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Defence Industry in National Defence

Rethinking the future of Australian defence industry policy

Australian Industry Group and Strategic and
Defence Studies Centre, Australian National University

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Executive Summary

As our geostrategic environment deteriorates, the Australian Government has adopted the concept of *National Defence* – the defence against potential threats arising from major power competition – as a new approach to defence planning and strategy.

While many reforms will be required to implement the *National Defence* concept, building Australia's defence industry capability is one of the most important. The *Defence Strategic Review* has argued for the need to build enhanced sovereign defence capabilities in key areas.

However, the current paradigm of defence industry policy was established in a very different context to that of today. Risks of major power conflict were low, policy assumed a 10-year warning time, and industry capability was viewed largely in terms of supporting individual ADF programs.

This report examines the role of defence industry in the context of Australia's *National Defence* strategy. It argues that a change is required to recognise defence industry not as an *input to capability* but as *national capability in its own right*. The possession of a sovereign but internationally linked defence industry is itself an asset during a period where the risk of major conflict is rising.

To inform the national debate in Australia, this report examines defence industry policy in five countries: Sweden, France, the UK, Israel and Canada. These case studies offer pertinent lessons for how defence industry policy can be implemented in different strategic contexts.

The report identifies several factors that shape effective policy: fostering defence-civilian industry embeddedness; utilising a broad range of industry policy tools; ensuring formal and informal coordination between government and business; balancing competition and strategic relationships; and leveraging international markets for scale.

The report then connects these lessons to Australia, considering how our defence industry policy could be reformed to deliver on the needs of a *National Defence* Strategy. It offers five recommendations for the future of defence industry policy in Australia.

Policy recommendations

1. **The Australian defence industry should be considered a capability in its own right:** A capability that supports the ADF force-in-being, but whose strategic value lies in those situations where that force is fully committed, needs to be rapidly reconstituted, and may need to expand. Domestic industrial capability should be developed to meet the demands of our defence planning scenarios, with foundation capabilities in place and capacity to scale with operational needs during conflict.
2. **Defence industry should be embedded within and managed as part of Australia's broader national industry structure and policy.** Defence industry draws on resources such as capital, technology, infrastructure and skills from the civilian economy, and can achieve better scale and efficiencies when connected to their civilian peers. Industrial policy support for defence industry is integrated with, and not simply alongside that, support offered to its civilian counterparts.
3. **Defence industries should be strategically prioritised, then supported to achieve scale and surge capabilities.** Prioritisation will be required to identify where Australia has relevant capabilities, or might be able to efficiently develop them, that can contribute to our own and allies supply chains. These capabilities should also be aligned to existing areas of strength in Australia's civilian industries and leverage new industrial policy programs. Scale in these prioritised areas should then be achieved by coordination across programs, the development of export markets, and/or the building of international technology partnerships.
4. **Government should utilise the full range of policy levers at its disposal to shape defence industry outcomes.** This including both formal and informal mechanisms for coordination between government and business, to ensure greater understanding, cooperative relationships, and two-way flow of information. Given the size of Australia's defence effort, the selective use of single supplier (strategic partnering) arrangements will be crucial in some areas to achieve and sustain required industry outcomes.
5. **Government should establish a Defence Industry Capability Manager.** The Capability Manager would be responsible for defining the capability and capacity that government needs to develop, as well as for development of industry to meet the level of preparedness determined by the Government. Whilst close liaison within the Department of Defence and specific Capability Managers would be required, the Industry Capability Manager would have a wider 'whole of government' role to bring Defence, wider government and industry together for the achievement of strategic industrial outcomes.

1. Introduction

Australia faces the most challenging strategic circumstances in several generations. The risk of a major conflict in the Indo-Pacific – likely involving the great powers – is real. China is openly using military and para-military forces to change the status-quo in the South China Sea, while in Europe Russia is in the second year of its war to annex Ukraine.

Australia's deteriorating strategic environment is reflected in the evolution of recent defence policy statements. While the 2016 *Defence White Paper* recognised challenges to the global rules-based order as the key issue for Australian Defence, in 2020 the *Defence Strategic Update* (DSU) warned that 'Australia can no longer rely on a timely warning ahead of conflict occurring'.¹ And by 2023, the *Defence Strategic Review* (DSR) found the Australian Defence Force's (ADF) current force structure is 'not fit for purpose'.²

It argued: '[F]or the first time in 80 years, we must go back to fundamentals, to take a first-principles approach as to how we manage and seek to avoid the highest level of strategic risk we now face as a nation: the prospect of major conflict in the region that directly threatens our national interest.'³

The Australian Government has adopted the concept of *National Defence* – the defence of Australia against potential threats arising from major power competition – as a new approach to Australia's defence planning and strategy. While many reforms will be required to implement this concept, building Australia's defence industry capability is one of the most important.

The DSR argues that '[i]t is essential to ensure Australian sovereign defence industry capability is supported where it makes strategic sense',⁴ and calls for building enhanced sovereign defence industrial capacity in 'key areas'.⁵ But it is largely silent on what kind of defence industry this requires, how government can ensure that the industrial requirements can be met, or even on how to think about the role of defence industry in *National Defence*.

These are critical questions. The current paradigm of Australia's defence industry policy – as set out in the *Defence Industry Policy Statement* (DIPS) in 2016 – was established in a very different world. The risk of major threat to Australia was low; policy (implicitly or explicitly) assumed a 10-year warning time;⁶ and minimising the net cost of acquisition was the main objective. Questions of industry structure, capacity and capability were primarily considered in relation to the acquisition and sustainment of individual ADF capability programs.

Moreover, the establishment of the AUKUS trilateral security partnership also sets the foundation for a new technology and industry framework for Australia. The acquisition and sustainment of nuclear-powered submarines under AUKUS will require an unprecedented uplift to the capability and capacity of the Australian defence industry. Widespread adoption of AUKUS Pillar 2 technologies throughout the ADF will require adaptation, innovation and acquisition at much faster timescales than Australia has traditionally managed.

Implementation of both the DSR and AUKUS will thus require the Australian defence industry to respond to challenges of new technology, challenges of delivery, challenges of scale for mobilisation and major conflict, and challenges of ensuring sufficient and appropriate domestic industrial capability, as well as developing secure and resilient supply chains.

This report seeks to launch a national conversation on the role of defence industry in *National Defence*.

The purpose of the Australian defence industry is not solely to provide government one (of many) options to meet the acquisition and sustainment requirements of specific projects for the ADF. Rather, the report argues that a significant change is required which recognises that defence industry is a *national capability in its own right*.

An independent but internationally-linked defence industry is in itself an asset during a period where the risk of major conflict is rising. It is an asset that can reduce the risks of excessive reliance on overseas industry and supplies, and which will allow Australia to respond flexibly and effectively to the surges in production, reconstitution and adaptation of military capabilities that major conflict will force upon it.

In examining the role of industry as a fundamental part of *National Defence*, this report draws on observations on defence industry policy in peer countries. Sweden, France, the United Kingdom, Israel and Canada have been selected for examination.⁷ The purpose of these case studies is to identify how other governments think about the role of industry in their own defence requirements, and how governments act to build the industry capabilities required to meet them.

In examining the five international case studies, the report highlights how each country has engaged with the challenging questions of balancing the need for overseas-sourced, strategically critical capability with growing the domestic industrial base. It also examines the policy levers each country has used to develop local capability as a national capability, and the distinct patterns of government-industry partnerships supporting it.

The countries considered in this report face different strategic circumstances from those described by the DSR for Australia. Each has their own defence industry structure, requirements and national policy context. They do not necessarily all “get it right” in their own policy approaches. However, their experience shows that while all countries are grappling with similar trade-offs, constraints and challenges, there is nothing preordained about Australia’s policy settings of the last twenty-five years.

From these case studies arise key questions that Australia needs to ask if it is to develop industry to provide the capabilities that the country needs, and a broad, new direction for industry policy. Importantly, the case studies show that countries have agency over their defence industry capability—agency that Australia can and must exercise in a far more deliberate and direct manner than it did in the more benign decades past.

In the context of the development of the *National Defence Strategy*, there is an opportunity for Australian governments and industry to create the foundations of a local defence industrial base that is a national strategic asset that can support Australia to face the challenges of the next decade and beyond: A defence industry that is a capability for *National Defence*.

2. Defence Industry and ‘National Defence’

Since the release of the 2020 DSU, Australian governments and Defence have acknowledged that Australia is facing acute strategic challenges and that ‘many of these challenges will require a whole-of-government and whole-of-nation effort’.⁸ The 2023 DSR has also noted that ‘[t]he ADF’s current force structure is not fit for purpose for our current strategic circumstances’,⁹ and that the current approach to capability acquisition is also ‘not suitable given our strategic circumstances’.¹⁰

The DSR has therefore called for a new approach of *National Defence* that provides a ‘more holistic approach to Australian defence and security strategy’.¹¹ National Defence is advocated as a ‘part of a broader national strategy of whole-of-government coordinated and focused statecraft’,¹² and includes, inter alia:

- Defence strategy and policy supporting whole-of-nation strategies;
- A whole-of-nation effort to develop strategic resilience;
- A new approach to the management of risk across government;
- Enhanced sovereign defence industrial capacity in key areas;
- A new approach to developing advanced military technology; and
- A renewed focus on national planning for Defence preparedness.¹³

The *National Defence* approach therefore seeks to draw more directly on resources across industry, government, and society. The initial *National Defence* Strategy is due to be released in 2024. At the same time, the Department of Defence is currently revising defence industry policy, with a *Defence Industry Development Strategy* (DIDS) expected in early 2024. The DIDS will be the first comprehensive revision of policy for defence industry since the release of the *Defence Industry Policy Statement* (DIPS) in 2016. It comes at a time when our region ‘has seen the return of major power strategic competition, the intensity of which should be seen as the defining feature of our region and time’.¹⁴

The strategic importance of defence industry

Australia’s move towards a defence strategy that explicitly mobilises ‘whole-of-nation’ resources is not unusual—either internationally, or in terms of Australia’s own history. Some elements of *National Defence* echo Australia’s own approaches from previous eras when Australia’s main defence focus was on the defence of Australia and ADF operations from Australian territory. More broadly, the idea that ADF operations in the defence of Australia had to rely on the logistical and sustainment capabilities in Australia’s wider economy was central to both the Commercial Support Program of the early 1990s, and the Defence Efficiency Review of the late 1990s. Internationally, there are echoes of the *National Defence* concept in other’s approaches, such as Sweden’s concept of “Total Defence”.¹⁵

The call for ‘sovereign capabilities’ has permeated Australian defence industry policy since the development of the Priority Industry Capabilities (PICs) and Strategic Industry Capabilities (SICs) in the late 2000s. However, recent re-interpretations of ‘self-reliance’ have moved Australia closer to seeking strategic autonomy in select industrial verticals. For example, the *Defence of Australia* White Paper in 1987 could still assume that a regional conflict involving Australia would not be correlated with a major conflict involving the United States, hence ‘alleviating the need’ for Australia to maintain

its own stockpiles or production capacity for munitions and consumables.¹⁶ The same assumption evidently no longer holds today.

Hence, the 2020 DSU found that '[t]he ADF must increase its self-reliant ability to deploy and deliver combat power and reduce its dependencies on partners for critical capability'.¹⁷ This led to the establishment of the Guided Weapons and Explosive Ordnance Enterprise (GWEO). In its domain, GWEO shows recognition that the strategic pressures that Australia and its allies will face in a major war mean that assumptions on the ease of resupply and industrial support that were appropriate for a different era of low-intensity conflicts are no longer suitable.¹⁸

The rediscovery of the need to consider broader national – including industrial – capabilities for defence is not solely an Australian phenomenon. The war in Ukraine following the Russian invasion in 2022, and the possibility of a major conflict with China, have stimulated many countries to re-assess their strategic circumstances and the role of their defence industry. The Secretary General of NATO has described the Ukraine war as a “war of logistics”, as NATO countries work to replenish stockpiles, depleted through supplying Ukraine and raise production capacity of critical munitions.¹⁹

Increasing production to sustain the war in Ukraine is being hampered by supply chain disruptions and bottlenecks, limited workforce numbers, and the availability of specialist skills.²⁰ This has promoted proposals for systemic changes to defence industry policy, such as the development of a more agile and flexible industry through measures such as collapsing design and manufacturing together.²¹ Legislative developments are also occurring in Europe and in the US to remove potential inefficiencies and roadblocks associated with the increased production of munitions and other key supplies.²²

In the US, UK and Europe, governments are thus rediscovering the importance of deep defence industrial capabilities. Trade-offs and costs are inevitable: increasing stocks of weapons reduces logistics risk but increases costs; while increasing production capacity incurs costs in the establishment of capability that may not be required.²³ But either way, the key point is that when faced with the possibility of major conflict, demands placed on industry are far more directly determined by considerations of strategic risk than by the relatively more predictable demands of sustainment in peacetime or low-intensity operations.

