ANNUAL REPORT

CAPABILITY THROUGH COLLABORATION

DMTC

2021

IMAGE
Credits

All images in this Report were taken in COVID-safe settings.

AUSTRALIAN GOVERNMENT DEPARTMENT OF DEFENCE
Front Cover, 28, 34

MIKE BAKER PHOTOGRAPHY
Page: 4, 50, 51, 53

UNSW CANBERRA SPACE
Page: 7

ROD PILBEAM
Page: 12

JENNY JOHNSON (RAP ARTIST)
Page: 15

JAMIE FARNELL
Page: 25

PROTEIN DATA BANK IMAGE
(https://www.rcsb.org/structure/6I2T)
Page: 27

CAMCO ENGINEERING
Page: 40

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Cover: HMAS *Ballarat's* MH-60R helicopter prepares to launch at dusk during a recent Regional Presence Deployment in the Indian Ocean. The harsh operating conditions faced on deployments give rise to challenges including corrosion of metal alloys commonly used in ADF rotary wing fleets. More details on DMTC's work with partners to prevent and manage corrosion is on Page 37.

TABLE OF
Contents

KEY MESSAGE

Government

Australian companies are at the cutting edge of technology and it is critical that we harness this capability to ensure our men and women in the Australian Defence Force are the best equipped in the world during this strategically challenging time.

Gaining and retaining that capability edge for our Defence Force will help protect Australia and promote security and prosperity in our region.

This is why I commissioned an independent review into Defence innovation, science and technology.

The review was asked to carefully examine the Defence organisation in its entirety, to establish how it can more effectively deliver home-grown, innovative capabilities for the men and women of the ADF.

DMTC partners with industry to build the breadth and depth of Australia's industrial capability, and works with the research sector to enhance the alignment with – and the relevance of – research outcomes to help overcome the challenges faced by Defence and national security agencies.

I acknowledge the continuing partnership between DMTC and Defence, including through the Defence Innovation Hub. I was delighted to recently announce a new Hub investment to advance the application of ground-breaking textile technologies that have been years in the making and reflect a strong partnership between Defence Science and Technology Group, DMTC and industrial and research partners.

Throughout my time as Defence Industry Minister, I have been focused on supporting the delivery of world-class capability for our Defence Force and showcasing the ingenuity of Australian business, creating thousands of Australian jobs in the process.

Together with prime contractors and bolstered by the support of organisations like DMTC, small businesses in Australia's defence sector are well-positioned to demonstrate that they are among the best in the world.

As Defence Industry Minister, my number one priority is to ensure we have the right systems in place to support Australian defence industry and to see it thrive.

I was recently honoured to be given the added portfolio responsibility of Science and Technology by the Prime Minister.

There is a strong connection between Science and Technology and my Defence Industry responsibilities, with clear linkages between Australia's economic security and national security.

DMTC has earned a very strong reputation as a leader in innovation and technology development, and increasingly for its focus on supply chain development, which is a critical enabler of sovereign industrial capability.

DMTC is taking advantage of its novel, cooperative structure to bring together leading industry partners, universities and publicly funded research agencies to develop cutting-edge technology to enhance ADF capability.

I commend Dr Mark Hodge and his team for their efforts, working with capable partners across Australia to deliver the many successes outlined in this Report.

The Hon Melissa Price MP

Minister for Defence Industry
Minister for Science and Technology

RUAG Australia is working with DMTC's Air Program and research partners to advance the development and application of laser additive deposition (LAD), a highly efficient repair process for aerospace components that offers significant cost and lead-time advantages over the need to replace the part.

KEY MESSAGE

Defence

Australian Industry and the ecosystem play a critical role equipping and sustaining the ADF to meet Government requirements. The Australian Government is committed to maturing a robust, resilient and internationally competitive Australian industry base as initiated with the 2016 Defence White Paper and then reinforced in the 2020 Force Structure Plan, with its $270bn capital investment commitment.

Practical support to build both the capabilities and the capacity of the Australian industry base is critical in taking a comprehensive view of Australian Industry Capability (or AIC).

This work has been guided by five pillars that were announced by the Minister for Defence Industry in 2020 to improve our work with industry and to equip our sailors, soldiers and aviators.

Businesses in the defence sector have shown a commendable resilience and adaptability in dealing with the many challenges that the COVID-19 pandemic and other international supply shocks have brought to bear.

Whether they are already established in the defence sector or seeking a foothold in it, these businesses need our support and encouragement to be more resilient and more competitive.

The recent establishment of the Office of Defence Industry Support (ODIS) provides the bridge for new defence businesses.

As with many areas of new or promising research, bridging the gap between a bright idea and the cost-effective manufacturing of products at scale for industrial application is a key challenge for Australia's defence industry.

Organisations like DMTC are helping defence industry to meet this challenge and have shown the benefits of a technology-led approach that delivers enduring benefits for the sector as a whole.

DMTC is highly respected for innovation and its practical mission focus.

I am most grateful to the DMTC team including its broad network of industry and research partners, for contributing not only to the national COVID-19 response but also to technology development and collaborative projects across a range of disciplines. In doing so, they are helping to deliver our troops a competitive advantage with increased levels of protection and performance.

With reviews underway to improve the innovation ecosystem, we look forward to the important role that DMTC can continue to play in leveraging, but also sharpening the focus of investments in Australia's industry and research capabilities.

Mark and the DMTC team are valued partners in this critical journey for our troops.

Mr Tony Fraser AO, CSC

Deputy Secretary Capability Acquisition and Sustainment Group (CASG)

KEY MESSAGE

Science & Innovation

For more than a decade, DMTC and Defence Science and Technology Group (DSTG) have been partners in developing industrial capability to give effect to Australia's defence science, technology and innovation priorities.

Across a number of domains, working with DMTC has delivered outstanding results, and elevated previously-disparate activities into strategic and impactful programs of work.

The speed and broad impact of technological change presents Defence with both challenges and opportunities, the first among them being to resolve how to translate these technological advances into new Defence capability. In making those leaps forward we must align with the priorities of the warfighter, and those opportunities that generate sovereign industry capability.

It is critical that DSTG focus on those national security and operational capability-focused tasks that only our people can do. Of course in applying that laser-like focus internally, there is a recognition that future success depends not only on our own efforts but on teaming effectively with Universities, PFRAs and industry, as well as with specialists like DMTC.

The challenge is to achieve More, Together. It's so critical that we harness the skills, talents and expertise of the national innovation network to deliver the best possible outcomes for Defence and for the nation.

Reflecting on the national COVID-19 response, I can think of no better example of an excellent collaborative effort than the administration of a clinical trial by DMTC on behalf of Defence and with the support of DMTC's network of industrial and academic organisation partners.

The multi-entity partnership was underpinned by the professional approach by DMTC in rapidly bringing together the relevant parts of the Australian ecosystem. The speed at which this was accomplished was truly incredible and has set a new benchmark for future responses.

In applied research, a team's inability to reach a conclusive or desired end-point is not synonymous with failure. Many variables, unforeseen risks or environmental conditions need to be considered. So, while it was unfortunate that circumstances did not allow the trial to reach a definitive determination, my strong view is that the management of the trial was first-rate.

The DMTC-led execution of this trial has so clearly demonstrated that, through the resources available in Australia, the capability, capacity and agility exists to respond to a future pandemic emergency.

Multi-disciplinary and collaborative partnerships are also undeniably about contributing to Australia's sovereign industrial capability. This is much more than just words on a page – it's about ensuring we have the ability to do what we need to do in country, for the benefit of the country.

In translating research outcomes into industrial capabilities, at scale, DSTG's partnership with DMTC has already fostered the creation of stronger, more diverse teams who are able to tackle the broad defence and national security challenges facing Australia.

I congratulate Mark and the DMTC team, and all of the partners involved, on the collective achievements showcased in this Report.

Professor Tanya Monro

Chief Defence Scientist
Department of Defence

The successful launch of the UNSW Canberra Space M2 CubeSat in March 2021 marked the culmination of more than three years of preparation. A key component of the CubeSat was produced by CSIRO as part of a DMTC project. More detail on the project is on Page 38.

KEY MESSAGE

Industry

We don't need individual governments' policies on manufacturing. We need something far more comprehensive; something that transcends terms of governments and creates a national, corporate approach to industrialisation. Private industry and research organisations must determine the path forward.

There's nothing new about the concept of sovereign capability. The push to reinvigorate domestic manufacturing has been a stated goal of governments on both sides, for a long time now. Despite the challenges we've faced as a result of the COVID-19 pandemic - and in fact, largely due to those challenges - there's new enthusiasm and excitement around building sovereign industrial capabilities and returning manufacturing to our shores.

Heat Treatment Australia (HTA) is committed to working in partnership with industry leaders like DMTC to **put industrial capability in Australian hands**. We're proud that our tiny part of the puzzle is having a big influence on work in this space and delivering manufacturing outcomes to achieve economic prosperity.

The pandemic certainly magnified the risks of sourcing goods, services and products offshore - some companies were crippled by their inability to get materials out of places like China. It was definitely an awakening for those who had chosen cheaper international imports, and exposed flaws and issues in process and supply chains.

As a result of these experiences, there is a noticeable trend for work outsourced to other countries like India and China to come back to Australia. It's a trend we must encourage, considering the decline in income from Australian manufacturing. In 2007, manufacturing production contributed $119.5 billion to the Australian economy - but that number has since declined by around 10 to 12 per cent.

Alongside materials and other inputs, we also need to consider the workforce that's needed for the sheer volume of defence programs playing out over the next five to 10 years. We have an industry-wide problem, a genuine skill shortage across manufacturing, and significant difficulty recruiting talent from overseas without a major shift in visa settings for skilled migration to Australia.

We have to work harder on developing our own people in-house, and via the training systems available across the country. We need to be innovative in both delivery of training and in critically reviewing the prerequisite qualifications or experience that we demand of our people.

The fact is, we're a small country with a small population and high labour costs, located a significant distance from most of our potential markets. This unique position means we need to make difficult decisions around a critical mass of markets and gain sufficient revenue streams to make a business case for capability development. This is just one of the reasons it's difficult to depend solely on private enterprise and private industry to fill those sovereign gaps.

At HTA, we saw the writing on the wall 15-20 years ago and invested in developing new capabilities and processes not previously available in Australia. Without those processes, Australia's defence and aerospace community would not be what it is today, and we see big growth on the horizon for HTA and others in the manufacturing sector in Australia.

HTA has worked on a range of outstanding sovereign capability projects in recent years. We developed the vacuum heat treatment process specifically for F-35 landing gear, a process that was subsequently picked up and approved by a number of primes and OEMs across the world. Today, we are the primary technology supplier for the F-35 heat treatment process.

HTA also worked on research and development for the aluminium vacuum brazing process, which has multiple applications for comms and avionics boxes across aerospace, land and sea. While it's a process in short supply around the world, HTA is partnering with a Brisbane company to achieve international export growth.

We're proud to be working with DMTC on several new projects, including an in-country capability for hot isostatic pressing (HIPping). When we achieve process efficacy for additively manufactured and 3D-printed parts, we can move into more extensive component production, then develop other parts of our supply chain. It will mean sovereign capability to keep this work here in this country and support other sovereign industries.

We don't need individual governments' policies on manufacturing. We need something far more comprehensive; something that transcends terms of governments and creates a national, corporate approach to industrialisation. There is support available from Government but it's the responsibility of private industry and research organisations to determine the path forward.

I sincerely hope the concern about sovereignty, prompted by COVID, will continue well into the future. We must keep this in focus even when the pandemic is largely behind us and other parts of life return to a sense of normal.

Karen Stanton

Director, Corporate Strategy,
Heat Treatment Australia
Board Chair, Elbit Systems of Australia

CHAIR'S
Report

The breadth and depth of work covered by this Report highlights that the whole can indeed be greater than the sum of the parts.

Harnessing the expertise of researchers and industrial partners alike, DMTC teams have achieved outstanding results across a range of disciplines with a continuing focus on ***capability through collaboration***.

In its thirteenth year, DMTC continued to grow and continued to adapt to the demands of its government customers. It continued to work on both technology development and innovation programs while also investing in critical enablers such as supply chain capacity and the pipeline of early to mid-career researchers.

I am proud of DMTC's truly strategic underpinnings, of its ability to make strategic investments in research and in industrial capability, and of its strategic impact across the defence and national security sectors.

These achievements are driving the Company's growth and the Board has carefully considered the implications of this continued growth.

We have commenced the process of establishing operating divisions to ensure that we can provide focused attention and additional resources for specific elements of the business, while retaining an indelible connection to the systems, culture, agility and management ethos of DMTC.

