

Industry is our last line of defence

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The growing appreciation of the critical importance of domestic industry in national security resilience has led to the recent issue of the Defence Industry Development Strategy (DIDS). This article outlines the DIDS strategy and discusses the seven priority areas for industry development and several topical policy areas, notably naval shipbuilding and autonomous systems. Throughout this discussion the development of skilled workforce is an important challenge with no clear resolution in sight.

Key words: defence industry; autonomous systems; workforce development; naval shipbuilding; battlespace awareness; sustainment of defence materiel; maintenance, repair, overhaul and update; intellectual property.

Introduction

The World War 2 Pacific campaign ended with the atomic bomb but was won ultimately by the prodigious US industrial capacity to produce military materiel, seemingly without constraint. Such foundational industrial contribution to warfare has been belatedly recognised by Australia, oddly enough due to the disruption of supply chains during the COVID pandemic.

How then should Australia proceed? On 29th February 2024 Defence Industry Minister Pat Conroy MP announced the Defence Industry Development Strategy (DIDS)ⁱ that aims to foster defence-related industry with streamlined processes and grants, following seven Sovereign Defence Industry Priorities (SDIP) as followsⁱⁱ:

1. SDIP 1 – Maintenance, repair, overhaul and upgrade (MRO&U) of Australian Defence Force (ADF) aircraft.
2. SDIP 2 – Continuous naval shipbuilding and sustainment.
3. SDIP 3 – Sustainment and enhancement of the combined-arms land system.
4. SDIP 4 – Domestic manufacture of guided weapons, explosive ordnance and munitions.
5. SDIP 5 – Development and integration of autonomous systems.
6. SDIP 6 – Integration and enhancement of battlespace awareness and management systems .
7. SDIP 7 – Test and evaluation, certification and systems assurance.

These seven major themes go to the heart of current and foreseeable future Defence materiel needs. The challenge is to build up the industrial capability to deliver in each of these domains.

In this paper these priorities are addressed with note taken of the Ukraine War and other current and potential conflicts. Together the priorities are viewed in the light of the DIDS initiatives and programs, which cover the following areas:

- Strategic rationale.
- Structure of the Defence industrial base.
- Prioritisation of actions to be taken.
- Procurement reform.
- Communication.
- Innovation by industry.

- Workforce development and sustainment.
- Export potential.
- Security.

The article concludes with a summary of the insights from the AUKUS pillar 1 nuclear submarine program for Australian industry and issues that need to be addressed in the near term.

The broader implications for development of Australian defence industry will also be suggested for further investigation, addressing the following questions:

- What are the industries and technologies of the future?
- What are our areas of competitive advantage?
- Which global markets and value chains are most valuable for Defence?
- How do these subjects intersect?
- How should Australia position itself to best advantage?

Defence Industry

The fundamental role of industrial capacity for national defence has always been recognised and was eventually formalised as a Fundamental Input to Capability (FIC)ⁱⁱⁱ. The recent COVID pandemic with the resulting disruption to supply chains and the recognition of the serious implications of reliance on overseas suppliers for critical consumable materials, added to this recognition and the eventual release of the DIDS which leads with the Rationale for a sovereign Defence industrial base. This includes the following summary for what is included in industrial capability^{iv}:

- **Business acumen** – the knowledge, systems and administration to run an effective business, including security and supply chain resilience.
- **Intellectual property** – ownership of, or sufficient access to, detailed product knowledge and information, including the ability to innovate or develop improved and/or new products and services.
- **Workforce** – the right mix of suitably qualified and experienced personnel.
- **Capital** – the necessary assets, space, facilities, inputs and cash flow.

Within the diverse community of defence industry, a major participant is naval shipbuilding notably because of the significant infrastructure and extensive range of workforce skills required.

ⁱDefence Industry Development Strategy (DIDS) (2024) <https://www.defence.gov.au/about/strategic-planning/defence-industry-development-strategy>.

ⁱⁱDIDS p17.

ⁱⁱⁱAustralian Defence Capability Manual (2022). <https://www.defence.gov.au/sites/default/files/2022-07/Defence-Capability-Manual.pdf>.

^{iv}DIDS p2.

Naval Shipbuilding

The importance of all shipbuilding, especially naval shipbuilding, has always been apparent to the naval and merchant fleet owners and operators, but has been more generally ignored in the decades following the Falklands War, the end of the Cold War and the following war on terror. Meanwhile maritime piracy has continued, and the realities of naval warfare have once again become apparent in the Ukraine War in the Black Sea and the attacks on merchant shipping in the Red Sea connected to the war in Gaza.