In addition, Russia's war on Ukraine reinforces the importance of deep and adaptive industrial capabilities in major war. Multiple reports have highlighted the role that expendable drones have played in that conflict,²⁴ with Ukraine reportedly using 10,000 drones per month.²⁵ Since 2022, Ukraine has rapidly emerged as a producer of drones comprising short-range drones for ISR and direct attack, as well as naval surface-and sub-surface drones. That Ukraine is now developing such a large drone industry, even though it has been fighting Russia in the Donbas since 2014, highlights the importance of industrial adaptability to new and unexpected demands that major conflict will inevitably bring.

A related challenge is the need to rapidly adapt existing in-service equipment during conflict. For example, changes have been made to Ukraine's legacy Soviet fighter-bombers to deploy Western anti-radiation,²⁶ decoy,²⁷ or long-range strike cruise missiles.²⁸ The strategic pressures driving Ukraine's industrial adaptation today would have been all too familiar to Australia's defence and industrial leaders that improvised the Boomerang fighter program in 1941.²⁹

The realisation that post-Cold War industry policies have left governments ill-prepared for the current challenges is not driven solely by Euro-Atlantic concerns. Major war games on conflict over Taiwan by the Center for a New American Security and the Center for Strategic and International Studies in the United States demonstrate that any such conflict, regardless of outcome, would almost certainly exhaust US long-range missile inventories within days.³⁰ It would also cause losses to aircraft and

naval surface combatants on a scale not seen since the Second World War, disrupt many global supply chains for both defence and defence-adjacent industrial goods, and could well last for years.

The scale of the challenges facing countries with substantially larger and more complex defence industries than Australia,³¹ the transformation of military technology as well as modern manufacturing, and the stated intent from the Australian Government to adopt a position of *National Defence*, suggests that a fundamental re-consideration of the role of the domestic defence industry in Australia's defence is required.

The evolution of Australian defence industry policies

Commencing with the 1976 Defence White Paper, successive Australian governments have highlighted and promoted the importance of the domestic defence industry in supporting 'self-reliance' and meeting our geostrategic circumstances. The 1976 White Paper noted that 'the central objective of Defence industrial policy is thus to ensure that the Defence Force can be supported and maintained in Australia, utilising for the provision of equipment and material, a combination of local industry, selective stockholding and reliable overseas sources of supply'.³² At that time, defence industry policy also recognised the need for Australian industry to provide some items or substitutes if 'overseas supply should be denied to us'.³³

Australia has successfully developed innovative defence systems such as the Jindalee Over-the-Horizon Radar Network, the Ikara anti-submarine missile system, and more recently the CEA Phased Array Radar. Some of these systems have been successfully exported, but the domestic defence industry has faced challenges associated with a small local market and geographic distance from key allies and partners. The need for Australian military industry activity to be affordable has been a repeating theme in defence industry reviews, including the 1986 Cooksey Review,³⁴ the 2003 Kinnaird Review,³⁵ and the 2008 Mortimer Review.³⁶

The structure of the domestic defence industry has changed since the late 1970s. This proceeded through the initial consolidation and commercialisation of government facilities and activities, such as the government-owned Australian Defence Industries (ADI) in 1989, the subsequent privatisation of the ADI in 1999, and the progressive privatisation of other Australian defence industry companies.³⁷ Many of these were subsequently acquired and developed by international defence primes, who by the late 2000s brought significant capability and technology to the Australian defence market.

Within this changing structure, major attempts to establish defence industrial capability in Australia occurred during the 1980s. This included the manufacture of major platforms such as the *Collins* class submarine, the *Anzac* ships, and hulls #5 and #6 of the *Adelaide* class FFGs, all based on foreign designs. More recent examples are the *Hunter* frigate and the *Boxer* Combat Reconnaissance Vehicle.

Other approaches to identify and foster desired industry capability included the introduction of policy concepts of Priority Local Industrial Capabilities (PLICs),³⁸ then the Priority Industry Capabilities (PICs),³⁹ and more recently Sovereign Industrial Capability Priorities (SICPs).⁴⁰ Through PLICs/PICs/SICPs, Defence has repeatedly acknowledged the strategic value of certain capabilities, and the critical contribution of local industry to delivering those capabilities. At the same time, the government focus remained on achieving value for money and minimising project risk through the consideration of military-off-the-shelf solutions as alternatives to the domestic development of systems,⁴¹ and subsequently the adoption of off-the-shelf as standard approach.⁴²

The release of the 2016 DIPS marked a significant change in Australian defence industry policy. The DIPS formally recognised Australian defence industry as a *Fundamental Input to Capability* (FIC). It

noted that, 'the intent behind making industry a [FIC] is to drive more formal consideration of industry impacts through the early stages of the capability development life cycle. In this way, Defence will better match the development of new capabilities with industry's ability to deliver them.'⁴³ DIPS also updated industry and innovation programs including the Centre for Defence Industry Capability (now Office of Defence Industry Support), and the Defence Innovation Hub.

Since 2016, additional policies and initiatives have been released with the objective of further driving domestic industry outcomes. These include:

- The 2018 *Defence Export Strategy*, where the Government expressed an intent to become a top ten Defence exporter.
- The 2018 *Defence Industrial Capability Plan*, which set out a plan for the industrial base and introduced the concept of SICPs.
- The 2019 *Defence Industry Skilling and STEM [Science, Technology, Engineering and Mathematics] Strategy*.
- A new and enhanced *Australian Industry Capability (AIC)* contractual framework, requiring detailed AIC plans as part of the bids for major capital equipment projects.

In addition, explicit attempts have been made to build specific industry capabilities in Australia, including continuous naval shipbuilding,⁴⁴ and the establishment of the GWEO Enterprise to manufacture high speed guided weapons in Australia.⁴⁵ The Commonwealth acquisition of the Australian radar company CEA Technologies is another example.⁴⁶ These new initiatives parallel the longstanding government ownership of munitions factories operated by Thales, continued government ownership of the Australian Submarine Corporation, and the government owned Australian Naval Infrastructure which develops the Osbourne Naval Shipyard.

When measured in terms of economic aggregates, Australian defence industry policies have met with some success: According to the Australian Strategic Policy Institute, they have materially increased local spend, noting '[In 2021-22] Defence's local military equipment spend grew by a remarkable 35% to around \$3.5 billion'.⁴⁷ According to data published by the Australian Bureau of Statistics, defence industry contributed \$2.2 billion to Australian industry value added in 2021-22, a 37.5% rise from the \$1.6 billion in 2016-17 when the DIPS was released.⁴⁸

However, despite these formal policies and initiatives, Australian defence industry policy remains characterised by an overall lack of clear purpose and intent; a lack of direct connection between strategic objectives and industry policy; and a continuing project-by-project approach. The concept of industry as a FIC has only partially been implemented in isolated programs, and has the consequence that industry is considered primarily in the context of how it relates to the acquisition and sustainment of specific capability programs.

None of the existing policy approaches of recent decades add up to one that considers industry a strategic asset, or clearly articulates what kind of defence industry Australia needs to meet strategic needs. One observer of US policy recently remarked that 'You go to war with the industry base you have, not the industry base you want'.⁴⁹ But what industry base does Australia want? What are the objectives it seeks to achieve in defence industry policy, and how can it achieve these? What does success look like, and is current policy making use of all the levers of government that are available to achieve it?

The challenges described by the DSR suggest that a fundamental rethink of defence industry policy from first principles is required. To this end, this report now draws on observations of how other countries with similar features, but very different industry outcomes, approach these challenges.

3. Comparing International Defence Industry Policies

International comparison of defence industry policies is challenging at both conceptual and practical levels. In practical terms, few countries publish explicit defence industry statements or policies in the way that Australia does. Decisions in practice do not necessarily align with published policy – where that exists – or can seem or be inconsistent with each other. Countries’ context for defence industry differs significantly in terms of their strategic environment, economic and industry structure, international relationships as well as history, culture and traditions of the relations between industry and government in general.

To overcome these challenges, the project developed a framework paper that examined defence industry policy from a first principles approach. It then used this framework to examine the policies of five countries: Canada, Israel, Sweden, France, and the United Kingdom. These countries were chosen on the consideration that accessibility of information, the nature of policy objectives, the size, overall capability and structure of defence industry, and the overall context of government-industry relations, would be sufficiently similar to the Australian situation to enable policy-relevant insights to be drawn.

Approaching defence industry policy from first principles

Defining what is the object of ‘defence industry policy’ can be surprisingly difficult. Defence industry is often categorised as those businesses producing systems and services specifically developed for defence. That market is distinguished from broader civilian sectors as government is a monopsony buyer, and is simultaneously the customer, the sponsor and the regulator of defence industrial activity.⁵⁰

The 2018 *Defence Industrial Capability Plan* (DICP) states that defence industrial activity includes businesses that ‘are providing or have the capacity to provide defence specific or dual-use goods and services’.⁵¹ But since neither definition links to specific strategic needs, it is far from certain that these definitions are either the most useful, nor used in practice for defining the scope of actual defence industry policy.

Moreover, the businesses which make up the Defence Industrial Base (DIB) do not exist in isolation from the rest of the economy. They also participate in non-defence markets, and rely upon a wide range of factors of production from outside defence industry itself, including capital, workforce, material inputs, technologies and infrastructure.

Within that wider industrial context, the structure of the DIB is important for its ability to deliver required goods and services, and includes the following key factors: capability, capacity and innovation:

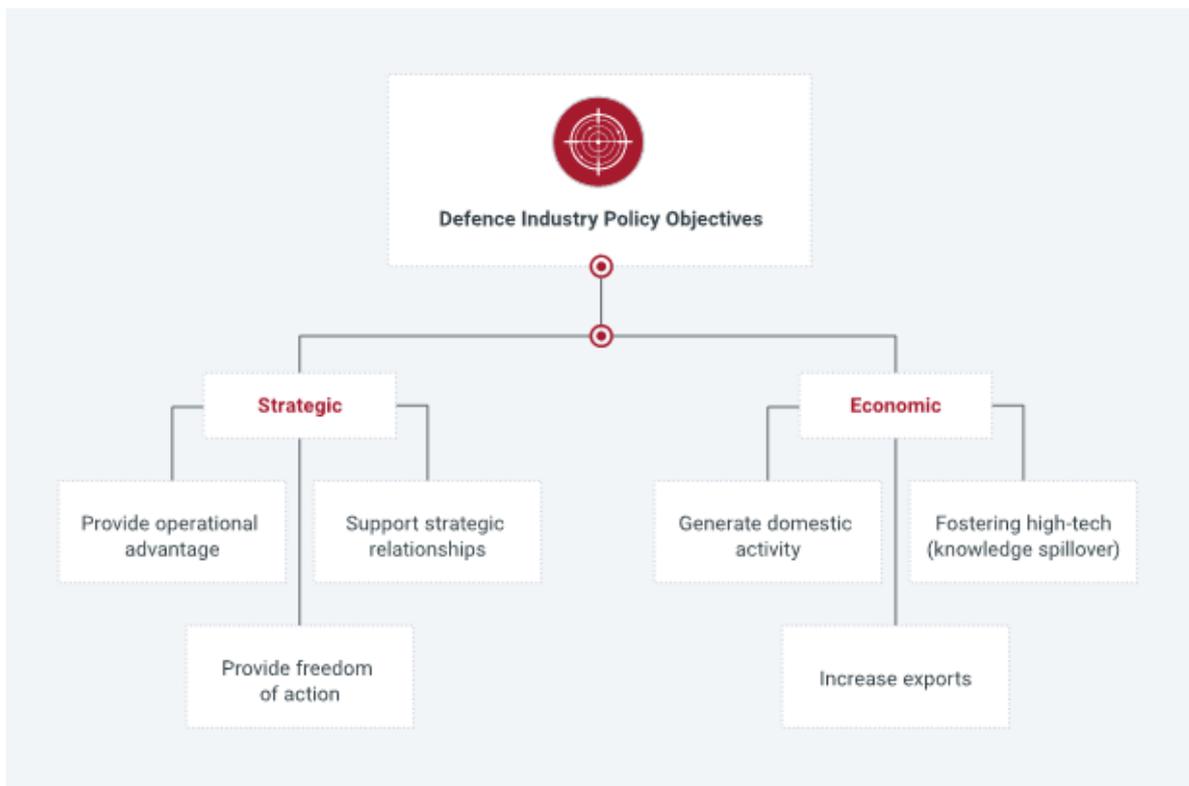
- *Industrial capability* is the ability of industry to deliver a product or service to an acceptable level of proficiency. Defence industrial capability has been defined by the US Department of Defense as ‘a skill, facility, process or technology needed to design, develop, produce, repair or maintain products used by the Department of Defense’.⁵²

- *Industrial capacity* relates to the scale (and speed) with which industry can deliver goods and services when required. While capability captures the quality of a good or service that industry can deliver, capacity relates to the quantity and timeframe in which it can do so.
- The ability to *innovate* relates to the ability of the DIB to develop new processes and apply them to the production, improvement or sustainment of goods and services. This can include the development of intellectual property (IP), the creation of new products, and/or the creation and deployment of new businesses processes. Innovation is not simply an activity of high-tech or start-up businesses, and occurs across all levels of technology and business maturity.