Discussions around national resilience have of course, gained even more traction as the effects of the COVID-19 pandemic linger on. Future-focused investments that Australia can make in industrially-relevant research and development have arguably never been so important.

The Board continues to be impressed by the diligence and professionalism of the DMTC team. We have many reasons to be confident in the strategy, structure and systems that support the day-to-day business.

The excellent team we have delivering the vision and mission of the Company continue to excel and to demonstrate a genuine commitment to continuous improvement.

The Board is committed to DMTC continuing to play a critical role in building new industrial capability for Australia, underpinned by brilliant Australian research. Our Defence and national security customers deserve nothing less than our full attention to this important task.

It is my great pleasure to present the DMTC Annual Report for 2021.

Tony Quick

Chair, DMTC Ltd

CEO'S
Report

In delivering the vision and mission set for the Company by the Board, DMTC is ***putting industrial capability in Australian hands***. That phrase neatly sums up many of the individual stories in this Report.

Within our portfolio of projects and partnerships, and in response to the needs and requirements of our key defence and national security customers, we have made advances in sovereign technology development, contributed to the capacity of Australian small businesses and made investments in industrially-focused innovation that will continue to pay dividends for years to come. In revenue terms, DMTC activity increased by over 20% in 2020-21 compared to 2019-20.

The formal re-certification of our systems against international standards (namely ISO 9001 and ISO 44001), that I am delighted to say DMTC has again achieved this year, is a strong signal and an objective validation of the value we deliver to our partners. It is also significant in ensuring that our approach to the business of collaboration and innovation is geared to deliver consistent and repeatable results.

Attention to systems should never override or interfere with a resolute focus on outcomes, and nor should we be any less ambitious in the outcomes that we seek to achieve. The right balance between outcomes and systems is caught up in what I describe as structural flexibility.

This is where DMTC is at its best, and where the expertise and experience we've developed and built across our team comes to the fore. In terms that our industrial partners would know only too well, it's our point of difference and source of competitive advantage.

DMTC has consistently shown that harmonising the cultures and success drivers of the research sector, the industrial sector and government practitioners is not only possible, but delivers great benefits. It creates an environment for purpose-driven collaboration.

This Report provides many examples of this, whether related to our efforts in technology development or in technology transfer. It's about success by design, not by chance.

In our corresponding Report last year, we spoke about COVID-19 with some confidence that we might have seen the worst of it. As we now know, the pandemic has had an arguably even greater impact this year than last.

Despite the significance of the challenge, DMTC has continued to achieve extraordinary results. I am proud of the team's efforts, and warmly welcome our new team members who have fitted in well and are already making strong contributions.

Our 'one plus one equals three' approach might be an affront to my colleagues with expertise in mathematics, but it is demonstrated in our collaborative achievements and will be a key ingredient in our continued success.

I commend the Report to you.

Dr Mark Hodge

CEO, DMTC

Dr Mitch Dunn from UQ tests the strength of the coaxial radio-frequency connector of a functional antenna structure. The DMTC project team is investigating the electromechanical performance of different connector attachment options to optimise the durability of these critical system components. More information on the project is on Page 32.

ABOUT
DMTC

OUR Vision

To develop technology solutions and provide advice enabling industry to enhance Australian defence and national security capability.

OUR Mission

To create and enhance Australian industrial capability and skills through designing and executing collaborative technology development and innovation activities in the defence, national security and related sectors.

OUR Values

Inclusive. Committed. Inspiring. Trusted.

underpinned by **Integrity**

OUR Approach

DMTC operates through an extensive network of innovation and technology development partners in Australia and across the world. DMTC works across multiple specialist disciplines to support the development of sovereign industrial capability for Australia's defence and national security agencies.

DMTC leads and manages collaborative efforts involving government, industry and research partners to enhance Australia's industrial capacity and capabilities. These efforts are backed by DMTC's internationally accredited program management framework. Our catchcry of **capability through collaboration** has been a mainstay of our business.

OVERVIEW

Diversity & Inclusion

As a proudly Australian company, furthering opportunities for diversity, inclusion, and partnership is in our DNA.

DMTC is committed to diversity and inclusion because, fundamentally, it is the right thing to do. As with the Company's approach to reconciliation, DMTC is taking tangible and practical actions right across the Company through team members, taking account of DMTC's size and operating context.

The Company's approach to diversity and inclusion encompasses issues of gender; sexual orientation; indigenous heritage; disability; cultural and linguistic diversity (CALD) and work/education background based on country and sector.

Guided by the Company's newly-formed Diversity & Inclusion Committee, DMTC has been on a transformative journey over the last 18 months to improve diversity and inclusion within the organisation and now seek to influence similar outcomes across the broader defence innovation ecosystem.

Working at the interface between government, industry and the research sector, DMTC can play a key leadership role. DMTC's work in this regard has been underpinned by expert advice from *Diversity Partners*, one of Australia's leading consulting firms guiding organisations to achieve more diverse and inclusive workplaces.

Diversity Partners' work with DMTC to date has been shaped by a series of workshops with DMTC team members at all levels and has led to several bespoke recommendations.

DMTC's Diversity & Inclusion Strategy focuses on four themes: strategy and accountability, culture and capability, hiring and promotion and partnerships and projects. Across these themes, there are four interrelated aims:

- Supporting the Strategy with associated objectives, actions, metrics and strong governance
- All DMTC team members actively promote diversity, consistently support flexible working and challenge unconscious bias
- DMTC hires, retains, promotes, and supports a diverse workforce, and
- DMTC is acknowledged and respected for its commitment to diversity and inclusion, and embeds diversity and inclusion principles into its relationships with partners.

Each aim is backed by both medium-term actions and metrics that will be used by the Diversity & Inclusion Committee to measure organisational progress. Regular reports will be provided to the DMTC Board.

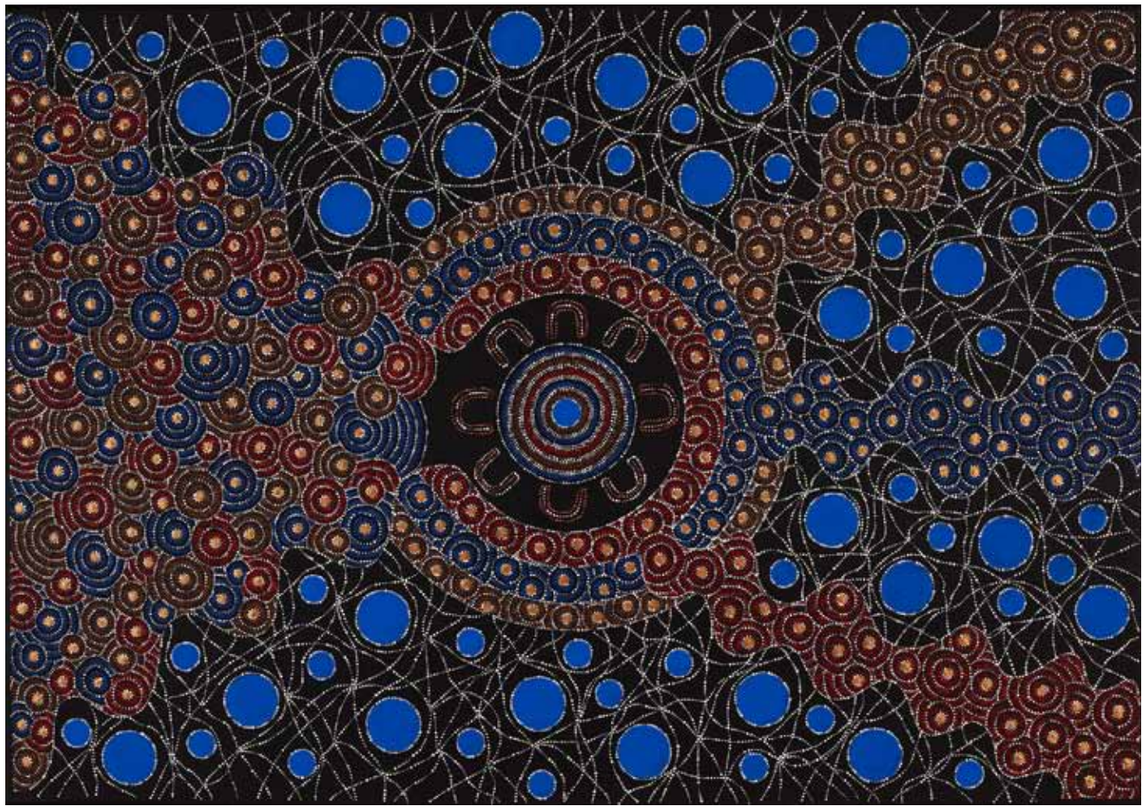
Several initiatives have already been actioned as at the publication of this report. DMTC has augmented its employee satisfaction survey and launched a new targeted survey to establish baselines for future work, and to validate and improve the recently formulated Diversity & Inclusion Strategy. The Company's policies have been updated to appropriately reference diversity and inclusion considerations.

DMTC has also become a member of the Diversity Council of Australia and thereby gained access to a rich vein of resources and training opportunities.

A calendar of diversity and inclusion training initiatives has been established that will include workshops on topics such as well-being, unconscious bias and respect in the workplace.

OUR COMMITMENT TO

Reconciliation



Actions, not just words

In March 2021, DMTC received approval from Reconciliation Australia to publicly release its Reflect Reconciliation Action Plan, or RAP. Starting with the Reflect level, the Reconciliation Australia program includes four types of RAP for organisations as they mature their understanding and approach to reconciliation.

DMTC's approach to reconciliation action is guided by a working group drawn from across the DMTC team.

DMTC CEO Dr Mark Hodge noted that the release of the RAP was not an 'end' in itself, but about highlighting practical actions DMTC will take in the period through to June 2022 that will have a meaningful and positive impact.

https://issuu.com/dmtc-ltd/docs/dmtc_reflect_reconciliation_action_plan

FEATURE

Where are they now?

DMTC has provided pathways for early-career researchers in the defence and related sectors through both scholarship and internship opportunities. Through its Education portfolio, DMTC is committed to boosting the pipeline of young, innovative Australians who can progress from academia to applied research and on to employment in related industries. In this respect, DMTC, the research providers and the industry employer are all playing an important role in realising the Australian Government's long-term vision for Australia's defence industrial base.

DMTC reached out to several exemplary former participants in its Education program for reflections on how support from DMTC has impacted their career trajectory. Here are several highlights from conversations with Emily Kibble (PhD completed in Western Australia), Dr Joseph Polden (PhD completed in New South Wales), and Dr Brodie McDonald (PhD completed in Victoria).

Emily Kibble (WA)

Emily's research in molecular biology focused on the bacteria that causes invasive meningococcal disease (IMD) which causes infection and swelling of the brain (meningitis) and infection of the blood (sepsis), and can be fatal even with proper treatment. She also developed a novel screening mechanism to reduce the time required to test anti-virulence inhibitors against pathogens, increasing the efficiency of the testing process.

"Each year of my PhD, my participation in DMTC's Annual Conference gave me valuable experience for future presentations to expert academic audiences."

Now in a full-time project management role with DMTC, Emily uses her specialised area of knowledge to help manage projects within the new Health Security Systems Australia (HSSA) division of DMTC, which progresses sovereign industrial and research capabilities.

> Involvement in a DMTC Project throughout my PhD allowed me to see the greater context of my research... to aid Australian Defence personnel, as well as the general population."
>
> Emily Kibble (WA)

The full suite of interviews will be made available on DMTC's website at https://www.dmtc.com.au/education-and-training/

Dr Joseph Polden (NSW)

Joseph's research focused on software development to assist in programming industrial robots. Through his PhD project, Joseph's solution has drastically reduced the amount of effort (and cost) associated with programming the robotic welding system of a DMTC industry partner.

"While robots can vastly improve productivity in manufacturing processes... programming them to complete their given task (such as welding or painting) is a challenging and expensive exercise, especially considering frequent updates are often made to the manufacturing process, requiring robotic systems to be reprogrammed."

Joseph says his DMTC-funded PhD added a practical industrial dimension to his experience. He is now a postdoctoral research fellow at the University of Wollongong, a role that has included active involvement in multiple projects within DMTC's Maritime program.

> As an engineer and researcher, I've been exposed to problems encountered in real world manufacturing scenarios and work to develop solutions for them. What more could a budding engineer want?"
>
> Dr Joseph Polden (NSW)

Dr Brodie McDonald (VIC)

Brodie's research, conducted with DMTC's support, involved developing computer simulations to virtually test armour against blast weapons like landmines or IEDs. His particular focus was "being able to predict the point where the armour reaches its deformation limit and begins to tear open, a critical point in overmatch testing of vehicle armour".

