SOVEREIGN INDUSTRIAL CAPABILITY PRIORITY INDUSTRY PLAN

Munitions and Small Arms Research, Design, Development and Manufacture

December 2019
Industry is a critical partner in the development of the Sovereign Industrial Capability Priority Implementation Plans. I thank the individuals and organisations that participated in the consultations and the Defence Industry Capability Survey that informed the development of this suite of Plans.

The Hon Melissa Price MP
Minister for Defence Industry
We are pleased to release the Munitions and small arms research, design, development and manufacture Industry Plan, which is a key deliverable of the 2018 Defence Industrial Capability Plan.

This Industry Plan was developed in close consultation with experts from industry and Defence to unpack the industrial capabilities that need to be delivered or supported by Australian industry. Identifying the critical industrial capabilities will encourage a framework for investment in these capabilities and provides guide posts to Defence personnel on the importance of maximising Australian industry participation in relevant Defence contracts.

A long-term partnership between Defence and defence industry is key to enabling informed and timely decisions to be made with respect to our defence capability, including necessary investments in workforce, infrastructure or intellectual property.

This Plan addresses workforce and skilling requirements, and forecasts the technological developments that may impact on future defence capabilities. The Plan also outlines the broader defence industry and innovation initiatives available to support capability requirements, and lists key actions for Defence to assist the munitions and small arms sector.

A key priority for Defence is to ensure that our people receive the support necessary to succeed in their mission to defend Australia and its national interests. Australia’s defence industry is critical to enabling Defence preparedness and delivering warfighting advantage.

We would like to express our gratitude to the many Defence personnel and defence industry representatives who volunteered their time and expertise to support the development of this Plan. We look forward to continuing to build and strengthen our partnership in delivering the products and services needed to support our Defence Force.

Greg Moriarty
Secretary
December 2019

Angus J Campbell, AO, DSC
General
Chief of the Defence Force
December 2019
In 2018, through the Defence Industrial Capability Plan, Government identified the first ten Sovereign Industrial Capability Priorities (priorities). These priorities are critical to Defence and must be developed or supported by Australian industry.

These Industry Plans, as well as the supporting Implementation Plans, build on the Defence Industrial Capability Plan to identify the critical industrial capabilities that underpin each priority to enable informed and timely defence capability decisions. Defence is focused on access to, or control over, essential skills, technology, intellectual property, financial resources and infrastructure within the Australian defence industrial base to preserve sovereign interests and realise the benefits associated with such interests. This Plan enables both Defence and industry to better understand opportunities and trade-offs associated with sovereign capability, and should be read in conjunction with the Implementation Plan.

**Guidance to Government Readers:**
This Industry Plan supports Government, Defence project managers and others focused on capability acquisition and sustainment. This Plan provides information and guidance to enable Defence to align capability decisions with the strategic intent of the Department and broader Whole-of-Government policies, including:

- The critical industrial capabilities to be developed in Australian industry to support this priority (pages 15-17).
- The capability enablers required to protect Australian sovereign interests (pages 40-43). This will support industry’s business planning and investment decisions, as well as enable the development of Australian Industry Capability Plans that align with Defence priorities.
- A description of the industrial base and its dynamics to support planning and consultation, including preparing for and undertaking market solicitation, such as requests for information (pages 22-37).
- The actions to be taken by Government to support development of this priority (distributed throughout pages 33-44 and consolidated in Annex A).

**Guidance to Industry Readers:**
This Industry Plan details specific areas of focus for Defence, enabling industry to support growth of sovereign capability by investing in those capabilities identified as critical (for example, in workforce, technology or infrastructure). The Plan includes:

- An explanation of the policy environment, the definition of Defence sovereignty and what it means to contribute to a priority (pages 9-10).
- Identification of the critical industrial capabilities and capability enablers related to this priority and Defence’s intent to access or control particular aspects. This will support industry’s business planning and investment decisions, as well as Australian Industry Capability Plans that align with Defence priorities.
- Existing support levers available to industry seeking to develop Defence industrial capability (Annex B) and specific actions to be taken by Government to support this priority (distributed throughout pages 33-44 and consolidated in Annex A).
EXECUTIVE SUMMARY

Munitions and small arms equipment is critical to the Australian Defence Force’s (ADF) ability to train, fight and win. With an increased focus on integrating the warfighter and the weapon system, munitions and small arms play a critical role in generating a warfighting advantage for one of Defence’s greatest capabilities – the dismounted combatant.

Within the next three to five years, capability enhancement in small arms platforms and munitions capabilities is anticipated to be delivered through systems integration and advanced combatant training, both of which present opportunities for defence industry.

Integration of systems requires knowledge of each component and platform, access to the necessary Intellectual Property (IP) and expertise in the workforce to operationalise, and undertake test and evaluation functions. Munitions and small arms industries have identified collaboration as a challenge and a barrier to perform this integration function and broader development of this Sovereign Industrial Capability Priority (priority). Industry must be willing to collaborate more actively, and this Industry Plan details key areas where collaboration is most crucial.

Changes in the delivery of combatant training means a greater emphasis will be placed on realistic training simulation, and the data will be provided to industry to improve equipment and enhance ADF warfighter capability. Currently, industry indicates very low investment in capital and low reinvestment in research and development (R&D). Defence’s increased data sharing will need to be met by increased investment from industry if capability enhancements are to be delivered.

Alongside the development of this Plan, Government is in the process of establishing a new Strategic Domestic Munitions Manufacturing contract, which will take effect in 2020. This contract will allow greater industry access to Government-Owned-Contractor-Operated (GOCO) facilities in Mulwala and Benalla. Underpinning this will be a strategic vision for munitions manufacturing in Australia that aligns with ensuring the most critical Explosive Ordnance natures are accessible when we need them.

While not explicitly identified in the Defence Industrial Capability Plan, this Industry Plan includes sustainment of small arms as an element of the priority, acknowledging the need for the ADF to be able to continue to maintain and upgrade weapon platforms and ancillaries and ensuring availability of skilled labour and IP.

Within this environment six industrial capabilities are critical and Government seeks to have access to and control over certain elements of each, and to support or influence related defence industry investment. Development of these critical industrial capabilities will ensure the most critical elements of sovereign industry are available when and where they are needed by the ADF.

WEAPON SYSTEM INTEGRATION

Integrated weapon system research and design and the ability to upgrade / reconfigure systems, utilising advanced ancillaries and lighter-weight components.

PRECISION SPECIALIST MACHINING

Precision specialist machining, treatments and coatings of components utilising advanced lightweight materials to support the assembly and sustainment of small arms and ancillaries.

PRODUCTION OF ENERGETIC MATERIEL

Development and manufacture of Energetic Materiel, including high explosives, propellants and primers, using current technologies and future alternatives.
LOAD, ASSEMBLE AND PACK CAPABILITY
The ability to fill and Load, Assemble and Pack designated Explosive Ordnance products inclusive of handling high explosive fill and use of advanced / lightweight components and parts.

TEST & EVALUATION
Test, evaluation and experimentation capabilities to facilitate weapon system research, design, development and modification, including experimentation of munitions.

COMBAT TRAINING TECHNOLOGIES
Design and development of training technologies and environments, incorporating digital and autonomous capabilities and synthetic immersive systems, to enhance combatant performance.

To ensure Australia retains the identified critical industrial capabilities, Government seeks to build the following enabling capabilities in partnership with industry over the next decade, starting with the Government actions listed in this Plan:

- **Munitions Production Facilities:** Continued Commonwealth control of the GOCO explosives and munitions factories, as key enablers of sovereignty.
- **Weapon System Performance:** Access to the IP and skilled resources required to design, integrate, test and evaluate weapon system performance. This focus on ancillaries and platform integration is linked to warfighting advantage.
- **Software Systems and Data:** The ADF's increasing focus on digital capabilities and networking requires a level of access to IP and other input data needed to operate and integrate weapons-centric software systems, and control over the data generated when operating these systems. This extends to replicating the physical attributes and performance metrics of ADF small arms and munitions technologies for use in combat training simulations and enabling the collection and dissemination of data collected during training activities and exercises.

The recognition of munitions and small arms as a Sovereign Industrial Capability Priority provides industry with the confidence to invest in research, IP and the skilled workforce to deliver capability benefits to the men and women serving in the ADF. This Industry Plan also includes support mechanisms available to businesses.
What does success look like? The munitions and small arms industry in 2022-24

This Industry Plan describes Defence’s priorities for the next three to five years in terms of investment in research, design, development and manufacture of munitions and small arms technologies. Success in implementing this Industry Plan will enable the following industrial landscape in 2022–24:

- Australian industry, in collaboration with ADF, have access to the capabilities necessary to sustain small arms fleets and critical ancillary items in-country, including the requisite IP and a pipeline of qualified armourers and other technical specialists.
- Retained agility in the design, Test & Evaluation (T&E) and certification of weapon components and munitions. This is enabled by flexibility in the integration of systems, workforce expertise and access to T&E capabilities for modifying and assuring systems in response to changes in the threat environment.
- Defence has a nuanced understanding of risks and dependencies in the munitions supply chain, and is implementing innovative approaches for ensuring future stock surety, including identifying alternative sources of supply.
- Growth in the pipeline of highly skilled personnel with technical weapons and munitions expertise, with development programs for Science Technology Engineering and Mathematics (STEM) students and graduates. This will encourage specialisation in explosive materiel research and manufacturing, chemical science and engineering (inclusive of software, electrical, mechanical, robotics, chemical and other relevant fields of engineering). This will also enable experienced and qualified plant operators at Defence and industry facilities to disseminate knowledge across industry.
- Australia’s niche capabilities as a manufacturer of explosive materials and munitions are globally recognised, and investment of local and international organisations is strengthened.
- Australian industry’s resilience continues to be enhanced as a result of growth in export activities, in particular, Explosive Ordnance. Industry access to specialist proof and experimental facilities strengthens international competitiveness and facilitates industry R&D activity in support of the ADF.
- ADF investments in agile and adaptable training facilities and technologies continue to deliver world class combat shooting training to the Joint Force, generating adoption by Allied Forces.
- Clear Government vision for domestic munitions manufacturing including unambiguous priorities for Australian manufacture, providing signals to industry to make investment decisions. Government has also communicated a clear strategy for the GOCO facilities, enabled by strategic partnerships with industry, providing medium-to-long term certainty.
- Established methods and processes have been implemented to assist ADF programs and projects to evaluate and access (where appropriate) inclusion of domestically sourced explosive materials, including those manufactured at the GOCO facilities.
- The multi-tenancy vision for the GOCO facilities, primarily around the Benalla munitions factory, is realised through the Strategic Domestic Munitions Manufacturing contract with the arrangements and work practices established with industry providing confidence to all tenants in terms of IP protection and investment in infrastructure.
This Industry Plan describes the Munitions and small arms research, design, development and manufacture priority and specific sovereign capability requirements across four key areas. These areas are standardised across all Industry Plans and are presented in the diagram below.

Features of this Industry Plan

Sovereign Industrial Capability Priority
Munitions and small arms research, design, development and manufacture

Critical Industrial Capabilities

- Weapon system integration
- Precision specialist machining
- Production of Energetic Materiel
- Load, Assemble & Pack Capability
- Test & Evaluation
- Combat Training Technologies

Enablers

- Munitions production facilities
- Weapon system performance analysis
- Software systems and data

Government Actions

- Explosive Ordnance collaboration Program
- Access to specialist test facilities
- Establishment of a professionalisation framework for the explosives sector
- Increasing access to Defence user communities
- Defence Industry Security Program
- National firearms manufacturing license or permit
- Identification and communication of prioritise for Australian manufacture
- A clear vision for domestic munitions manufacturing
- Explosive ordnance governance and coordination
- Engineering development program
- Intellectual property protection
- Opportunities for industry participation in the future of training

Available Support

- Defence innovation programs
- Other Defence support opportunities
- External support and collaboration opportunities
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STRATEGIC CONTEXT

The case for a sovereign industrial base

Sovereign industrial capabilities are capabilities considered to be operationally critical due to the strategic advantage they provide to the Australian Defence Force (ADF). They must be developed and supported by Australian industry because overseas sources do not always provide the required security or assurances of access and supply. When making capability decisions, Government considers how Australia will develop, maintain or enhance these capabilities and the degree of access to, or control over, we need now and in the future.

Sovereign Industrial Capability Priorities (priorities) are those industrial capabilities assessed as:

- operationally critical to the Defence mission;
- priorities within the Integrated Investment Program (IIP) over the next three to five years; or
- in need of dedicated monitoring, management and support due to their industrial complexity, government priority, or requirements across multiple capability programs.¹

The initial Sovereign Industrial Capability Priorities are²:

The Australian Government will, on a case by case basis, make judgements on the optimal level of access to, or control over, for each priority. It does not automatically mean the priorities have to be designed, developed, manufactured or maintained in Australia, and for each priority, the level of sovereignty may vary. Defence sovereignty is made up of many elements, and may include:

- access to resident technical design capabilities, for example, to modify or upgrade systems;
- ability to test and assure equipment is operationally ready for service or to be returned to service;
- a degree of access to, or control over, the facilities, technologies and Intellectual Property (IP) that underpins defence capability within Defence and Australian industry;
- access to allied capability that supports our war fighting advantage; and/or
- the ability to protect foreign-sourced, controlled technologies employed by the ADF.

² Full DICP descriptions:
   * Advanced signal processing capability in electronic warfare, cyber and information security, and signature management technologies and operations
   ** Surveillance and intelligence data collection, analysis, dissemination and complex systems integration
‘Access’ refers to the availability of key assets within Australia, able to be utilised by Defence, as and when required. ‘Control’ is obtained by Defence through ownership or exclusive rights to a critical asset such as specialist machinery or infrastructure.

The priorities identify a number of elements of the Australian Defence industrial base at a capability rather than at a company or technology level. This is to encourage innovation in existing technologies and provide flexibility in supporting the current and future critical industrial capabilities.

**Sovereign Industrial Capability Priority development**

The priorities were developed through a rigorous assessment framework that considered the strategic, capability and resource dimensions of industrial sovereignty against the needs of Defence. Consideration of priority industries and technologies were balanced against Defence’s priority to provide the ADF with cost-effective, cutting-edge capability that maximises Australian industry involvement.

Management and support for the priorities starts at the very beginning of Defence planning, and continues throughout the Force Design Cycle and Capability Life Cycle, including the Australian Industry Capability (AIC) Program, into Government grants and initiatives to support industry directly. The AIC Program remains the critical lever for Australian industry involvement in supporting the priorities and Defence’s broader capability needs.

**Policy framework**

The 2016 Defence White Paper sets out a comprehensive, long-term plan for the defence of Australia and its national interests. Australian industry will continue to play a major role in delivering on this.

The 2016 Defence White Paper is complemented by:

- the IIP, which outlines $200 billion of Defence capability investment and provides industry with the certainty to invest in people and infrastructure; and
- the Defence Industry Policy Statement (DIPS), which outline how we will strengthen partnerships between Defence and industry with a focus on closer alignment between industry investment and Defence capability needs.

Industry’s role as a Fundamental Input to Capability was officially recognised in the 2016 Defence White Paper, with Government, formalising the pivotal role defence industry plays in generating military capability and supporting the ADF.
The Defence Industrial Capability Plan notes kinetic weapons and payloads will continue to underpin a large portion of the ADF’s military capabilities over the next decade. These capabilities will continue to be delivered primarily by industry through a number of major acquisition and sustainment projects. Accordingly, the Munitions and small arms research, design, development and manufacture Sovereign Industrial Capability Priority (Munitions and Small Arms priority) requires Australian industry to manufacture propellants, munitions and ammunition as well as support the sustainment of the small arms that provide our soldiers with a warfighting advantage.