Capability, capacity and innovation are not independent of each other. For example, achieving capability in industry typically relies on activity at minimum scales, which presupposes an ongoing level of capacity over time. In a similar way, building capacity likely requires innovation to take pioneer capabilities and deploy them at scale.

The DIB that governments seek – and the internal composition of that DIB – depends on government objectives. Whether explicitly articulated or only implicit in government actions, defence industry policy can seek to maximise two fundamental objectives: The *strategic effect* of that industry for defence purposes, and the *economic impact* of that industry for its host economy. These objectives are not mutually exclusive, either collectively or in relation to a specific capability or program, and can be further divided into three distinct objectives each.

Figure 1: Government objectives in defence industry policy



The strategic objectives of defence industry policy reflect the government’s intention for the DIB to support a country in armed conflict, including alongside coalition partners or allies. This has three aspects: ‘Operational advantage’ is ‘the ability to find and maintain an edge over potential adversaries, both to increase the chances of success in hostile situations and to increase the protection of the assets involved’.⁵³ By contrast, freedom of action is the ability of the defence force to operate as,

when, where and for the period required.⁵⁴ Whereas operational advantage relates to relations with the adversary, 'freedom of action' relates to the extent of independence from other countries with respect to the ability to operate, sustain, and replace/reconstitute forces on operations. In addition, governments also often use defence industry cooperation to foster and solidify strategic relationships with important allies and partners.

Economic objectives are also pertinent for defence industry policy as, in many countries, defence industry is the part of the wider national industry that is most closely shaped by government fiat. Defence industry presents a significant opportunity for direct government direction of economic and business activity in a way that is not available in civilian industry policy. In addition, development of export markets and the fostering of high-technology spillovers from defence into civilian industry can in certain contexts be important objectives.

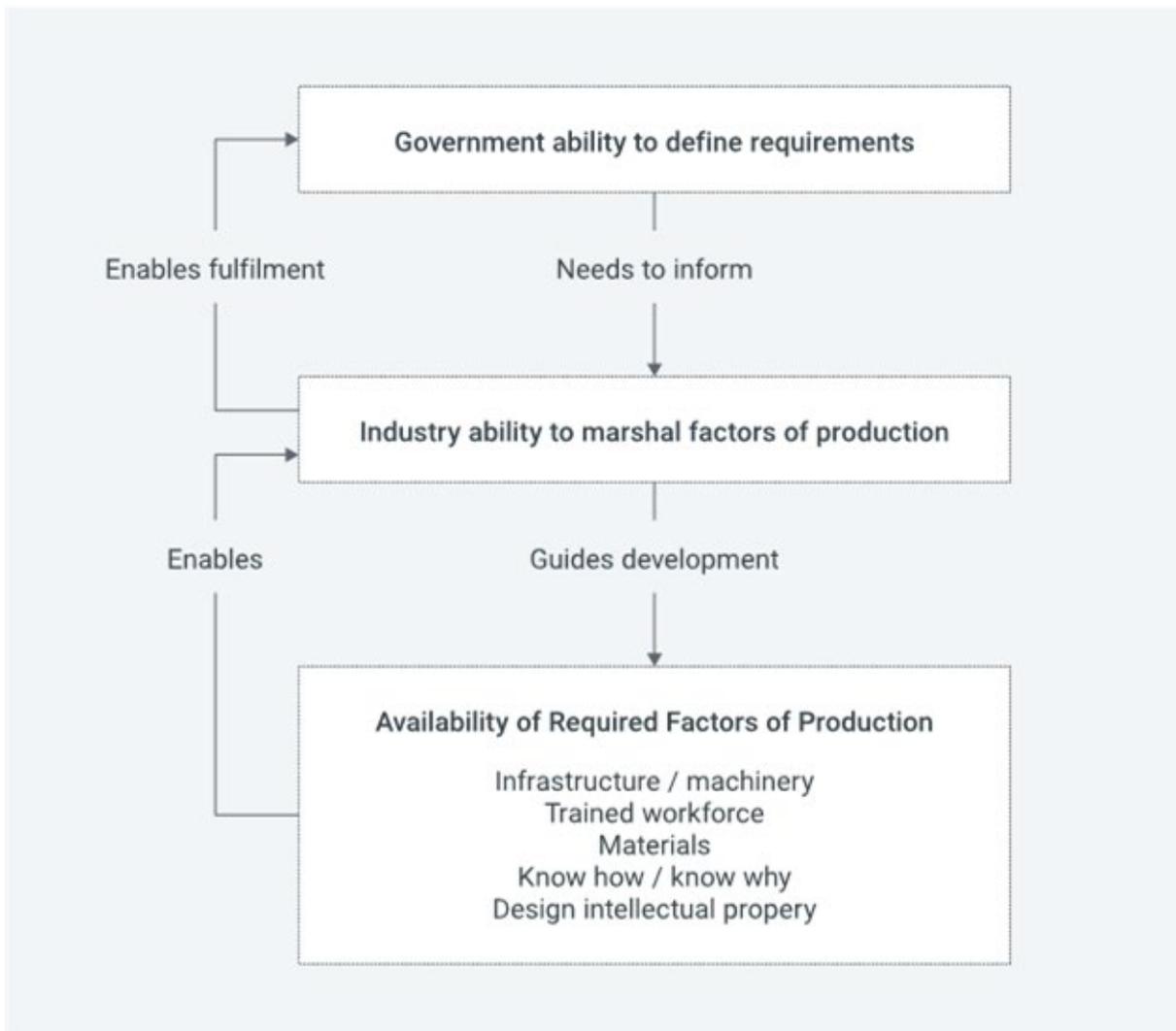
Governments have a host of legal, regulatory, contractual, financial, organisational and informal tools that they can make use of to direct, manage, and shape changes defence industry's structure and activities to achieve the particular objectives that they seek. Examples include:

- Funding of acquisition and sustainment of platforms/systems being tied to industry outcomes;
- Direct financial support for research and development, as well as other R&D incentives;
- The provision and administration of grants and concessional loans to shape industry;
- Setting of standards and contracting conditions, including in relation to ownership of intellectual property;
- Development of infrastructure for use by defence industry;
- Government ownership or influence on ownership of defence industry, such as restrictions on foreign investment;
- Access to government infrastructure, facilities and test ranges;
- Sharing of information about government requirements with defence industry;
- Assistance from government officials in accessing and developing export markets;
- Workforce development, for example, through visa allocation or special training programs for workers in key areas;
- Secrecy provisions – to limit access to technologies;
- Taxation policy and the incentives it creates; and
- Coordination and network support to enable interaction between defence industry and non-defence industry actors – for example, universities.

For defence industry policy to be successful, these levers need to align factors of production, industry's ability to marshal them, and government intent (Figure 2). Government must define what it needs industry to provide, in terms of industrial capability, capacity, and ability to innovate. The ability of industry to respond effectively to meet government requirements depends upon the clarity of the nature of the requirements, their associated timeframes, the ability to make required investments, and the timelines required to do so.

In some cases, where the industrial "as-is" capability is a long way from the "needs to be", significant, persistent and costly government action over an extended time may be required. This is particularly the case when factors of production themselves need to be created, which includes infrastructure, trained workforce, intellectual property, know-how and know-why.

Figure 2: Framework for successful defence industry policy



Focusing on the objectives of defence industry policy, industry structure, and the way that government and industry coordinate, provides a basis for examining the defence industry policies of different countries—as well as for rethinking Australia’s own. The following sections explore these questions in the five countries examined in detail in this study.

Canada

Canadian defence industry policy reflects a process between the end of the Second World War and the 1980s that saw government divest itself of government owned defence industry establishments, end the development of air and land platforms in country, and progressively transfer responsibility for defence procurement and industry to Ministers and departments responsible for general government procurement and civilian industry.⁵⁵ Canada’s defence industry base is spread across regional clusters that align with the geographic location of civilian industry clusters. Canada is integrated into the US defence industrial base through preferential treatment under the US Defense Production Sharing Agreement,⁵⁶ and the ‘Canadian Exemption’ under the US Arms Export Control Act and the International Traffic in Arms Regulations (ITAR).

Key defence industry policy objectives are to deliver the right equipment in a timely manner and to leverage defence industry ‘to maximise job creation, support Canadian manufacturing capabilities and

innovation and bolster economic growth'.⁵⁷ In practice, economic objectives predominate overall policy,⁵⁸ and large procurement programs are often used as a means of regional development.⁵⁹

Public Services and Procurement Canada is responsible for developing all government defence and non-defence procurement plans and strategy, soliciting and evaluating bids, coordinating industry engagement and preparing, awarding, administering and closing contracts. The Industrial and Technological Benefits (ITB) policy leverages procurements over \$100m to contribute to jobs, innovation and economic growth.

Innovation Science and Economic Development (ISED) is the government agency responsible for coordinating and administering ITB policy. Contractors are required to make business investments in Canada's economy in the amount equal to 100% of the contract's value. The mechanism in which this is achieved is by evaluating a Value Proposition (VP), an economic proposal submitted by companies bidding for defence contracts. However, some academic observers argue that there is 'no clear evidence' that the offset policy, in place since 1986, has achieved its objective of increasing the competitiveness of Canadian industry.⁶⁰

France

France's defence industry is structured around eight quasi-monopolistic major companies (Airbus, Arqus, Dassault, MBDA, Naval Group, Nexter, Safran and Thales) and more than 4000 medium and small enterprises.⁶¹ It is both product and part of a wider defence policy, national system and political culture of the Fifth Republic that remains focused on maintaining French strategic autonomy, of which industrial elements are a key aspect.

The state has actively shaped defence industry for decades and while today most defence companies are privatised, state minority shareholding and restrictions on foreign ownership are the norm. The state maintains significant influence on the strategic direction of French defence companies through direct R&D funding, guaranteed work in major acquisition programs, and support to defence exports—including by designing export versions during development and active diplomatic support to exports, to lower costs of production.

The *Direction générale de l'armement* (DGA) is responsible for developing French defence industrial strategic autonomy and for equipping the armed forces. It controls military R&D, acquisition, test and evaluation facilities, force design (with the armed services), and support to defence exports, and reports directly to the minister and president. DGA is responsible for maintaining the capabilities of the defence industrial base required for strategic autonomy, and actively monitors the capabilities and financial health of companies.

A second important institution is the *Corps des ingénieurs de l'armement* – a military corps of armament engineers whose commandant is of equivalent rank to a service chief – that provides crucial technical expertise and a link with defence industry. The corps staffs technical positions in DGA and other parts of the ministry and government, with about half seconded to defence industry.⁶²

Reforms in the context of reduced defence budgets in 1997 increased competition based on fixed cost rather than cost-plus contracts. Industry rather than DGA took on a greater role in systems integration, and DGA design expertise (and links with industry) declined. However, while its role has changed, and it has lost the centrality it enjoyed in the Cold War, DGA continues to fulfil key program manager roles which require not just technical but also increasingly commercial and organisational understanding of industry partners.⁶³

Israel

Israel's has an advanced and innovative defence industry driven by the nation's historical challenges and the need to secure self-reliance in defence capabilities. The catalyst for Israel's development of its domestic defence industry came in 1967 when France, its major defence supplier, imposed an arms embargo after the Six-Day War.⁶⁴ As a result, Israel embarked on an all-out policy of self-sufficiency that led the country into an industrial revolution, the main thrust of which was directed towards the manufacture of military equipment such as aircrafts, tanks, precision-guided smart weapons, microelectronics and rocket-propelled engines.⁶⁵

Israel's defence industry currently comprises approximately 600 companies, and encompasses diverse sectors, including military aircraft, missiles, missile defence systems, unmanned systems (drones), naval vessels, cybersecurity, electronic warfare, and intelligence and surveillance equipment.⁶⁶ Domestic defence activity does, however, rely upon imported components, mostly from the US,⁶⁷ and Israel imports aircraft and naval platforms from overseas.

The industry's capability planning involves close collaboration between the Israel Defence Forces (IDF), the Israeli Ministry of Defense (MOD), and research and development agencies. The IDF identifies operational requirements, which the MOD and agencies such as the Israel Defense Research and Development Directorate (DDR&D) evaluate and prioritise based on national security interests and technological feasibility. The International Defense Cooperation Directorate (SIBAT) plays a role in bridging relationships between industry and the defence establishment, and placing this in the context of the operational needs of the IDF.⁶⁸

Indigenous development and production of defence systems to ensure self-sufficiency in critical technologies and platforms is a key focus of Israel's defence industry. The Defense Exports Control Agency (DECA) regulates defence exports, evaluating requests based on national security, foreign policy interests, and international agreements.⁶⁹

The Israeli government views the defence industry as a strategic sector vital for national security, technological innovation, and economic growth. Local industry benefits from Israel's offset program, which is administered by the Industrial Cooperation Authority at the Ministry of Economy. Israeli industry has also benefitted historically from US permission to convert 25 percent of U.S. Government Foreign Military Financing (FMF) from dollars to shekels, which has enabled the MOD to spend FMF locally.