Brodie was grateful for DMTC's support to visit the University of Cape Town in South Africa for six weeks of blast testing, where he discussed his work with a world-class research group and built lasting connections with University Professors and graduate students.

"The research skills developed throughout my PhD are critical to how I approach any new problem in this role. Involvement with DMTC and exposure to the full range of projects supported the Company at annual conferences has given me contacts in the land, maritime and air domains which have opened up unique opportunities for collaboration that wouldn't have been possible otherwise."

More information on Brodie's research is on Page 47.

> Involvement with DMTC and exposure to the full range of projects supported at annual conferences has given me contacts in the land, maritime and air domains, opening up unique opportunities for collaboration that wouldn't have been possible otherwise."
>
> Dr Brodie McDonald (VIC)

PROGRAM
Overview

Technology Readiness Levels (TRLs) are a key component of DMTC's approach to technology development and innovation. This table provides highlights from across DMTC's portfolio of program and project activity in 2020-21.

The Industry Capability Development (ICD) Program is not included here as its focus is on technology transfer rather than the creation or development of technology.

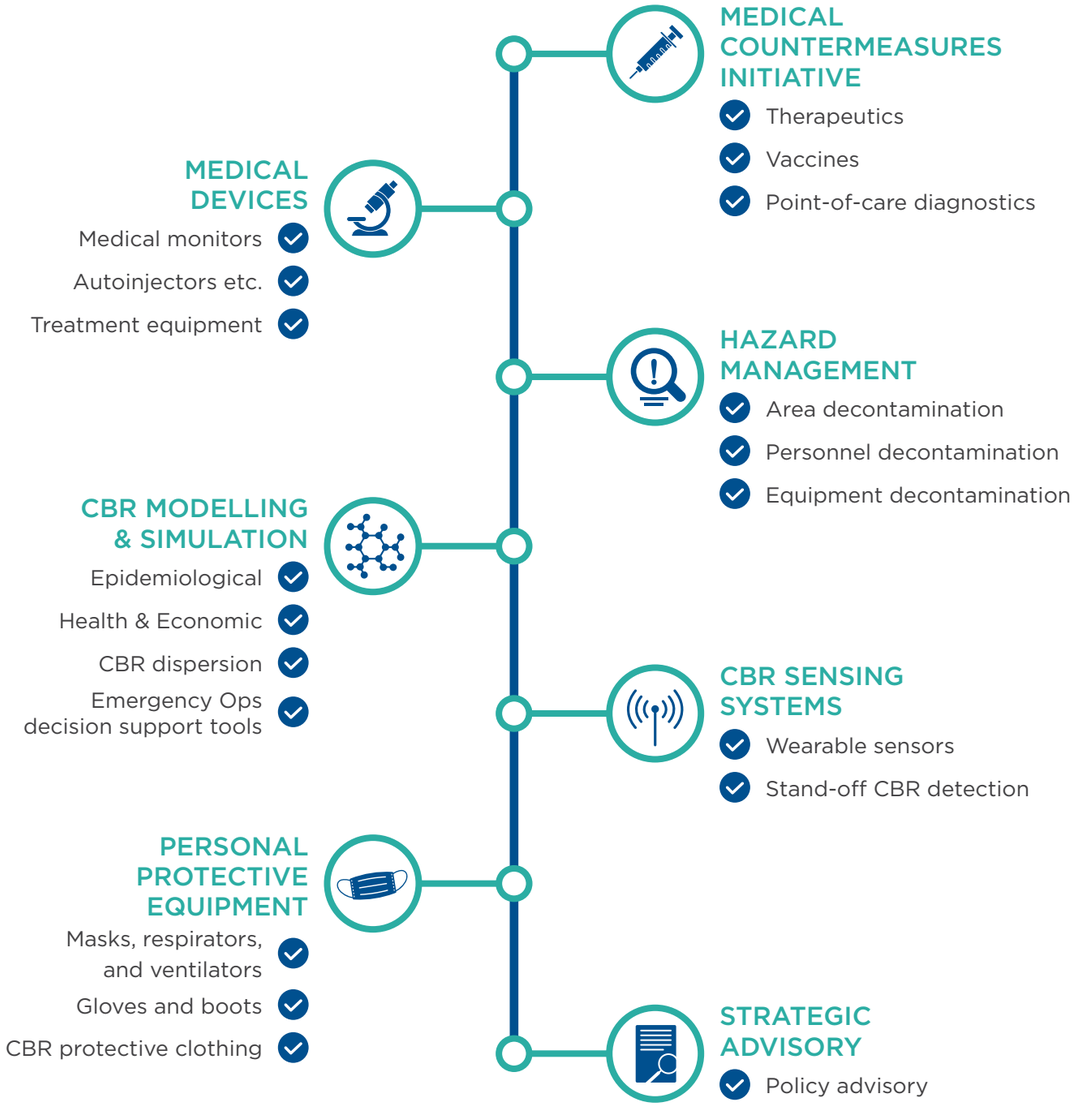
DESCRIPTION	Continuation of previous DMTC work	Performance against milestones in 2020-21	Schedule	Technology roadmap	
				TRL Journey (project life)	TRL Snapshot (as at June 2021)
MARITIME PROGRAM					
Titanium cold spray of WAAM components for naval applications	No	Milestones met	On track	2-4	3
Cold spray repair and additive manufacturing of submarine components	No	Milestones met	On track	2-6	5
Steel characteristics and grade selection for vulnerability reduction in Australia's future frigates	Yes	Milestones met	On track	3-5	5
Blast and shock modelling – complex numerical models to assess vulnerability – Phase Three	Yes	Milestones met	Extended to allow for further analysis and development	2-6	6
Develop fabrication techniques using ferroelectric ceramics	No	Milestones met	On track	2-4	3
Characterisation and development of single crystals (SSCG method)	Yes	Milestones met	On track	1-5	5
Technology maturation of superconducting cryocooling systems for a naval environment	No	Milestones met	On track	4-6	5
High temperature superconductors for minesweeping - Phase Two	Yes	Milestones met	On track	2-4	3
LAND PROGRAM					
Development of a light weight, prototype CBRN protective suit • Textile Development • Prototype suit	Yes	New project commenced in April 2021	On track	 4-7 3-5	 4 3
Networked FAST Collaboration • Materials • Modelling (digital twin)	Yes	Milestones met	Extended	 3-4 4-6	 4 6
ENABLING TECHNOLOGIES PROGRAM					
Investigating potential applications for hybrid composite materials and structures • Testing methodologies • Manufacturing processes • Properties database	Yes	Milestones met	Complete	 4-7 3-4 3-6	 5 4 5
Functional antenna structures • Integrated antenna system for a land-based Defence application • Cost-effective manufacturing and installation technique for integrated antenna system • Modelling tools to support design and testing	Yes	Milestones met	On track	 4-7 4-6 4-6	 6 4 5
AIR, GEOSPATIAL AND ISR PROGRAMS					
New corrosion coating technologies for light metal components (aerospace)	Yes	Milestones met	On track	2-5	4
Wire Arc Additive Manufacturing of aluminium alloy aerospace components	Yes	Milestones met	On track	4-5	4
Developing a compact, spatially agile spectral sensor (C-SASS)	No	Milestones met	Complete	3-5	6
Distributed LiDAR capture and process	No	On track	On track	4-6	5
MEDICAL COUNTERMEASURES PROGRAM					
Developing novel treatments to inhibit key elements of bacterial pathogens	No	Milestones achieved	On track	3-5	4
Rapid diagnosis of microbial infections without culture	No	Milestones partially met	Extended	3-5	3-4
Molecular genetics platform for rapid point of care detection • Detection kit • Pathogen specific	No	Milestones achieved	On track	 4-5 3-4	 4 3
Rapid identification of bacterial and viral agents using bioinformatics approach	No	Milestones partially met	Extended	3-7	4
Pilot flow chemistry production line and scale-up	No	Milestones achieved	On track	3-5	3
Development of non-reactogenic human Q Fever vaccine	Yes	Milestones partially met	Extended	2-4	3
Development of new therapeutic against chemical threat	No	Milestones achieved	Extended	2-4	2-3
Universal malaria vaccine candidate	No	First milestone delayed	Extended	4-6	4
Development of sovereign flow chemistry manufacturing capability	No	Milestones achieved	Extended	2-6	4

NEW

HSSA Division

A new division of DMTC, known as Health Security Systems Australia (HSSA), has been established with effect from 1 July 2021. HSSA encompasses DMTC's existing Medical Countermeasures (MCM) program as well as new areas relevant to national health security (illustrated below).

More information on the HSSA Division can be found at https://dmtc.com.au/health-security-systems/.



OVERVIEW

HSSA Division

A new division of DMTC, known as HSSA, has been established with effect from 1 July 2021.

The mission of the new division is to lead collaborative programs and projects to develop products and decision-support systems for the protection of military and civilian personnel against Chemical, Biological and Radiological and Nuclear (CBR) threats, emerging infectious diseases and pandemics.

The HSSA division is led by Dr Leigh Farrell, while Dr Felicia Pradera has been appointed to the role of General Manager, HSSA and Program Leader for the MCM Program.

HSSA is committed to building in-country industrial and research capabilities that align with Australian national health security priorities.

This is achieved through management and leadership of collaborative research and industry teams to progress innovative and promising concepts into maturity, as well as monitoring of Australia's national health security capabilities – an example of this is detailed on Pages 22-23 – and providing expert advice and guidance on this to Government partners.

Each of the HSSA research areas illustrated on Page 20 will be managed through Programs containing research projects of relevance. An example of this is the Sensing Systems Program. This Program consists of research projects focused on the development of technologies that sense the presence and/or concentration of CBR threats and provide a resulting measurement. More information on this new Program of research can be found on page 24.

National Health Security Resilience Assessment (NHSRA) Spotlight

The National Health Security Resilience Assessment (NHSRA), led by HSSA, is expanded in scope compared to the two National Capability Audits led by DSTG undertaken in 2012 and 2017 respectively. HSSA was asked to deliver the expanded remit of the NHSRA on behalf of DSTG. Traditionally the Audit would have begun in 2022, however the COVID-19 pandemic led to a request from the MCM Stakeholder Group for it to begin this year.

The NHSRA is supported by the Next Generation Technologies Fund (NGTF) which is managed by DSTG.

Previous National Capability Audits focused on Medical Countermeasures i.e., vaccines, therapeutics, and diagnostics, with potential application against CBR threats generated by either natural or manmade activities.

The scope of the NHSRA comprises a detailed examination of Australia's capability and capacity for research, development, manufacturing, supply chain resilience, and distribution of priority products and solutions in the six key national health security sectors that comprise the HSSA, seen on Page 20.

Utilising more than 800 questions across all sectors, each survey aims to extract information about supply chain resilience and in-country manufacturing capacity, as well as the strengths and vulnerabilities of Australia's prevention, preparedness, response, and recovery (PPRR) ecosystem in the context of CBR threats.

The NHSRA's outcomes will be presented to the HSSA whole-of-Government Stakeholder Group established to support DMTC's work in relation to medical countermeasures and broader health security issues. Stakeholders were consulted throughout the development of the NHSRA. In addition to its expanded remit, the NHSRA is different from the two previously undertaken National Capability Audits in that it harnesses Gravity iLabs' enterprise software platform, StrategyDotZero. Rather than being a static spreadsheet which is a snapshot in time, the vision is to create a health security 'data lake' that can be progressively updated as part of an appropriately secure single software system.

The workplan to digitise the NHSRA included the creation of both a user-friendly online survey portal for participants, and an analytics engine to organise and aggregate the data that is collected. This allows for generation and visualisation of insights (as illustrated on Page 23) into the collected data in real-time, both through a series of dashboards, and, for government stakeholders, through a bespoke user interface.

The survey portal was launched in November 2020. Since then, efforts have focused on optimisation of the analytics engine, dashboards and user interface for improved data analysis and display, in parallel with initiatives to raise the profile of and participation in the NHSRA.

DMTC engaged a second technology services partner, Opyl, to design and utilise an algorithmic scraping tool to create a contact list of 700 potential NHSRA participants.

Through the NHSRA, DMTC and its whole-of-Government Stakeholder Group hope to better understand the academic and industrial organisations contributing to Australian health security. Outcomes may be used to inform public policy initiatives and strategic investment aimed at enhancing Australia's PPRR ecosystem and national health security posture.

The full report from the NHSRA will be released in 2022.

> DMTC has been a really valued partner to Pfizer – we've been working with them throughout 2021 to explore issues around supply chain resilience and pandemic preparedness. Completing the NHSRA is a benefit to all of us in the life sciences sector, but also Australia and Australians not only during times of pandemic but in the future.
>
> Anne Harris, Managing Director,
> Pfizer Australia & New Zealand and Board Member, Medicines Australia

HIGHLIGHT

HSSA

New programs delivering novel technologies

Chemical, Biological and Radiological (CBR) Modelling and Simulation is one of the six key areas of research within the newly formed HSSA.