From a capability perspective, the scope of this priority includes:

- **Small Arms** – the weapons and corresponding ancillaries carried by the dismounted combatant up to and including Direct Fire Support Weapons;

- **Munitions** – the ammunition and munitions,\(^3\) including their component parts, used in weapons carried by the dismounted combatant, as well as grenades, demolition charges, artillery, mortars and aircraft bombs\(^4\), and

- the supporting ecosystem elements that enable these capabilities to be integrated, tested and operated.\(^5\)

Related weaponry out of scope of this priority includes:

- complex guided weapons (not able to be carried by a dismounted combatant);

- remote weapon stations and armouries; and

- bomb guidance systems.

Where the requirement for sovereign protection is identified, these will be addressed through other Industry Plans.

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\(^3\) While these terms are often used interchangeably, ammunition is a term that includes shells, bullets, fuses, and powder, and munition involves everything from guns, small revolvers, medium rifles, automatic rifles, special arms, artillery guns, missiles, and bombs.

\(^4\) This priority only applies to the bomb body – typically the explosive components of the munitions, not the guidance and control kits that can be attached to the bomb bodies for precision guidance.

\(^5\) These elements are intentionally discussed in the context of the ecosystem as opposed to the support system e.g. storage, distribution, disposal.
The vision for the integrated warfighter...

Within Defence, the Soldier Combat System Program (SCSP) in Army Headquarters represents the lead Capability Manager for sustainment and modernisation of dismounted combat capability used across all three Services. The SCSP ensures the soldier combat system maintains a capability advantage over current and emerging threats.

Defence’s focus on the ‘soldier as a system’ has developed over the past decade. Lethality, primarily delivered through munitions and small arms, reflects just one of the attributes of the soldier system (alongside Survivability, Mobility, Situational Awareness and Human Performance). Defence’s vision is for an integrated Australian warfighter with:

- enhanced situational awareness, including physiological and environmental senses;
- adaptive protection against ballistic, blast and environmental threats;
- enhanced lethality; and
- proactive resupply systems to reduce the load carriage burden and enable enduring mobility.

This vision recognises that weapon systems represent only a small portion of the equipment ADF personnel are required to carry and operate in a combat environment. Management and delivery of the integrated soldier system requires organisations such as Integrated Soldier Systems Branch, and its resident development directorate Diggerworks, within Capability Acquisition and Sustainment Group (CASG), the Defence Science and Technology Group (DST) and a cross-section of the Australian defence industry to take a holistic view of the user.

... and the integrated force

Beyond the individual warfighter, the ADF seeks to enhance the capability of the Joint Force. Exploiting technologies such as low cost swarming technology, computers, cyber expertise and long range weapons generates advantages for the Joint Force. Munitions and small arms capabilities must consider enhanced connectivity and networking between systems and platforms, facilitating command and control and integrating joint fires and intelligence networks.6

Integration at multiple capability levels enhances ADF weapon systems, contributing to ongoing capability enhancement. Integration is considered at three levels:

- the sub-system level, such as integrating weapon, munition and ancillary sub-systems to create a weapon system;
- the platform level, such as integration of the soldier and the weapon system as part of the soldier combat system and mounting onto other military platforms; and
- the network level, including integrating weapon systems into a network such as the Battle Management System.

While each level of integration is important to deliver the capability effect, only sub-system integration is included in the bounds of this Plan. Specific technologies enabling platform and network integration of weapon systems, and associated IP and workforce, are beyond the scope of this Plan.

Munitions and small arms capability systems

Munitions and small arms are fundamental lethality systems used to support a variety of users, platforms and activities across the ADF. Whether to support training activities or enable deployed operations, they are essential to ensure preparedness and to deliver capability for our warfighters to protect themselves and others in conflict.

Munitions

- Included within the scope of this Plan is explosives, small arms ammunition and larger munitions including mortars, Army and Navy artillery, aircraft bombs, as well as munitions used in cannons.
- To produce Explosive Materiel required for various types of munitions, high quality input materials are required including paper for nitrocellulose, input chemicals such as nitric acid, as well as fuses and primers. Extensive specialist assets and infrastructure, access to IP and deep explosive experience and skill sets are necessary for production.

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6 Chief of Army, Army in Motion 2019.
Small arms

- Small arms are weapons carried by individual combatants and include pistols, rifles, shotguns, general purpose machine guns and assault rifles. While there is no internationally agreed definition of small arms, as a general rule 'small arms' are firearms with a bore diameter of .50 calibre or less. This Industry Plan takes a broader view when defining 'small arms', including Direct Fire Support Weapons such as anti-tank weapons, grenade launchers and heavy machine guns able to be carried by a dismounted combatant.\(^7\)

- Small arms capabilities consists of individual manufactured components. The manufacture and test of small arms is a precise, complex process involving engineering, specialised metal alloys and extensive testing. Various materials and manufacturing methods are included, such as chrome-molybdenum and stainless steel, brass, aluminium and plastic. These materials are also subject to different coatings and treatments, which enable greater durability, corrosion resistance and aesthetics.

- Various ancillary products are integrated onto the small arms weapon platform to enhance performance, such as day and night sights, image intensifier systems, thermal imager systems, suppressors and other mission-specific add-ons such as grenade launcher attachments. Small arms weapon systems are configurable, enabling the user to modify the system and ancillaries to suit a specific mission or purpose. Scalability and interoperability of ancillaries with weapon platforms is required given the breadth of ADF users, mission profiles and operating environments.

Defence access to, or control over, these capabilities is needed to assure supply of critical systems and sub-systems. This enables the ADF to respond rapidly to changes in the threat environment and advances in technology.

In-service systems

Australian industry continues to support in-service weapons and capability enhancements through a variety of acquisition and sustainment programs, including the Carl Gustaf anti-tank weapon, the TAC2 sniper rifle and the EF88 assault rifle. Supported by strategic industry partners, Joint Logistics Command (JLC) integrates warehousing, distribution, materiel maintenance functions and services throughout the Joint Logistics Unit (JLU) network. This includes highly skilled armourers to assist with the sustainment of various weapon systems. Australian Munitions, a subsidiary of Thales Australia Limited, continues to operate the GOPO munitions manufacturing facilities as the Commonwealth's strategic partner.

Current explosives and small arms manufacturing capability

The GOCO facilities, comprising the Mulwala explosives facility in New South Wales and the Benalla munitions facility in Victoria, have supported delivery of munitions for the ADF and other global customers for several decades. Mulwala has been operating since World War II, producing explosive materials including propellants and more recently, various high explosives, used in munitions and other explosive natures. A proportion of these materials are provided to the Benalla factory, which has been operating since the mid-1990s, to enable the manufacture of products for the ADF such as 5.56mm, 7.62mm and .50 calibre small arms ammunitions and select medium and large calibre munitions (e.g. some variants of 5/54” naval gunnery munitions and MK 82/MK 84 aircraft bombs).

These factories are now entering a new era alongside the refinement of Government's ambition for domestic manufacturing and the establishment of the Strategic Domestic Munitions Manufacturing (SDMM) contract, due to take effect in July 2020. This contract serves to ‘open up’ the GOCO facilities by enabling additional tenants to operate at the sites. This will build collaboration, enable a concentration of industry expertise and knowledge and optimise the facilities' assets and infrastructure.

Lithgow Arms, operated by Thales Australia, manufactures small arms and has equipped ADF personnel in every conflict from World War I to Afghanistan and continues to support the ADF today.

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\(^7\) It is noted that many of the small arms weapons discussed in this Plan are mounted onto other platforms in addition to being carried by a dismounted combatant (for example, heavy machine guns are mounted to helicopters).
In March 2019, Thales Australia announced concept plans to upgrade the precinct to develop and manufacture the next generation soldier systems for the ADF. This precinct will integrate traditional manufacturing with digital technologies, as well as small businesses and research institutions to grow the domestic small arms manufacturing sector.

This investment will strengthen the munitions and small arms sector in Australia, drive innovation and create greater export opportunities for Australian businesses.

Critical Industrial Capabilities

The critical industrial capabilities are priority-specific industrial capabilities the Government seeks a level of access to, or control over. They could be an essential skills, technology, IP, financial resources, infrastructure or some other industrial element. These capabilities need protection, to ensure a capability advantage for the ADF. When considering the development and production of enhanced lethality systems, specific capabilities (set out below) underpin the ability to leverage current, emerging and disruptive technologies into capabilities which are ready for acquisition and integration into the existing and future integrated soldier combat system.

1. **WEAPON SYSTEM INTEGRATION**

   Integrated weapon system research and design and the ability to upgrade/reconfigure systems, utilising advanced ancillaries and lighter-weight components.

   Enhanced functionality, human performance and terminal effects through weapon system research, design and integration are key to enhanced lethality. Combatants must be able to reconfigure their own weapons in response to different threats and operational requirements. This must be enabled by industry, providing support and sharing expertise in relation to weapon performance and effect.

   Warfighting advantage is, in part, realised through integration, design and production of ‘best of breed’ components and sub-systems. The design and development of high quality and lighter weight components, such as polymer or caseless cartridges and the use of composite materials, continues to be a priority for the ADF with weight reduction allowing greater flexibility for ancillary items. Ensuring security of supply to this critical industrial capability within the Australian industrial base is required to allow the ADF to reconfigure and test weapon systems in response to technology enhancements and global trends. For example, reconfiguring may be required if the US developed a 6.8mm round resulting in a calibre change among allied nations.

2. **PRECISION SPECIALIST MACHINING**

   Precision specialist machining, treatments and coatings of components utilising advanced lightweight materials to support the assembly and sustainment of small arms and ancillaries.

   Warfighting advantage is supported by the ability to design and manufacture lightweight, high quality components. This expertise enables weight and overall load to be optimised, specifically in relation to small arms platform and ancillary product assembly, sustainment and upgrade. Traditional manufacturing capabilities are transforming through the application of new materials and processes. Domestic control and access to this equipment provides a source for substitution or enhanced components.

   There is domestic and international competition for the skills and technologies required to produce these components; therefore commercial viability of manufacturing many of these systems and components in Australia is a key consideration.

3. **PRODUCTION OF ENERGETIC MATERIEL**

   Research, development and manufacture of Energetic Materiel, including high explosives, propellants and primers, using current technologies and future alternatives.

   Energetic Materials are essential for the munitions manufacturing process and given the degradable nature of these critical inputs they present a key risk to domestic munitions manufacturing. This critical industrial capability seeks to ensure domestic production is able to be increased in response to demand, with future alternatives investigated and supported. This could include a broader range of energetics (inclusive of advanced bomb fill compositions and propellants currently unable to be produced in Australia) and options for in-country production of key components.
Continued investment in design and development within the GOCO facilities and broader Australian industry owned facilities is required to access and evolve products and technologies in response to changing capability requirements. This investment also encourages industry growth and supports enhancing the long term viability of manufacturing facilities. A highly skilled workforce is central to the delivery of this critical industrial capability and requires dedicated investment in professionalising and future proofing access to technical expertise. The ability to maintain and manage the technological IP of the products currently being manufactured, as well as expanding the manufacturing capability will be important for Australia’s sovereign interests.

**LOAD, ASSEMBLE AND PACK CAPABILITY**

The ability to fill and Load, Assemble and Pack designated explosive ordnance products inclusive of handling high explosive fill and use of advanced / lightweight components and parts.

The production of munitions requires access to a highly skilled workforce, IP and specialist facilities to enable safe and high quality fill and/or Load, Assemble and Pack functions. This critical industrial capability is focused on ongoing research, design and development of explosive materials, enabling high quality, high performance munitions and ammunition to be produced through the application of advanced coatings, treatments and manufacturing processes. Safety and governance are critical enablers to the quality assurance activities necessary for munitions manufacture, in particular, fill and Load, Assemble and Pack, including the ability to x-ray munitions during the production process.

Investment in this critical industrial capability encourages expansion of munitions manufacturing capabilities of other Australian-based industrial facilities. The viability of this sub-sector will require both Defence and industry to invest in workforce skills development and knowledge transfer.

**TEST & EVALUATION**

Test and evaluation capabilities to facilitate weapon system research, design, development and modification, including experimentation of munitions.

The industrial capabilities required to undertake experimentation in munitions and test and evaluation of weapon systems (inclusive of sub-systems and Explosive Ordnance) are critical to enable ongoing design, development and certification of the equipment. This critical industrial capability includes research, development, test and evaluation functions at all stages in the product lifecycle. It is supported by specific skill sets, IP and infrastructure, specifically proof and test facilities. The ability to undertake these activities in Australia enables responsiveness to changing operational requirements, surety of supply and protection of intent. It also enables interoperability with allied nations and will support the maturity and competitiveness of Australian products in export markets. Configuration management and integration functions (including integration at the sub-system level) are embedded in this critical industrial capability.

Defence and industry have different test, evaluation and certification roles. Defence will focus on staying ahead of capability needs of the ADF into the future, retaining analytical expertise to evaluate and assure product performance. Future proofing this capability within the Defence workforce is a high priority. In contrast, industry test activity is expected to focus on informing ongoing capability enhancements to determine when a product is ready to be introduced into service. Industry may need to leverage specialist equipment, facilities and knowledge to enable this.

Future of Joint Training

The critical industrial capabilities only address a portion of the priorities, future investments and overarching vision for joint training in the ADF. A ‘training transformation’ is underway and is seeking to take advantage of improvements in technology, including optimising the collection, analysis and dissemination of data (in real time and post-activity) and enhance interoperability of training technologies. Through strategic publications such as the Chief of Army’s *Army in Motion* and the *Defence Simulation Strategy*, senior Defence leaders have described this future of joint training vision and the need for whole of Department coordination. This ensures capability and financial returns on investments in training solutions, including simulators, training ranges and accessories.
COMBAT TRAINING TECHNOLOGIES

Design and development of training technologies and environments, incorporating digital and autonomous capabilities and synthetic immersive systems, to enhance combatant performance.

Enhanced combatant performance is a key contributor to warfighting advantage. This critical industrial capability seeks to develop interoperable, flexible and adaptable training technologies, and to create training scenarios that are realistic, dynamic and unpredictable. Training systems enabling joint, as opposed to single service, training is a priority – across activities and exercises of all scales – as are systems that can accommodate a broad range of weapon systems and supporting technologies.

Australian industry has a key role in the design, development and delivery of training technologies in both the physical and synthetic environments. These types of technologies enable fit-for-purpose investments in training systems that can be upgraded and integrated with other technologies and environments. Having these technologies and any data collected, analysed and disseminated during a training activity resident in Australia supports protection of intent. Training technologies within this critical industrial capability apply specifically to the use of unguided weapon systems able to be carried and operated by the warfighter and include digital ranges, static and dynamic thermal and infrared targets, among other autonomous and synthetic technologies. The industrial capabilities needed to use, maintain and modify these systems are important for enduring outcomes.

What is a digital range?

Modern digital technologies capable of training, evaluating and stressing personnel and their environment enable improved training outcomes through more realistic train-as-you-fight environments. The ADF’s requirements for digital ranges are still being defined, however, it is anticipated they will be able to be used for individual and collective live-fire training and have the ability to simulate new weapon systems, stress personnel, incorporate the digitised force, and provide enhanced training data collection and review capabilities. The digital ranges utilise all available combat system capabilities and digitally integrate them to manage forces undergoing individual and collective live-fire training and qualification exercises, often in geographically separate locations.