Sweden

Sweden has had a long history of armed neutrality, although that has changed since the end of the Cold War. By the late 1970s, Sweden had achieved a comprehensive defence-industrial and defence-development infrastructure, and by the 1980s Sweden was largely autonomous in various defence technology domains, producing its own combat aircraft, surface combatants, submarines, armoured vehicles, artillery, radars, ground combat weapons, ammunition, and command, control, communications, and intelligence (C3I) solutions.

The end of the Cold War saw Sweden take a "peace dividend", and substantially reduce its investment in the domestic defence industry. This also saw Sweden seek closer engagement with European partners, the divestment of the Government's interests in defence companies, and substantial sections of the defence industry acquired by foreign companies. The Government-owned submarine designer and manufacturer Kockums⁷⁰ was included in the sale of government companies.

Following the Russian invasion of Crimea in 2014, Swedish defence and security policy has re-introduced *Total Defence*, with the aim being a resilient society capable of withstanding an attack, identified as being from Russia, for a period of three months.⁷¹ *Total Defence* therefore requires a high degree of government involvement and regulation over all the entities that comprise Swedish society, from the military to the civil defence, and encompassing all functions and activities throughout the Swedish economy.

Sweden does not have a formal defence industry policy in place but does have a capability acquisition strategy that influences the shape of the industry. Sweden also publishes other related documentation, such as military budget initiatives,⁷² and excerpts from reports from the Defence Commission.⁷³ The combat aircraft capability, the underwater capability, and integrity-critical areas in the C3I domain have been designated as essential security interests, with activities in these areas allocated predominantly to Swedish companies.⁷⁴ The Swedish Government has also sought to ensure its access to defence inventions made in Sweden through a 1971 law addressing this issue.⁷⁵

United Kingdom

The United Kingdom has a long history of developing its own weapons systems, and an associated recognition of the value of a capable defence industry for national security. Prior to 2000, the UK aimed for a high level of domestic content for both economic and strategic objectives but did not develop specific policy for the defence industry. Government actions to shape defence industry structure included forced amalgamations within the aerospace and shipbuilding industries,⁷⁶ the nationalisation of important defence companies such as British Aerospace and Rolls Royce,⁷⁷ and the retention of a 'golden share' and the implementation of board restrictions upon the subsequent privatisation of the nationalised companies.⁷⁸

Since 2000, largely driven by a series of economic challenges, and shrinking defence budgets, the development and maintenance of local industry capability has increasingly been by design, with a conscious decision to maintain industry capability and capacity for specific military capabilities. The United Kingdom currently develops industrial strategies for several sectors, including surface vessel shipbuilding, land, space, and 'defence and security' which includes a range of capabilities such as the nuclear deterrent, cyber, complex weapons, novel weapons, and submarines.

The United Kingdom has used strategic relationships with companies such as BAE Systems, Rolls-Royce and MBDA as a mechanism for managing and maintaining industrial capability. The UK has also acted to ensure that the government retains full rights to systems developed in the UK with government funding through the introduction of a suite of rules covering the handling of intellectual property.⁷⁹

Key industry partners in the UK have been involved in activities to scope projects in early stages. This has provided greater two-way knowledge of what is sought, and what is possible, and therefore has provided greater efficiency in both the definition of requirements and the industry response to those requirements. The UK also uses exports to offset procurement costs and thereby increase the number of platforms in service. Focused support for exports is provided by UK Defence & Security Exports (UKDSE), part of the Department for Business and Trade, with the aim to 'help UK defence, physical and cyber security, and civil maritime companies to export products, technology and services'.⁸⁰

Defence industry structures reflect government choices

What the defence industry policies of these countries demonstrate is that the defence industry structure that a country has – and which it can thus draw on for strategic needs – ultimately reflects government choices. Defence industries emerge from decisions made by policymakers over time, the form and level of investment embedded in these decisions, and from the continuity of policies and implementation.

The case studies have highlighted that a primary driver for policy selections, and the relative importance of the strategic and economic objectives, can be usefully grouped as the combination of two factors: the extent to which there is a preference for domestic supply, and the extent to which government seeks geostrategic or more socio-economic objectives from defence industry.

Figure 3: Typology of defence industry policy approaches

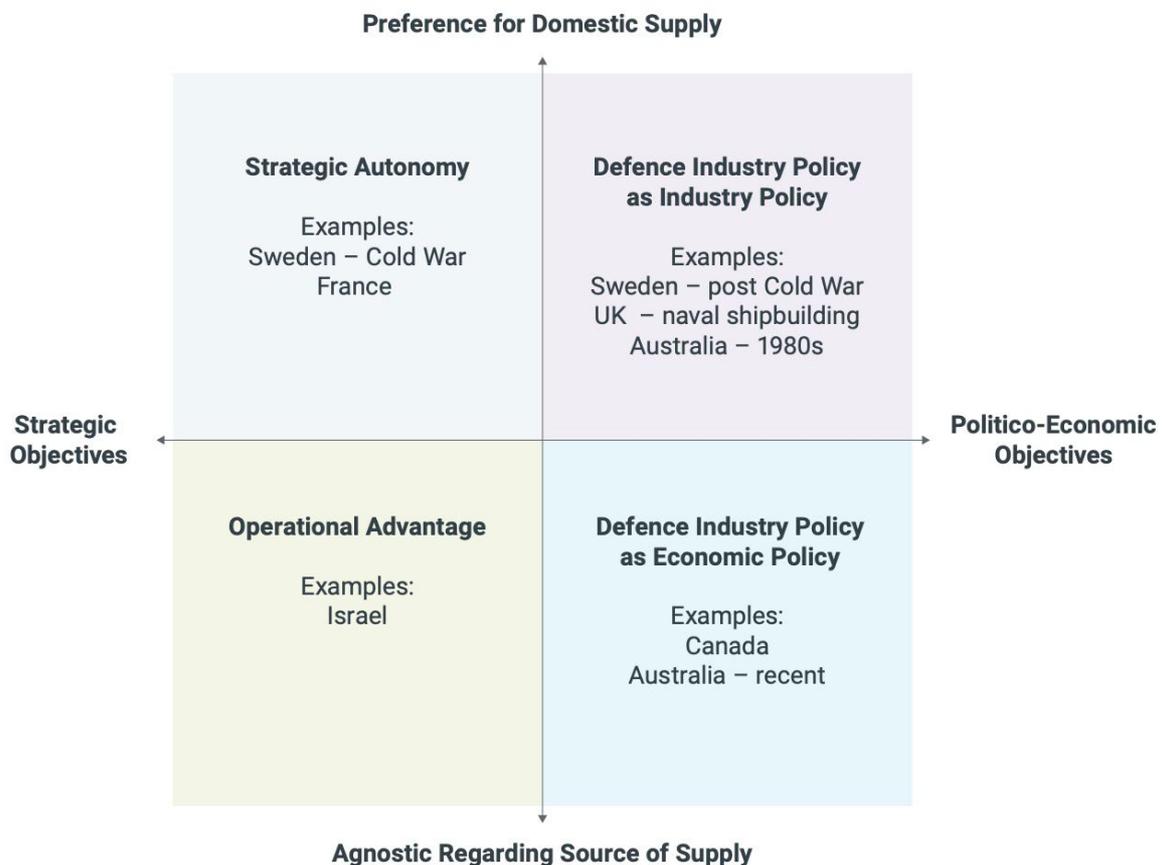


Figure 3 provides a stylised illustration of how countries' policy choices reflect these strategic and economic objectives and combine to produce distinct approaches to defence industry policy. Four different approaches emerge, noting that countries' policies can differ by sector:

Defence Industry Policy as Economic Policy: Where strategic threat perceptions are low, and confidence in international supply chains is high, governments tend to prefer approaches that focus on national economic benefit. Defence industry policy largely reflects the opportunities for government to have greater influence as a monopsony buyer, which it can use to minimise overall, net cost to the national economy from defence acquisition and sustainment. Overall government is agnostic about the

source of supply, about the specific activity undertaken in-country, and the structure of industry, and industry policy seeks to shape markets in a way that deliver the most efficient (typically lowest-cost) solution to defence needs.

In practice, this means that defence industry will be pushed towards integration into international supply chains and a relatively distanced relationship between government and defence companies as contractors on specific programs. This has been Australia's approach in recent decades; and it is even more clearly developed in Canada's with its explicit embrace of offsets as a form of (regional) economic development.

Defence Industry Policy as Industry Policy: For some countries, threat perceptions are low, but governments still seek to achieve geostrategic objectives through defence industry that are not directly related to the role of industry in military capability and operations. Hence, they adopt a more active industry policy approaches designed to support or shape domestic capabilities in specific ways. This approach treats defence similarly to a *strategic* civilian industrial sector, such as critical infrastructure, national airlines, or major banks. These are entities that are relevant by their mere existence, can operate at arm's length from government, but are regulated and supported as they are considered 'too important to fail'.

In post-Cold War Sweden, the strategic sale of Swedish companies to defence primes helped integrate Sweden into the EU and wider western security architecture. In the United Kingdom, preservation of a naval shipbuilding industry underpins the country's status as a nation able to produce and operate aircraft carriers and nuclear submarines.

Operational advantage: Where strategic threat perceptions are high, but confidence in supply chains is also high, governments can structure domestic industry to maximise operational advantage. Typically, this involves building domestic industry to complement what industrial capabilities they can tap via the international market. The relative advantage of domestic industry lies in the understanding of local conditions, ability to adapt to emerging needs, and speed at which it can meet emerging requirements—all of which requires a very close cooperation at all levels between user and industry communities.

The prime example of this approach is in Israel, which relies on international suppliers – in particular the US and Germany – for major air and naval platforms, but has built a domestic military-industrial complex of companies that are closely integrated with the Israeli Defence Forces. These are able to quickly develop and supply systems and sub-systems that respond to operational needs.

Strategic autonomy: When governments pursue strategic objectives for the DIB that emphasise freedom of action by minimising reliance on overseas supply chains, they will seek to build independent defence industries. The scale of such undertakings means that these are long-term, and high-cost national endeavours. Limited market size means competition is often not a viable approach to minimising costs, which instead must rely on enduring partnerships between government and specific companies and, to some extent, trade-offs between cost and capability.

The high costs of the strategic autonomy approach mean it is usually reserved for more extreme situations, particularly those which occurred during the Cold War. However, the fruits of strategic autonomy can persist after the circumstances warranting it. Sweden and France achieved strategic autonomy in almost all their major platforms and sub-systems this way during the Cold War, when the high costs of such an approach were considered justifiable. Following the Cold War, they were able to retain most of their major platforms at a lower cost due to the industrial foundations established in the preceding period.

Of course, this categorisation should be viewed as a spectrum of possible policy settings, which may blend in practice, over time, and may differ for different capabilities.

As strategic and political circumstances change, governments will move their policy position both within and across quadrants: Sweden's move from Strategic Autonomy during the Cold War, to deliberate integration with western industry in the 1990s, is a prime example. Indeed, the same can be said for Australia and its attempt to build a major defence industry, especially shipbuilding capabilities in the 1980s, followed by its distinct turn towards defence industry policy as a cost-minimising, market-driven, economic policy since the 2000s.

The central matter is that a country's defence industry base reflects government choices, and these choices change over time. However, an important caveat is that while policy can change relatively rapidly, the corresponding evolution of defence industry itself takes time. Industry capacity, capability, and the ability to innovate, can persist and only slowly degrade over time even if policy stops seeking them as an end in their own right, but they cannot be created or re-created overnight.

The current situation pertaining to guided weapons and other munitions that has been highlighted by the war in Ukraine shows that, not only does the development of additional industrial capacity take time, but that industry capability also needs to be fed by undertaking realistic projects if it is to be retained.⁸¹ Consistency of policy settings is therefore required to enable sought-after industrial capability and capacity to be developed. Policies that regularly change focus, that periodically alter investment profiles, that change priorities, are unlikely to be successful in reaching any worthwhile end states.

The key question for Australia today is thus: What kind of defence industry, and hence what kind of defence industry policy, does the country need for *National Defence*? The approaches that Australia has adopted in defence industry policy over the past decades indicate an emphasis primarily on economic considerations rather than strategic ones. If that is to change, government will need to re-think how it can more actively shape Australia's defence industrial base.

4. Considerations for Effective Defence Industry Policy

The case studies illustrate that there is significant variation in how countries approach and structure their defence industry policy. Unique economic, institutional and strategic considerations – and their sometimes-sudden changes – have produced considerable diversity in national approaches.

But while there is no one-size-fits-all approach to successful defence industry policy, several key considerations that are relevant for Australian defence industry policy emerge from the case studies. These relate to the importance of industrial embeddedness and sector specific approaches, means of government influence and control, formal and informal coordination, market structures, and international market linkages.