This research theme aims to develop computer models and simulations to investigate the potential impact of various CBR threats under a number of scenarios and inform the development of prevention, preparedness, response and recovery plans for both military personnel and civilian populations.

HSSA is working with Defence to leverage the capabilities of Australian industrial and academic organisations in this domain. This new activity is underpinned by a three-year funding commitment from DSTG. In the first instance, the program will have three key streams of projects: plume modelling, radiation modelling and decision support tools.

HSSA is commencing four research projects in the CBR Modelling and Simulation program that will:

- Progress an existing algorithm that provides chief decision makers with advice on how to respond to novel disease outbreaks, through modelling of epidemiological data
- Predict and map levels of vulnerability within the body, should a human become exposed to a radiological threat, as well as potential shielding solutions, and
- Develop real-time, high-resolution hazard prediction models for predicting CBR dispersion in both complex urban and indoor environments.

Outcomes from this program will enhance defence and national security capability and contribute to the depth of expertise in the wider hazard modelling community.

Another key HSSA research area is CBR Sensing Systems. This area is dedicated to the development of wearable and stand-off technology for detection of CBR threats, to provide enhanced situational awareness for military and civilian personnel.

HSSA is coordinating and delivering this program of work on behalf of the DSTG team leading the Department of Defence's Operating in CBRN Environments (OCE) STaR Shot. Currently, the program consists of two projects: Compact Aerosolized SARS Exposure Sentinel (CASES) and Human Integrated Sensor Systems (HISS).

The CASES project is the first of the wearable sensing systems that has begun during this reporting year and aims to develop a prototype wearable device that is capable of detecting SARS-CoV-2 virus. This complex system will integrate the rapid molecular detection technology loop-mediated isothermal amplification (LAMP), microfluidics and micro air filtration technology into a matchbox sized wearable sensor.

The HISS Challenge began in this reporting year with the release of a Request For Information, which resulted in over 70 responses. This led to a workshop, co-hosted by DMTC and DSTG, where scenarios for the application of the HISS technology and its potential requirements where considered by workshop participants.

A subsequent Request For Proposals by DMTC and the OCE STaR Shot defined a clear scope for HISS. Collaborative teams will apply advanced biotechnology, sensing systems and data analytics, to measure and interpret pre-symptomatic indicators from the human body when exposed to a biological threat.

The CBR Sensing System Program will progress sensing technologies, with the aim to create sensors that alert the wearer to chemical and biological threats, allowing more time for interventions such as medical countermeasures, and supporting rapid operational decision making.

OVERVIEW

Medical Countermeasures

Now a major component of DMTC's HSSA division, the MCM program continues to develop Australia's defence and national security capabilities against CBR threats, infectious diseases and pandemics, by improving the sovereign development of vaccine, therapeutic and diagnostic technologies.

The program currently has nine active projects comprising two vaccine candidates, two therapeutic candidates, three rapid diagnostic technologies, and two manufacturing projects. This variety and dual focus on capability and capacity makes the MCM project portfolio a major asset in the development of sovereign capability and health security resilience.

The MCM program has continued to have strong engagement with its whole-of-government Stakeholder Group, with senior representatives from the Departments of Defence; Health; Industry, Science, Energy and Resources; Foreign Affairs and Trade; and Home Affairs.

In May, DMTC hosted an MCM Conference session as part of the hybrid 2021 DMTC Annual Conference. The physical event was held in Brisbane, however the majority of speakers and attendees participated online.

The significant breadth of expertise developed through the MCM program was displayed through technical presentations by MCM project leaders Associate Professor Joanne Macdonald, Professor Stephen Graves, Dr Oliver Hutt, Professor Louis Schofield, and early career researcher Joanne Allard.

In August, DMTC co-hosted a workshop with the Indo-Pacific Centre for Health Security (within the Department of Foreign Affairs and Trade) and the Coalition for Epidemic Preparedness Innovations (CEPI) to brief stakeholders on CEPI's product development requirements, and the capabilities Australian academia and industry have to support this, including novel vaccine technologies.

The MCM program has also contributed to capability analyses of the Australian MCM landscape. In June, the DMTC team collaborated with MTPConnect to provide Austrade with highlights of Australia's opportunities for foreign direct investment in biologics capabilities. The DMTC team is also working collaboratively with industry partner Biointelect to provide the Australian Antimicrobial Resistance Network (AAMRNet) with a national audit of research and development capabilities relevant to antimicrobial resistance (AMR).

Dr Nina Pollak, post-doctoral research scientist at the University of the Sunshine Coast (USC) tests the rapid diagnostic technology being designed in the DMTC project involving BioCifer, USC, UQCCR and CSIRO.

HIGHLIGHT

Medical Countermeasures

Scaling for success: diagnostic capability partnership

DMTC has partnered with Queensland University of Technology, DSTG, and Microbio Pty Ltd, to develop a platform diagnostic capability for identification of seven bacterial agents of concern to Defence.

The aim of this project was to progress a promising diagnostic technology, called InfectID®, which can identify multiple different bacterial species in clinical samples such as blood, without the need for prior culture, significantly reducing the time to diagnosis from days to just hours.

InfectID® focuses on Single Nucleotide Polymorphisms (SNPs) – a substitution of a single nucleotide at a specific position in the genome. The technology analyses the amplification of regions of DNA containing SNPs, to differentiate bacterial species quickly, effectively and accurately.

During this project, a single set of primers were designed and optimised to clearly differentiate the various bacterial pathogens. The InfectID® technology was determined to have high sensitivity and specificity. The project team further demonstrated that the InfectID® technology could be used to differentiate between closely related bacterial species.

During the COVID-19 pandemic, industry partner Microbio pivoted on adapting their InfectID® diagnostic for rapid detection of the replicating and non-replicating SARS-CoV-2 virus in patient samples. The underpinning technologies required for this viral diagnostic capability were developed during the DMTC project for bacterial detection.

DMTC has supported this rapid pivot to diagnose COVID-19, as the technology has relevance to national and international diagnostic strategies for the COVID-19 pandemic. This project underlines the importance of developing agile, platform MCM capabilities which can pivot to address a particular health security threat of national consequence.

InfectID® was shown to rapidly identify different bacterial species in clinical samples. In future health threat scenarios this is expected to enable more timely and accurate treatment decisions, improving prospects for successful medical intervention.

Looking Ahead

DMTC is planning to expand the MCM Program portfolio in 2022. An Expression of Interest call will be released in early 2022 for a new round of MCM projects. This EOI will focus on research into novel broad-spectrum therapeutics and/or new vaccine technologies that aim to tackle antimicrobial resistance (AMR) and infectious disease threats. Down-selected projects will be invited to submit a White Paper by July 2022, with successful projects expected to begin in the last quarter of 2022. Information surrounding this EOI will become available on the HSSA website: https://dmtc.com.au/health-security-systems/

Broad spectrum therapeutic against nerve agents

DMTC has partnered with UQ and DSTG to develop a cost effective, broad spectrum, medical countermeasure to counteract nerve agents.

Nerve agents disrupt the normal transfer of messages from the brain to organs and muscles within the body by blocking an enzyme that is responsible for breaking down neurotransmitters. When this enzyme is blocked, it is unable to break down the neurotransmitter as normal, resulting in an increase in signals from the brain to the body, which in turn causes life threatening symptoms such as convulsions and respiratory arrest. Nerve agents are a genuine threat to both Defence personnel and public health.

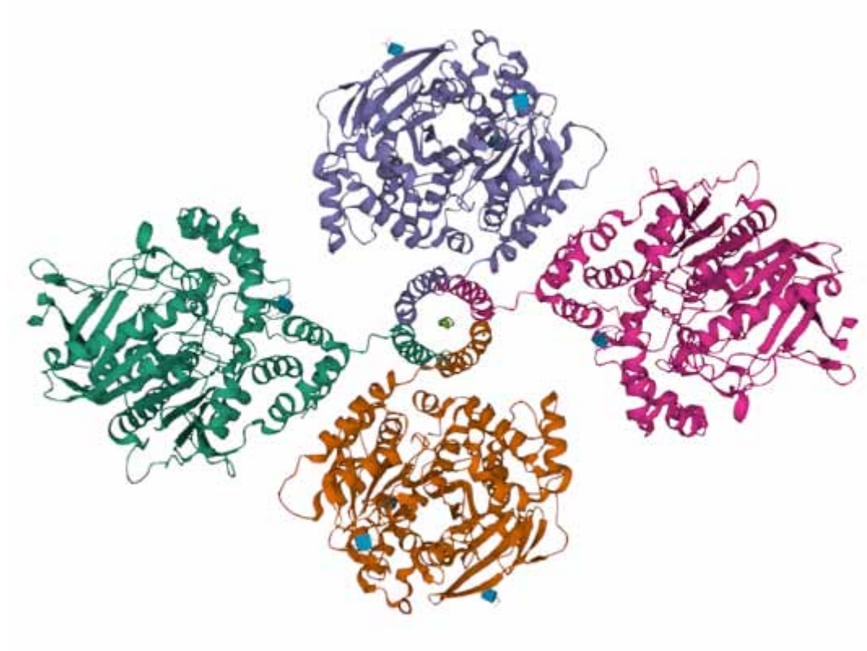
The current therapeutics against nerve agents are sub-optimal, as they either only treat symptoms rather than the cause, do not treat all classes of agent, or have unwanted side effects.

The aim of this project is to produce an improved therapeutic that binds to and inactivates nerve agents within the body.

UQ and DSTG are working collaboratively to develop expertise in a range of areas required for success in this project. The current focus of work is investigations into a range of potential therapeutic constructs which will produce bioscavengers with ability to bind to nerve agents. Promising therapeutic constructs will be subject to more rigorous analysis.

The successful completion of this project will result in a drug candidate which is ready to move into pre-clinical testing, and advanced product development aligned with Good Manufacturing Practice (GMP) manufacture.

The project aims to provide Australia with an in-country capability to produce nerve agent therapeutics at GMP standards for the protection of both Defence and civilian populations.



Human plasma Butyrylcholinesterase (huBChE) is the protein molecule that binds to and inactivates nerve agents within the body.

HMAS *Anzac* conducts maritime manoeuvres during the Indo-Pacific Endeavour 21 deployment. To optimise the performance of the Royal Australian Navy's current and future fleets, DMTC's Maritime Program is providing industrial innovation leadership alongside the science and technology strategy led by DSTG.

PROGRAM

Maritime

Australia's Continuous Naval Shipbuilding Program experienced a period of consolidation over the last 12 months. Review activities were a focus, looking into how Defence can better coordinate industrial development activities across each of the ADF's naval shipbuilding programs.

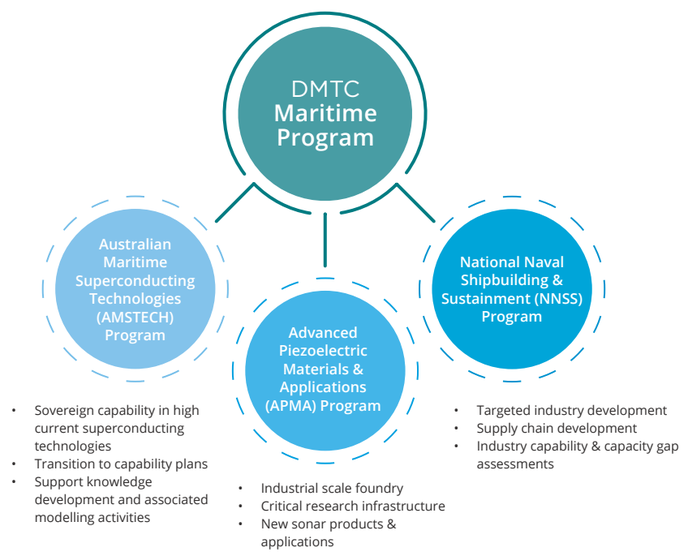
Defence continues its focus on the importance of sovereign industrial capability and its role in supporting Defence capability and the sector eagerly awaits the release of a comprehensive update of the 2017 *Naval Shipbuilding Plan*.

DMTC's Maritime Program has seen expanded activities across a number of new themes. DMTC's National Naval Shipbuilding and Sustainment (NNSS) Program, with support and funding through a long standing relationship with CASG (previously through the National Naval Shipbuilding Office and now CASG's Australian Industry Capability Division) continues to make important strides in developing industrial capability across additive manufacturing, improved maritime steel production techniques and a new project focused on shipyard welding productivity improvements for the Hunter Class Frigate Program.