Defence acquisition of Munitions and Small Arms

The critical industrial capabilities described above are applicable to a number of current and future projects and programs. The 2016 Integrated Investment Program identified the following projects of relevance:

- AIR 6000 Phase 2A/B and Phase 3 New Air Combat; Capability – munitions components;
- LAND 159 Lethality Systems Project;
- LAND 1508 Phase 1 Special Operations Enhancements;
- LAND 400 Phase 2 Mounted Combat Reconnaissance Vehicle and Phase 3 Mounted Close Combat Capability (long range Direct Fire Support Weapons and other munitions components);
- JP 2085 Phase 2/3 Explosive Ordnance Contingency Stock Surety Project;
- SEA 4100 Phase 1 Maritime Strike; and
- SEA 5000 Phase 2 Future Frigate Weapons.

*This list is not exhaustive. A large number of Defence acquisition programs include explosive ordnance elements. It should be noted that i) since the IIP 2016, Land 159 and Land 4108 have been amalgamated into L159 Lethality Systems Project, ii) the Guided Weapons in the scope of these projects (e.g. SEA 500 Phase 2) are not covered by this plan; and iii) the long range Direct Fire Support Weapons for Land 400 Phase 2 has been awarded.*
For projects above, the described critical industrial capabilities will be included in the AIC Plan requirements which form part of Defence’s procurement documents. In responding to this, industry must acknowledge these AIC requirements in a way that optimises critical industrial capabilities development in Australia. The evaluation process will continue to address an array of factors in accordance with competitive tender conditions, with Value for Money (VfM), among other key criteria, continuing to represent an enduring Commonwealth requirement.

**Chemring Australia secures global supply opportunity**

Australia’s industrial capabilities in energetics span beyond the Government’s own facilities. Chemring Group's world class manufacturing facility in Lara, Victoria produces flares and counter-measures designed to protect ADF platforms in the air, sea and on land. In 2018, Chemring Australia was chosen as a strategic supplier for unique flares for the global F-35 Joint Strike Fighter program.

**Future trends and technological evolutions**

Within the next three to five years, warfighting advantage will be generated through the evolution of ancillaries, soldier systems integration and combatant training.

Technological evolution in small arms platforms and conventional munitions capabilities are expected to be limited to adaptations and improvements to existing technologies. However, ongoing evolution of some key components is expected intermittently over a medium to long time horizon both within these equipment sets and within the broader ecosystem, inclusive of the integrated soldier, platform and network integration, training technologies and test, evaluation and certification capabilities. These evolutions serve to enhance mobility and lethality and improve the overall performance of the warfighters in combat.

Ancillaries such as fire control systems are integral to enhanced lethality and they evolve at a faster rate than weapon platforms. The global market for this equipment is competitive and growing. Australia’s ability to ensure access to the skills and IP necessary to undertake all levels of integration, as well as to complete test and evaluation functions to assess weapon system performance, is integral to deliver capability enhancements over the next five years.

It is expected some of the greatest marginal gains in warfighter performance will be realised through advanced combat training and not through improvements to the weapon system capability itself. Defence is moving away from a traditional approach for combat shooting training and instead seeks to optimise human performance and enhance authentic preparedness outcomes across the Joint Force. The benefit of this investment is twofold.

1. More realistic Live Virtual Constructive training technologies, including digital ranges and mobile targeting systems enables combatants to ‘train as they fight’; and
2. It allows for collection, analysis and dissemination of data collected in physical and synthetic training environments. This data supports capability evolution by providing substantial information on individual and group performance during training activities.

This data enriched feedback enables evidenced-based enhancements to training technologies and practices, providing a measurable baseline for evaluating training effectiveness and improvement of performance. As indicated in Figure 1, this data may also inform ongoing capability evolution.
“The ability to identify a target, utilising passive systems to prevent detection, to act as a node in the broader control system and to shoot with greater precision and lethality over greater distances, with lighter weight burdens – that’s how we’ll realise warfighting advantage.” – Global Prime

Figure 1: The two way feedback loop of training system testing and enhancement with weapon system testing and enhancements

Figure 2 provides a ten year view of the trends and potential technological evolutions that may impact the capabilities being operated by the ADF relevant to this priority.9

Figure 2: Evolution of Technology and Trends Impacting ADF Capability

9 The timeframes identified in this graphic are approximate and have been determined based on public available information.
Force Ordnance – Technology Transfer Enables Local Manufacturing

Force Ordnance is Lightforce Australia Group’s newest addition offering high-quality research, design, development, manufacture and integration of small arms and lightweight ammunition. Led by Dr Ray Dennis, founder and MD, Force Ordnance continues a long tradition of Australian innovation and manufacturing that started with brands such as Lightforce and Nightforce.

The Force Ordnance team focuses on providing small arms systems to military, law enforcement and government, leveraging the Group’s footprint in the United States. Force Ordnance is primarily partnered with Lewis Machine and Tool Co, a world-leading designer and manufacturer of small arms with other key partners to leverage more specific products and services.

Force Ordnance will transfer technology to Australia to develop the sovereign industrial base. Using its advanced manufacturing methods in South Australia, it can take the products offered by its United States partner and tailor the offering to suit local needs.

Force Ordnance’s growing partnerships and infrastructure will provide a new technology innovation hub in Adelaide. This hub aims to provide a key link to superior weapon capabilities using its technology transfer capability to build domestic engineering and design skills. “We are always asking, what does the next stage look like? How can we push the boundaries of what we have to help our customers achieve their operational advantage?” Acting COO, Force Ordnance.

Force Ordnance acknowledges that fundamentally, it is people and skills that drive innovation. “We are always looking for people with the right skills, who are open to try new concepts to make the most advanced systems.”

CASE STUDY
CURRENT AUSTRALIAN INDUSTRIAL CAPABILITY

The industrial base supporting the development and production of small arms and munitions technologies in Australia is mature and stable, driven in part by limited technological change and steady ADF buying patterns over recent decades. The market is dominated by a small number of major manufacturers and assemblers. The market also consists of a small number of second and third tier providers and a large number of companies acting as agents, resellers and importers. The ADF is the key customer to many of the companies in this market.

Australian industry overview

The findings from extensive consultation undertaken in developing this Industry Plan and through the National Defence Industry Survey Report 2018–1910, as well as research and analysis into the composition and characteristics of Australia’s industrial base has produced insights on Australian industry’s current capabilities. The data used in this section reflects those organisations who completed the survey and indicated an ability to generate the Defence Relevant Industrial Capabilities (DRIC) applicable to this priority.

Size and Composition

The sector includes a small number of large companies, and a large number of small and medium sized companies11. The munitions and small arms market in Australia has traditionally attracted a lower number of end-to-end manufacturing organisations and a larger number of component manufacturers, integrators and assemblers, as well as agents and resellers.

Large companies were more prevalent in the delivery of munitions technologies relevant to this priority and in the delivery of weapons and munitions outside of the scope of this priority, predominantly complex guided weapons. This in part reflects the greater investment requirements to generate munitions and guided weapon technologies, specifically infrastructure, high-tech inputs and materials, and ensuring compliance with Workplace Health and Safety requirements. Survey respondents generating munitions capabilities indicated greater capital expenditure (CAPEX) than those generating small arms capabilities or undertaking the processes in the supply chain - approximately 20 per cent of munitions organisations spent in excess of $10 million on CAPEX last financial year, versus 7 per cent or less for those in the sub-sector generating other capabilities.

Size of the Organisations Supporting this priority

10 The survey, administered by the Centre for Defence Industry Capability (CDIC) in 2018, required industry to complete a range of questions in relation to their business and the industrial capabilities able to be generated with a Defence application (referred to as Defence Relevant Industrial Capabilities). Approximately 1,800 organisations responded to this survey and the self-reported data was not validated through other sources; accordingly there are limitations in terms of data bias and representation of the sector.

11 The survey categorises organisations as: micro (up to 4 employees), small (5 to 19 employees), medium (20 – 200 employees) and large (200+ employees).
Strong Small-to-Medium Enterprise (SME) Base

SMEs in this part of the sector are, for the most part, well diversified with approximately 65 per cent of SME respondents delivering munitions and small arms capabilities generating less than 25 per cent of their revenue from Defence related activities. Other attributes of this SME community include:

- The majority of SME survey respondents are not currently providing capabilities to Defence, although many have done so in the past. With limited alternative markets for munitions and small arms products, not having business with Defence challenges business continuity and flexibility for investing in assets and Research & Development (R&D).
- Of those not currently supplying goods or services to a Defence sector customer, there exists significant interest (and apparent capacity) to generate components and other inputs that support munitions and small arms technologies, and to a lesser extent, other ADF weapon capabilities. This exists mostly among small businesses.

A number of micro organisations were also identified as participants in the sector, with many seeking to differentiate themselves as specialised, agile development and prototyping agencies in the supply chain of more established Defence suppliers. However, consistent with all organisations supporting this sub-sector, more than a third of micros are yet to secure work with a Defence customer.

Innovation

More than 75 per cent of survey respondents with the capability to support this priority reported reinvesting less than half a million dollars in R&D last financial year. This is relatively low in comparison to other parts of the Defence sector. One of the reasons for this may be the average revenue of the organisations in this part of the sector – more than half generate $5 million or less annually – and another is the number of organisations in this sub-sector are agents, importers or resellers (and therefore are less likely to pursue innovation). These organisations, as indicated in the consultations, apply limited, if any, innovation to the products supplied to Defence customers.

There is a correlation between the level of investment in R&D and the number of DRICs being generated by organisations. In relation to companies investing $10 million or more in R&D, the survey suggests that these organisations on average generate more than 100 discrete capabilities.

Collaboration

Industry identified that it did not collaborate well, and this was supported in the survey results. The survey indicated that only one third of respondents had collaborated with another firm or research organisation on an innovation or research and development. Those organisations manufacturing small arms weapon platforms were most strongly represented among this group.

Given the emphasis on networking and systems integration to enhance combatant performance, greater collaboration and coordination within this sector would be advantageous to both industry and the ADF.

Global Connectivity

Approximately 75 per cent of survey respondents indicated that they were not generating export revenue. Further, only 13 per cent of respondents had experience providing products or services to both the ADF and a foreign defence force. This supports the view of industry stakeholders, which indicated they were not competitive globally for these technologies. Industry attributed this to the limited opportunities in Australia to diversify and collaborate.

Of those generating export revenue from a foreign defence source, half were generating less than $500,000 annually.
The defence value chain presents activities involved in the design, development, production and through life support of the capabilities defined within this priority. Across the Industry Plans, a common defence value chain provides a framework for understanding industrial capabilities and potential trends across the identified priorities. For each priority, enablers and inputs to each activity are assessed for their relative impacts to understand the strengths and weaknesses of the domestic industry as well as to determine if action needs to be taken.

The value chains for munitions and small arms are presented separately to ensure differences in equipment generation and life cycle are accurately defined, and the impacts on Australian business capability of specific inputs can be attributed, relative to strategic importance. To support analysis of the industrial base, each of the defence value chains include the critical steps in the generation of sovereign capability for each - research, design, development and manufacture, as stated in the Defence Industrial Capability Plan. These value chains are presented over the following pages.

**Munitions.** Based on the analysis presented in Figure 3, the value chain steps with the greatest potential impact on sovereignty are R&D and manufacturing.

From an R&D perspective, sovereign capability is developed through:

- access to a skilled workforce;
- the ability to undertake Operational Test and Evaluation (OT&E);
- the ability to access, operationalise and generate new IP, and
- access to components and intermediate goods.

Supporting R&D are inputs that include raw materials, intermediate goods and production capacity. This aligns with the Government’s ambition for increased domestic munitions manufacturing and investments in workforce and infrastructure.
Small Arms. The value chain analysis in Figure 4 shows there is alignment between the need for access to, or control over, R&D and design, and the integration of weapon systems. In particular, the need to ensure access to IP, OT&E capabilities and a highly skilled technical workforce, significantly impact the ability to develop, modify and test small arms capabilities.
Into production, post production and introduction into service of the small arms value chain; sustainment and the ability to modify and upgrade weapon platforms and systems were identified as key requirements. These observations complement the identified capability need, to multiply the force effect through the integration of weapons systems.

While the contrast is significant when considering the potential impact of sovereignty in relation to the production of munitions and small arms as two distinct equipment sets, there is commonality in the earlier stages of the value chain. The linkages between a skilled workforce, IP access and OT&E capabilities feature heavily throughout the R&D and design and integrate phases of both value chains.

According to the market analysis undertaken in support of the Land 159 Lethality Systems Project in 2017, the highest degree of market competition is also anticipated to be in the sustainment and integration aspects of the value chain.

**Sovereign sustainment of small arms is a requirement of this priority.**

When published, the Defence Industrial Capability Plan did not explicitly identify sustainment as part of this priority. While the logic behind this is more apparent from a munitions perspective, for small arms this presents a concern with the ability to maintain weapon platforms considered critical for preparedness and to support enduring operations.

As a result of further investigation and analysis, and informed by the views and experiences of Defence and industry, two specific sustainment requirements have been included in the scope of this priority:

- The ability to undertake weapon maintenance up to and including rebuild; and
- The ability to undertake servicing, first line, and where possible, second line, maintenance of ancillary equipment such as electro-optics.

Sovereign sustainment enables the level of Australian industry involvement to grow and technology transfer to occur over the life of each major capital equipment acquisition, maximising the industrial capability available to meet Australia’s broader defence capability needs.

**Industrial processes supporting Munitions and Small Arms production**

The munitions and small arms industry cannot be directly identified when looking across the Australian economy as the industrial classifications that underpin this priority category do not specifically address these technologies. The industry often supports equipment and technologies outside of the scope of this priority and the defence sector. Despite this, an understanding of the composition of the broader industrial group provides insights, as this sub-sector is anticipated to share workforce, raw materials and specialist machinery with other sub-sectors. Six industrial processes, leveraging the Australia New Zealand Standard Industrial Classifications (ANZSIC) are discussed below. These are:

- Basic Chemical Manufacturing
- Iron and Steel Forging
- Other Basic Chemical Product Manufacturing
- Other Fabricated Metal Product Manufacturing
- Basic Polymer Manufacturing
- Polymer Product Manufacturing

In comparison to those organisations undertaking the processes above for the commercial market, those undertaking these processes in order to produce weapons or explosive materials must meet additional requirements and quality standards (for example, compliance with various state and federal regulations due to the sensitivity and the controlled nature of the technologies). This presents a barrier and potential disincentive where there is a Defence need for increased supply of these products, or where industry seeks to diversify into this part of the Defence sector.

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12 It is noted that there are many other industrial processes which contribute to the products and services associated with this priority. For the benefit of this analysis, those with the strongest alignment have been chosen for analysis.
Basic and Other Basic Chemical Manufacturing

The manufacturing of propellant and other explosive materials requires access to individuals and manufacturing capabilities able to undertake the specialised industrial processes, and to chemicals such as ammonium nitrate and cellulose nitrate that are essential for local manufacture.

Basic Chemical Manufacturing encompasses manufacturing of industrial gases as well as organic acids and industrial alcohols such as ethanol, methanol, ethylene glycol and ether and inorganic chemicals including dyes and pigments, chlorine, sodium hydroxide and other alkali using electrochemical processes. In contrast, Other Basic Chemical Manufacturing includes photographic chemicals and explosives manufacture. Currently, more than 20 per cent of the inputs for these processes are imported.