Defence industry is embedded in broader civilian industry

Defence industry does not operate independently of the economy in which it is embedded. While its products are often distinct from those in the civilian economy, it interfaces with, and draws goods and services from broader civilian industry, including:

- Suitably educated persons from educational institutions
- Skilled and trained workforce from contiguous sectors
- Technological developments with application, or potential application, to defence capabilities
- Research outputs, including the outcome of non-defence research that has application for the development of defence capability
- Physical plant, including for manufacturing, test and evaluation
- Finance, including the size and structure of financial institutions and their propensity to support investment into defence industry
- Infrastructure, including the provision of utilities at the required level in the right geographic locations

Whilst the output of the defence industry may provide products and services for which there are no civilian equivalents, it can also be considered as existing within a civilian industrial ecosystem. Furthermore, the ability to surge defence industry production during conflict has historically rested on the ability to repurpose civil facilities and workforce.⁸²

In the case studies surveyed for this report, Israel is perhaps the only example of a country that has built significant defence industry from scratch—and it took many decades, extreme strategic pressures, and financial commitments to do so. In general, the strengths of defence industry in all other countries surveyed here build on and reflect strengths in the civilian industry. This is most obvious in the way that defence industry is geographically part of much larger, civilian clusters of related naval and aerospace industries in Sweden, France and Canada in particular. Support to defence industries often is administered via the same vehicles as support to wider industry, such as through the *Banque Publique d'Investissement* in France.

Hence, Australia must consider that successful defence industry needs to be embedded in a relevant successful civilian industry sector. Defence industry policy needs to be grounded in an understanding of underlying civilian industry capacity and capability from which it can draw, and where geographically that civilian industry environment is most developed. Policy support needs to reflect

health and vitality of all the relevant parts of industrial ecosystem, including both defence industry and its civilian dependencies.

Multiple policy levers can shape defence industries

Governments have significant agency over their domestic defence industry structure. Emphasis on program-by-program competition is one way in which governments can exercise that agency, which will shape industry accordingly. But it is far from the only way in which governments can influence and control industry behaviour, incentives and structure.

The most obvious means for governments to exercise control is through state ownership of the entity, both those that are Government-Owned Government-Operated (GO-GO) and those that are Government-Owned, Commercially-Operated (GO-CO). These entities can include both those that have been established by the government, and those that become a government asset through nationalisation. State ownership allows governments to directly control the activities of defence industries and continues to be an important element in all case study countries, especially in production of land munitions.

However, there exist additional means for government control beyond direct ownership. Since the end of the Cold War many governments have sought to divest themselves of previously held GO-GO or GO-CO organisations. The conditions of sale of these divestments typically include provisions that provide ongoing, or time-limited, protections for the state with respect to how the company may operate. These conditions have included the use of 'golden shares', restrictions on shareholdings, and restrictions on the structure of company boards.

A golden share is a type of share that gives its shareholder the power to veto changes to the company's charter. The holder of the golden share therefore holds special voting rights and can block another shareholder from taking more than a defined ratio of ordinary shares. In the case of British Aerospace, for example, the UK Government mandated that foreign ownership was restricted to a maximum of 15 percent of the company. The government's golden share ensured that this could not change without its express agreement. Minority shareholdings, as France now still maintains in many defence companies, also give government seats on company boards and thus direct insight into, and influence over cost structures and commercial strategies.

Other restrictions may also be included as conditions of sale of a government asset. In the case of the privatisation of British defence test and evaluation company QinetiQ, this included maintaining certain strategically important test facilities in the United Kingdom. In Sweden, the sale of the Government-owned submarine design and manufacturer, Kockums, to HDW of Germany, contained provisions for the retention, in Sweden, of all IP related to the design and production of Swedish submarines. Recognising the fragility of many smaller but crucial suppliers in its defence industrial base during the Covid pandemic, France reduced the threshold for government authorisation of foreign investment from 25 percent to 10 percent, and increased penalties for non-compliance with conditions placed on foreign investors.⁸³

More broadly, the 1971 Swedish law on defence inventions provides avenues for state access to any military-related innovations made in Sweden, or that belongs to a natural or legal person in Sweden, and the associated IP. In particular, any such invention must not be disclosed before it has been tested to whether it should remain classified, and government may order it to be used on behalf of the state, or that it be relinquished to the state, if it is of essential importance to defence.⁸⁴ Likewise, the United Kingdom introduced a package of regulations in 1974, expressed as defence conditions (DEFCONs) that set out the standard specifications and conditions of a contract.

With the acquisition of radar company CEA and direct government ownership of the Osbourne Naval Shipyard, Australia has in recent years started to make more use of direct ownership than in the past. But compared to other countries, the way it shapes, influences and supports industry, including through legislative frameworks, remains very narrow.

Formal and informal government-industry coordination

Most countries examined in this report employ a mix of formal and informal mechanisms to foster mutual understanding between industry and government. These mechanisms are tailored to meet the prerequisites discussed in the preceding chapter for a successful industry policy. They serve multiple purposes, such as enhancing the government's comprehension of industry capacities and constraints, evaluating the well-being of key suppliers, offering early insights to the industry for influencing production and sustainment programs, and facilitating the coordinated allocation of resources.

Formal mechanisms are those that are associated with structural organisation and rules, and are established in legislation and regulation. Informal mechanisms are largely related to culture, and are the more effective the greater the level of trust that exists between participants.⁸⁵ Both act to create and maintain a culture in government and industry that contributes to national outcomes. The range of both formal and informal coordination mechanisms is large, and often reflects historical traditions. But they are nonetheless deliberately maintained and invested in as part of countries' defence industry policy.

The country examined herein where coordination between government and defence industry is most institutionalised is France. DGA maintains a dedicated *Service des affaires industrielles et de l'intelligence économique* whose responsibility is to maintain visibility of the industrial base, protect access to IP and coordinate interventions.⁸⁶ Strong industry associations for land, air and naval defence industry (GICAT, GIFAS and GICAN) provide a forum for coordination between companies on production, research and exports, advise government on specific industry capabilities relevant to particular programs, and highlight challenges to the health of the industry base. For example, after GICAT brought challenging financing conditions for Small and Medium Enterprises (SMEs) to the attention of DGA, and whole-of-government cooperation led to the establishment of defence industry points of contacts across the French banking system.⁸⁷

Many countries encourage close personal connections and continuous engagement between industry and defence. In France, the *École Polytechnique*—one of the world's top engineering schools—is a military institution from which the majority of the military's *Corps des ingénieurs de l'armement* is recruited. The Corps staffs technical, project management and research areas across DGA, seconds staff into industry, and has an influential veterans association.

In Israel, regular reserve service means that defence industry personnel are often also users of their own equipment, and can rapidly and easily transfer knowledge between the IDF and industry. In the United Kingdom as well as Sweden, strategic industry partners are involved early in the definition of needs and requirements for possible acquisition program. This was an approach that in the United Kingdom case reflected the post-Cold War realisation that in a world of shrinking budgets, both Defence and industry needed to coordinate for projects to be realised in the first place.⁸⁸ It has since been expressly reaffirmed in the UK 2023 Defence Command Paper.⁸⁹

Balancing competition with strategic relationships

Market structures vary widely between defence industries. They can range from competitive market environments with multiple suppliers and overlapping supply chains, through to single supplier relationships where one company controls the entire supply chain. While market structures are shaped by the nature of the specific defence capability – with less competition in more capital- and technology-intensive segments – they are not fully pre-ordained by technical considerations. Government policy choices also structure the nature of defence markets.

Market competition is often seen as being fundamental to a well-functioning industrial base in civilian industries. In the defence sector, competitive tendering can lead to lower prices, higher quality goods and services, greater efficiency and more innovation.⁹⁰ Competition is the *sine qua non* of the 'defence industry policy as economic policy' approach. However, it can also raise costs for individual companies, leads to duplication of effort, harm the creation of capacity and capability at the national level, and result in a 'hands-off' relationship between potential suppliers and the government as the buyer, characterised by restricted information flows and tender probity concerns.

Hence, it is notable that in all the countries surveyed, long-term supplier relationships are important in relation to those defence capabilities identified as a national industry priority.⁹¹ This reflects government recognition of minimum viable capability, historic amalgamation of suppliers, and relations of trust that have been built over decades. This approach foregoes the benefits of competition, in favour of allowing closer engagement between government and industry.

This starts with the definition of needs and requirements, a greater coordination of investment, the ability to build capacity and capability in industry as well as supply chains across different programs and over time, and quicker and easier acquisition paths. Government typically guarantees a certain level of work to the company in exchange for the maintenance of industrial capability and capacity at a pre-defined level, which also extends to the maintenance of the health of an associated supply chain.

Many instances of single supplier relationships have been evident from the case studies, including as national champions. BAE, Thales, SAAB, Nexter, Naval Group, Dassault, Rafael, IAI, Babcock, and Rolls-Royce all provide examples. These firms are de-facto considered the single source of supply for certain capabilities or domains, and thus supported by governments with a view to the company contributing industrial capacity and capability to that advances the national interest.

Of note is the fact that, since the Cold War, such single-supply relationships have ceased to be solely on national lines. In Sweden the sale of Bofors and Hägglunds to foreign companies after the Cold War means that BAE Land Systems is now the strategic partner for government in the continued development of land vehicles, most notably the CV-90. European guided weapons manufacturer MBDA was created as a single-source strategic partner for both France and the UK, and retains an internal structure that reflects both countries' desire for national capacity.⁹² Thales is also the strategic partner for the UK's sonar capabilities.

Hence, as part of developing defence industry policy for *National Defence*, Australia should consider what will be the industry structure that best serves its strategic needs in relation to specific industry capabilities, and whether the costs of competition in acquisition do not outweigh the benefits.

International markets offer scale for capacity and capability

International markets provide an important way to achieve scale where government seeks to build national industry capacity, both defence and civilian. This is particularly important for medium-sized countries seeking to develop advanced capabilities, whose high upfront development costs are challenging to recover from domestic sales alone. There are two means by which international markets can be used to scale defence industries: international collaboration and/or exports.

Joint development of defence platforms is one way to achieve scale. By combining the complementary capabilities of two countries, and targeting a larger market, such projects facilitate mutually beneficial scale. An early example of this approach is the joint development of the Jaguar ground attack aircraft by the United Kingdom and France during the 1960s,⁹³ and the Tornado in the 1970s.

Other examples include the development of the Eurofighter by the UK, Germany, Spain and Italy,⁹⁴ the current development of the Tempest jet fighter by the UK, Italy and Japan,⁹⁵ and the establishment of the guided weapon company MBDA as a multi-national group spanning France, Germany, Italy, Spain and the United Kingdom.⁹⁶ That said, the history of international defence collaboration is also littered with examples of failed programs where countries could not agree on requirements, workshare or other aspects of the program.

Exports provide another avenue to achieve scale. The United Kingdom's most recent defence policy, published in July 2023, links exports with the promotion of national interests globally, with achieving greater economic and industrial resilience, and the contribution to national prosperity. In contrast, views exports from their defence industry as a means to offset the cost of domestic development and production of their priority capabilities. This makes exports a key foundation that makes industrial autonomy more affordable for France.

For example, export variants of defence programs are considered as an integral part of the development and acquisition process,⁹⁷ and defence export support – through financial as well as diplomatic means – is a key task for government. But whereas the financial mechanisms for defence exports support, such as government guarantees and insurance, make use of the same mechanisms as support for civilian exports, the objective is expressly strategic in terms of defraying the cost of defence industry capability for France itself.⁹⁸

5. Industry as a Capability for Australian National Defence

Australia's current defence industry settings do not reflect the demands of a world where Australia needs to be prepared for major conflict in our region. The current policy paradigm reflects a world where substantial warning time was assumed and the threat environment was less specific. Policy was focused on addressing individual ADF capabilities under the 'Industry as a FIC' construct. Despite the conceptual underpinning for a risk-based approach provided by PICs and SICPs, these neither defined nor resourced the creation of an Australian defence industry linked to operational needs.

The development of a *National Defence Strategy*, encompassing a 'new, holistic approach to Australian defence planning and strategy',⁹⁹ must revise our approach to defence industry capabilities, capacity and innovation. This entails a fundamental change in outlook: simple fine-tuning of policy settings will not provide the defence industry that Australia needs today or in the near future.

Success in defence industry policy needs to be defined in terms of industrial capability and capacity that reflects the needs Australia would face in the planning scenarios that underpin the DSR; and government policy needs to drive with all the levers at its disposal towards achieving this capability.

The DSR makes clear that the ADF needs to be prepared for conflict of a scale unlike any it has seen since the Second World War. Russia's war on Ukraine has also demonstrated again that the ability to reconstitute forces and innovate at scale during conflict remain crucial for major war. That conflict has also highlighted the importance of supply chains, and the strategic vulnerabilities that arise when supply chains fail.

In a future scenario where Australia will be engaged in the same conflict as its traditional defence system suppliers, a domestic industry that is able to scale to meet demands for consumables and introduce new systems to scale and replace existing forces, is a necessity.

Australian defence industry is a capability in its own right

Key to this change is to recognise the importance of Australia's defence industry base as a national capability in its own right: A capability that supports the ADF force-in-being, but whose strategic value lies in those situations where that force is fully committed, needs to be expanded, and be rapidly reconstituted, This would include with new capabilities and systems that reflect new operational needs, and/or utilising the limited sources of equipment and supplies available at the time.