In December 2020, DMTC and DSTG established the Advanced Piezoelectric Materials and Application (APMA) Program with support and funding from DSTG's NGTF Program. This is discussed in more detail below on page 30. The program is already making important gains through strategic investments in industrial and research infrastructure and know-how to support the development and manufacture of piezoelectric materials applicable to maritime applications.

DMTC and DSTG have also recently established the Australian Maritime Superconducting Technologies (AMSTECH) Program with support and funding from DSTG's NGTF Program. The AMSTECH Program will bring together a number of existing disparate programs of work to establish a strategic national capability in the application of superconducting materials in maritime applications. This will be achieved by fostering and promoting collaboration across Defence stakeholders, industrial partners and the research sector.

The next 12 months promise to be a busy period for DMTC's Maritime Program, with exciting outcomes expected from existing activities and the establishment of several new projects within the APMA and AMSTECH Programs.



PROGRAM
Maritime

Bridging the gap

With the Australian Government recently announcing the AUKUS trilateral security partnership, the first initiative of this alliance has resulted in Australia pursuing an alternative option of nuclear-powered submarines to replace the six conventional Collins Class submarines currently in operation.

This change in force posture places a renewed importance on life-of-type extension (LOTE) program planning for the Collins Class fleet. Sustainment technologies and practices for the Collins Class will be critical for the ongoing operation of the fleet until the new nuclear-powered submarine capability is realised.

DMTC is currently working with partners ASC and CSIRO to develop and specify cold spray repair methodologies for Collins Class submarine components that will assist with LOTE planning. The project captures four distinct work packages – two assigned to the repair of worn or corroded metal surfaces, a third for the rapid additive manufacture of welding inserts, and the fourth investigating the constraints of in-situ robotic application.

The cold spray metal deposition process has been chosen because it does not cause distortion or microstructural changes in the base metals. Secondly, the ability to blend metal powders that feed into the cold spray process means unique metal alloys can be formed. Finally, when coupled with portable automation, in-situ repair becomes an option, potentially eliminating the need for docking repair and allowing submarines to remain at sea longer.

Researchers are currently completing the first three work packages, with ASC about to begin production trials using the cold spray, additively-manufactured welding inserts. The fourth package is on track to be completed by mid-2023.

Establishing national capability

Backed by NGTF funding, DMTC's APMA Program creates an overarching framework to realise a coordinated, collaborative, long-term vision to establish a strategic national capability in advanced piezoelectric materials and their application.

The Australian Defence Force requires access to advanced piezoelectric materials to maintain operational superiority in both Above Sea Warfare (ASW) and Under Sea Warfare (USW) environments, and as a key enabler for remote undersea surveillance as well as other Defence domains such as sensors for aerospace platforms.

An Information Session with potential industry and research partners was followed by a call for Expressions of Interest. Thirteen responses were received and the APMA Program is now working through detailed project agreements that will:

- establish an industrial scale foundry facility that will ensure security of supply of single crystal materials for defence and associated research applications
- support critical research infrastructure and develop national expertise in advanced piezoelectric materials and their applications, and
- enable the development of new sonar products for ASW and USW applications, as well as sensors for aerospace platforms, ensuring Australia remains at the leading edge of innovation.

The power of high temperature superconductors

As modern naval platforms are upgraded to account for evolving threat environments, design constraints with power, weight and space margins are an ever-present consideration. High Temperature Superconductors (HTS) offer an effective way to alleviate many of these challenges because of their increased electrical current carrying capacity and almost zero energy losses when compared to traditional conductors. The unique physical properties of HTS systems allow for either transmission of significantly more energy within the same weight allowances, or alternatively, the same energy requirements at reduced weight.

HTS systems have been successfully used in medical and civil energy distribution sectors and have great potential for many naval applications. However, the unique properties of a HTS device can only be achieved when operated under cryogenic conditions. Cryogenic cooling systems technology is reasonably established and commercially available, but the requirements for naval operation are not well understood.

DMTC is working with Queensland University of Technology (QUT), DSTG and Siemens Energy to understand what unique demands a naval platform will place on a cryogenic cooler for defence operations. Researchers at QUT have now completed a comprehensive scientific assessment of a number of cryogenic cooling technologies in a laboratory simulated sea state environment.

Tests have measured and characterised operational performance relative to naval applications and requirements, including heat load capacity and acoustic signatures, allowing the collaborative partners to down-select the most appropriate cryogenic cooling technology for naval applications.

This research has provided the Royal Australian Navy with risk-assessed options for critical cooling requirements for HTS systems.

With funding support from the NGTF, DMTC's collaborative research team is preparing for instrumented sea trials of the down-selected cryogenic system on a naval vessel, with the results expected to validate laboratory observations.

Antenna technology on track for success

After a three-year trial of conformal GPS antenna components installed in Army vehicles, a DMTC collaboration involving Defence scientists, industry and research partners has successfully demonstrated the performance of functional antenna technologies in the field.

The final results confirmed good performance and condition of two antennas, with negligible physical or electromagnetic deterioration. The Radio Frequency feed unit, which is critical to interface the antenna with the standard Defence Advanced GPS receiver (or DAGR), was fully operational throughout the entire trial period and a commercial GPS unit successfully achieved a complete position lock using the prototype antennas.

The testing has confirmed maturity of the technology to TRL Six (System sub-system technology model or prototype demonstration in a relevant environment) and provided further evidence of strong outcomes from DMTC's collaborative model.

The capacity to take a technical breakthrough that was initially developed for military aircraft and adapt it to solve a problem in vastly different conditions like protected mobility vehicle platforms is a feature of DMTC's work.

Australian Government
Department of Defence
Science and Technology

The University Of Queensland
AUSTRALIA

SWINBURNE UNIVERSITY OF TECHNOLOGY

RMIT UNIVERSITY

DEAKIN UNIVERSITY

Penguin Composites

imagine INTELLIGENT MATERIALS

THALES

PROGRAM
Enabling Technologies

Composite materials and structures have been an enduring theme in DMTC's portfolio of technology development work, evaluating different elements of performance and weight optimisation across a range of applications.

Identification and development of composite materials for use by Defence is driven by a complex push/pull dynamic.

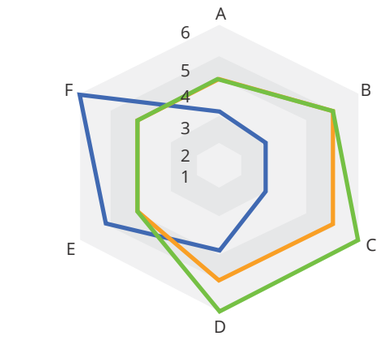
There is a need to balance the 'push' for innovation from industry and academia – for example, developing high temperature matrix systems, nano and hybrid composites, improved manufacturing and quality assurance and better diagnostics and prognostics – with the requirements 'pull' from platform users, OEMs and Defence.

As illustrated below, an increasing awareness of the potential benefits of composite structures, including enhanced performance, functionality and improved cost-effectiveness, leads to increased demand for technology solutions using composites. A key area demanding further work is in the detailed technical understanding of composite durability and composite repair. The composites industry in general - and the defence industry specifically - needs reliable material data on the durability of composite materials, especially when operating in harsh Australian service conditions and under dynamic loadings.

Likewise, there is a need for more comprehensive understanding of how to design, apply and validate the quality of composite repairs, especially where they are applied in the field.

To help meet some of these needs, find solutions to knowledge gaps and drive sovereign manufacturing development for future defence projects, in November 2020 DMTC commissioned the 'Carbon Fibre Supply Chain Development Report' in conjunction with the Advanced Fibre Cluster Geelong. The outcomes of the project will inform DMTC's future work in this emerging sub-sector of the defence industry, in relation to both further technology development and technology transfer through DMTC's ICD Program.

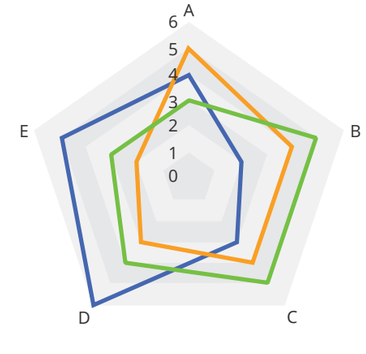
NANO **Composites**



- Aluminium
- HNR-FRP
- FRP

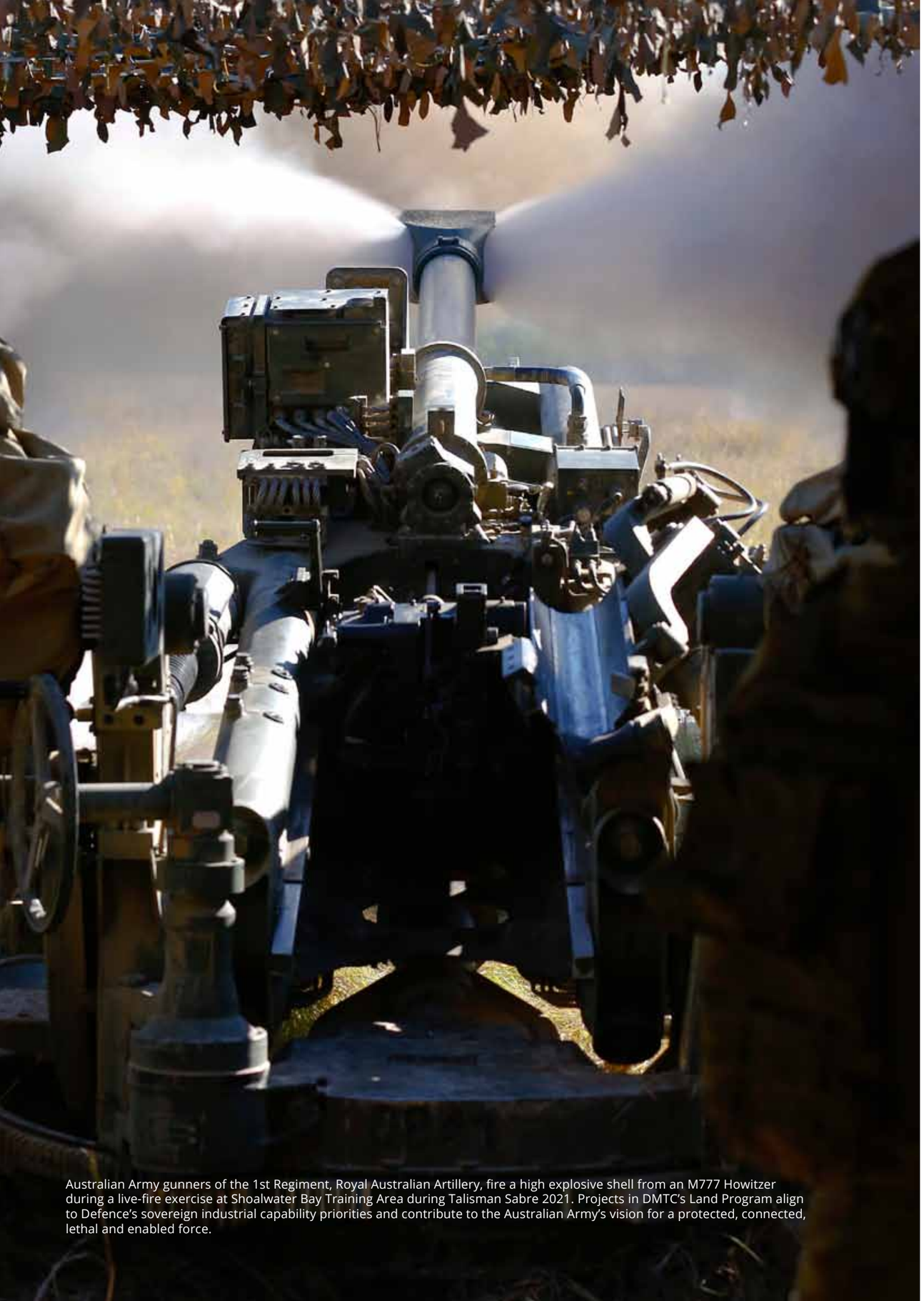
A Density (g/cm^3)
B Elastic modulus (GPa)
C Tensive strength (MPA)
D Fracture toughness (MPAm$^{1/2}$)
E Manufacturing complexity
F Cost ($/Kg)

FIBRE METAL **Laminates**



- Aluminium
- FML
- CFRTP

A Stiffness lightweighting (GPa.g^{-1}.cm^3)
B Impact performance (J)
C Fatigue resistance (fraction of initial @ 10^7 cycles)
D Raw material cost (MPAm$^{1/2}$)
E Processing cost



Australian Army gunners of the 1st Regiment, Royal Australian Artillery, fire a high explosive shell from an M777 Howitzer during a live-fire exercise at Shoalwater Bay Training Area during Talisman Sabre 2021. Projects in DMTC's Land Program align to Defence's sovereign industrial capability priorities and contribute to the Australian Army's vision for a protected, connected, lethal and enabled force.