The industry considerations below demonstrates this is a small manufacturing sector with a specialist workforce that is potentially vulnerable to supply issues. Industry and Defence will need to work closely to ensure that adequate lead times exist to access materials and resources including labour; as well as ensure any required growth in production is sustainable.

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**Industry observations**

- There were 257 Basic Chemical Manufacturing businesses identified across the country. More than a third are located in Victoria and approximately 80 per cent are on the east coast. Slightly fewer Other Basic Chemical Product Manufacturing organisations were identified – approximately 174 – however, Western Australia had a relatively large proportion of businesses (22 per cent). This is driven primarily by the requirements of the mining sector for explosive materials supported by a specialist technical workforce.
- Basic Chemical Manufacturing businesses are relatively small, with 37 per cent not employing staff, 49 per cent employing 1-19 workers, and only 13 per cent of businesses employing 20 workers or more.
- More than one third of workers in both these classifications have a tertiary engineering or technical qualification, with approximately 2.5 per cent having obtained qualifications in chemical sciences. The average salary of workers in the Other Basic Chemical Manufacturing sector, approximately $115,000 annually in 2016-17, was the highest of the six classifications considered in this analysis. The most common occupation in this category is Drillers, Miners and Shot Firers, representing almost 14 per cent of the national sector workforce.
- Chemical manufacturing is not an industrial process in abundance in Australia – this is not unexpected given the costs associated with establishing and maintaining safe and compliant plant operations, and in some cases, the ready substitutes available on the export market. This dynamic may impact the ability of local industry to mobilise and undertake more energetics manufacturing in Australia outside of the GOFO facilities. In contrast, Basic Chemical Manufacturing had the highest relative export output of all industrial classifications considered in this analysis, with 19 per cent of products generated in country later sent offshore.
- By virtue of the demand for chemical products, salary comparisons with other sectors, and the relatively low volume of specialist engineers and technicians, attracting this workforce to the Defence sector and the regional locations where this work occurs, may present a challenge.

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Basic Polymer and Polymer Product Manufacturing

Polymers are generally classified by their source of origin, including natural polymers that occur in nature (such as rubber) and semi-synthetic and synthetic polymers that require human intervention to modify or create (such as low and high density polyethylene, polypropylene, polystyrene, Teflon and thermoplastic polyurethanes). Accordingly, basic polymer manufacturing refers to the industrial process required to create the polymer as a material, whereas polymer product manufacturing refers to the industrial process which converts that material to a product, including both rigid and semi-rigid polymer products.

Advanced synthetic polymers are used to manufacture various components of weapon systems, including weapon grips and polymer-cased ammunition, and as a surface treatment for other metal gun parts. Currently, synthetic polymers are being used instead of traditional materials such as steel as a means of reducing overall weight (Defence is a minor user of these products). Polymers are used across the broader economy to develop non-military products such as food and beverage packaging, automotive parts and construction materials.

Competition and the availability of more substitutes in the international market may pose the greatest challenge to Defence accessing or controlling domestic polymer producing capability, if this were required.
Industry observations

- Of the six industrial classifications considered in this analysis, polymer product manufacturing has the largest number of employees, commensurate with the broad range of polymer products able to be generated across sectors. One occupation, Plastics and Rubber Production Machine Operators, represents almost 10 per cent of the jobs in this group. The highest level of study for more than one third of the Polymer Product Manufacturing workforce is year 12 or below, with a further third having completed engineering and technology related fields of study beyond year 12.
- The analysis also shows a large concentration of businesses in New South Wales, Victoria and Queensland that manufacture basic polymers and/or polymer products.
- Defence is not considered a key contributor of demand for this industrial classification. Construction related industries (constructions services, residential building construction and heavy and civil engineering) are significant consumers of polymer products, accounting for approximately 30 per cent of total output.
- In 2015-16, approximately 5 per cent of the polymer products generated by the Australian industrial base was exported, reflecting $1 billion in output.

Other Fabricated Metal Product Manufacturing

This industrial process includes the manufacture of component parts with broad applications such as springs and wires, nuts, bolts and screws, and processes relating to metal coatings and finishings. Ammunition and firearm manufacturing are specified as primary activities within this classification, with many of these parts and processes required to produce and sustain the products in this priority. The abundance and transferability of skills necessary to manufacture and sustain fabricated metal and the contribution this makes to the operation and sustainment of munitions and small arms capabilities in-country, is advantageous for Defence. There may be an opportunity for industry to share resources and knowledge to support innovative solutions and integration.

Industry observations

- This industrial classification comprises the largest number of business of the six industrial classifications considered in this analysis, reflecting more than 50 per cent of the total. Businesses were identified in all states and territories reflecting the broad industrial need for these products.
- Of the six industrial classifications considered, Other Fabricated Metal Product Manufacturing had the lowest average wage at around $57,000 per worker. This is consistent with the large proportion (more than 40 per cent) of the workforce whose highest level of study is year 12 or below.
- Structural Steel and Welding Trades Workers, Industrial Spraypainters and Metal Casting, Forging and Finishing Trade Workers represent almost a quarter of the total workforce. Each of these occupations have direct relevance to the production and sustainment of small arms and munitions.

Iron and Steel Forging

This industrial process, a sub-set of fabricated metal product manufacturing, directly correlates with the ability to manufacture component parts for weapons and munitions, including the barrel. Traditionally, this has been a very labour intensive manufacturing process requiring qualified personnel to design products and operate the tools and machinery; however, larger operators are now relying more on technology to enhance quality and control operating costs. For SMEs with this capability, competitiveness in the Defence sector requires ongoing investment in technology-enabled manufacturing products and processes due to precision requirements of the equipment.

This sector presents a key risk to the development of weapons and munitions, and the Government's broader advanced manufacturing agenda, with competing sectors such as mining and construction able to incentivise through higher salaries.

Industry observations

- The Iron and Steel Forging industry has struggled in recent years, with current levels of supply extremely low across the economy. Difficult demand conditions following the exit of major local vehicle manufacturers have driven down sales of forged steel products and as a result, many smaller operators have left the industry. The low supply of these capabilities across the economy has implications for manufacturing in the Defence sector with demand in construction and rail anticipated to absorb a large proportion of what is available over the coming years.

- A large concentration of Iron and Steel Forging businesses are based in Perth, approximately 19 per cent. This suggests correlation with the mining sector and the fabrication of mining plant and equipment, and to a lesser extent but relevant for this Plan, the shipbuilding industry which is expected to grow in the three to five year time horizon.

- The challenge in this industry is reflected in the workforce numbers, which are the lowest of all six classifications that support this priority. Analysis indicates a workforce reduction of approximately 5 per cent over the past five years. The largest occupation category, Engineering Production Workers, accounts for approximately 10 per cent of the sector workforce, followed closely by Metal Fitters and Machinists.

National capability overview

The Australian small arms and munitions sector operates in one small part of a mature, highly competitive, series of global markets for raw materials, components and weapon systems.

The geographic distribution of organisations supporting this sector is largely consistent with the geographic distribution of all organisations with the potential to develop and produce munitions and small arms. Figure 5 reflects the latter, breaking down the total number of businesses in each state further, into the six respective industrial classifications discussed earlier in this section.

Figure 5: State distribution of identified industries by number of businesses, 201714

The category with the highest number of businesses – Other Fabricated Metal Product Manufacturing – accounted for around half of the total number of identified businesses overall, and also more than half across the east coast. This priority aligns with the strategic industry intent of Victoria and New South Wales, with each states’ most recent Defence strategies citing investment in advanced munitions and investments in advanced small arms manufacturing capabilities. The presence of significant infrastructure dedicated to supporting these capabilities in each of these locations – the GOCO facilities and Lithgow Arms (a former Commonwealth-owned small arms manufacturing facility) provides surety for the long term development and production. No other state or territory Government explicitly described an intention to support the development of small arms and munitions related industrial capabilities among industry in their locations.

14 Source: ABS catalogue number 81650
Global markets and access to supply chains

As a procurer and consumer of military equipment, Australia's global footprint is relatively small. In 2014, the international small arms trade was valued at approximately USD$6 billion, 38 per cent of which was attributed to ammunition. Australia's contribution was USD$18 million in exports and USD$156 million in imports – less than 3 per cent of annual global trade.\(^{15}\)

Beyond the military community and into the commercial marketplace, Australia's contribution to the global sector is limited compared to other nations, in particular the United States (US) whose annual weapon exports are equivalent to Australia's annual exports of iron ore.\(^ {16}\) By virtue of this, R&D and production costs for US-based companies may be significantly reduced, enabling lower cost products to be marketed to domestic and international customers, and the ability to reinvest in R&D.

Given the high availability of munitions and small arms products on the commodity market, and the quality of these products, the investment required for Australia to become a larger player globally will, in most circumstances, not generate the commensurate economic or capability benefits. The scale of the Australian market means that designing and manufacturing weapons in Australia is more expensive than in the US and European countries. The ability to diversify into other consumer markets is also limited, Australian industry most often citing supply into police and law enforcement agencies as opposed to the commercial and sporting shooter markets which are considered to be dominated by imported products.

There are exceptions however, as discussed throughout this Industry Plan.

Changing Sector Dynamics

The weapons sector in Australia has experienced limited competition as a result of the transition of Government-owned strategic assets to commercial entities. Defence typically generates long-term contracts, which limits the number of organisations able to enter the market. Organisational changes within Defence arising from the 2015 First Principles Review (FPR) and subsequent defence industry policies focused on growing Australian capability and SME expertise, have sought to diversity sources of supply for the delivery of weapons and related equipment. The introduction of the Strategic Defence Munitions Manufacturing (SDMM) contract from July 2020 will support this.

The shift towards ‘Prime’ contracting models post-FPR is intended to reduce transactional workloads inside Capability Acquisition and Sustainment Group (CASG) and enhance the accountability of major Defence suppliers; however, it presents both risks and opportunities for Australian SMEs. The Prime centric procurement model introduces risk in potentially limiting Australian SME access to Defence. SMEs noted concern at the prospect of increased competition and the need to dislodge incumbent specialist providers in existing supply chains and/or have their access to the Commonwealth facilitated indirectly or through a competitor.

The opportunity to counter this risk exists where collaborative behaviours and relationships can be established and mechanisms to enable sharing of critical assets can be established.

A refocus of the market’s approach to AIC may also provide opportunities for Australian businesses to showcase their capabilities and potentially access global supply chain opportunities. Potential Primes are aware of the importance of meaningful Australian industry participant in major projects and programs and are increasingly looking for (and providing) opportunities to collaborate with innovative Australian companies. Similarly, SMEs are aware of the need to innovate and differentiate themselves to enhance competitiveness.

\(^{15}\) Source: Small Arms Survey is an independent research project at the Graduate Institute of International and Development Studies in Geneva, Switzerland http://www.smallarmssurvey.org/?small-arms-survey-2014=

\(^{16}\) US weapons exports and Australia's iron ore exports are both approximately $47 billion annually. Accessible: https://oec.world/en/profile/country/aus/
GC Precision Developments - Micro Company Providing Innovation Agility

GC Precision Developments (GCPD) is an Australian owned, Canberra-based specialist firearms manufacturer. GCPD was established in 2015 to design and manufacture light-weight premium-grade precision rifles for sporting, military and law enforcement purposes. The company currently employs five people to deliver its range of precision rifle systems and accessories including muzzle breaks, suppressors and alloy chassis systems, as it continues to grow in the Defence market.

GCPD's competitive advantage is that it can go from concept to manufacture in a very short space of time. The company's. 375 Cheytac AMAP (Anti-Materiel and Anti-Personnel) sniper rifle is an extra long-range, modular switch barrel rifle. It is world-leading in weight for its calibre class with exceptional recoil management and accuracy.

“We can do things very quickly and efficiently. Primes are looking to work collaboratively and we can bring them a very agile and innovative capability to explore possibilities and ensure what is proposed is a superior system.”

GCPD was established through a family interest in shooting sports and a passion for quality and precision. “My son found the average hunting rifle didn't give him the accuracy he wanted. He's a precision machinist with a passion for excellence and that drove him to design and develop his own lightweight rifle”. GCPD has since designed weapons for military and law enforcement purposes. “Starting from a blank canvas, we talked to operators in police tactical units and the ADF, then designed, prototyped, tested and manufactured the Covert Weapons System (CWS).” Tests on the CWS rifle were conducted in-house. It was fired by experienced shooters, including current and former Australian Defence Force snipers and exceeded the ANZ Counter Terrorism Marksman Standard by an average factor of 20. “All shooters were very impressed by its lightweight quality, features and overall functionality, particularly considering how quickly we developed the system”.

GCPD understands how critical a focus on lightweight materials is for the modern solder. “When I was in the ADF, we had a 30kg pack and thought we were hard done by. Now it's 50kg plus so we are especially focused on delivering high-accuracy, lightweight designs to reduce what the soldier has to carry.”

GCPD is now working with Thales as part of a short listed proposal to offer its .375 Cheytac AMAP sniper rifle to the ADF under Land 159. “Our weapons systems are getting a lot of attention from military and law enforcement agencies because of the accuracy and [light] weight overmatch. We're proud of our growing reputation for excellence and that we have been able to develop a truly world-class military-grade firearm in such a short space of time.”

By partnering with companies like GCPD, Primes can leverage the innovative agility offered by a micro company to rapidly design and test new concepts while also assuring and building the capability of the sovereign industrial base.

Find out more about GCPD at https://www.gcpdarms.com/.

Workforce and technical skills

In 2016-17 there were 82,873 people employed across the six identified ANZSIC classifications analysed in this section, declining from 87,756 people in 2014-15. This equates to a down turn of almost 6 per cent, which is not unexpected given the overall reduction of manufacturing activity in Australia. According to the Australian Bureau of Statistics (ABS), these six classifications represented less than 0.7 per cent of the total Australian workforce in 2016 –17. Figure 6 illustrates employment trends over time across these groups.

As was the case in terms of the number of businesses, employment in these six classifications was dominated by Polymer Product Manufacturing and Other Fabricated Metal Product Manufacturing, which employed over 67,000 people, or more than 70 per cent of the total. Although Other Fabricated Metal Product Manufacturing had nearly double the amount of businesses when compared to Polymer Product Manufacturing, there were more employees in the latter category, with this difference increasing in recent years while employment in Other Fabricated Metal Product Manufacturing was reduced. For other categories, employment numbers have been more stable. The group with the smallest number of employees was Iron and Steel Forging, corresponding with the small number of businesses for this particular category.

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17 Total Workforce in 2016-17 was 12.160 million according to Australian Bureau of Statistics (ABS).
Across the primary manufacturing functions above, the technical workforce was dominated by professionals such as Industrial, Mechanical and Production Engineers, Chemical, Gas, Petroleum and Power Generation Plant Operators and Production Managers. The need for these professions and others to ensure safe operation and management of industrial manufacturing sites, and to produce fit-for-purpose products for range of downstream industries, creates demand today and into the future.

This is consistent with the munitions and small arms sub-sector which seeks a diverse workforce, spanning logistics professionals through to various technicians, scientists and engineers. While not a comprehensive list, these workforce requirements include:

- **Explosive materiel and munitions**: a broad range of professionals with chemical engineering, Explosive Ordnance handling and manufacturing qualifications and experience spanning all stages of the value chain (R&D, production and disposal) is necessary for maintenance and growth of expertise. Access to metallurgical engineers and scientists is particularly important for investment in innovation and R&D.