What the international survey in this report demonstrates is that such change is possible, and that countries can build defence industrial bases that reflect their strategic needs. This is truly a national endeavour of the kind that the *National Defence* approach calls for.

At the moment, Defence considers defence industry as a FIC that supports current ADF capability.¹⁰⁰ This diffuses responsibility for industry amongst several capability managers, limits consideration of the domestic defence industry as a system with application across multiple capabilities, and prevents treatment of the domestic defence industry under a whole-of-government construct. It also de-links defence industrial activities within the over-arching application of Australian statecraft, and inhibits

the development of broader concepts such as industrial surge, mobilisation, and preparedness that will be required during periods leading up to, and including, conflict.

The construct of 'industry as a FIC' values industry only insofar as it supports specific programs in the current force-in-being. In the future, we need to recognise industry as a national capability in its own right, required for the nation to be able to meet the demands of a major conflict.

Recognising defence industry as a national capability within a broader *National Defence* construct will provide a more holistic means to align industrial capabilities with strategic demands, which include support and sustainment of critical military capabilities, surge production of consumables, and rapid innovation at scale to meet emerging operational needs during conflict and reconstitution of forces.

Australian defence industry capacity and capability need to reflect the demands of the scenarios that the DSR placed at the foundation of Australian defence planning. Of particular importance is the role of industry in expanding and reconstituting forces during a protracted conflict. The contribution expected from the domestic industry, and that sought from allies, needs to be clearly articulated. The government's ability to influence and/or control industrial development will be significantly degraded in the absence of clarity of intent and clearly defined objectives.

While adaptation and improvisation will be inevitable, the industrial base that will allow this to provide the systems and consumables that are going to be required during conflict cannot be developed once a conflict has commenced. Industrial capability, together with the capacity to operate at the expected scale, is therefore required to be in place to address *National Defence* from the outset.

The current war in Ukraine has shown that forces will need to be reconstituted during conflict, and this may involve significant amendments to the original force structure. That is, major platforms may be lost and may not be able to be replaced within a usable timeframe. The loss of major platforms, and their ability to detect, track and engage an adversary, means that engagement options will need to be sought through alternative means. An increased use of autonomous systems, and the use of rudimentary, non-military platforms, would be options.

The domestic defence industry base will therefore need the capability and capacity to address non-traditional military options, and the agility and the flexibility to develop and field systems for use on autonomous and/or non-military platforms. From the perspective of industry as a national capability, this suggests that the ability of domestic industry to produce critical components and technologies within a platform will become increasingly important.

Manage defence industry as a part of broader industry

The DSR has advocated the concept of *National Defence* and 'genuine whole-of-government coordination of Defence policy and activities with our wider efforts in statecraft'.¹⁰¹ This includes government efforts to enhance security and build economic resilience, and encompasses investments in research and development, manufacturing, and supply chains.

This complements the finding in this report of the importance of the wider industry context within which defence industry operates. The implication is, therefore, that defence industry needs to be considered within the broader context of national industry and industry policy, and not just as a defence-centric activity.

This comes at a time when broader industry policy settings in Australia are also rapidly changing. Since 2022, a suite of new industry policies has been announced by the Commonwealth government, currently at various stages of implementation and maturity:

- The *National Reconstruction Fund* (NRF), a government-owned bank which will be able to make loans, offer loan guarantees, and take equity positions in selected industrial projects. The NRF is expected to be capitalised with \$15 billion of investment funds
- The *Industry Growth Program* (IGP), which will support early-stage businesses to commercialise through advisory services and matched grants
- The *Future Made in Australia Office* (FMiAO), a Department of Finance agency tasked with building contracting and procurement capabilities across government, and supporting businesses to lift their competitive capabilities through government procurement
- Sector-level industrial policies for cyber security, robotics, advanced manufacturing, critical minerals, batteries, quantum computing and others.

The NRF includes a list of seven priority sectors, with defence capabilities as one of the identified sectors. Enabling capabilities – such as data science, robotics and quantum – is another priority sector, which in many cases will be directly relevant to defence applications. The seven NRF priority sectors are being used as a *de facto* guide for other industrial policy initiatives as well. In this way, defence industry is already centrally located within Australia's broader industrial policy orientation.

However, the defence industry should not be considered 'just another sector to be targeted by industry policy'. Previous major conflicts have shown that integration with the broader civilian industry is required if production at scale is to be achieved across a swathe of military requirements.¹⁰² Of greater importance, therefore, is that industrial policy support for defence industry is *integrated with*, and not simply *alongside that*, support offered to its civilian counterparts.

There is a pressing need to explore how this suite of new industry policies can be aligned, such that investments made in defence industry integrate with and mutually support those made in their civilian adjacent sectors.

Prioritise defence industries, then support for scale

Australian defence industry has always suffered from having limited domestic demand whilst being geographically remote from allies and partners. For many platforms and systems, particularly those with high technology levels that require scale for production, procuring direct from foreign suppliers has increasingly become the norm.

However, Australia's evolving strategic environment means that this approach will carry additional operational risks in the future. Allied supply chains for defence goods and services are already strained in the wake of the war in Ukraine, and during a major conflict in the Indo-Pacific this situation will be significantly exacerbated. Adaption, improvisation and battle-damage repair in wartime will have to rest on locally available industry.

Both in terms of cost and in workforce, Australia cannot manufacture all the military capabilities and consumables that might be required, nor would strategic autonomy be a politically relevant goal. But an increased level of capacity in Australian defence industry would be desirable for multiple reasons. It would help alleviate current pressures on supply chains, helping to meet Australia's needs and relieve pressures on allies. It would provide the foundation for the development of more advanced capabilities. In the event of a conflict or near-conflict scenario in the Indo-Pacific, it would also ensure continuity in supply and provide near-theatre production that can help meet Australian and allied surge requirements.

While achieving scale in producing major platforms remains challenging, the example of Israel also demonstrates that major platforms do not have to be at the centre of a vibrant and strategically relevant defence industry. Indeed, the different adaptation of defence industry within and outside Ukraine to meet the demands of that conflict has arguably demonstrated that there is not one but at least three defence industries, with very different business and politico-economic characteristics: those for platforms, for commodities (including attributable drones), and technological systems often rooted in civilian technology and independent of or applicable across platforms.¹⁰³

Prioritisation will be required to identify where Australia has relevant capabilities, or might be able to efficiently develop them, that can contribute to our ability to meet the needs of major conflict. These capabilities should also be aligned to existing areas of strength in Australia's civilian industries, and leverage new industrial policy programs. Scale in relevant areas can thus be achieved by coordination across a range of acquisition programs – the use of CEA radars across a range of contexts being one emerging example – or by locating defence industry within the broader civilian industrial ecosystem.

Industries which can serve both defence and civilian markets are able to benefit from economies of scale not available if they are defence-only, and stove-piped into discrete elements associated with specific military systems and capabilities. Policy should be directed to supporting industrial capabilities *of relevance to defence requirements*, not simply *those which serve defence markets*.

The consideration of 'industry as a capability' (rather than as a FIC) will also provide a framework for workforce capabilities and capacity to be addressed on a whole-of-economy basis. Workforce and skills requirements should be planned and delivered at an 'industry' level – including the needs of both defence and civilian users – creating scale and addressing the challenges of the small defence-specific industrial workforce. This will provide increased flexibility in the way that workforce issues are monitored, planned, and managed.

Addressing workforce across the industry base will also have to include the technical and industrial competencies required within the Department of Defence. The rebuilding of these competencies is necessary for Defence to fully understand the technical and industrial aspects of capability, particularly that associated with new and emerging technologies.

Use all policy levers to grow and shape defence industry

The government has an array of powers that allow it to shape and foster the industrial structure that it wants to develop, and to control and incentivise industrial behaviour. It is not just a contractual partner to industry, but can also be legislator, regulator, provider of direct or indirect support, landlord and part- or full-owner. If government is to develop and manage defence industry as a national capability, it is important that it make use of the full range of these tools.

The current situation in Australia regarding the Defence–industry relationship is dominated by an interpretation and application of probity rules that inhibit the development of the cooperative relationships, greater level of understanding, and two-way information flow. This must change if government is to be effective and efficient in building the industry structure that it needs, involve industry and industrial considerations more broadly – and earlier – in its planning than is current the case, and if it is to be able to make flexible and timely use of that defence industry structure for strategic needs.

To move towards industry as a national capability will thus require changes to processes and culture. Developing and resourcing formal and informal coordination mechanisms will be crucial, with overseas examples including the Astute key supplier forum in the UK, or GICAT/GICAS/GICAF in

France. Australia's federal system has also created an environment where States compete for defence industrial activity. This has resulted in the duplication of facilities and activities, hindered the emergence of enduring clusters, and therefore added cost. If a *National Defence* posture is to be sought and attained, greater coordination is required between the Commonwealth and states to ensure that efficiency and effectiveness is achieved.

Moving from 'industry as a FIC' to view defence industry as a capability in its own right will require a change in the way that defence approaches value for money in procurement. Where government has identified requirements, the industrial capacity and capability that a procurement creates, sustains – or lets atrophy – therefore becomes part of the value proposition. Procurement strategy is a crucial tool to affect industry outcomes, as are direct government interventions and support beyond individual programs to maintain or redevelop industry health.

Given the size of Australia's defence effort, the selective use of single supplier (strategic partnering) arrangements will be crucial in some areas to achieve and sustain required industry outcomes. In other areas—such as the designation of Aegis and Saab Australia combat systems for all future naval surface combatants—capability considerations also lead to single-supplier relationships. This example also demonstrates the importance of the capability and technology advantages brought into the country by the larger global companies to unlock local capability aligned to operational needs, and that—as in the countries examined in this report—single-supply relationships do not have to be on a purely national basis.

If Australia is to build defence industrial capacity and capability it identifies as necessary, single supply relationships will become increasingly important. So will become the mechanisms to ensure that the Australian Government obtains value for money within them, which will need to use more creative solutions that simply a reliance on open tendering within existing procurement rules.

Establish a Defence Industry Capability Manager

Successful defence industry development requires alignment of several distinct activities in government: overall policy frameworks, monitoring of the industrial base, management of intellectual property on behalf of the state, support to industry, acquisition and sustainment programs, testing and R&D programs, and exports support.

This means that the internal organisational structure of defence departments – which agencies or areas are involved, how their responsibilities overlap, how they engage with industry, and what internal objectives they are working to – determines the degree of alignment between these distinct activities.

Throughout the case studies examined in this report, overall industry policy objectives are reflected in the internal organisation of how Defence interacts with industry, and the ability of those in government responsible for defence industry outcomes to marshal resources and make use of policy levers.

For Australia, this means that if defence industry is a capability in its own right, Defence needs an Industry Capability Manager with a dedicated and fully resourced staff. The Capability Manager would be responsible for defining the industry capability and capacity that government needs to develop, as well as for development of industry to meet the level of preparedness determined by the Government.

Whilst close liaison within the Department of Defence, and with the Defence Capability Managers, would be required, the Industry Capability Manager would have a wider role across all Australian industry and government.

The Industry Capability Manager will need the resources and ability to:

- Establish current and developing Defence requirements for industrial support
- Understand the capability, capacity and competence of the Australian industrial base, and of the defence aspects of that base, including the capacity to surge
- Maintain an intelligence function to inform on developing trends and potential stress points within the local industry, including strategically-relevant SMEs
- Be able to liaise across the entire Australian industrial landscape, as well as department of industry and state governments to coordinate industry support
- Be able to leverage direct and indirect support to industry in pursuit of government's requirements
- Recommend to government the acquisition strategies for major programs that are most conducive to achieving defence industry objectives

Importantly, to be successful in this role and bring the required understanding of industrial realities, the Industry Capability Manager should have a background as a respected industrialist, rather than a senior military officer or Defence bureaucrat.

Appointing a Defence Industry Capability Manager and recognising defence industry as a capability for National Defence is a necessary reaction to the strategic circumstances Australia finds itself in, and a major departure from the policy of earlier years. Building defence industry that prepares the country for the challenges of conflict will be a significant national undertaking. But the case studies in this report demonstrate that doing so was possible for other countries during challenging strategic circumstances. With the approach laid out herein, doing so will be possible for Australia too.