In catalysing a long-term partnership with defence industry, the Department of Defence has identified a range of sovereign industrial capability priorities, including land combat and protected vehicles; munitions and small arms research, design, development and manufacture; and combat clothing survivability and signature reduction technologies.

DMTC's collaboration model accelerates technology development and supports rapid adoption related to land domain technologies.

Looking down the barrel

DMTC projects in the reporting year included contributions to the Networked Future Augmented Small Arms Technologies (or N-FAST) suite of research projects, that is developing next-generation soldier systems for Australian defence personnel.

While the project consists of a series of parallel technical investigations and activities, DMTC's contribution focuses on breakthroughs in digitisation, lightweighting and advanced manufacturing through collaboration with Thales Australia, UQ and RMIT. More detail on this project can be found on Page 46.

Protection prototypes

Building on years of underpinning research led by DSTG, the project is advancing the technology behind the development of Nano Protective Adsorbent Composite (NPAC) fabrics.

DMTC has brought together a diverse and multidisciplinary team to work on this complex challenge, including industry partners Bruck Textiles and NanoLayr (formerly Revolution Fibres), DSTG, RMIT and CSIRO. DMTC's work centres on a lightweight, prototype Chemical, Biological, Radiological and Nuclear (CBRN) suit for further testing, demonstration and trials and to support the CBRN-Defence protection requirements of ADF personnel. Aerosol protection in an air-breathable CBRN protective suit is a capability that does not exist today.

This innovation will achieve the twin aims of providing Defence with a new capability and contributing to sovereign industrial capability outcomes. The project is expected to prompt further research collaborations in advanced textiles and expand Australian and New Zealand knowledge and industry capacity related to nanofibre and composite fabric production, CBRN suit design and manufacture.

Industry partners in the project will also benefit from enhanced credentials and competitiveness for future supply chain opportunities with the defence primes, including on phases of projects such as LAND 2110.

> Warfighting advantage is supported by the ability to design and manufacture lightweight, high quality components."
>
> *Sovereign Industry Capability Priority (SICP) Munitions and Small Arms Industry Plan,*
> Department of Defence, December 2019

PROGRAM

Air

DMTC and its partners are working to build Australian industry capability to capitalise on new technology horizons across the air and space domains. The span of this effort covers new technology developments as well as advances in the use of existing additive manufacturing (AM) technologies and techniques.

DMTC and its government, industry and research partners have also been involved in extensive R&D efforts for over a decade to advance the use of AM in the sustainment and restoration of parts that are used, worn or damaged. Understanding the properties and performance of high-end, aerospace grade metals including ultra-high strength steels, titanium alloys and/or nickel alloys is vitally important.

This work aligns closely with Defence's identification of Sovereign Industrial Capability Priorities (or SICPs), one of which relates specifically to the maintenance of aerospace platforms. Documentation released by the Department of Defence in November 2020 specifically calls out *the design, development and repair of parts through additive manufacturing processes* as one of the underpinning industrial capabilities critical for Australia in this context.

Testing their mettle

DMTC is continuing to build on its research expertise and extensive collaboration with leading-edge industrial partners in areas of AM, with a particular focus on metallic AM methods such as wire arc additive manufacturing, cold spray deposition, laser powder bed fusion and new techniques such as atomic-diffused additive manufacturing.

While it is clear that AM and 3-D printing are not the answer to all questions, these methods are proving particularly useful in the development and manufacture of complex shape parts.

Taking research breakthroughs through to repeatable processes at an industrial scale - for new or repaired parts - continues to be a challenge in the adoption and acceptance of AM techniques.

As the maturity of the technology grows, the focus is shifting from experimenting with AM techniques to designing for AM. DMTC's involvement is helping to ensure that issues of quality, testing standards and accreditations are viewed through a Defence lens.

DMTC is working to support DSTG's ambitions around a rapid and robust certification pathway for all parts developed through the use of AM. This is being done by assessing the current level of capability in Australian industry and ensuring the availability of a high-quality, sovereign industrial base of Australian suppliers for use by Defence and the prime contractors.

DMTC is working with a range of Australian small businesses to manufacture challenging aerospace component designs using in-country industrial facilities.

The components produced by Australian industry are comprehensively evaluated by DMTC and DSTG using a combination of mechanical testing and microstructure evaluation. An important aspect of the project is that DSTG will also utilise their advanced in-situ process monitoring technology during part production – a critical element for fast-tracking AM component certification. This will provide deeper insights into the role of process parameters in determining component quality.

Opportunities abound

Many of the ADF's aircraft platforms are required to perform in harsh and demanding operating environments, including deployments at sea or high humidity tropics, and remain in service for as much as three or four decades.

This puts a premium on the work of DSTG, through DMTC and its partners, to understand, quantify and prevent a range of causes of damage and wear including corrosion and structural fatigue.

Of particular interest to Defence are cast magnesium alloys commonly found in flight-critical helicopter gearbox housings and components.

A better understanding of the corrosion performance of new anodised coatings applied to cast magnesium alloys – to protect them from corrosion – will directly inform planning for through-life support and sustainment management of Defence aerospace assets.

In a long-running research partnership with DSTG and the University of Queensland, DMTC is developing a deeper understanding of the corrosion behaviour of legacy and emerging magnesium alloys and coatings.

Recent work has involved comparisons of the corrosion resistance of a range of commercial anodised coatings. This work includes both short-term immersion testing in laboratories at UQ and longer-term, outdoor exposure testing of test samples in far north Queensland at DSTG's tropical exposure sites.

The DMTC project is also evaluating the performance of existing coatings and developing improved formulations for application as protective barriers on these magnesium components.

While the immediate application of this test and development work relates to alloys most commonly used in ADF rotary wing fleets (ARH Tiger, MRH-90 Taipan, MH-60R Seahawk, and CH-47F Chinook), there is significant potential for these investigations to inform the development of sustainment and through-life support plans for Australia's F-35 Joint Strike Fighter program, as well as other aerospace platforms.

This knowledge and understanding has also informed decisions by Defence's equipment acquisition programs, allowing for incorporation of improved technologies by the Original Equipment Manufacturers onto current and future aerospace platforms.

PROGRAM

Geospatial & ISR

Expanding on Australia's world-leading expertise in instrument design and data analysis, these collaborative projects have supported the formation of Australian-led consortia with opportunities to create new sovereign Australian capabilities. Space is a critical domain for Australian technology, both for civilian or military applications. In a defence context, Australia's burgeoning interest in the Space domain has been likened to transitioning from frequent flyer membership to managing and operating an airline.

Against this backdrop, the Minister for Defence Industry recently confirmed that space-based technologies would be added to Defence's list of Sovereign Industrial Capability Priorities (or SICPs).

DMTC's work in this area since 2018 has focused on developing and demonstrating the capacity and expertise of Australian industry and research organisations to meet a growing demand for high-performance small satellite structures, componentry and data analysis. DMTC's industrial partners in this work reflect the predominance of small businesses and startups in the sector.

An example of the extension of these technologies to support national security agencies of Government, including but not limited to the Department of Defence, is DMTC's work with a small business delivering geospatial information and visualisation tools.

DMTC's project is coordinating a series of rapid technological development cycles to meet the requirements of Army and national intelligence community stakeholders. The project team is taking advantage of advances in image capture and synthesis of multiple 'feeds' of imagery to provide enhanced situational awareness capabilities.

Into low earth orbit

The successful launch of the M2 CubeSat in March 2021 marked the culmination of more than three years of preparation.

The CubeSat's imaging payload assembly (IPA) is mounted on a composite Ti-6Al-4V/Invar36 optical mount, produced by CSIRO as part of a DMTC project that successfully demonstrated a novel approach to accelerating the production of satellite components. The project used advanced manufacturing techniques such as 3-D printing and aerospace investment casting.

DMTC also collaborated with UNSW Canberra Space, CSIRO, La Trobe University and industry partner, A.W. Bell on a project to research, design, test and manufacture a CubeSat chassis and the optical mount.

More recently, the M2 mission achieved another major milestone with the spacecraft separating into two, while in orbit, to demonstrate formation flight and allow for further testing of intelligent, networked satellite technologies

A new angle on sovereign capability

DMTC also worked with University of Technology Sydney (UTS), Sydney-based industry partner, HyVista Corporation and specialists from DSTG on a compact, spatially agile spectral sensor (C-SASS) system.

The ability to tilt the view angle of the hyperspectral sensor and look 'off nadir' (at as much as a 40-60 degree angle) enables the image to be acquired without being directly above the target area, such as flying above the open ocean and looking towards a beach or coastal environment.

The team successfully developed a prototype and demonstrated its capacity during test flights in 2020. The more recent work, including support for a PhD candidature at UTS, has focused on interrogating the imagery using artificial intelligence (AI) and deep learning methods. These methods have allowed for the aggregation of both nadir and off-nadir imagery and validated an anomaly detection framework.

DMTC is also working with a project team involving researchers from the Australian National University (ANU), CSIRO and industry partner, Skykraft, a small business formed out of the UNSW Canberra Space team, on a CubeSat Hyperspectral Imager for Coastal Oceans (or CHICO).

CHICO is a visible light hyperspectral imager with defence, civil and research applications, for deployment in low earth orbit.

Deployed on a small satellite (SmallSat), the CHICO sensor could be tuned to measure optical water quality or detect objects in submerged environments, and simultaneously to provide a consolidated view of the targeted area.

The aim in both the C-SASS and CHICO projects is to provide customers, including Defence, with visibility of littoral environments (the land-sea boundary zone), with direct applications for navigation, disaster response, hydrographic survey and information gathering from denied or contested access areas.

Expanding on Australia's world-leading expertise in instrument design and data analysis, these projects have supported the formation of Australian-led consortia with opportunities to create new sovereign Australian capabilities.

Designing the systems to deploy on unmanned aerial vehicles and SmallSats puts an emphasis on making the systems compact in size without compromising the quality of data capture. Along the way the teams have confronted and overcome a number of technological barriers, including miniaturisation for deployment on target flight platforms, and size and weight optimisation of the prototype design.

The trade-offs between these competing elements have been addressed through advanced simulation techniques based on new design methods developed by the CHICO team in collaboration with DMTC.

DEVELOPMENT

Industry Capability

> The intersection between cyber and advanced manufacturing is a great place for the economy to be able to develop that muscle memory of the right behaviours in cyber security, but then to also leverage that from the advanced manufacturing side of things; to not only have trust in the data that everyone is using and leveraging, but as a point of comparative and competitive advantage in both domestic and international markets."
>
> Michelle Price
> CEO, AustCyber

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

Through its Industry Capability Development (ICD) Program, DMTC is engaged in technology transfer for the benefit of Australian industry.

DMTC's goal is to put best-practice industrial capability into Australian hands. For small businesses seeking an opportunity in defence supply chains, issues of capability (expertise, skills, quality, traceability) and capacity (demand, throughput, reliability of supply) need to be addressed as a precursor to future success. The ICD Program helps companies identify and resolve these issues, and therefore open doors to Defence opportunities for individual companies, and regionally-based clusters of companies.

In 2020-2021, the ICD Program focused on three streams of activity:

- **Welding of High-Strength Steels** – delivers improved procedures for welding, insights in relation to emerging technologies and the steps to enhance welding productivity.

- **Smart Enough Factory** – delivers practical and low-cost insights for companies to understand the value of recording and analysing production data and the benefits of best practice business systems and factory connectivity to provide additional value to their customers.

- **Next-Generation Additive Manufacturing** – delivers material quality data of printed parts and print process recommendations for improving part quality.

The geographical reach of these activities across Australia is shown on Page 43.

The Program provides both process benchmarking and technological expertise to help Australian companies enhance their 'factory floor' operating procedures and demonstrate their potential to compete for defence sector opportunities. It also seeks to build understanding of defence industry sector characteristics such as market structure, lead times, quality standards, accreditations and security requirements. Experts engaged by DMTC provide mentoring and evidence-based feedback, both during workshops and in post-activity reports, highlighting improvement opportunities for each company.

Although the COVID-19 pandemic continued to impact ICD activities throughout 2020-21, the agility and resilience of both the DMTC team and participating companies ensured projects stayed on schedule and delivered intended outcomes. Adaptions included the transition to virtual 'site visits' and increased online interactions between participating companies and the DMTC team, allowing continued successful delivery of workshops. In June 2021, DMTC hosted a delegation of ICD Program companies at the Land Forces Exhibition. The event was attended by 50 people representing 18 SMEs from past and present ICD cohorts. The event included a series of Defence and program briefings including from Army Headquarters, and the opportunity for SMEs to engage directly with prime contractors including Rheinmetall Defence Australia and Hanwha Defense Australia.