DIDS discusses naval shipbuilding with emphasis on the specialist workforce needed for the nuclear-powered submarine enterprise^v as described in AUKUS pillar 1. The establishment of a Skills & Training Academy is mentioned as also is the introduction of a Naval Shipbuilding and Sustainment Identification Card.^{vi}

Shipbuilding is a major employer of ship and submarine designers, builders and maintainers in a workforce that takes time and investment to establish and requires continuity of employment to maintain the specialist skills involved. For Australia, the commitment to build a follow-on submarine fleet in South Australia was belatedly made in 2016 with the SEA 1000 program involving the ATTACK class of conventionally powered submarines. Then the AUKUS^{vii} tripartite agreement replaced this with the Pillar 1 nuclear-powered submarine program that required an even greater investment in workforce development and infrastructure essential for the nuclear safety, security and efficiency demands on such a program.

Then has followed the 2023 Defence Strategic Review (DSR)^{viii} that led to the further Surface Combatant Force (SFR) review^{ix} that recommended the following naval surface force structure:

- **Tier 1**
 - Current HOBART class Air Warfare Destroyers (DDG) – 3.
 - HUNTER class frigates – 6 building in South Australia.
- **Tier 2**
 - General purpose frigates – 11, of which 8 to be built in Western Australia.
 - Large optionally crewed vessels (LOCV) – 6 to be built in Western Australia.
- **Minor war vessels**
 - Offshore patrol and other vessels for Navy and Border Force – 25.

Concurrently there were announced shipbuilding partnerships of Defence with BAE Systems for the Hunter class in SA, Austal for the GP frigates and LOCV in WA. ASC had previously been announced as the partner for submarine building in SA.

Not included were additional afloat support ships for refuelling, rearming and other vessels for stores replenish-

ment, afloat maintenance for ships and submarines or possibly a floating dock. A docking capability in WA is essential for US and UK nuclear submarines to be based there under AUKUS Pillar 1 phase 1 Submarine Rotational Force – West (SRF-W).

DIDS Sovereign Defence Industry Priorities

The DIDS provides seven areas of prioritised attention as follows and provides explicit areas for each of them to be developed over the coming several years.^x

SDIP 1: Maintenance, Repair, Overhaul and Update of ADF Aircraft

Aircraft acquired for Navy, Army and Airforce have mostly been sourced from well-known overseas suppliers who are expected to set up a significant industrial presence in Australia to provide second-echelon support and to manage local and overseas suppliers for components and sub-assemblies. Nevertheless, the in-country capability is critical to provide essential support to ADF aircraft operations, maintenance and upgrade.

Areas for explicit attention include integration of Maintenance, Repair, Overhaul & Upgrade activities with international partners and allies, building a sustainable Australia's technical workforce and building a network of regional depots around Australia. These depots should be made ready for use by allies with compatible aviation capabilities.

SDIP 2: Continuous Naval Shipbuilding and Sustainment

Continuous naval shipbuilding depends on justification for fleet investment to replace obsolescent ships that no longer provide the capability required and/or have become uneconomic to continue operation and sustainment. The time-scale of such shipbuilding investment is much longer than most military capability acquisition programs and this is especially so when new infrastructure and workforce skills are required, as is the case for the AUKUS Pillar 1 nuclear submarines, firstly for sustainment in WA and then later for building in SA and for eventual basing in Eastern Australia (NSW or Queensland).

Specific areas for attention include achievement of ship availability, development of sovereign industrial capability in combat management systems, and in industrial ship and submarine design, development, construction and sustainment, associated supply chains. The ability to develop and adapt to new technologies is important as technology and geopolitical factors change quickly. This applies especially to the integration of autonomous systems to naval vessels.

SDIP 3: Combined-Arms Land System Sustainment & Enhancement

Land systems are affected by changes in technology and the rapid adoption of new means of land warfare as demonstrated vividly in the Ukraine War where soldier-operated anti-tank weapons have been highly effective. Similarly, the adoption of robotic vehicles has rendered some combat environments passable in much faster time than previously feasible.

Areas for attention stated in the DIDS include establishment and reinforcement of an industrial base that will support the domestic innovation, design, integration, manufacture

^vDIDS p67.

^{vi}DIDS p91.

^{vii}Joint Leaders Statement on AUKUS, 14 March 2024, <https://www.pm.gov.au/media/joint-leaders-statement-aukus> and <https://www.defence.gov/Spotlights/AUKUS/>.

^{viii}National Defence: Defence Strategic Review, 2023, <https://www.defence.gov.au/about/reviews-inquiries/defence-strategic-review>.