Acronyms

ADF	Australian Defence Force
ADI	Australian Defence Industries
AIG	Australian Industry Group
ANU	Australian National University
AUKUS	Australia United Kingdom United States
CAF	Canadian Armed Forces
CCG	Canadian Coast Guard
DGA	<i>Direction générale de l'armement (France)</i>
DIB	Defence Industrial Base
DICP	Defence Industrial Capability Plan
DIPS	Defence Industry Policy Statement
DMA	<i>Délégation ministérielle pour l'armement (France)</i>
DND	Department of National Defence (Canada)
DoD	Department of Defence
DPS	Defence Procurement Strategy (Canada)
DSR	Defence Strategic Review
DSU	Defence Strategic Update
FIC	Fundamental Input to Capability
FMF	Foreign Military Financing
FMV	<i>Försvarets Materielverk (Sweden)</i>
FOI	<i>Totalförsvarets Forskningsinstitut (Sweden)</i>
GWEO	Guided Weapons and Explosive Ordnance
GO-CO	Government Owned, Commercial Operated
GO-GO	Government Owned, Government Operated
IP	Intellectual Property
ISED	Innovation Science and Economic Development (Canada)
ISR	Intelligence, Surveillance, Reconnaissance
ITAR	International Trade in Arms Regulations
ITB	Industrial and Technical Benefits (Canada)
KIC	Key Industrial Capability
NATO	North Atlantic Treaty Organisation
NRF	National Reconstruction Fund

PIC	Priority Industry Capability
PLIC	Priority Local Industry Capability
PSPC	Public Services and Procurement Canada
R&D	Research and Development
SICP	Sovereign Industrial Capability Priority
SME	Small and Medium Enterprises
STEM	Science, Technology, Engineering, Mathematics
T&E	Test and Evaluation

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Appendix: Detailed Country Case Studies

Canada

Canadian defence industry and the government's approach to defence procurement and defence industry policy reflect a decade-long process between the end of the Second World War and the 1980s that saw government divest itself of government-owned defence industry establishments, end the development of air and land platforms in country, and progressively transfer responsibility for defence procurement and industry to Ministers and departments responsible for general government procurement and civilian industry.¹⁰⁴

Canada's defence industry base currently consists of approximately 620 companies, but only about 30 of these have more than 500 employees and they generate more than 60 percent of defence industry economic activity.¹⁰⁵ The largest defence companies are mostly subsidiaries of US companies, with their Canadian activities integrated into US supply chains and their own civilian industrial activities in Canada. Foreign companies resident in Canada include General Dynamics, Lockheed Martin Canada, Boeing Canada, Pratt and Whitney Canada, Textron, Rheinmetall and Thales Canada.

Canada is integrated into the US defence industrial base through preferential treatment under the US Defense Production Sharing Agreement,¹⁰⁶ and the 'Canadian Exemption' that provides Canada with special treatment under the US Arms Export Control Act and the ITAR.¹⁰⁷

Canadian defence industry is spread across regional clusters that align with the geographic location of civilian industry clusters. Naval shipbuilding, design, and maintenance, repair and overhaul are clustered in Western, Northern and Atlantic Canada. Aerospace industry, ammunition and combat vehicle fabrications are based in Ontario and Quebec.¹⁰⁸ R&D is largely conducted by primes and larger companies that have the capacity to develop new technologies and work with Defence. SMEs in the Canadian defence industry are often acquired by foreign, often US companies, once they reach a certain size.¹⁰⁹

Canada does not produce a defence industry policy statement as a separate or standalone policy statement. Industry objectives and defence procurement are shaped by four key documents: the Canadian defence policy statement, of which the most recent version *Strong, Secure, Engaged*, was released in 2017;¹¹⁰ the National Shipbuilding Strategy released in 2010;¹¹¹ the Defence Investment Plan released in 2018;¹¹² and the Defence Procurement Strategy (DPS) 2014. Key defence industry policy objectives are to deliver the right equipment in a timely manner to the Canadian Armed Forces (CAF) and Canadian Coast Guard (CCG), and to leverage defence industry 'to maximise job creation, support Canadian manufacturing capabilities and innovation and bolster economic growth'.¹¹³

In practice, however, economic objectives predominate overall policy,¹¹⁴ and large procurement programs are often used as a means of regional development.¹¹⁵ While the majority of government contracts are competitive, most major defence acquisitions by dollar value are sole-sourced, and cost-plus contracts have recently made a comeback in the context of domestic naval shipbuilding. Cost-plus is also used in munitions supply, where, since 1978, the government has granted monopolies to private companies in return for assured supply and surge capacity.¹¹⁶

Defence industry policy in practice is implemented by three separate government departments: Department of National Defence (DND), Public Services and Procurement Canada (PSPC) and Industry Canada, and largely in the context of the requirement for offsets from acquisition projects. DND is the

lead department responsible for defining operational requirements, developing specifications, preparing the procurement instrument, providing technical expertise, conducting acceptance trials and tests relating to delivery of materiel of services procured. DND also manages the integration of newly acquired weapons systems and military equipment into the CAF.¹¹⁷

However, procurement itself is handled by PSPC as the department responsible for developing Government procurement plans and strategy, soliciting and evaluating bids, coordinating industry engagement and preparing, awarding, administering and closing contracts. The *Defence Production Act* provides PSPC with “exclusive authority” to purchase defence products required by the DND. The two departments have a partnering relationship with the defence procurement process and have agreed division of responsibilities for the acquisition of goods and services and to quality assurance of materiel and services as it applies to military specifications.¹¹⁸ This division of responsibilities does not apply to materiel and services to non-military specifications, such as the acquisition of office supplies and civilian type products.

In practice, defence procurement follows the same processes as general government procurement, which the Treasury Board requires to meet value-for-money as well as to be ‘consistent with and supportive of such national objectives as industrial and regional development, aboriginal economic development, the environment and other approved socio-economic objectives’.¹¹⁹

In addition, the Industrial and Technological Benefits (ITB) policy leverages defence industry activities to contribute to jobs, innovation, and economic growth. Innovation Science and Economic Development (ISED) is the government agency responsible for coordinating and administering ITB policy. The ITB policy applies to all CAF and CCG procurements over \$100m. Contractors are required to make business investments in Canada’s economy in the amount equal to 100% of the contract’s value.

Companies bidding for defence contracts submit an economic proposal, a Value Proposition (VP), that details the expected industrial and technological benefits to be delivered to Canada. The VPs are evaluated and scored based on their plans for investing in Canada’s defence industry, providing work to Canadian suppliers, undertaking research and development in Canada, promoting exports from Canada and fostering skills development and training for Canadian workforce.¹²⁰ Bids are also evaluated for their focus on investments in Key Industrial Capabilities (KICs),¹²¹ areas of emerging technology that have potential for rapid growth, and areas where domestic capacity is essential to national security.¹²² Several academic analysts have argued it is not clear the offsets policy has achieved its objective of increasing the competitiveness of Canadian industry.¹²³

France

France’s defence industry is structured around eight quasi-monopolistic major companies (Airbus, Arquus, Dassault, MBDA, Naval Group, Nexter, Safran and Thales) and more than 4000 medium and small enterprises.¹²⁴ It is both product and part of a wider defence policy, national system and political culture of the Fifth Republic that remains focused on French strategic autonomy, of which industrial elements are a key but ultimately enabling aspect. Although France has always been a member of the NATO alliance and has, since 2009, rejoined most of its military and planning structures, it retains the ambition to be able to mount significant conventional operations independently, and a submarine- and air-based nuclear deterrent over which it maintains full political and practical sovereignty.

Other unique and complementary aspects of France’s approach to defence include the centrality of the President, who directly commands military forces and provides direction to the *Direction générale de l’armement* (DGA, formerly *Délégation ministérielle pour l’armement* (DMA, 1961-1977) and

Délégation générale pour l'armement), as well as a strong role of the state in industry, including in defence and civilian private enterprises whose leadership is generally recruited from the same *grandes écoles* as government elites.¹²⁵

The government has always played a major role in French defence industry. State-owned as well as private companies had been granted monopolies to create critical industries in the production of powder, swords and cannons as early as the Middle Ages. Major state-run engineering schools were established in the 17th and 18th centuries, including the *École polytechnique* in 1794. Private defence industry became more important with industrialisation in the 19th century, the First World War and in the interwar period, but remained closely coordinated by the state and was largely nationalised in the 1930s, although owning families remained involved in key management roles.¹²⁶

Following the Second World War, French defence industry was rebuilt with US help but suffered from a lack of investment, as well as strong Service influence over specific parts of the industrial base which led to a lack of coordination as well as rivalry in the development of modern technologies, such as nuclear weapons, guided missiles and jet engines.¹²⁷

France's contemporary approach to managing its defence industry arose from President de Gaulle's determination, after assuming office in 1958, to make France a genuinely independent nuclear power. Key elements of this transformation were the establishment of the DMA in 1961 to provide centralised direction and control over R&D and industry; significant state investment into the national R&D system; and the establishment of the modern *Corps des ingénieurs de l'armement* in 1967.¹²⁸ The objective of defence industrial and strategic autonomy; the DGA and the *Corps des ingénieurs de l'armement* remain the key elements of French industrial policy to this day.

The *Corps des ingénieurs de l'armement* is one of four engineering corps in the French public sector, and the only one that is military not civil. By statute, the majority of its members must be recruited from the *École polytechnique*. Its commanding officer is of the same rank as the chiefs of service. The modern corps was created in 1967 from an amalgamation of separate specialised and service corps as a key element of the drive towards strategic autonomy. Deliberate movement of its members between research institutes, DGA and industry, as well as regular organisation of colloquia and conferences on defence technology and industry policies, were approaches to create sense of mission and engineering elite that closely identified with the overall objectives of the new policy.¹²⁹

Today, of about 1600 *ingénieurs* on active service, 30 percent work in DGA, 6 percent in other parts of the department of defence, 16 percent in other government agencies and departments or international organisations, and 48 percent in defence industry.¹³⁰ The veterans' association of the corps remains an influential element in French debates on defence industry policy.

DGA is one—and historically arguably the most influential—of three main parts of the French defence ministry, which report directly to the Minister (and President); the others being the armed forces and the general secretariat for administration. DGA is responsible for equipping the armed forces including R&D (in industry as well as defence establishments), acquisition, test and evaluation centres, the remaining government-operated factories, and support of defence industry. This includes the preparation of longer-term capability plans and definition of requirements, which only since 1997 is a shared responsibility with the armed forces.¹³¹ In 2021, it employed 10,118 staff.¹³²

The state actively reshaped defence industry in the 1970s and 1980s through amalgamation of companies, partial nationalisation and allocation of R&D and procurement to form a number of larger, specialised companies (e.g. Thomson-CSF, Aérospatiale, and Matra). Defence exports, supported by the state,¹³³ increased from 8 percent of total exports in 1960 to 31 percent in 1990.¹³⁴ While French

aerospace industry had traditionally been made up of predominantly private (or majority private-owned) corporations, with the end of the Cold War, state-run naval and land industrial activities were all established as state-owned corporate entities in the 1990s. With growing size, technical competence and greater organisational independence of defence companies during the 1990s, the influence of the state—including that of the *Corps*—somewhat receded relative to earlier decades.¹³⁵

With limited opportunities for international consolidation given the priority on maintaining French ownership, decreased defence budgets from the 1990s were a particular challenge to the French defence industry. To lower costs, government committed in greater detail and over longer time periods on the acquisition of new programs, such as Scalp and Rafale, and supported further consolidation, especially into EADS (Airbus) and Thales.¹³⁶ In the 2000s, the state increasingly become a minority shareholder as it sought to encourage consolidation, efficiencies and international cooperation, although it retains the right to increase its holdings in some cases; cross-ownership remains common and procurement and R&D funding remain key levers available to maintain strong influence over the strategic direction of French defence companies.¹³⁷

However, budgetary pressures, the increased importance of industry expertise in systems integration, and growth of French defence industry companies, have led to significant changes in DGA's role and relationship with industry after the Cold War. Reforms in 1997 increased competition based on fixed-cost rather than cost-plus contracts, industry rather than DGA took on a greater role in systems integration, and DGA design expertise (and links with industry) declined. However, while its role has changed, and it has lost the centrality it enjoyed in the Cold War, DGA continues to fulfil key program manager roles which require not just technical but also increasingly commercial and organizational understanding of industry partners.¹³⁸

Despite the increased emphasis on competition, France thus continues to support its industrial base through the expectation that unsuccessful bidders are included as sub-contractors,¹³⁹ and an approach to fixed-price contracting that emphasizes joint identification of risk pre-contract and regular adjustments in an overall culture that emphasizes trust and 'fairness' between government and industry.¹⁴⁰

However, given its changed—and relatively diminished—role, DGA has struggled to impose and lead the development of industry in new areas, such as drones.¹⁴¹ As a large organisation working to central priorities and with a focus on long-term programs, struggled to capture and foster broader innovation esp. from SMEs and dual-use technologies. In 2018, government thus created a separate *Agence de l'innovation de défense* affiliated but separate from DGA, charged with supporting innovation within defence as well as in and with defence industry. While the agency provides a clearer entry point for SMEs new to defence industry and has deliberately mapped the capabilities of hundreds of such companies, challenges remain in integrating open innovation into large programs, and from contractual and other rigidities.¹⁴²

Israel

Since its independence in 1948, Israel has forged an advanced and innovative defence industry, driven by the nation's historical security challenges and the need to ensure self-reliance in defence capabilities. During the 1950s, Israel steadily gained self-sufficiency in small arms, mortars and in modifying and overhauling tanks and aircraft. In the early 1960s, the focus shifted towards building up the electronic industry and by 1965, Israel had achieved defence production capability in small arms, aircraft and electronics. The primary emphasis during the first two decades of the state of Israel was thus to establish modern military production lines.¹⁴³

The catalyst for Israel's development of an advanced defence industry came in 1967 when France, its major defence supplier, imposed an arms embargo after the Six-Day War. As a result, Israel embarked on an all-out policy of self-sufficiency that led the country into an industrial revolution, the main thrust of which was directed towards the manufacture of military equipment.¹⁴⁴ This period began the transformation of Israel into a hub for producing advanced military equipment, including tanks, aircraft, precision-guided smart weapons, microelectronics, and rocket-propelled engines. By the time France declared its second arms embargo in January 1969, Israel was domestically producing most of the items that were withheld.¹⁴⁵

However, while Israel used to develop and build its own fighter aircraft, notably the Kfir, its ambition to do so ended with the cancellation of the Lavi fighter project in the late 1980s due to spiralling costs.¹⁴⁶ Following the termination of the Lavi program, Israel's defence industry policy shifted towards a "focused self-reliance" in which the defence industry was tasked with developing only "force multiplier" systems that are uniquely tailored to the Israeli Defence Force (IDF).¹⁴⁷ During this time, a focus was on systems that did not exist elsewhere or those that were denied to Israel due to political impediments.¹⁴⁸

The Israeli defence industry is currently a significant global player with about 600 companies participating in the production of Israeli weapons systems, particularly in areas such as missile defence systems, unmanned aerial vehicles, intelligence and surveillance equipment, cyber defence, electronic warfare, and advanced weaponry.¹⁴⁹ Israel does, however, rely on imported components to support weapon system development and production, with the majority of imports being sourced from the US. It imports aircraft platforms from the United States, and major naval platforms from Germany.