A solution that is 'smart enough'

DMTC has developed the Smart Enough Factory Project in response to the increasing demand for companies to be literate in the concept of Industry 4.0, the digitalisation of manufacturing. Data-driven approaches are one of the keys to productivity improvements in modern manufacturing and can help participating companies to realise points of difference and competitive advantage.

To date the Smart Enough Factory Project has been successfully piloted in Queensland and Victoria.

In October 2021 the Victorian Government announced a multi-year Digital Uplift Program for SMEs based on the Smart Enough Factory and delivered by DMTC. Five Victorian companies (Australian Precision Technologies, APV Corporation, A.W. Bell, Heat Treatment Australia and Ronson Gears) are participating in the Victorian pilot.

The Victorian Digital Uplift Program is delivered by DMTC, its research partners and business advisers. This broader business enterprise development advice is a natural complement to technical knowledge transfer and supports the adoption of innovative manufacturing technologies.

DMTC has continued to work with Indigenous-owned cyber security company, Willyama, supporting the delivery of the Smart Enough Factory project. This engagement aligns with the goals of DMTC's Reconciliation Action Plan.

In June DMTC launched a series of five promotional videos to raise awareness and showcase the benefits of DMTC's ICD Program. The companies featured in the video series discuss the benefits of the Program in overcoming barriers to access for defence supply chains.

DMTC Youtube Link: https://dmtc.com.au/our-activities/industry-capability/video-series/

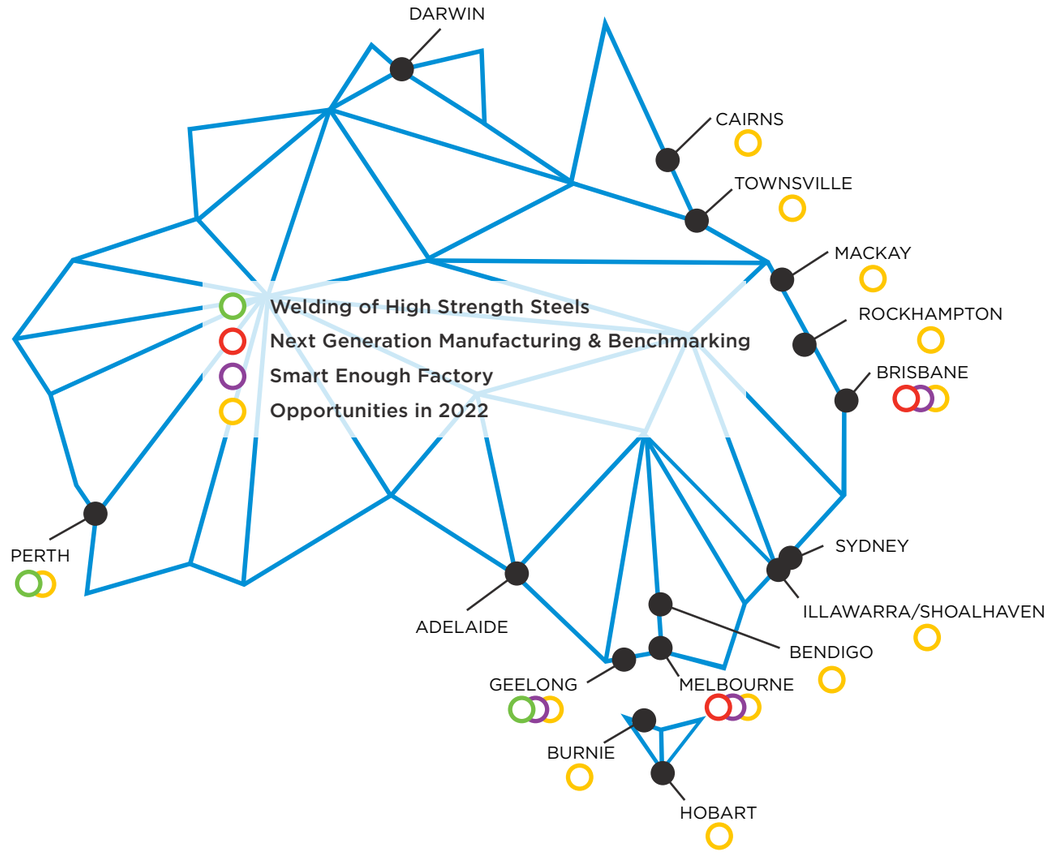
From Page 41

ICD Program activities such as the Smart Enough Factory are also being supported by a talented team of interns from several universities, delivered through a scheme supported by the Defence Science Institute (DSI) Victoria. Contribution by interns is becoming an increasingly important part of the ICD Program delivery model, and their efforts and skill levels augur well for a bright future in Australian industry. More information on internships can be found on Page 44.

DMTC's ICD Program continues to focus on transfer of innovative technologies to benefit and equip Australian SMEs, priming them for future success. This will contribute to resilient supply chains in line with the Government's ambitions for sovereign industrial capability.

Looking Ahead

In 2021-22 and beyond DMTC is seeking to expand its ICD Program to benefit additional companies and to look to new technology frontiers. Further Welding and Smart Enough Factory projects are expected in SA, NSW and Queensland. The development of advanced composite materials and structures is one likely avenue for ICD Program growth.



EDUCATION &

Outreach

Australia's next generation of Defence research and technology leaders will drive Australia's sovereign capability and allow the nation to remain at the leading edge of science and technology development in the defence and national security sectors.

DMTC's long-standing commitment to education and outreach has supported more than 50 PhD and masters candidates with scholarships, operational funding, travel and conference support. DMTC also supports undergraduate and graduate student internships.

A renewed focus on the importance of investing in the next generation of Defence researchers has led DMTC to provide new scholarships and support across a range of projects in the HSSA division, the Advanced Piezoelectric Materials and Applications and ICD Programs respectively.

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

DMTC's investment in future leaders in research and technology puts an emphasis on broad professional development and professional skills to complement their subject matter knowledge and expertise. One example is the opportunity for DMTC-supported students to showcase their work to their peers and others in the DMTC community through presentations at DMTC's Annual Conference.

DMTC-supported candidates have successfully transitioned into careers in defence and related sectors, whether in postdoctoral research or professional positions. More information is provided on Pages 16-17 of this Report.

Through DMTC's ICD Program, which seeks to boost the defence readiness of Australian SMEs in the manufacturing sector, DMTC has facilitated several meaningful internship opportunities.

One recent example is the Smart Enough Factory project, which assists participating businesses to learn Industry 4.0 concepts and take advantage of advances in data-driven manufacturing processes. Two undergraduate interns are currently participating in the program in Victoria and, by 2026, approximately 34 interns will have participated in Victoria alone. DMTC aims to expand this element of the program to other States and territories.

DMTC

Annual Conference

DMTC's Annual Conference continues to provide ample opportunity for the DMTC community to present, share and discuss perspectives and ideas relevant to breakthroughs in applied research and technology developments.

As expected, the challenges presented by the COVID-19 pandemic throughout 2021 led to the restructure of the conference to accommodate virtual attendance.

To effectively cater for these changed circumstances and mirror the technical streams commonly featured in DMTC's in-person events, the conference was divided into three distinct events, all of which were successfully delivered online:

- Medical Countermeasures and Health Security (31 May)
- Advances in Platform & Enabling Technologies (16 June) and
- Naval Shipbuilding & Sustainment (1 July).

Keynotes from DMTC, DSTG, Defence, and Industry were a feature of all three events. Technical presentations from industry and research partners examined each theme area in more detail.

Each of the three events included a Q&A panel, with distinguished guests providing their unique perspectives on building industrial capacity in Australia. The Medical Countermeasures panel consisted of senior leaders from Joint Health Command, MTP Connect, CSIRO and Planet Innovation. Industry and research leaders were featured on the panel for the Platform & Enabling Technologies event while representatives from three of the primes engaged in the delivery of major shipbuilding and sustainment projects for the ADF comprised the panel for the Naval Shipbuilding & Sustainment event.

While the disaggregation of this year's conference allowed participants to engage with topics of particular interest to them, it was notable that 46% of the 178 registrants signed up for more than one event.

A beneficial element of operating the conference as three distinct events was that it allowed for alignment with other scheduled activities in the defence sphere, such as the Land Forces exhibition.

Despite its divergence from the usual structure and presentation, the 2021 events retained the critical hallmarks of previous DMTC conference events: hearing from Defence and other senior stakeholders; technical presentations to demonstrate outcomes; and opportunities for students and early-career researchers to showcase their work.

> "Industrial capability provides the nation with a resilience to respond to global challenges, as we've seen in the past year. It adds sovereign weight to the nation and provides certainty for us as citizens, and to the regional and global community."
>
> Dr Mark Hodge, CEO DMTC

Harry Veivers

DMTC-supported PhD candidate and young Australian innovator, Mr Harry Veivers, was awarded a High Commendation in the Young Innovator prize category at the Land Forces 2021 Innovation Awards in June.

Harry Veivers is a PhD candidate at the University of Queensland (UQ) School of Mechanical and Mining Engineering, where he is developing a model to investigate 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.

Harry has been a driving force in the lightweighting work package of the Thales Australia N-FAST project, successfully manufacturing prototypes using a novel design to achieve a 40% mass reduction.

The N-FAST project is part of sector-wide innovations that provide advances in the lethality, situational awareness and survivability of the Solider Combat System, through advances in digitisation, lightweighting and advanced manufacturing. A key element and enabler to this work is to remove non-functional weight carried by soldiers in battle. DMTC's contribution is principally through collaboration partners at UQ and RMIT.

The work of Thales, DMTC and partners is ensuring that Defence is able to provide leading-edge equipment for Defence personnel and is also contributing significantly to establishing a sovereign industrial capability for munitions and small arms research, design, development and manufacture.

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

> "Harry has been a driving force in the lightweighting work package of the Thales N-FAST project, successfully manufacturing prototypes using a novel design with a 40% mass reduction. These units met all the targeted requirements validating Harry's predictions regarding mechanical and thermal performance of the system. Harry is an outstanding Young Innovator."
>
> Graham Evenden,
> Director Soldier Weapon Systems,
> Thales Australia

AWARD
Recipients

Brodie McDonald

Dr Brodie McDonald, a DSTG researcher won the Young Innovator prize at the Land Forces 2021 Innovation Awards in June.

During Dr McDonald's PhD studies at DSTG, which were supported by DMTC, he developed complex numerical models to predict the performance of high-strength steels used in armour material for military vehicles.

Brodie has since accepted a position in the Land Vehicle Survivability Group at DSTG where he has continued his research into the response of armour materials to blast loading and ballistic impact. In this role, he works on armour development, improvised explosive device (IED) threat characterisation and vulnerability modelling for ADF land vehicles.

The innovation that won this award, known as Advanced Smart Armour Systems, aims to provide lighter weight and higher protection armour solutions against ballistic and blast threats including IEDs. This multi-disciplinary project utilises advanced materials, computational modelling, and sense and deploy capability to produce active armour that responds to the threat environment.

This project developed a simulation capability, that allows testing and evaluation of new armour designs completely within a computer environment. Traditional physical testing of ballistic and blast threats can be time-consuming, expensive, and limiting in observations. In comparison, advanced computational simulations can give insights into armour behaviour that can't be observed in the real event. Furthermore, computer simulations can allow the testing of hundreds to thousands of armour combinations before choosing the most optimal design for physical testing or further development.

Brodie's innovative work is expected to lead to more rapid development of armour systems for the protection of ADF land vehicle fleets. This efficiency can significantly reduce the armour development lifecycle, allowing more threats to be analysed and negated, and therefore increasing the protection of Defence personnel.

A promising future

Harry Veivers' work has led to an offer of employment with Thales Australia, while Harry completes his DMTC-supported PhD candidature at the University of Queensland. Brodie and Harry are further examples of DMTC's track record in supporting exceptional young researchers who are using their studies as a springboard to careers in defence and related industry sectors. More details on Pages 16-17.

SNAPSHOT
Finance

In the reporting period, DMTC continued to work closely with relevant defence and national security agencies to successfully deliver outcomes across a broad and expanding portfolio of research and development activities.

DMTC secured new investment in its activities from a range of sources, including from the Defence Innovation Hub, through both discrete innovation contracts and the negotiation of an extension, to June 2022, of an overarching Collaborative Research, Development and Innovation services contract. Through DMTC's co-investment model, this investment leveraged additional cash and in-kind investment from Australian industry, research agencies, State Government and other Defence Program sources.