- **Weapon system design, test and evaluation**: scientists and engineers to undertake modelling and analysis, design and prototyping, and T&E throughout the product lifecycle, enabling evaluation of system performance. These capabilities are required within industry, but also within Defence to enable retention and growth of expertise such as that required within the Joint Proof and Experimental Unit (JPEU) and other specialist facilities.

- **Weapon sustainment**: exposure to the array of weapon systems used by the ADF and experience undertaking sustainment activities is required to build the capabilities of armourers. Sovereign sustainment capabilities cannot be generated through tertiary qualifications or rapidly through on-the-job training – this expertise is gained over several years.

- **Software and simulated technologies**: the ADF is becoming increasingly digital and the need for systems integration, enabled through coding, is at the core of technological developments within this sub-sector. Enhancing combatant performance through advancements in Joint Force training is also enabled through an Information Communications Technology (ICT) proficient workforce.

The ADF may also benefit from enhancing the software and simulation literacy of service personnel (applicable to a range of military capabilities and not specific to small arms and munitions). The establishment of a simulation trade for ADF members would enhance these capabilities, enable more effective conversations and negotiations with industry and support the ongoing adoption and use of simulated training capabilities.

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18 Source: ABS catalogue number 81550
Defence will consider the creation of a collaborative munitions learning and development program that brings together Defence, industry and academia to deliver a common Defence objective.

Projects may be focused on delivering learning outcomes to the existing or potential future Explosive Ordnance community, for example, Defence buyers and project managers, or the development of products and technologies for future Defence use. DST Group would provide the science and technology direction and enhanced support from Defence may be available where technologies developed in the course of the program are commercialised.

Personnel with weapons qualifications such as armourers are in high demand and critical for maintaining preparedness

Although omitted from the original Defence Industrial Capability Plan description, both Defence and industry identified the need for sovereign sustainment capabilities for small arms. The expected life of type of these platforms, alongside the limited evolution in technology, reinforces the need for a highly skilled technical workforce able to undertake various grades of repair, including modification and rebuild, in Australia. Given the need to attain and retain both currency and competency across various weapon fleets, armourers and other weapons-qualified personnel require many years of training and development.

On-the-job experience is the most effective means of training explosive professionals

On-the-job training is the most common and most effective means of training Explosive Ordnance professionals, including test engineers and the supporting technical workforce required to operate specialist test facilities and to analyse and interpret test data. The nature of these capabilities means that equivalent skill sets are not readily available in the commercial market, with the movement of the workforce presenting a challenge to capability continuity and assurance activities, in addition to being expensive and time consuming to generate. Both Defence and industry need to preserve these skill sets to enable both to continue undertaking their roles and responsibilities in relation to the development and operation of Explosive Ordnance.

In the United Kingdom, the workforce challenge has in part been mitigated through the establishment of the Sector Skills Strategy Group (SSSG), a collaborative group of varying organisations from across the explosives sector who provide strategic direction to sustain explosive skills. Comprising corporate members of the Institute of Explosive Engineers (IExpE), the group was formed following a European Space Agency (ESA) feasibility study undertaken by two professors from Cranfield University which identified a risk to the loss of skills and competence in the region.

SSSG Mission Statement: ‘To encourage a sustained and prosperous UK energetics sector with recognised world class skills satisfying present and future business needs, ‘in skills and safety, we co-operate’
Assets and Infrastructure

Defence and industry each contribute to this priority through specialist assets and infrastructure used in the research, design, manufacture and sustainment of munitions and small arms capabilities. A range of Australian assets and infrastructure supporting this priority is presented in Figure 7.

**Figure 7**: Australian assets and infrastructure supporting this priority across the value chain

Industry access to specialist facilities

Critical inputs for weapon system design and development are access to the Defence user community and access to specialised test facilities. The nature of the products being developed and the tests required to achieve technical readiness means there aren’t always commercial alternatives.

Historically, industry access to Defence facilities has proven challenging due to Workplace Health and Safety regulations, and the priority given to ADF demands and activities. Commercially owned and operated test facilities may provide industry with more certainty and greater control over access, however, the establishment and ongoing maintenance of such facilities comes at a considerable cost, and is complicated by security, licensing and other regulatory requirements.

These challenges are most acutely felt by SMEs and start-ups, with some citing the inability to access Defence training areas and ranges as a reason for moving R&D activities off-shore. Primes generally have the relationships and contractual implications to get more traction, but access to proofing units in particular is still problematic, impacting their ability to innovate and export.
Access to specialist test facilities

Defence will explore mechanisms that enable industry greater access to Defence test facilities to assist with R&D and prototyping activities.

As part of the proposed enhancements to the Joint Proof and Experimental Unit (JPEU) at Graytown and/or Port Wakefield, Defence will undertake a feasibility assessment for the expansion of one or both of these facilities to enable the sites to accommodate additional and growing demands for their services among ADF users and industry.

The feasibility assessment will consider options to expand the scope of industry standards and specifications able to be tested in the facilities as well as increase overall throughput. New and/or refurbished infrastructure, more advanced equipment and test range functionality, and investments in the expertise of the workforce, will be considered by Defence during the initial scoping and planning stages for the proposed redevelopment. Opportunities for ongoing commercial access to the facilities, including engagement of Defence test expertise, will be built into the design of any future facilities.

Defence will also enable industry access to the Combat Application Lab, which was recently established within Army Headquarters as part of the Soldier Combat System Program. The Lab will provide a platform for industry to engage with end users and subject matter experts across the Defence portfolio, including Defence Science and Technology Group, Capability Acquisition and Sustainment Group and Capability Manager representatives.

The skills and knowledge required to undertake specialist testing and certification functions, as well as interpret the results of such activities are developed over time and through on-the-job training and experience. This is especially evident in proof and experimentation of munitions, where the ability to understand why a test or nature failed is critical for assuring capability performance and for informing ongoing system design and development.

If the Commonwealth proceeds with the proposed expansion of the JPEU and builds dedicated facilities for industry, the intent will be to retain responsibility for testing and performance evaluations. This commitment will support retention of the Defence workforce and corporate testing knowledge, with Defence also retaining responsibility for investigating faults and incidents. This will ensure the safe operation of facilities and an element of independence in testing and highlights the importance of workforce retention and professionalisation within Defence and across the sector.

Establishment of a professionalisation framework for the explosive sector

Defence will engage with the Institute of Explosives Engineers (IExpE) and the Sector Skills Strategy Group (SSSG) in the United Kingdom with the view to develop an Australian Explosives Professionalisation Framework that leverages the key learnings from the United Kingdom.

The intended result of this engagement will be the development of an Australian Explosives Professionalisation Framework that leverages the approach, processes and key learnings of the SSSG. The Australian Framework will address both engineering and technical skill sets, establishing a baseline training construct that enables consistency in skill sets and training standards across the explosives sector.

While initiated by Defence, depending on the scope of this Framework, this action will be delivered as a collaborative endeavor, with associations and professional bodies, among others, expected to be involved. This action will require coordination across Defence and industry to ensure all levels of skills and expertise are reflected in the Framework with consideration also being given to the distribution of the workforce between Defence and industry, including the traineeships offered at Defence facilities such as the JPEU.

Access to user communities to inform industry’s development activities and provide feedback on particular attributes of a capability is also an enabler during R&D. It is broadly recognised that user inputs during the development process greatly enhance the readiness of the resultant technology.
Increasing access to Defence user communities

Defence will provide opportunities to industry through increased access to ADF personnel and other Defence representatives to obtain feedback on developmental equipment related to this priority. This may be through a dedicated forum or exhibition with users such as Capability Manager representatives from Army Headquarters and Diggerworks, delivered in a similar style to Army Innovation Day.

A key consideration in executing this action will be providing a cost-effective means for SMEs to participate in demonstrations, many citing this as a hurdle to promoting capabilities at major events. This action serves to support Defence by maintaining visibility of the supply chain and its capabilities as prime contracting models continue to be adopted and direct engagement with SMEs changes shape.

One of the outcomes of this engagement could include identifying capabilities to undergo further evaluation or formal user trials at Defence training facilities and ranges.

Risks to Domestic Industry

With limited diversification options available in Australia, technological evolution and organisational growth are linked to optimising local production and enhancing export market competitiveness. These attributes, underpinned but not restricted by, effective governance and regulation, will be critical for industrial resilience.

Limited diversification opportunities

Outside of the ADF, there are very few customers for small arms capabilities. Adjacent customer markets are limited to policing and law enforcement, hunting and sporting shooter markets, which are small and competitive. This impacts reinvestment in R&D and the ability to compete with foreign sourced products. Similarly, Explosive Ordnance markets beyond Defence are largely limited to mining, site preparation and construction industries. The challenge for industry is to build relationships and capabilities that enable export competitiveness.

Regulation and compliance

The regulatory requirements in each Australian state and territory are complex and varied, making it difficult to navigate compliance requirements and expensive to obtain the required permits and approvals. Throughout the industry consultations, state and territory-based regulations were cited as a key barriers to cross-state collaboration and the ability to be agile in delivering capability enhancements for small arms in particular. This slows down development work and impacts overall cost.

At the Defence level, there are additional security requirements for the storage of Defence weapons. For example, industry contracted by Defence and involved in the storage or transport of weapons or explosive ordnance must be Defence Industry Security Program (DISP) members.

Defence Industry Security Program (DISP)

Defence will continue implementing the reformed DISP to strengthen security practices in partnership with industry.

DISP supports industry to protect their interests from threats including foreign interference, and increases opportunities to compete for work with Defence and international partners by becoming ‘Defence Ready’.

Defence provides DISP members with access to security information, guidance and services, including personnel security vetting, certification and accreditation of facilities and/or ICT systems. In certain circumstances, Defence can also provide an assurance to international partners of an entity’s DISP membership, promoting Australia’s sovereign capability internationally.

More information on DISP can be found at https://www.defence.gov.au/dsvs/industry/default.asp
National firearms manufacturing license or permit

The Department of Home Affairs is responsible for matters relating to Commonwealth firearms and weapons policy. Responsibility for management, including firearms registration and licensing matters, sits with the individual state and territory police agencies. The Firearms and Weapons Policy Working Group has been established to provide policy advice to Ministers and represents the voice and interests of all Australian and New Zealand state and territory police forces in matters relating to firearms and weapons policy issues.

The Department of Home Affairs, through the Working Group, will continue to provide policy advice to Ministers and other state and territory officials on policy issues, including those emerging and nationally significant. In recent years, Working Group discussions have encompassed consideration and development of a national approach to firearms and weapons and the variation and application of licenses and permits required by SMEs manufacturing small arms weapons and components. It is intended that these discussions will continue, with an objective to determine the feasibility and potential approach for creating a national manufacturing license or permit for defence industry SMEs. This would enable IP and products to be more readily transferred between customers, vendors and geographic regions.

Government support

Ongoing Government support for a domestic munitions manufacturing capability is necessary for industry to invest in local operations and position themselves for export opportunities. A number of domestic and foreign organisations indicated a willingness to expand munitions manufacturing capabilities in Australia to meet the ADF’s needs and support export markets. Promoting Australia as a global munitions manufacturer requires continued bipartisan support and clear messaging from Government including clarity of vision and willingness to support investments. This will provide industry with the confidence to invest in building a resilient, export-oriented industrial base, enhancing sovereignty in the process.

Export restrictions

Australian Government approval for export of locally produced capabilities is required in accordance with the Defence Trade Controls Act and Regulation 13E of the Customs (Prohibited Exports) Regulations 1958 (the Prohibited Exports Regulations). To ensure Australia’s sovereign interests, Regulation 13ED of the Prohibited Exports Regulations provides the Defence Minister with the power to revoke permissions granted under Regulation 13E, if satisfied that the exportation of the goods would prejudice the security, defence or international relations of Australia. Sensitive or controlled military equipment, including small arms and munitions technologies, require permits to be issued by the Defence Export Control Office (DECO) prior to export occurring and cannot be obtained in anticipation, before readiness to export. This presents as a risk to industry with long term R&D and export strategies. Industry is encouraged to engage with DECO as early as possible in the R&D process to understand limitations through an In-Principle Assessment process.

Commercial work pays for Defence work in-between drinks. Defence focused companies struggle due to the gap between order and delivery. The size of the Australian market makes survival very challenging – diversification is necessary, and if you can’t diversify, you must be able to export.”

Global Manufacturer

Australian ownership

Australia as the place of manufacture is not a pre-requisite or requirement for the Munitions and Small Arms priority.

The high cost of production of some of the technologies associated with this priority, particularly those which are high in energy consumption, coupled with high cost of entry to the market, means that offshore production is more attractive to Australian companies. In-country manufacture may also have benefits, for example, enabling Australian industry to cross-subsidise and to reinvest in innovation.

Value for Money (VfM) is more than getting the cheapest outcome or about getting something at the lowest price. For this priority it does not just relate to the cost per round or per weapon. A VfM assessment should also consider the potential for an Australian made capability solution to reduce others costs (e.g. facilities, storage, maintenance and distribution) and to enhance other outcomes (e.g. operational responsiveness, flexibility and agility in design and upgrade, preferential access to IP). However, domestic production ultimately has an impact on price, and the trade-off must be understood in relation to the capabilities which are being considered for expanded local production. Where there is limited customer base in-country, and the products are not deemed competitive on the global market, for example, small arms platforms, investing in additional manufacturing capabilities (as opposed to retaining existing ones) does not make commercial or capability sense.

Key considerations of Defence when assessing opportunities to invest in local manufacturing capability for particular munition natures include supply chain vulnerability, particularly during times of international conflict, and the need for interoperability with coalition partners. Acknowledging the limitations of Foreign Military Sales (FMS) from an Australian industrial capability perspective, specifically the reduced opportunity for participation and capability growth of Australian businesses, it is expected that Defence will continue to use FMS as a method of procuring select small arms and munitions capabilities into the future. Ensuring appropriate use of FMS as a procurement approach is a mandatory consideration in the early stages of the Capability Life Cycle (CLC) when determining the procurement strategy, and adoption of this method is subject to Cabinet approval.

Electro-optical products and other high-tech ancillaries

It is difficult for Australia to become an electro-optics manufacturing nation, in part due to the high cost of establishing this capability in-country and also the ability to reduce availability risk through potential stock-piling. Taking a greater role in ancillary assembly or sustainment functions, in particular electro-optical sights, may provide greater benefits to the ADF, subject to the required investments in workforce, and acquisition of additional Support and Test Equipment and IP. In undertaking market scanning and procurement functions, Commonwealth personnel should seek to position greater access to IP and greater participation of local industry and/or Commonwealth maintenance providers to grow this capability.

Identification and communication of priorities for Australian manufacture

Alongside the development of the domestic munitions manufacturing capability strategy, Defence will undertake a supply chain assessment to identify those components and natures of ordnance which could, should or must be manufactured in Australia in order to protect our sovereign interests and assure lines of supply. This assessment will take into account Australian industry’s interest, capability and capacity to support expanded Explosive Ordnance production requirements, various economic factors, as well as consider the complexities and potential barriers to supply from the global supply chain in times of peace and conflict.

This assessment will be delivered as part of JP 2085 Explosive Ordnance Contingency Stock Surety Project, a 30 year-long project valued at over $1.2 billion seeking to meet the Chief of Defence Force (CDF) Preparedness Directive (CPD) by assuring supply of critical components and capabilities through initiatives ranging from targeted investments in the industrial base through to stockpiling, dependent on the risk profile.