^{ix}Enhanced Lethality Surface Combatant Fleet review report, 2024, https://www.defence.gov.au/sites/default/files/2024-02/Enhanced_Lethality_Surface_Combatant_Fleet_web.pdf.

^xDIDS pp18 & 19.

and sustainment of land materiel, supply chains and provide support for industrial mobilisation. Maturing of autonomous capability is an important early step.

SDIP 4: Guided Weapons, Explosive Ordnance Domestic Manufacture

The Ukraine War has demonstrated vividly the greatly increased expenditure in guided weapons and other forms of explosive ordnance (GWEO) that demand reliable sourcing that cannot be guaranteed without domestic manufacture of critical items. This has been a definite commitment of Australian governments for two or more years but progress to implement this has been slow.

DIDS prioritises the manufacture of selected guided weapons initially from imported sections and components. Thence to include manufacture of selected weapon sub-sections and components to improve supply chain resilience, including rocket motors and warheads. Manufacture of non-guided munitions is also a priority noting the high expenditure of such munitions in current conflicts.

SDIP 5: Autonomous Systems Development and Integration

The Ukraine War has also demonstrated the pervasive use of drones and other autonomous or remotely operated vehicles in surface and air roles and in combination with crewed vehicles and systems. The rapidity in which these capabilities have been developed, often based on commercially available technology, and the low costs involved have rendered highly sophisticated military devices disproportionately expensive and time-consuming to replenish. While the higher levels of capability will still be valuable, in the future the bulk of inventory will be lower-cost uncrewed systems and the related operational concepts for operation need to be updated urgently.

Autonomous systems of all kinds and capabilities will be critical and Australia needs to expand its industrial capacity in all these areas as has been started in some notable cases such as the Ghost Bat^{xi} uncrewed air vehicle and the Ghost Shark^{xii} large uncrewed undersea vehicle. DIDS calls for proof that autonomous systems are practical and dependable elements to integrated into the ADF. This will require demonstration through experimental air-vehicle and sub-surface prototypes to explore operational concepts and inform future investment decisions. Thence the establishment of the necessary industrial capacity to support their development and production for delivery and sustainment of platforms and systems that make effective contributions to the integrated joint force. Defence had previously established the Trusted Autonomous Systems Cooperative Research Centre (TAS CRC), the first of its kind.

SDIP 6: Battlespace Awareness and Management Systems

Battlespace awareness and management systems integration and enhancement is an everlasting process that is made more complex by the rapid increase in the variety of actors and effects to be considered. Continuous improvement is essential and involves integration of systems,

sensors and communications to improve the speed of decision-making, achievement of operational resilience in degraded environments and adaptation to new challenges in technology and opposing combatant initiatives.

SDIP 7: Test and Evaluation, Certification and System Assurance

Research, development, test and evaluation (RDT&E) is a critical capability for effective design and development of effective warfare systems. The related processes of certification and system assurance of products and systems once development is advanced or completed are essential for timely achievement of operational capability.

Industry must acquire the capability to assure and, if necessary, certify that enhanced systems are safe and effective to deliver Minimum Viable Capability^{xiii} as representing better value and more readily achievable. This requires a significant enhancement of the Test and Evaluation (T&E) skilled workforce, including the attainment of standards and qualifications recognised by partners and allies for interoperable systems. This capacity extends to force-level T&E and to all stages of capability acquisition and sustainment.

DIDS Key Policy Aspects

The DIDS includes several critical aspects of policy and process that are worthy of discussion.

Acquisition Reform

Defence acquisition has incurred much criticism over several years due to the complex nature of many defence programs and to the inability to fully appreciate the effects of such complexity and unexpected influences on the execution of the projects. Various reforms have been proposed to the applicable processes that are hoped will reduce the inflation of costs and timeframes and avoid shortfalls in system performance or suitability.

Innovation by Industry

The greater contribution by industry to innovation in defence acquisition is to be encouraged. The DIDS announces a series of incentives for industry to plan a more innovative role but the detail of this approach remains to be explained. A critical factor will be the manner in which greater risk is shared between government and industry.

Workforce Development and Sustainment

Much of defence materiel requires specialist skills and to build such a workforce requires attractive career prospects and assured continuity to avoid losses of skilled workers to non-defence industries. This has been especially true in shipbuilding which has suffered in the past from discontinuities of orders for design, building and/or sustainment.

With the commitment to sustain and then to construct nuclear-powered submarines this factor is even more important with new specialist skills required that have not been needed within Australia before.

Export Potential

With the design, development or simply construction of defence materiel in Australia, an added potential benefit is

^{xi}Boeing MQ-28 Ghost Bat, <https://www.boeing.com.au/products-services/defence-space-security/ghost-bat>.

