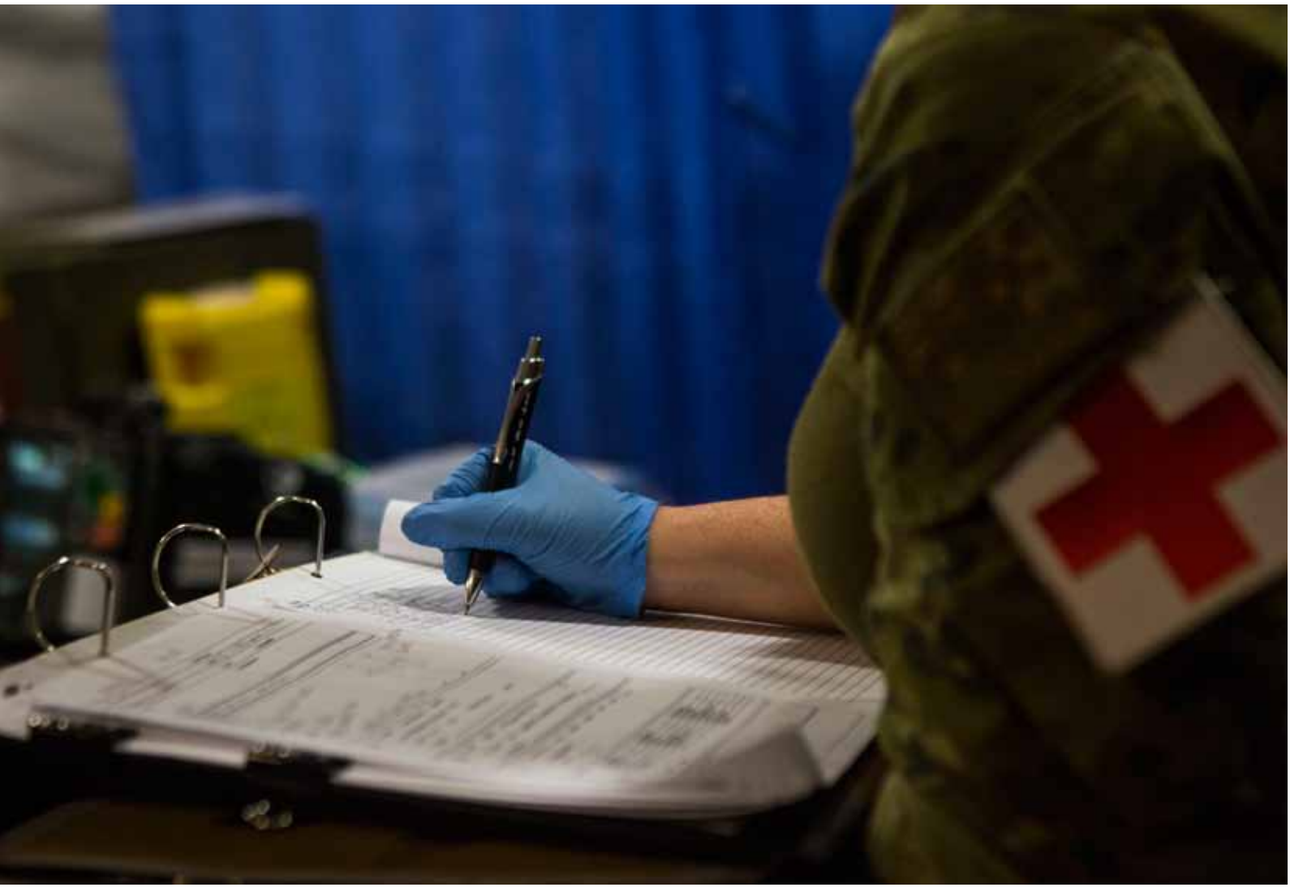
MR MICHAEL GROGAN
Director

PROFESSOR VALERIE LINTON
Director
PhD (University of Cambridge),
MBA (La Trobe University), FIEAust

DR JOHN BEST
Director
PhD (University of Wollongong),
BSc (Hons) (University of Queensland),
MBA (University of Adelaide), GAICD

* Air Marshal (Ret) John Harvey AM was appointed to the Board of Directors in the period between the end of the 2018-19 financial year and the finalisation of this report.
** The biographies of DMTC Board members are available from www.dmtc.com.au

Quality Management



Australian Army medics assess a simulated injury while participating in a mass casualty exercise during Exercise Talisman Sabre 2019 at Shoalwater Bay Training Area in Queensland.

Quality system accreditation is a key reputational asset for DMTC in its engagement with the Department of Defence and, more broadly, in its work in the Australian defence sector, complementing appropriate physical and information security measures.

The achievement of ISO 9001:2015 accreditation by the company in 2017 has been reaffirmed in annual audits required to retain the accreditation. The ISO benchmark represents a genuinely independent validation of our systems and processes.

In 2019, DMTC was also successful in achieving accreditation against the ISO 44001:2017 Collaborative Business Relationship Management Systems standard. This ISO certification is a validation of the DMTC collaborative model. To the best of our knowledge, DMTC is the first organisation in Australia that has been accredited to ISO 44001:2017.

The external accreditation of DMTC's quality management system and business relationship management system sits alongside, and is complementary to, a range of existing, internal continuous improvement commitments.

Through both of these initiatives, DMTC continues to maximise the effectiveness and efficiency of its program delivery activities, and its supporting corporate systems and operations.

DMTC's partners and state and federal government agencies alike can have confidence that our focus remains in delivery of practical, tangible outcomes for Defence capability and for the defence industrial sector.

Building on its seven years of involvement in the internationally-benchmarked Supplier Continuous Improvement Program, administered in Australia by the CDIC, DMTC has continued to conduct annual self-assessments. These are useful as a 'health-check' on the organisation and to test the strategic focus and alignment of ongoing improvement initiatives.

SUPPLIER CONTINUOUS IMPROVEMENT PROGRAM
PARTICIPANT

CERTEX
9001:2015
Quality Certified

CERTEX
ISO 44001
Collaborative Business
Relationship Management System

Glossary

ADF	Australian Defence Force
AM	additive manufacturing
C-SASS	compact spatially agile spectral sensor
CASG	Capability Acquisition and Sustainment Group
CBR	chemical, biological or radiological
CDIC	Centre for Defence Industry Capability
CNC	computer numerically controlled
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Defence	Australian Defence Organisation
DICP	Defence Industrial Capability Plan
DIIP	Defence Integrated Investment Program
DIPS	Defence Industry Policy Statement
DMTC	Defence Materials Technology Centre
DST	Defence Science and Technology Group
FY	financial year
HASS	high altitude sensor systems
HTS	high temperature superconductor
HVOF	high velocity oxygen fuel
ICD	Industry Capability Development
MCMs	medical countermeasures
Mip	macrophage infectivity potentiator
N-FAST	Networked Future Augmented Small-arms Technologies program
PhD	Doctor of Philosophy
QUT	Queensland University of Technology
R&D	research and development
RAAF	Royal Australian Air Force
RAN	Royal Australian Navy
RMIT	Royal Melbourne Institute of Technology
SME	small to medium-sized enterprise
SSCG	solid-state single crystal growth
SUT	Swinburne University of Technology
TRL	Technology Readiness Level
UoM	The University of Melbourne
UoW	The University of Wollongong
UNSW	University of New South Wales
UQ	University of Queensland
WAAM	wire arc additive manufacturing

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