In determining where Australia’s sovereign interests can only be met through local manufacture, and attributing relative priorities, Defence will consider investment requirements in technology, infrastructure, IP and the workforce. Consideration will also be given to established contracts and planned procurements, and the need to grant sales and export licences, among other factors.
BUILDING INDUSTRIAL CAPABILITY

Industry capability enablers

The ability to generate each of the critical industrial capabilities identified as part of this priority is enabled by a range of tangible and intangible assets, behaviours and other inputs. Like the critical industrial capabilities themselves, these enablers may need to be accessed or controlled by Defence in order to protect our sovereign interests.

Broad consultation with Defence and industry, analysis of the munitions and small arms value chains, and deep consideration of the ADF’s strategic ambitions and outlook, has resulted in the identification of three key enablers that contribute to Defence’s lethality and warfighting capabilities: the Commonwealth’s munitions manufacturing facilities, the Intellectual Property (IP) and skilled resources to evaluate weapon system performance and the IP and skilled resources to enable the development and operation of training technologies.

Continued Commonwealth control of the Government-Owned-Contractor-Operated propellant and munitions factories, as key enablers of sovereignty

The Benalla munitions facility and the Mulwala explosives facility are strategically significant, and with optimised investment and management, will continue to provide the ADF with a secure supply of various munition natures. Beyond meeting the requirements of the ADF these facilities may also generate economic benefits through export markets.

Facilities such as these are uncommon around the globe and the expertise to commission and operate them is scarce. There is a need to preserve the infrastructure and machinery and the skilled workforce responsible for operation and the collective ability to translate current and future IP into products required by the ADF now and into the future. Taking a long term view is paramount to ensuring these facilities and the industrial capabilities generated within them are accessible when Australia most needs them.

In order to protect Australia’s sovereign interests, Government needs to continue to control these facilities and establish long term operating practices consistent with a broader, and clearly defined vision for domestic munitions manufacturing (including but not limited to the outputs of the GOCO facilities).

Defence and industry must work together to optimise domestic munitions manufacturing to enable ADF preparedness requirements to be met via a resilient supply chain, while also enhancing Australian industry’s competitiveness in global markets. Government and industry acknowledge the limits in terms of the ADF demand profile for Explosive Ordnance. Increasing production should be focused on those components and/or natures where there is an identified gap or a need to enhance stock surety.

Mulwala is the sole remaining manufacturing site of military propellant and high explosives in Australia, and as part of JP2086 Mulwala Redevelopment Project, Government sought to “modernise and revitalise” the facilities at this site to future proof this capability for Defence. This project closed in 2015 after close to 20 years of activity and AUD$1 billion of expenditure, having delivered a new propellant plant with much higher levels of safety, automation and environmental compliance than the former plant. Further redevelopment works are planned for Mulwala from FY2023/2024 to maintain what is now considered a world class facility.
Government Action

**A clear vision for domestic munitions manufacturing**

At the highest level, Government's requirement for domestic munitions manufacturing is to enable capability delivery for the ADF, providing responsiveness and surety of supply when needed, while also supporting the growth, productivity and competitiveness of the Australian industrial base. Mulwala and Benalla present opportunities for both Defence and industry to collaborate to increase value for money propositions in domestic manufacturing, however, investment should not be limited to these Government facilities.

This requires Defence and Government to align and promote a long term strategic vision and provide requisite investment to enable the use of the facilities to be optimised and generate greater return on investment by expanding capability sets and supporting adjacent market growth.

In turn, this will require Defence to advise industry partners of longer term capability requirements to assist in providing surety and promoting innovation, and industry to act to develop profitable markets (with the ADF being but one of its customers).

Alongside the refinement of this strategic vision, Defence will also map its Explosive Ordnance requirements for the next ten years to assist in evaluating and approving enabling investment cases, to support price negotiations and the determination of manufacturing requirements. A rolling forward view of five to ten year options for supply of existing and new Explosive Ordnance natures is intended to be completed and communicated with industry to support their own plans and investments.

Optimising the use of the Government-owned production facilities is key to their ongoing viability and underpins stock surety of those explosive natures most important for Defence preparedness. While communication of the strategic vision and forward requirements is central from the GOCO facility perspective, it also enables Defence to continue to support and shape opportunities among industry outside of the facilities.

Establishing a framework and the necessary policy to require Defence programs and projects to consider the explosive materials and products generated at the GOCO facilities at each Gate in the CLC, will encourage more proactive thought and consideration of options by Defence and industry. In turn, this will enable investment requirements to be identified early enough to execute partnering agreements and communication with industry on expectations for delivery of the capability.

**Explosive Ordnance governance and coordination**

Defence will introduce an enhanced Explosive Ordnance governance framework that includes processes and practices to enable the realisation of the domestic munitions manufacturing vision. The Defence Explosive Ordnance Committee (DEOC) is the primary mechanism for enterprise decision making which seeks to share information and leverage Explosive Ordnance expertise across the sector in delivering outcomes for Defence. The framework will support:

- An enhanced decision making framework, for Projects and Capability Managers to use, that supports an increased understanding of the pathway to, and options for, local manufacture and assembly of munitions. This framework will be consistent with, and complementary to, the CLC.
- The establishment of prompts in the acquisition process for Explosive Ordnance and capabilities that use Explosive Ordnance. This may include high level guidance from the Investment Committee such as mechanisms for evaluating use of facility outputs in ADF major capital programs, including a requirement to consider capabilities and outputs of Mulwala and Benalla from Gate 0 onwards, incorporating evaluation of capital expenditure requirements and export benefits (propellants through to projectiles).
- The establishment of a peak body for industry and Defence focused on the Explosive Ordnance subsector reporting to the DEOC. This body will initially be called the Munitions Manufacturing Working Group. Various parts of Defence (such as Capability Acquisition and Sustainment Group (CASG), the services and Joint Logistics Command (JLC)) as well as industry will be represented in the Working Group. The Working Group will provide advice to Chief of Joint Capabilities (CJ(C), Commander Joint Logistics (CJLOG) and Director General Explosive Ordnance (DGEO) as they pursue their mandate to optimise, cooperate and coordinate domestic munitions manufacturing.
Further supporting this is the development of programs and initiatives to enable enduring development of and access to a highly skilled Explosive Ordnance workforce.

**Engineering development program**

Defence will explore options for the development of an engineering development stream or program focused on students and graduates with an interest and appropriate qualifications to support a career in the Defence sector, focused specifically on explosive technologies. This program will seek to leverage the Defence Industry Internship Program. The intent of the program would be to encourage junior engineers, in particular chemical, electrical and mechanical engineers, to specialise in the design, development and manufacture of explosive materials and products and build the future pipeline of specialists in the field in Australia. The program, subject to security requirements and interest from proposed industry partners, would provide participants with rotations across Defence, the GOCO facilities and other industry factories and facilities, enabling on-the-job skills development.

This action will evolve alongside the collaborative development of a Professionalisation Framework for the sector (refer to page 34).

**Access to the intellectual property and skilled resources required to design, integrate, test and evaluate weapon system performance.** This focus on ancillaries and platform integration is linked to warfighting advantage.

Australian industry must retain the capability to source and integrate weapon components in order to meet the ADF’s lethality requirements. The ability to undertake T&E to support introduction into service, upgrades and recertification is also required.

The highly competitive and protective nature of organisations in this sector and the relatively low appetite for collaboration deters other companies seeking to expand into this space. Regulation, IP requirements and the concentrated customer base also drive these behaviours.

Considered alongside the significant investment needed to operate in this market and the inability to leverage the experience and assets of others, diversifying the supply base and strengthening SME capabilities will be challenging. This also serves to limit R&D activity in this part of the market. The necessary role of DST Group as a facilitator and driver of R&D in this sector was reinforced by many industry representatives during the consultations conducted to develop this Plan.

Where collaboration is possible, for example through joint R&D projects and multi-use facilities, there is an essential role for Government to deliver confidence and facilitate effective IP transfer and governance. There may be a requirement for Government-to-Government engagement for technology transfer and access. This will support foreign market entrants and the ongoing evolution of existing market participants.

**Intellectual Property protection**

Defence will develop guidance for industry on best practice regarding Intellectual Property, including hints and tips for working with Defence and the range of existing Intellectual Property strategies and requirements.

This work will be developed by Defence Industry Policy Division within Strategic Policy and Intelligence Group.
The ADF's increasing focus on digital capabilities and networking requires a level of access to the IP and other input data needed to operate and integrate weapons-centric software systems, and control over the data generated when operating these systems. This extends to replicating the physical attributes and performance metrics of ADF small arms and munitions technologies for use in combat training simulations and enabling the collection and dissemination of data collected during training activities and exercises.

Attaining and retaining warfighting advantage through combatant performance requires continuous evolution of training technologies. While small arms and munitions technologies represent only a fraction of the military capabilities used in the Joint Force training environment, there is a requirement for the systems and technologies used for land combat shooting to evolve in a way that is consistent with the holistic ADF approach. This impacts on the design and development of training environments, requiring consideration of the weapons systems, targetry (kinetic and system emulators) and instrumentation technologies used in synthetic (Live, Virtual, Constructive) environments.

Within this Industry Plan, specific areas of focus are those technologies that enable: replication and operation of weapon platforms and munitions capabilities; networking and the collection, interpretation and dissemination of data during and post training activities and understanding and improvement of human factors that contribute to warfighting advantage.

The ability to integrate new and existing platforms and systems onto ADF training ranges, to allow these platforms and systems to interoperate, collect data on individual, collective and system performance, and refine training processes and outcomes, will support delivery of the desired combatant training effects. The ADF also seeks to enable interoperability with allied nations to support joint training activities, while maintaining autonomy to operate or upgrade these technologies.

The ability to upgrade and integrate training systems in-country and incorporate future weapon system capabilities into synthetic environments will require the ADF to access the IP and skilled resources able to undertake these requirements.

In contrast to core munitions and small arms, the sub-sector generating technology and equipment to support the broader weapons environment, in particular, advanced training technologies are less mature but continuously evolving, generating opportunities for Australian industry.

The increased use of simulated technologies across all domains means Defence will require greater access to specialist systems, software and mechatronic engineers. It will also be important to ensure that the understanding and expertise is available within Defence, and not solely within industry, to future proof technologies and skill sets and enable more effective requirements definition and development of contractual arrangements. Enhanced Defence simulation literacy will also support industry by enabling meaningful engagement on user requirements and technical specifications, and more targeted feedback. This goes beyond the services and Chief Information Officer Group and into CASG, Estate & Infrastructure Group and their respective industry partners whose capabilities also enable the design, development and delivery of digital training technologies and outcomes.
Opportunities for industry participation in the future of training

Defence will ensure regular communication with industry, working collaboratively to understand the risks and opportunities presented by future joint training objectives and seeking to leverage the unique knowledge base and experience of the Australian industrial base in refining the vision and potential capability solutions.

CJC within Joint Capabilities Group will continue to lead the development of this approach on behalf of the Joint Force and will continue to work with industry to inform design, development and delivery of future training facilities and technologies. Routine engagement is intended to continue through forums such as the Synthetic Environment Working Group (SEWG) held twice annually and providing a conduit of communication between Defence and industry in relation to modelling and simulation. Engagement will also occur through specific project or initiative focused forums and briefings.

To maximise the value of industry engagement, Defence will seek to better coordinate acquisition programs and communicate common requirements and priorities with industry, enabling more targeted investments in R&D, business development activities and workforce skilling. Where potential gaps are identified in future capability requirements, Defence will communicate this with industry and where possible, work collaboratively toward a solution.
The Centre for Advanced Materials Processing and Manufacturing (AMPAM) at the University of Queensland provides a place for industry and researchers to work together, blending technologies and processes to create opportunities for materials development, processing and manufacturing.

AMPAM is a key contributor to a Defence Materials Technology Centre (DMTC) led project focused on realising the benefits of Industry 4.0 adoption for Australian small to medium sized enterprises (SMEs). Other partners in the collaboration include RMIT University, industry partner Sutton Tools and the Advanced Manufacturing Growth Centre.

Known as ‘Factory in a Box’, the project delivers a low-cost entry point for SMEs to explore the potential of Industry 4.0 adoption, and demonstrates that applying a few changes to existing processes and machines can make them “smart enough”. This enhances the SMEs’ understanding of the benefits of Industry 4.0 adoption and how it can position them to engage in defence supply chains.

DMTC has played a key role in the industry and academic collaboration, working closely with the project partners. “We supported the project team in identifying the latest technology in sensing and electronics, wireless communication and helped develop the components to apply to existing equipment and enhance capability.” AMPAM researcher and DMTC Enabling Technologies Program leader.

“With a better understanding of digitalisation and its potential benefits, SMEs will be able to see how the adoption of Industry 4.0 can enhance their capability to manufacture quality components and ultimately increase their competitiveness. The Factory in a Box project is about demonstrating how easily Industry 4.0 practices can be implemented to generate a large increase in a company’s ability.”

Centres like AMPAM can help industry to identify better ways of working and increase a company’s advanced manufacturing capability and overall competitiveness when it comes to competing for work in defence and other related sectors. DMTC’s leadership of the project ensures that specific issues related to defence manufacturing are considered and that there is a strong focus on industrially-relevant research and technology transfer.

To find out more and see if Factory in a Box could assist your company, visit https://www.dmtc.com.au/news/case-study/embracing-advanced-manufacturing/
ANNEX A. GOVERNMENT ACTIONS

This Industry Plan includes the following actions to be taken by Government to support the Munitions and small arms research, design, development and manufacture priority. Although responsibility has been attributed to a particular branch, group or agency, it is expected that a broader group of Government stakeholders will participate in, or contribute to, the action.

Not included are the actions which may be taken within Defence to support preparedness of the Government workforce and infrastructure supporting this priority.