Cash funding and associated in-kind received for the financial year was $28.9m, whilst resources applied for the financial year totalled $26.2m, including $11.8m of in-kind contributions from industry and research partners.

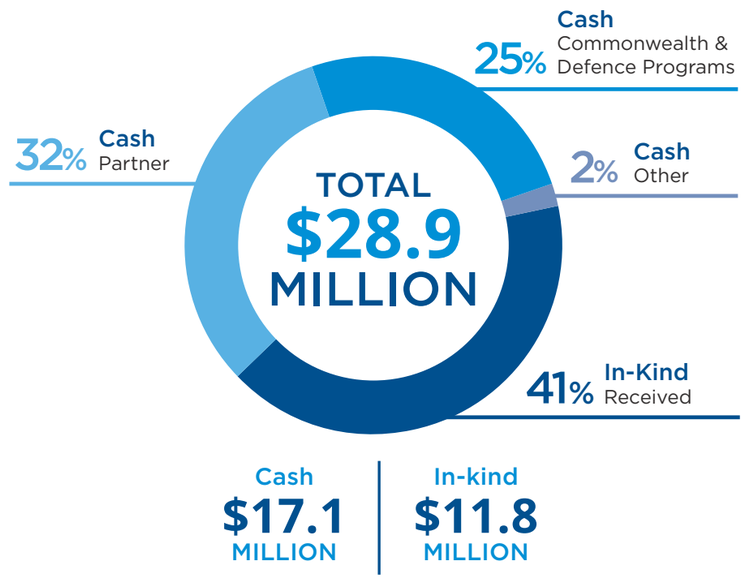
A surplus of $1.028m was recognised for the year ending 30 June 2021, which is slightly higher than the corresponding result in 2020, driven by a reduction in strategic investment throughout the year. This surplus was added to the Program Opportunity Reserve, increasing DMTC's ability to respond to new and emerging technologies while preserving the capacity to deliver its core objectives. Management took a deliberate strategy to increase the Program Opportunity Reserve to prepare for increased strategic investment in FY22, anticipating a re-emergence from COVID-19 related issues.

Cash reserves totalled $30.2m at 30 June 2021 and included $25.3m of unearned revenue from Commonwealth and Defence program funding. These funds have been committed to fulfil existing and new research activities in future periods.

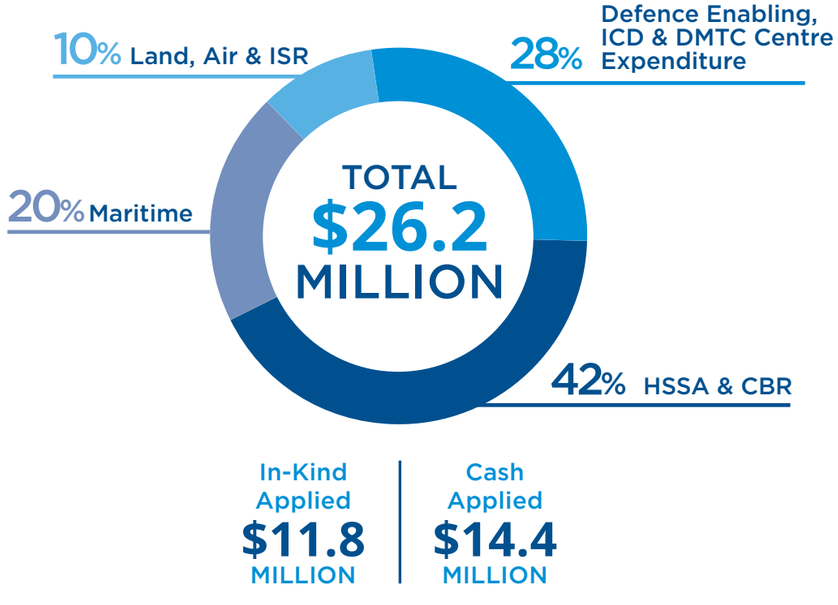
Copies of the company's statutory financial report for the year ending 30 June 2021 are available on request.

YEAR IN
Summary

RESOURCES **Received**



RESOURCES **Applied**



TEAM

Management

Dr Mark Hodge
Chief Executive Officer

Mr Jim Arthur
Chief Operating Officer

Mr Steve Evans
Chief Financial Officer

Dr Matt Dargusch
Chief Technology Officer & Air Program Leader

Ms Charlotte Morris
Industry Capability Development Program Leader

Mr Deepak Ganga
Head Program Management

Dr Leigh Farrell
Head HSSA

Dr Felicia Pradera
General Manager HSSA & Medical Countermeasures Program Leader

Dr Martin Veidt
Enabling Technologies Program Leader

Mr Steve Patrick
Head Strategic Projects & General Counsel

Ms Anthea Silom
Finance Manager

Mr Milan Gandhi
Manager Innovation Capability & Senior Associate (Office of the General Counsel)

Dr Matthew Byrnes
CBR Modelling and Simulation Program Leader

Dr Julia Cianci
Senior Project Manager HSSA

Mr Steven Champion
Supply Chain Development Project Manager

Dr Stephen van Duin
Maritime Program Leader

Ms Elisa Woodlock
Information, Quality & Program Support Officer

Mr Miles Kenyon
Head Maritime Strategy

Mr James Sandlin
Program Development Manager

Ms Bronwynne McPherson
Executive Coordinator

Dr Neil Sims
High Altitude Sensor Systems Program Leader

Mr Fred Eske AM
General Manager Innovation & Maritime Capability Development

Ms Emily Kibble
Project Manager HSSA

Mr Harry Baxter
Head Government Relations

GOVERANCE

Corporate Responsibility

Governance And Corporate Responsibility

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 Annual General Meeting (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 Industry, Defence systems and policies, education and research, financial and risk management and corporate governance.

AGM and Participant Workshop

The DMTC AGM was held on 12 November 2020 and in accordance with the Company Constitution, Directors Mr Mike Grogan, Ms Patricia Kelly, and Mr Marc Peskett retired by rotation at the meeting, re-nominated and were subsequently re-elected to the Board of Directors.

The DMTC Partner Workshop was held on 12 November 2021. The workshop provided partners with an update on the Company's achievements for the 2019-20 financial year, ongoing and planned program activities, an update on likely future activities and discussion on Defence policy initiatives and developments, including briefings from senior Defence leaders.

Audit, Risk and Remuneration Committee

The Audit, Risk and Remuneration Committee is a formal subcommittee of the DMTC 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 non-executive Directors of DMTC, the majority of whom are independent.

Environmental and Social Impacts

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 academic prizes and charities

PROUD SUPPORTER OF SOLDIER ON

Nadrasca Diversity in Industry

BOARD OF

Directors

Mr Tony Quick

Chair
MA

Ms Patricia Kelly

Director
BA, GAICD

Mr Marc Peskett

Director
BBus, CA (Australia), FTI (Australia), MAICD

Mr Michael Grogan

Director

Professor Valerie Linton

Director
PhD, MBA, FIEAust

Dr John Best

Director
PhD, BSc (Hons), MBA, GAICD

Air Marshal (Retd) Dr John Harvey AM

Director
PhD, MIS, MLitt, BSc, BA, GAICD

Professor Caroline McMillen AO

Director
PhD, BA (Hons), FAHMS

Professor Linton retired on 30 June, 2021, Professor McMillen appointed 18 August 2021

CONSOLIDATING
Capability

The Office of the General Counsel is supporting DMTC's current activities, playing a key role in developing high levels of professionalism and outcomes in collaborative innovation, and contributing to the organisation's growth and evolution as a key stakeholder in sovereign research and development.

Reflecting the increasingly sophisticated nature of business for DMTC's stakeholders, and the steadily growing pipeline of work, the General Counsel function was established in 2020 to provide a dedicated in-house legal capability. It supports both the Company's executive in navigating business complexities, as well as providing direct support to specific programs and projects.

In-house legal advice and drafting support has been provided to Program Leaders to aid in project definition, delivery and management, providing fast, easy-reach support, and increasing the tempo and quality of DMTC's operations.

The Office has also taken carriage of advice on broader issues including amongst others, Defence Export Control, intellectual property, and Freedom of Information responses, ensuring that DMTC's stewardship of projects remains in accordance with the highest standards.

General Counsel staff have, in addition, led and contributed to a range of company-wide projects, including the National COVID-19 Technology Capability Portal, the acquisition and implementation of the data visualisation tool used to support the National Health Security Resilience Assessment, as well as a range of important internal functions.

As DMTC grows and adapt in response to the priorities of the Defence and national security community, the Office of the General Counsel will continue to provide advice to the management team and the Board on strategy, structure and systems.

Specific areas of focus are likely to include corporate structures, delineations between service offerings, extended applications of the platform underpinning the NHSRA, and ensuring that deliverables continue to uphold the Company's outstanding reputation.

QUALITY
Management

Quality systems accreditation remains a vital asset for DMTC in its engagement with the Department of Defence and, more broadly, in the Australian and international defence and national security sectors. In the reporting year, DMTC was re-certified against ISO 9001:2015 and ISO 44001:2017 standards. New policies added in the reporting year included a Whistleblower Policy and a Director Independence Policy.

The ISO benchmark represents a globally recognised endorsement of our systems and processes.

DMTC's focus on managing collaborative projects as a specialist endeavour pre-dates the development of the ISO 44001 standard. A focus on applying 'structural flexibility' in the way that multi-party collaborations are managed, with a view to delivering value for all partners, has been acknowledged in the defence sector for many years, and more recently through this certification outcome.

The ISO certifications are a significant validation of DMTC's collaborative model, but the Company's approach to quality and improvement goes beyond an annual drumbeat of audits and compliance.

Building on a long history of involvement in the internationally benchmarked Supplier Continuous Improvement Program, DMTC continues to conduct rigorous annual self-assessments. These are useful as a 'health-check' on the organisation and to monitor the ongoing strategic focus and alignment of ongoing improvement initiatives.

Through both of these initiatives, DMTC continues to maximise the effectiveness and efficiency of its program delivery, together with its supporting corporate systems and operations. Participants in DMTC projects, along with government agency customers, can have confidence that DMTC's focus remains squarely on the delivery of practical, tangible outcomes for Australia's defence capability and support for the local defence industry and research sectors.

SECURITY
Assurance

DMTC continued to monitor and review security requirements and maintained its Defence Industry Security Program (DISP) membership during the financial year. Security training has been provided to all team members to inform them of emerging risks and good practices, and the DMTC team members who hold formal security clearances have continued to comply with mandatory training and other requirements.

DMTC has also undertaken a comprehensive security risk assessment. Updated practices and procedures have been introduced in accordance with DMTC's IT system, which is managed by a service provider accredited under ISO 27001 standards.

Glossary

ADF	Australian Defence Force
AGM	Annual General Meeting
AM	additive manufacturing
AMSTECH	Australian Maritime Superconducting Technologies
ANSTO	Australian Nuclear Science and Technology Organisation
APMA	Advanced Piezoelectric Materials and Application
ASW	above sea warfare
CASES	Compact Aerosolised SARS Exposure Sentinel
C-SASS	compact spatially agile spectral sensor
CASG	Capability Acquisition and Sustainment Group
CBR	chemical, biological or radiological
CFRTP	carbon fibre-reinforced thermoset polymer
CHICO	CubeSat Hyperspectral Imager for Coastal Oceans
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DMTC	Defence Materials Technology Centre
DSTG	Defence Science and Technology Group
FML	fibre-metal laminate
GMP	Good Manufacturing Practice
HISS	human integrated sensor systems
HNR-FRP	hybrid nano-reinforced fibre-reinforced polymer
HSSA	Health Security Systems Australia
HTS	high temperature superconductor
ICD	Industry Capability Development
IED	improvised explosive device
LAMP	loop-mediated isothermal amplification
LOTE	life of type extension
MCMs	medical countermeasures
N-FAST	Networked Future Augmented Small-arms Technologies program
NGTF	Next Generation Technologies Fund
OCE	Operating in CBRN Environments
ODIS	Office of Defence Industry Support
PFRA	publicly funded research agency
PhD	Doctor of Philosophy
PPRR	prevention, preparedness, response and recovery
QUT	Queensland University of Technology
RAP	Reconciliation Action Plan
R&D	research and development
RAN	Royal Australian Navy
RMIT	Royal Melbourne Institute of Technology
SME	small to medium-sized enterprise
SNP	single nucleotide polymorphism
SUT	Swinburne University of Technology
TRL	Technology Readiness Level
UoW	The University of Wollongong
UQ	University of Queensland
USW	under-sea warfare
UTS	University of Technology Sydney
WAAM	wire arc additive manufacturing

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