Israel's defence industry is a hub of innovation, driven by a strong focus on STEM projects and boasting one of the world's highest R&D spending rates. Government funding plays a crucial role, but the industry also thrives on an entrepreneurial spirit and a robust venture capital community that gives rise to numerous defence-related startups each year.¹⁵⁰

Besides meeting domestic needs, Israel's defence industry is also a major exporter, with over 70 percent of its output sold to countries worldwide. Defence exports have been defined as central priority by the Ministry of Defence as they generate substantial revenue for the country and also foster diplomatic and strategic ties with international partners. Israel also collaborates with foreign partners to develop products that meet the specifications of both countries. These programs are jointly funded, and the workload (engineering and production) shared between two countries. An example is the Barak 8 ship defence system developed by India and Israel.¹⁵¹

The Israeli approach to the defence industry is marked by a unique level of closeness and integration, with little division between the civil and defence sectors. The defence industry is shaped by the skills gained through compulsory military service, and personnel who have served in the IDF move into defence industry with relevant knowledge, skills, and experience. Personnel in industry also serve as IDF reservists, thereby ensuring close collaboration between operational users and industrial implementation.

The industry's capability planning also involves close collaboration between the IDF, the Israeli MOD, and research and development agencies. The IDF identifies operational requirements, which the MOD and agencies such as the Israel Defence Research and Development Directorate (DDR&D) evaluate and prioritise based on national security interests and technological feasibility. The International Defence Cooperation Directorate (SIBAT) plays a role in bridging relationships between industry and the defence establishment, and placing this in the context of the operational needs of the IDF.¹⁵²

Israel's defence industry benefits from an ecosystem of research and development, involving collaborations between defence companies, academia, and research institutes. This cooperative approach has led to technological advancements and innovative solutions.

The Israeli government views the defence industry as a strategic sector vital for national security, technological innovation, and economic growth. Local industry benefits from Israel's offset program, which is administered by the Industrial Cooperation Authority at the Ministry of Economy. Israeli industry has also benefitted historically from an option to convert 25 percent of U.S. Government Foreign Military Financing (FMF) from dollars to shekels, which has enabled the MOD to spend FMF locally.

Overall, Israel's current policy towards its domestic defence industry is marked by a proactive and strategic approach, leading to its emergence as a global leader in defence technology and innovation.

Sweden

Despite its relatively small size, Sweden has cultivated a robust domestic defence industry that has experienced significant growth and development from the Second World War to the present day. During the Cold War, Sweden focused its defence industry on meeting domestic needs, influenced by its formal policy of neutrality and the corresponding decision not to join NATO. By the 1980s Sweden was largely self-sufficient in a variety of defence technology domains, producing its own combat aircraft, surface combatants, submarines, armoured vehicles, artillery, radars, ground combat weapons, ammunition, and command, control, communications, and intelligence (C3I) solutions.¹⁵³

Following the Cold War, Sweden faced both economic challenges and a period of reduced threat, leading to significant downsizing of its commitment to defence. During this period Sweden sought closer engagement with European partners, the divestment of the Government's interests in defence companies, and substantial sections of the defence industry acquired by foreign companies.¹⁵⁴ Kockums, the Government-owned submarine designer and manufacturer was also sold to HDW of Germany in 1999.

The Russian invasion of Crimea in 2014 brought a dramatic change in Swedish defence policy. From 2015, Sweden introduced its *Total Defence* policy to guide national planning and measures required to prepare the country for war.¹⁵⁵ In 2014, Sweden declared that the combat aircraft and the underwater capability were essential security interests, before adding integrity-critical areas in the C3I domain in 2018.¹⁵⁶

The Swedish defence industry provides about three quarters of Sweden's defence requirements,¹⁵⁷ and has emerged as one of the world's most export-oriented defence industries. For the past two decades, more than half the military equipment produced in Sweden has been exported,¹⁵⁸ with the majority going to other EU countries. The export success of the Swedish defence industry is evident in that it ranks 13th in the 2023 SIPRI report on trends in international arms transfers.¹⁵⁹

The defence industry in Sweden operates within a clearly defined structure, with distinct roles and responsibilities assigned to various government authorities and agencies. Capability planning is a collaborative effort involving the Armed Forces, the Swedish Defence Materiel Administration (*Försvarets Materielverk*, FMV), and the Swedish Defence Research Agency (*Totalförsvarets Forskningsinstitut*, FOI).¹⁶⁰ The Armed Forces initiate requests for new capabilities, which are then forwarded to FMV for further action. FMV is responsible for technical preparation of a procurement activity, the conduct of the procurement, inspection of materials and equipment, and necessary modifications or upgrades to ensure system effectiveness.¹⁶¹

FOI plays a vital role in shaping defence industry research, contributing to technological advancements and innovation. Collaborations with universities and research institutes further enhance research and development efforts in the defence industry. FOI's activities primarily revolve

around specific assignments, with the Swedish Armed Forces, FMV, and the Swedish Civil Contingencies Agency serving as their primary clients.¹⁶²

While Swedish ministries are relatively small, government agencies operate with a considerable degree of decentralisation. While adhering to laws and regulations established by Parliament, these agencies function independently, ensuring limited political interference in day-to-day operations.¹⁶³ This decentralised structure allows the expertise within the agencies to influence political decisions, a model that has proven successful in Sweden's defence industry.

Although most military procurement contracts are awarded to Swedish defence companies, partnerships with foreign suppliers are common due to the complexity of defence programs. Sweden does exhibit some dependency on foreign countries, particularly the United States, with approximately 50% of American-made components and technology incorporated into Sweden's Gripen aircraft.

The Swedish government adopts a relatively hands-off approach to the defence industry, allowing companies to operate with a significant degree of autonomy. The government's primary role is to ensure the provision of necessary infrastructure and resources to support the industry.¹⁶⁴ This strategy has proven successful as it fosters innovation and encourages university involvement in defence-related research and development. In addition, the 1971 Swedish law on defence inventions provided avenues for State access to military-related innovations made in Sweden, and the associated IP.¹⁶⁵

Overall, the Swedish government's hands-off approach to the defence industry, coupled with the promotion of innovation and engagement with universities, has yielded positive results. However, limited government support for defence exports and the need for alignment between political ideology and capital continue to present ongoing challenges for the industry.

Sweden does not have a formal defence industry policy. The shape of the defence industry is influenced by the Government policy on *Total Defence*,¹⁶⁶ and the initiatives included in that policy for the development of military capability. The current policy, for example, highlights the development of a long-term materiel supply strategy, with particular emphasis placed on combat aircraft and underwater capabilities. The Swedish Agency for Public Management is also involved in providing stability in defence, on the orientation of defence activities with the economic framework, and on how the Government's management of the Swedish Armed Forces can be more strategic.¹⁶⁷

Key considerations for Sweden's support and development of its defence industry include balancing the obligations of European Union membership with domestic developments, and the implications of developing unique Swedish capabilities and meeting the demands of international exports.

United Kingdom

At the conclusion of the Second World War, the United Kingdom was faced with the challenges of turning war-orientated industries into commercially-orientated ones, ensuring the protection of the nation in the new international environment, and maintaining its global interests and prestige. By 1966 the defence policy had morphed into three substantial and enduring pillars: The maintenance of an independent nuclear deterrent, the protection of the United Kingdom through NATO, and the fulfilment of obligations outside Europe.¹⁶⁸

The United Kingdom has a long history of developing its own weapons systems, and an associated recognition of the value of a capable defence industry for national security. As stated by a Secretary of State for Defence in 1980:

the ability to develop and produce arms is ... an important national asset. It ensures supply; it enables British Service requirement to be met in an appropriate and timely way..... Above all, because of its contribution to our defence, it helps maintain our national security.¹⁶⁹

In the period since the Second World War, however, the UK's defence expenditure has progressively declined as the country has repeatedly reassessed its security needs and its global commitments in the face of repeated economic challenges. Whilst the result has been the ongoing support for domestic defence developments, value for money considerations meant that this has often been pursued through collaboration with European partners, with the aim to 'retain onshore all of the technological and industrial capabilities required for the national development and manufacture of such projects if necessary'.¹⁷⁰

The UK defence industry is broadly divided into four sub-sectors (aerospace, including missiles, maritime, land, and intelligence systems) dominated by a single company, BAE Systems, with a small number of large firms¹⁷¹ such as Rolls-Royce, Babcock, QinetiQ and Ultra Electronics. Non-domestic companies with a major presence in the UK include Boeing, Airbus Group, Leonardo, General Electric, Lockheed Martin, and Thales Group.

The importance placed on a capable defence industry is evident in the ways employed by the UK Government to retain and maintain that industry. The nationalisation of the failing Rolls-Royce, and the forced amalgamation and subsequent nationalisations within the shipbuilding and aircraft industries to create the nationalised British Aerospace and British Shipbuilders under the Aircraft and Shipbuilding Industries Act,¹⁷² were made to retain the capability to develop strategically important technologies.

In the subsequent privatisation of these companies,¹⁷³ the UK Government retained a golden share, and imposed restrictions on the composition of the relevant Boards,¹⁷⁴ thereby preserving an ability to ensure that strategic interests were not subverted by purely commercial developments. UK interests were also protected by the utilisation, from 1974, of a series of defence conditions (DEFCON) that, almost other things, provided government access to IP developed in the UK with government funding.¹⁷⁵

Written statements of defence industry policies have been produced in the UK since 2002. These policies reflect the Government's intent for how the defence industry will support the development and maintenance of military capability, and have periodically waxed and waned between the importance of industry for sovereignty and national security, and the acquisition of capability through competition and market forces.¹⁷⁶

The current policy document, *Defence and Security Industrial Strategy*, published in 2021, sets out a strategic and ambitious approach to strengthening the UK's defence industrial sector, and has focused on developing capability in specific industry segments to address strategic capability and operational independence.¹⁷⁷ A small number of industry segment strategies have been developed, namely Defence and Security¹⁷⁸ (this includes a range of capabilities such as the nuclear deterrent, cyber, complex weapons, novel weapons, submarines), shipbuilding (but not including submarines),¹⁷⁹ land,¹⁸⁰ and space.¹⁸¹

The UK has also placed significant policy importance on the export of its domestically-developed defence capabilities. Whilst these exports are, ostensibly, predominantly in support of national economic activity and employment,¹⁸² there are also recognised advantages associated with the influence and leverage that may develop over other states,¹⁸³ and in increased production numbers reducing unit costs for the British defence force.¹⁸⁴ Export activity in the United Kingdom is managed

through a dedicated agency, the UK Defence and Security Exports (UKDSE) organisation within the Department of Business and Trade. The region of most value for UK defence exports is the Middle East, with aerospace systems being the most predominant.¹⁸⁵

In the UK, requirements for military system are set by the Services, with acquisition managed by the MOD Procurement Executive (MOD PE).¹⁸⁶ Whilst industry is engaged in requirements setting workshops for some projects, this is not standard practice.¹⁸⁷ The knowledge in MOD PE regarding industry capability and capacity is also focused primarily on the top tier contractors, with supply chain vulnerabilities somewhat opaque and SMEs and mid-tier suppliers having difficulty in engaging both with MOD and with top tier suppliers.¹⁸⁸ A RAND study has also found that UK defence supply chains are constrained by critical skill shortages, and that Defence is slow in taking up innovative processes and advanced manufacturing technologies.¹⁸⁹



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