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<th>Topic</th>
<th>Action</th>
<th>Responsible</th>
<th>Timeframe</th>
<th>Key Performance Indicators</th>
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<tr>
<td>Explosive Ordnance (EO) collaboration program</td>
<td>Defence will consider the creation of a collaborative munitions learning and development program that brings together Defence, industry and academia to deliver a common Defence objective. Projects may be focused on delivering learning outcomes to the existing or potential future EO community, for example, Defence buyers and project managers, or the development of products and technologies for future Defence use. DST Group would provide the science and technology direction and enhanced support from Defence may be available where technologies developed in the course of the program are commercialised.</td>
<td>Joint Capabilities Group Supported by DST Group</td>
<td>Mapping of Defence requirements no later than July 2020. Next meeting February 2020, set agenda items for 2020 and forward work for two years.</td>
<td>Research, Development, Test and Evaluation (RDTE) Sub-Committee established. Mapping of Defence requirements, to inform a forward work program and forward agenda. Agenda items established for industry and academia input into Defence capability development focus areas. Critical Industrial Capabilities utilised to ensure investment and forward work alignment with Munitions and small arms priority. Industry and academia access provided where applicable.</td>
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<tr>
<td>Topic</td>
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<td>Access to specialist test facilities</td>
<td>Defence will explore mechanisms that enable industry greater access to Defence test facilities to assist with research and development and prototyping activities. As part of the proposed enhancements to the JPEU at Graytown or Port Wakefield, Defence will undertake a feasibility assessment for the expansion of one or both of these facilities to enable the sites to accommodate additional and growing demands for their services among ADF users and industry. The feasibility assessment will consider options to expand the scope of industry standards and specifications able to be tested in the facilities as well as increase overall throughput. New and/or refurbished infrastructure, more advanced equipment and test range functionality, and investments in the expertise of the workforce, will be considered by Defence during the initial scoping and planning stages for the proposed redevelopment. Opportunities for ongoing commercial access to the facilities, including engagement of Defence test expertise, will be built into the design of any future facilities.</td>
<td>Joint Capabilities Group E&amp;I G a key contributor to this action and will support planning, development and delivery of the facilities where required</td>
<td>Feasibility study completed August 2020. Decision agreed December 2020. Infrastructure build commence - July 2023. Full Operational Capability June 2025.</td>
<td>Feasibility study commenced. Options paper developed for decision. Investment plan developed. Construction / investment commenced. Operating model endorsed. Industry access provided.</td>
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<td>Establishment of a professionalisation framework for the explosive sector</td>
<td>Defence will engage with the Institute of Explosives Engineers (IExpE) and the Sector Skills Strategy Group (SSSG) in the United Kingdom, with the view to develop an Australian Professionalisation Framework that leverages the key learnings from the United Kingdom. The intended result of this engagement will be the development of an Australian Explosives Professionalisation Framework that leverages the approach, processes and key learnings of the SSSG. The Australian framework will address both engineering and technical skill sets, establishing a baseline training framework that enables consistency in skill sets and training standards across the explosives sector. The Framework may also include specialist skill sets relevant to weapons, such as armourers. While initiated by Defence, depending on the scope of this Framework, this action will be delivered as a collaborative endeavor, with associations and professional bodies, among others, expected to be involved. This action will require coordination across Defence and industry to ensure all levels of skills and expertise are reflected in the Framework with consideration also being given to the distribution of the workforce between Defence and industry, including the traineeships offered at Defence facilities such as the JPEU.</td>
<td>Joint Capabilities Group</td>
<td>Joint Capabilities Group</td>
<td>Literature review and sector study completed.</td>
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<td>Skills strategy implemented.</td>
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<td>Increasing access to Defence user communities</td>
<td>Defence will explore opportunities to provide industry with increased access to ADF personnel and other Defence representatives for the purposes of obtaining feedback on developmental equipment related to this priority. This may be through a dedicated forum or exhibition with users such as Capability Manager representatives from Army Headquarters and Diggerworks, delivered in a similar style to Army Innovation Day. A key consideration in executing this action will be providing a cost-effective means for SMEs to participate in demonstrations, many citing this as a hurdle to promoting capabilities at major events. This action serves to support Defence maintaining visibility of the supply chain and its capabilities as prime contracting models continue to be adopted and direct engagement with SMEs changes shape. One of the outcomes of this engagement could include identifying capabilities to undergo further evaluation or formal user trials at Defence training facilities and ranges. Defence will provide industry access to the Combat Application Lab, which was recently established within Army Headquarters as part of the Soldier Combat System Program. The Lab will provide a platform for industry to engage with end users and subject matter experts across the Defence portfolio, including Defence Science and Technology Group, Capability Acquisition and Sustainment Group and Capability Manager representatives.</td>
<td>Capability Acquisition and Sustainment Group, Army Headquarters</td>
<td>Ongoing</td>
<td>Continued engagement by industry on industry events such as Land Environment Working Group, Army Demo Day, Army Innovation Day. Increase in the quality and frequency of collaboration efforts between Defence and industry.</td>
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<td>Defence Industry Security Program (DISP)</td>
<td>Defence will continue implementing the reformed DISP to strengthen security practices in partnership with industry. DISP supports industry to protect their interests from threats including foreign interference, and increases opportunities to compete for work with Defence and international partners by becoming ‘Defence Ready’. Defence provides DISP members with access to security information, guidance and services, including personnel security vetting, certification and accreditation of facilities and/or ICT systems. In certain circumstances, Defence can also provide an assurance to international partners of an entity’s DISP membership, promoting Australia’s sovereign capability internationally. More information on DISP can be found at <a href="https://www.defence.gov.au/dsvs/industry/default.asp">https://www.defence.gov.au/dsvs/industry/default.asp</a></td>
<td>Associate Secretary Group</td>
<td>Ongoing.</td>
<td>Increase in number of DISP members.</td>
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<td>National firearms manufacturing license or permit</td>
<td>The Department of Home Affairs, through the Firearms and Weapons Policy Working Group, will continue to provide policy advice to Ministers and other state and territory officials on policy issues, including continued discussion on a national approach to firearms and weapons and the variation and application of licenses and permits required by SMEs manufacturing small arms weapons and components.</td>
<td>Law Enforcement Policy Branch, Department of Home Affairs</td>
<td>Prior to the next meeting of the Ministerial Council for Police and Emergency Management.</td>
<td>Officials identify and provide advice to Ministers on changes to licensing and other requirements to provide greater national consistency for SMEs manufacturing small arms weapons and components.</td>
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<td>Identification and communication of priorities for Australian manufacture</td>
<td>Alongside the development of the domestic munitions manufacturing capability strategy, Defence will undertake a supply chain assessment to identify those components and natures of ordnance which could, should or must be manufactured in Australia in order to protect our sovereign interests and assure lines of supply. This assessment will take into account Australian industry’s interest, capability and capacity to support expanded EO production requirements, various economic factors, as well as consider the complexities and potential barriers to supply from the global supply chain in times of peace and conflict.</td>
<td>Joint Capabilities Group</td>
<td>Domestic Manufacturing narrative drafted with Defence Explosive Ordnance Committee (DEOC) sign off due end of February 2020. Mapping of Defence requirements no later than April 2020.</td>
<td>An assessment as part of JP 2085 EO Contingency Stock Surety Project, a 30 year-long project valued at over $1.2 billion. This assessment will assure the supply of critical components and capabilities through initiatives ranging from targeted investments in the industrial base through to stockpiling, dependent on the risk profile. Mapping of Defence requirements, to inform a forward work program and policy development. Critical industrial capabilities utilised to ensure investment and forward work alignment with the Munitions and small arms priority.</td>
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This assessment will be delivered as part of JP 2085 Explosive Ordnance Contingency Stock Surety Project, a 30 year-long project valued at over $1.2 billion seeking to meet the Chief of Defence Force (CDF) Preparedness Directive (CPD) by assuring supply of critical components and capabilities through initiatives ranging from targeted investments in the industrial base through to stockpiling, dependent on the risk profile.

In determining where Australia’s sovereign interests can only be met through local manufacture, and attributing relative priorities, Defence will consider investment requirements in technology, infrastructure, IP and the workforce. Defence will also consider established contracts and planned procurements, and the need to grant sales and export licences, among other things.
### Topic

**A clear vision for domestic munitions manufacturing**

At the highest level, Government’s requirement for domestic munitions manufacturing is to enable capability delivery for the ADF, providing responsiveness and surety of supply when needed, while also supporting the growth, productivity and competitiveness of the Australian industrial base. Mulwala and Benalla present opportunities for both Defence and industry to collaborate to increase value for money propositions in domestic manufacturing, however, investment should not be limited to these Government facilities.

This requires Defence and Government to align and promote a long term strategic vision and provide requisite the required investment to enable the use of the facilities to be optimised and generate greater return on investment by expanding capability sets and supporting adjacent market growth. In turn, this will require Defence to advise industry partners of longer term capability requirements to assist industry with surety and to promote innovation, and industry to act to develop profitable markets (with the ADF being but one of its customers).

Alongside the refinement of this strategic vision, Defence will also map its EO requirements for the next ten years to assist in evaluating and approving enabling investment cases, to support price negotiations and the determination of manufacturing requirements. A rolling forward view of five to ten year options for supply of existing and new munitions natures is intended to be completed and communicated with industry to support their own plans and investments.

Optimising the use of the Government-owned production facilities is key to their ongoing viability and underpins stock surety of those explosive natures most important for Defence preparedness. While communication of the strategic vision and forward requirements is central from the GOCO facility perspective, it also enables Defence to continue to support and shape opportunities among industry outside of the facilities.

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<td>Joint Capabilities Group</td>
<td>December 2019</td>
<td>A long term strategic vision to enable more effective the use of Defence munitions facilities. A map of Defence’s EO requirements for the next ten years.</td>
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<td>Explosive Ordnance (EO) governance and coordination</td>
<td>Defence will introduce an enhanced EO governance framework that includes processes and practices to enable the realisation of the domestic munitions manufacturing vision. The Defence Explosive Ordnance Committee (DEOC) is the primary mechanism for enterprise decision making which seeks to share information and leverage EO expertise across the sector in delivering outcomes for Defence. The framework will support:</td>
<td>Joint Capabilities Group</td>
<td>DEOC established with quarterly meetings. Force Structure Plan 2019 Guided Weapons and Explosive Ordnance Program Governance Framework due for Investment Committee sign off July 2020. Domestic Manufacturing sub-committee (to DEOC) next meeting in March 2020.</td>
<td>An enhanced decision making framework, for Project and Capability Managers to use, that supports an increased understanding of the pathway to, and options for, local manufacture and assembly of munitions. This framework will be consistent with, and complementary to, the CLC. The establishment of prompts in the acquisition process for EO and capabilities that use EO. The establishment of a Domestic Manufacturing and RDTE sub-committees for industry and Defence focused on the explosive ordnance subsector reporting to the DEOC. This body will initially be called the Munitions Manufacturing Working Group. Various parts of Defence (such as CASG, the services and JLC) and industry will be represented on the Working Group, providing advice to Chief of Joint Capabilities (CJC), Commander Joint Logistics (CJLOG) and Director General EO (DGEO) as they pursue their mandate to optimise, cooperate and coordinate domestic munitions manufacturing.</td>
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<td>Engineering development program</td>
<td>Defence will explore options for the development of an engineering development stream or program focused on students and graduates with an interest and appropriate qualifications to support a career in the Defence sector focused specifically on explosive technologies. This program will seek to leverage the Defence Industry Internship Program. The intent of the program would be to encourage junior engineers, in particular chemical, electrical and mechanical engineers, to specialise in the design, development and manufacture of explosive materials and products and build the future pipeline of specialists in the field in Australia. This Defence Industry Internship Program relies on industry partners identifying internship areas within their organisation.</td>
<td>Industry Partners Coordinated by Defence Industry Policy Division</td>
<td>Ongoing.</td>
<td>Increase in the number of Defence Industry Internship Program participants in the explosive technologies sector.</td>
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<td>Intellectual Property (IP) protection</td>
<td>Defence will develop guidance for industry on best practice regarding IP, including hints and tips for working with Defence and the range of existing IP strategies and requirements.</td>
<td>Strategic Policy and Intelligence Group</td>
<td>From Q4 2020.</td>
<td>Delivery of the guidance material to industry.</td>
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<td><strong>Opportunities for industry participation in the future of training</strong></td>
<td>Defence will ensure regular communication with industry, working collaboratively to understand the risks and opportunities presented by future Joint Force training objectives and seeking to leverage the unique knowledge base and experience of the Australian industrial base in refining the vision and potential capability solutions. Chief of Joint Capabilities within Joint Capabilities Group will continue to lead the development this approach on behalf of the Joint Force and will continue to work with industry to inform design, development and delivery of future training facilities and technologies. Routine engagement is intended to continue through forums such as the Synthetic Environment Working Group (SEWG) held twice annually and providing a conduit of communication between Defence and industry in relation to modelling and simulation. Engagement will also occur through specific project or initiative focused forums and briefings. To maximise the value of industry engagement, Defence will seek to better coordinate acquisition programs and communicate common requirements and priorities with industry, enabling more targeted investments in R&amp;D, business development activities and workforce skilling. Where potential gaps are identified in future capability requirements, Defence will communicate this with industry and where possible, work collaboratively toward a solution.</td>
<td>Joint Capabilities Group</td>
<td>Defence Explosive Ordnance Committee established with quarterly meetings. Workforce and Training sub-committee to look specifically at agenda item. Sector Study – 2020. Industry skills plan development – 2021.</td>
<td>Literature review and sector study completed. Development of National Explosive Ordnance Industry Skills Strategy completed. Skills strategy implemented. DEOC and sub-committee agenda to review activities.</td>
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ANNEX B. SUPPORT THROUGH INDUSTRY PROGRAMS

This section discusses the support available to current and aspiring defence industry in support of this Sovereign Industrial Capability Priority and other Defence capabilities.

Defence innovation system

Alongside the Next Generation Technologies Fund and the Defence Innovation Hub (the Hub), Diggerworks, and the Centre for Defence Industry Capability (CDIC) help encourage innovation and growth in the Australian industry sector. This system will support companies that contribute to the generation of this priority to innovate further, and position them to better support the Australian Defence Force (ADF).

Next Generation Technology Fund

Science and technology is a significant priority for Defence. Defence has to be prepared for the next revolution in the way war is fought. To do this, the Government is investing approximately $730 million over the ten years to 2026, through the Next Generation Technology Fund (NGTF). This forward-looking program focusses on research and development in emerging and future technologies for the ‘future Defence Force after next’.

The NGTF supports a number of collaboration initiatives such as the Emerging Disruptive Technology Assessment Symposium and the Grand Challenges. These aim at getting the best thinkers in Australia on a particular topic together and facilitating collaboration between Defence, industry and academia. There are also a number of funding initiatives managed through the NGTF that companies who contribute to this priority may wish to leverage. These include:

- The Small Business Innovation Research for Defence (SBIRD) program provides opportunity to Australia’s SMEs to undertake research projects that will benefit Defence in the future. Successful SBIRD project outcomes might be commercialised directly by the participant, be the subject of a separate development support application with the Hub, or be adapted to support other NGTF ventures such as a Grand Challenge.

- The Small Business Exploratory Program will accelerate promising science and technology of interest to Defence, from early-stage concept to a point where a proposal could be submitted to the Hub. The CDIC gives advice as to whether a technology idea could be eligible for NGTF funding.

Defence Innovation Hub

The Defence Innovation Hub, or ‘the Hub’, brings together defence industry, academia and research institutions to collaborate on innovative technologies that can be developed into capability for Defence. Funded at $640 million to 2025-26, the Hub accepts proposals that are ready to enter the engineering and development stages of the innovation process, from concept exploration and technology demonstration to prototyping and integrated capability demonstration and evaluation.

Each year, the Hub reviews and publishes its innovation priorities to help innovators plan their research and development activities. The Hub’s innovation priorities align with the six Integrated Investment Program capability streams, the most relevant streams for the Munitions and Small Arms priority being Land Combat, Amphibious Warfare and Special Operations and Key Enablers.

For more information on the Hub’s innovation and investment priorities visit: www.business.gov.au/centre-for-defence-industry-capability/defence-innovation/defence-innovation-hub/defence-innovation-hub-priorities

Diggerworks

Diggerworks is a unique, multi-disciplinary team tasked with providing innovative and integrated solutions for the ADF’s Soldier Combat System (SCS) including scalable tiered body armour, ballistic body armour plates, helmets, load-carriage systems (including a prototype exoskeleton trial), soldier-worn power management and flexible battery systems.

It conducts ongoing development of SCS capabilities, ensures integration of new capabilities and contributes to the future modernisation of the SCS, and assures integration with the broader Joint Land Combat System. Diggerworks
maintains an agile approach that seeks out and trials new products and capabilities to enable the adaptive acquisition of equipment that can be readily incorporated into the SCS.