^{xii}Andrew McLaughlin. *Rapid development: The Australian-designed Ghost Shark autonomous underwater vehicle* Riotact 26 April 2024 <https://the-riotact.com/rapid-development-the-australian-designed-ghost-shark-autonomous-underwater-vehicle/764751>.

^{xiii}Minimum Viable Capability is a capability that achieves a threshold capability effect, inclusive of all fundamental inputs of capabilities in the required time. DIDS p41.

^{xiv}DIDS p41.

the possibility of export as has been achieved in such products at the Bushmaster infantry fighting vehicle and the NULKA anti-ship missile decoy rocket system^{xv}. While the possibility of export is not the primary justification for domestic production, the possibility of defraying non-recurring costs over a larger production run is attractive.

Access to Intellectual Property and Product Information

It is critical to achieve sufficient access to intellectual property and product knowledge to enable detailed design, construction, operation and sustainment, and this requires at least non-exclusive licensing from the owner of that property. Similarly, locally developed property must be carefully licensed to others in a manner that protects security and value.

One of the features of the AUKUS agreement has been the early commitment by the three partner countries to reduce the constraints applicable to Pillar 2 technology collaboration.

Insights for Industry from AUKUS Pillar 1

The most radical new implications for Australian defence industry are undoubtedly those arising from the introduction of nuclear propulsion for submarines through AUKUS pillar 1. The stringent demands for safety, security and environmental sustainability are more onerous in some respects even than the very demanding SUBSAFE^{xv} standards adopted after the loss of the USS THRESHER in 1963 due to a non-nuclear incident.

Nuclear industrial involvement will place demands on all participants, including the full range of defence customer personnel and all related industrial partners and suppliers. The ethos is recognised in the AUKUS announcement and supported in principle by DIDS which states that a quarter of the workforce involved with submarine work will require specialist nuclear training and qualification.^{xvi}

Conclusions

Concluding comments are discussed in the shorter term of three to five years, and then in more speculative form for a longer period, as follows.

Shorter Term Conclusions

AUKUS has provided a welcome focus on the industrial aspects of defence materiel acquisition and sustainment. At the same time it has raised some challenging questions on the scale and uncertainty of some aspects of both workforce development and program design and delivery. The more general benefits of rebuilding defence industrial capabilities are recognised but the opportunity costs and other risk factors are significant.

In other aspects of defence industrial build-up there remain questions on how this can be made attractive to the private sector to invest and adapt to rapidly changing technological and geopolitical factors.

Longer Term Questions

In the longer term there are a number of questions that can be posed for which there are only partial answers apparent:

- What are the important industries and technologies for the future?

- Clearly drones and autonomous systems are a dominant industrial capability to be prioritised.
- GWEO domestic manufacturing capability is widely accepted as essential and a matter of urgency.
- Naval shipbuilding needs to get up to speed and then maintain a continuous order book to ensure retention of the necessary skilled workforce.
- Battlespace awareness system integration and rapid adaptation and upgrade to reflect rapidly-changing technology and geopolitical factors.
- What are Australia's areas of competitive advantage?
- Mining and resource exploitation are Australia's greatest skillsets, and these embody many industrial skills that are applicable to defence materiel.
- Remote area communications and information networking are also well advanced.
- Agricultural, industrial and regional area development are well developed.
- Australia has a relatively well-educated workforce that is adaptable to defence programs with the right incentives for careers and financing.
- Which global markets and value chains are most important for Australian Defence?
 - This is more difficult to answer but include Indo-Pacific markets for selected items.
 - More work is needed to seek new markets for existing products and services and for new products and services to be developed here for defence applications throughout the region.
- How do these topics intersect and how should Australia position itself for best advantage?
- There are undoubtedly aspects of defence materiel that are dual defence and commercial use and/or capable of adaptation to or from defence application to commercial use. These processes should be encouraged as an integral part of defence industrial capability development.
- Similarly the intersection of climate change and other safety and security factors must be considered.

Summary

There is a clear need for a defence industry development program as described in the DIDS document. It applies generally across all defence industrial activity as explained in the Defence Strategic Review, but especially to naval shipbuilding as has been demonstrated by the AUKUS pillar 1 nuclear submarine program and further expanded as a result of the Surface Combatant Force Review.

Many required actions are apparent but so also are many complex challenges to be addressed.

The Author

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^{xv}The Submarine Safety Program (SUBSAFE) <https://en.wikipedia.org/wiki/SUBSAFE>.

^{xvi}DIDS p67.