Diggerworks actively engages with industry, providing a critical access point for industry to engage Defence stakeholders to better develop the technology edge for warfighters. Diggerworks facilitating communication between industry and the end user helps develop Australian industry in the Combat Clothing and Signature Reduction Technology sub-sectors.

Diggerworks’ methodology mandates they conduct the following critical functions:

- Close engagement with ADF close combatants and commanders to identify SCS capability gaps;
- Leverage industry to identify SCS capability trends and emerging technologies;
- Maintain an agile, adaptive, responsive and rigorous approach to problem solving that harnesses Diggerworks’ unique, multi-disciplinary team;
- Focus on short- to medium-term SCS capability gaps but monitor the long term for technology pull opportunities;
- Integrate components and manage contributions to the configuration of the SCS;
- Maintain an active SCS related engagement with allies and regional partners; and
- Contribute to the broader, Army-led, modernisation of the SCS.

ADF close combatants require a continual enhancement of the SCS in order to successfully conduct complex operations in demanding environments against adaptive enemies. Through the collaboration of Army, CASG and DST Group, Diggerworks provides the ability to identify, analyse, develop and provide system level assurance of SCS solutions that enhance the capabilities of the ADF close combatant.

Centre for Defence Industry Capability

The CDIC is funded by the Department of Defence and delivered by the Department of Innovation, Industry and Science. The CDIC supports Australian businesses either working in or looking to enter the Defence sector providing advisory and facilitation services and grants to eligible Australian businesses to support them to deliver Defence capability. The CDIC’s national network of Defence Industry Facilitators and Defence Business Advisers can be contacted to discuss opportunities for business related to this priority. Facilitators and advisors also provide guidance on business improvement, skills development, Defence market preparedness, exports and supply chain participation.

The CDIC also administers Capability Improvement Grants of between $5,000 and $250,000 for Small and Medium Enterprises (SMEs) to fund part of the cost to engage a consultant or expert to implement recommendations.

More information is available at: www.business.gov.au/assistance/centre-for-defence-industry-capability-capability-improvement-grants

Sovereign Industrial Capability Priority Grants

In November 2018, the Government launched the Sovereign Industrial Capability Priority Grants program. The Grants program allows Defence to improve the resilience of a priority by providing funding to industry to ensure that Australian SMEs have the appropriate capacity and resilience to support Defence’s critical capabilities.

Grants of up to $1 million are be available to fund capital equipment purchases (including specialist software and security infrastructure), non-recurring engineering costs, design activities directly related to the project; and workforce training and accreditation directly related to the project. The grants are capped at $3 million over three years and are delivered through the CDIC. These grants directly subsidise the growth of industry in the industrial capabilities underpinning the priorities. This type of funding is for more mature companies that are able to fund at least 50 per cent of the funding and directly support the increased sovereignty outcomes for a particular priority.

Other Defence support opportunities

Australian Defence Export Office

The research, analysis and consultation undertaken to develop this Industry Plan provided evidence of the number of Australian companies already pursuing export opportunities or supplying to overseas customers. The development of the Defence Export Strategy is intended to support these companies in their endeavours, and to encourage more SMEs to pursue export opportunities.

The Strategy, released in 2018, outlines the Government's plan to support Australian defence industry to achieve greater export success to build a stronger, more sustainable and globally competitive defence industry to support Australia's Defence capability needs. Increasing access to international markets, through exports, will assist in reducing the risk to industry of having a single customer in the ADF. It will also support industry's ability to sustain and grow their business through the peaks and troughs of domestic demand.

The Australian Defence Export Office (the office) provides a focal point for delivering the key initiatives of the strategy. The office provides a coordinated approach to export support; working closely with Austrade, the CDIC, DFAT, Export Finance Australia, the Australian Border Force, state and territory governments, and Australian defence industry, to realise export success.

The office tailors support to industry on a case-by-case basis, including through the Australian Military Sales, Team Defence Australia and Policy and Engagement functions. The office has a number of initiatives that can be leveraged by industry including:

- International advocacy for Australian defence industry exports;
- Assistance from dedicated Business Development Managers in key markets and market intelligence;
- Targeted international trade missions;
- Government-to-government sales and transfer of equipment;
- Inclusion in the Australian Military Sales Catalogue;
- Defence Global Competitiveness Grants (administered by the CDIC); and
- Defence Export Facility (administered by Export Finance Australia).

All companies seeking support from the office should be aware of their Defence export control obligations.


National Defence Industry Skills Office

The National Defence Industry Skills Office (NDISO) is implementing the initiatives announced in the 2019 Defence Industry Skilling and Science, Technology, Engineering and Mathematics (STEM) Strategy. The Strategy details how the government will help Australian defence industry meet their workforce skills requirements over the coming decade. The NDISO will align efforts to ensure access to essential skills relating to the priorities. Initiatives companies can leverage include:

- The establishment of a new model of skilling support grants, administered through the CDIC, focuses on improving accessibility for SMEs and reducing the barriers faced by defence industry in up skilling or retraining their people.
- Continue the Schools Pathways Program, which encourages student engagement in STEM and introduces them to the many career pathways in defence industry.
- An additional 20 internships for the Defence Industry Internship Program (DIIP), bringing total places to 50 students per year. This will provide engineering students with direct connections to defence industry by facilitating 12 week internships with industry SMEs.

The Defence Industry Internship Program

The DIIP links third and fourth year engineering students with defence sector SMEs by sponsoring the industry placement component of their studies. The program specifically targets the engineering streams that are considered by defence industry to be in short or critical supply and aims to give student engineers a better understanding of the critical work performed by our Defence SMEs.
Defence industry SMEs who specialise in the design, development and manufacture of explosive materials and products and currently employ chemical, electrical and mechanical engineers, are encouraged to apply to host an intern through the DIIP and contribute to the professional development of the next generation of the explosive technologies workforce.

**Capability Improvement Grants**

Defence industry SMEs can also access government support to upskill and retrain existing staff by applying for a Capability Improvement Grant (CIG) though the CDIC, as discussed above. CIGs reimburse a business for up to half the cost of engaging a consultant or expert to assist with skills and training, to build the capability of the existing workforce and meet specific business needs.

Defence is also developing a new model of skilling support grants for defence industry SMEs. These grants will reduce the barriers faced by defence industry in upskilling or retaining their people, by offering financial support for training in trade, technical and professional skillsets. Defence will look at supporting innovative approaches to the provision of training, along with the more traditional ways of achieving accredited certifications.


**Defence Civilian Undergraduate Sponsorship**

The Defence Civilian Undergraduate Sponsorship (DCUS) is open to aspiring university students who wish to pursue a degree through the University of New South Wales – Canberra campus at the Australian Defence Force Academy. There are no military service obligations or requirements. This is a sponsorship for civilian students who may be interested in a civilian career in the Department of Defence.

The Department of Defence takes applications annually, with undergraduate degree disciplines to be offered subject to change. In 2019, applications were being sought for the following options:

- Bachelor of Engineering (Mechanical, Electrical and Aeronautical) (4 years)
- Bachelor of Computing and Cyber Security (3 years)

Eligible applicants will have the full tuition costs of their degree covered by the Department of Defence sponsorship agreement and receive a generous annual allowance to cover the cost of textbooks and equipment.

During the sponsorship students may have the opportunity to participate in paid work placements within Defence which will provide exciting opportunities and give an insight into how one of Australia's largest organisations conducts business.


**Defence TAFE Employment Scheme**

The Defence TAFE Employment Scheme offers students a head start for their career in Defence by supporting their vocational education with practical, paid work experience that contributes to the protection of Australia's national interests.

As a participant on the Defence TAFE Employment Scheme, students will work as part of the Australian Public Service where they will be provided with practical, relevant and high-quality work on a part time basis, while continuing their vocational education and being paid a full-time salary.

In 2020, the following disciplines relevant to this Plan are being sought (noting these will continue to evolve):

- Victoria: Engineering - Mechatronics/Software Communications/Electrical/Electronics
- Australian Capital Territory: Engineering
- South Australia: Engineering - Electronics and Communications

External support and collaboration opportunities

Industry are able to access further support and collaboration opportunities with respect to the Munitions and Small Arms priority through the organisations below. The list provided below is intended to focus on those opportunities specific to this priority, and not intended as exhaustive. It is acknowledged that other schemes and programs are available at academic institutions and across industry.

Defence Materials Technology Centre

The Defence Materials Technology Centre (DMTC) facilitates cooperation with Australian industry, research and government agencies to advance technologies in Defence and related sectors in manufacturing engineering and applied science. The DMTC aims to strengthen Australian industrial capacity, and Defence and national security capabilities.

The DMTC operates through a co-investment model applying the funding from Defence or other Commonwealth agencies and leverages additional contributions from industry and research partners. Because of this, DMTC works closely with Defence agencies such as DST Group and Force Design Division (within Vice Chief of Defence Force (VCDF) Group) to identify Defence capability changes and future needs. The DMTC then engages with industry and research partners to find solutions with advancing key technologies.

The DMTC focuses on the following capabilities relevant to this priority:

- New manufacturing technologies;
- Performance modelling, simulation and validation;
- Design, production and joining of new materials;
- Robotics and automation technologies;
- Prognostics and defect detection capabilities; and
- Weight reduction, design integration and light weighting materials.

Australian Defence Science University Network

The Australian Defence Science University Network is made up of four state based organisations that are designed to link university research and development capabilities with local SMEs. These organisations can provide advice and advocacy, assist building collaborations and partnerships, identify opportunities, and in some cases, provide funding support.

- Defence Science Institute (Victoria and Tasmania)
  www.defenceinnovationinstitute.com
- Defence Innovation Partnership (South Australia and Northern Territory)
  www.defenceinnovationpartnership.com
- Defence Innovation Network (New South Wales)
  www.defenceinnovationnetwork.com
- Defence Science Centre (Western Australia)
Industry Mentoring in STEM

The Graduate Research Industry Partnerships (GRIP) (IMNIS) is an award-winning industry-led initiative of the Australian Academy of Technology and Engineering. IMNIS connects motivated PhD students (mentees) in science, technology, engineering and mathematics (STEM) with outstanding high level industry leaders (mentors) in a one year industry mentoring program. The IMNIS provides PhD student mentees the opportunity to be successful within any part of the STEM sector.

In a one-year industry mentoring program, IMNIS mentors and mentees meet in a professional setting for one hour each month. State-level networking events hosted by IMNIS allow industry mentors and mentees to connect more broadly. Industry mentors are all volunteers generously sharing their time and expertise. IMNIS provides a diverse range of industry professionals the opportunity to engage with academia, share their mentoring skills, and ‘give back’ to the STEM community.

This program provides opportunities for industry and Defence to invest in the STEM workforce by increasing their understanding of the industry sector and strengthening their skills, as well as enhancing sector collaboration and professional networks.

More information is available at: https://imnis.org.au/

Monash University: Chemicals & Polymers Graduate Research Industry Partnerships Program

Since 2014, the Chemicals & Polymers Manufacturing Innovation Network has partnered with industry to undertake industry relevant research through the PhD GRIP Program. This is an opportunity for PhD students to build networks across industry sectors, develop business acumen and move directly into a job at the end of their studies. PhD researchers in the Chemicals and Polymers GRIP will also undertake advanced professional training, developed in partnership with industry partners.

This program provides opportunities for industry and Defence to invest in their workforce through the enrolment of an employee or as an industry partner to a project.

More information is available at: https://www.monash.edu/chemicals-polymers-grip

Industry-Led Apprenticeships and other Programs

A number of Australian industry organisations have obtained certification as Registered Training Organisations or provide other in-house training opportunities and are able to provide apprenticeships to those new to the industry or those seeking to formalize their qualifications.

These include but are not limited to:

**Thales Australia**. Delivery and assessment of a range of Certificates, including Explosive Ordnance, Explosive Ordnance Manufacture, Explosive Ordnance Maintenance and Explosive Ordnance Proof and Experimentation, inclusive of Certifications II through IV and Diplomas. Training locations vary among qualifications, however most are offered in NSW and Victoria.

**NIOA**. Delivery of an internship program for upskilling engineering students, including those enrolled at the Australian Defence Force Academy, through the provision of on-the-job training.
# ANNeX C. ACRoNYM LIST

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>ADF</td>
<td>Australian Defence Force</td>
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<tr>
<td>AIC</td>
<td>Australian Industry Capability</td>
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<td>AICP</td>
<td>Australian Industry Capability Plan</td>
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<td>AISC</td>
<td>Australian Industry and Skills Committee</td>
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<td>ANZSIC</td>
<td>Australian and New Zealand Standard Industrial Classifications</td>
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<td>ASSA</td>
<td>Australian Soldier Systems Architecture</td>
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<td>CAPEX</td>
<td>Capital Expenditure</td>
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<td>CASG</td>
<td>Capability Acquisition and Sustainment Group</td>
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<td>CDF</td>
<td>Chief of Defence Force</td>
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<td>CDIC</td>
<td>Centre for Defence Industry Capability</td>
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<td>CJC</td>
<td>Chief of Joint Capabilities</td>
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<td>CJLOG</td>
<td>Commander Joint Logistics</td>
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<td>CLC</td>
<td>Capability Life Cycle</td>
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<td>CPD</td>
<td>CDF Preparedness Directive</td>
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<td>DECO</td>
<td>Defence Export Controls Office</td>
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<td>DFAT</td>
<td>Department of Foreign Affairs and Trade</td>
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<td>DGEO</td>
<td>Director General Explosive Ordnance</td>
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<td>DISP</td>
<td>Defence Industry Security Program</td>
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<td>DMTC</td>
<td>Defence Materials Technology Centre</td>
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<td>DICP</td>
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<td>DPPM</td>
<td>Defence Procurement Policy Manual</td>
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<td>DRIC</td>
<td>Defence Relevant Industrial Capability</td>
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<td>E&amp;IG</td>
<td>Estate and Infrastructure Group</td>
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<td>Explosive Ordnance</td>
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<td>FPR</td>
<td>First Principles Review</td>
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<td>Institute of Explosives Engineers</td>
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<td>IIP</td>
<td>Integrated Investment Program</td>
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<td>IP</td>
<td>Intellectual Property</td>
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<td>JPEU</td>
<td>Joint Proof and Experimental Unit</td>
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<td>NDISO</td>
<td>National Defence Industry Skills Office</td>
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<td>NGTF</td>
<td>Next Generation Technologies Fund</td>
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<tr>
<td>OT&amp;E</td>
<td>Operational Test &amp; Evaluation</td>
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<td>R&amp;D</td>
<td>Research &amp; Development</td>
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<td>SBIRD</td>
<td>Small Business Innovation Research for Defence</td>
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<tr>
<td>SCE</td>
<td>Soldier Combat Ensemble</td>
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<td>SCS</td>
<td>Soldier Combat System</td>
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<td>SDMM</td>
<td>Strategic Defence Munitions Manufacturing</td>
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<td>SEWG</td>
<td>Synthetic Environment Working Group</td>
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<td>Small-to-Medium Enterprise</td>
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<td>Soldier System Architecture</td>
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<td>Sector Skills Strategy Group</td>
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<tr>
<td>STEM</td>
<td>Science, Technology, Engineering and Mathematics</td>
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<td>T&amp;E</td>
<td>Test and Evaluation</td>
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<td>VCDF</td>
<td>Vice Chief of Defence Force</td>
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<tr>
<td>VfM</td>
<td>Value for Money</td>
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Please direct any questions on the Sovereign Industrial Capability Priority policy or the information contained in this Industry Plan to:
defence.icp@defence.gov.au