CENTRE FOR INDUSTRIAL POLICY

BUILDING A CANADIAN DUAL-USE INDUSTRIAL COMMONS

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An initiative of The Transition Accelerator

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GLOSSARY OF ABBREVIATIONS

BOREALIS	Bureau of Research, Engineering and Advanced Leadership in Innovation and Science
CAF	Canadian Armed Forces
CCV	Canadian Content Value
CCI	Council of Canadian Innovators
CRC	Canadian Robotics Council
DAPIA	Defence Agile Procurement Insights and Analysis
DFARS	Defense Federal Acquisition Regulation Supplement
DIA	Defence Investment Agency
DIS	Defence Industrial Strategy
DISH/DISHS	Defence Innovation Secure Hub(s)
DND	Department of National Defence
DPA	Defence Production Act (R.S.C. 1985, c. D-1)
DRDC	Defence Research and Development Canada
EV	Electric Vehicle
EIPA	Export and Import Permits Act (R.S.C. 1985, c. E-19)
FTO	Freedom to Operate
GAC	Global Affairs Canada
IAC	Intangible Asset Collective (institution proposed in this paper)
IDEAS	Innovation for Defence Excellence and Security
IP	Intellectual Property
ISED	Innovation, Science and Economic Development Canada
ITB	Industrial and Technological Benefits
ITC	Investment Tax Credit
MOSA	U.S. Modular Open Systems Approach
NAC	Naval Association of Canada
NATO	North Atlantic Treaty Organization
NRC	National Research Council of Canada
NRC-IRAP	National Research Council — Industrial Research Assistance Program
NSS	U.S. National Security Strategy 2025
NSERC	Natural Sciences and Engineering Research Council of Canada

PSPC	Public Services and Procurement Canada
R&D	Research and Development
SMB / SME	Small and Medium-sized Business / Enterprise (this paper used SMB as it is the term used in the Defence Industrial Strategy)
SSO	Strategic Standards Office (institution proposed in this paper)
TDCR	Technical Data Control Regulations (SOR/86-345)
TTO	Technology Transfer Office

BUILDING A CANADIAN DUAL-USE INDUSTRIAL COMMONS

Canada faces a geopolitical moment unlike any in recent memory. The erosion of the rules-based international order, multiple wars of aggression around the globe, and the deepening of great power competition have forced a reassessment of defence posture across NATO. For Canada, this reassessment is complicated by uncertainty provoked by the aggressive behaviour of the Trump administration.

> The U.S.'s 2025 National Security Strategy (NSS) asserts control over the Western Hemisphere, treating the Americas as a zone of exclusive U.S. strategic interest. The NSS articulates an aggression that, when combined with U.S. threats to Canadian sovereignty and the imposition of tariffs on Canadian goods, has fundamentally altered Canada's national security and defence planning.

Prime Minister Carney has responded by articulating a clear reorientation: Canada must become more self-reliant, diversify its strategic partnerships, and reduce the structural dependencies on the U.S. that have accumulated over decades of deep integration. The pivot is toward Europe, the Indo-Pacific, and a new multilateralism among “middle powers”, but this path requires industrial and manufacturing capacity and industrial policy expertise within government that Canada currently lacks.

Against this backdrop, Canada has committed to reaching 2% of GDP in defence expenditure by the end of 2026, with an eventual goal of 5% by 2035, after decades of missing NATO targets. But the promise is also that defence spending will drive economic and industrial development cross the country, promising dual-use technologies and industrial capacity from the defence spending. The February 2026 release of Canada's Defence Industrial Strategy (DIS) was the government's first attempt to provide a coherent framework for how that investment will be structured.

The central problem this paper addresses is that increased defence spending alone will not deliver lasting national value. Canada faces three compounding structural failures that the DIS, despite its ambition, does not fully resolve: insufficient industrial and manufacturing capacity to convert defence investment into sovereign capability at scale; a chronic failure to retain the IP and intangible assets generated by publicly funded research; and a lack of analytical and coordination capacity within the federal government to identify supply chain gaps, target policy instruments effectively, and align the efforts of Department of National Defence (DND), Public Services and Procurement Canada (PSPC), Innovation Science and Economic Development (ISED), and other bodies toward shared industrial goals. Without addressing all three, the window created by political will and capital poised to act now will close without producing the broad industrial value expected.

What is needed is a Canadian dual-use industrial commons: an integrated ecosystem that connects research institutions and business expertise, builds and repurposes manufacturing capacity, retains the downstream value of defence investment in Canada, and ensures that governance over critical systems remains in Canadian hands. This builds from the conception of industrial and manufacturing commons developed by Suzanne Berger exploring the systemic costs of separating R&D from manufacturing;[1] Pisano and Shih exploring why that erosion is self-reinforcing once process engineering expertise atrophies;[2] and Bentley Allan, who applied those concepts to the Canadian battery manufacturing sector and explored the need to expand supply chains.[3]

This paper argues that the DIS, along with reforms to how Canada manages intangible assets, manufactures, and governs strategically through standardization, can begin to build that commons. For that investment to deliver lasting national value, it must generate dual-use outcomes—civilian technologies, industrial capacity, and retained IP that extend beyond the original defence application. Dual-use dividends, however, cannot be willed into existence by spending more. Simply increasing the defence budget and hoping for trickle-down innovation has never worked. What is required is a transformation of the whole ecosystem to build durable industrial and manufacturing capacity that matches the existing R&D strengths in strategic sectors, and to ensure all of the value generated by that ecosystem can be captured and channelled into new capacities over time.

1. Challenges With Defence Industrial Policy to Date

Before the DIS, Canada's defence procurement system was fragmented and lacked clarity. Unlike most NATO allies, Canada had no single procurement authority: DND defined capability requirements, PSPC administered contracting, and ISED managed industrial benefits, with the Treasury Board and Privy Council Office playing additional oversight roles. Critics argued that this distributed architecture produced systemic faults including duplicative processes, unclear accountability, siloed institutional knowledge, and competing mandates with no clear hierarchy of authority. Murphy and Forrest characterize the result as "a problem without a champion," as no single department was both empowered and incentivized to drive change.[4]

The practical consequences were most visible in the pace of procurement. Capital projects above $50 million required six internal DND approval levels before reaching Treasury Board, and the average timeline from identifying a capability need to fielding a solution ran between 10 and 15 years.[5] The National Shipbuilding Strategy and F-35 procurement, both initiated in 2010 and still not fully delivered 16 years later, are emblematic of a system structurally incapable of keeping pace with either strategic need or technological change. The Parliamentary Budget Office documented a cumulative $18.5 billion gap between planned and actual DND capital spending between 2017 and 2024, with roughly 35% of planned capital expenditure going unspent in an average year[6]—a pattern professor of defence procurement Jeffrey Collins has connected directly to diminished operational readiness, with the Royal Canadian Navy at only 45% fleet availability by 2025.[7]

For Canadian industry, the implication was that even clearly stated procurement commitments could not function as reliable demand signals, disincentivizing the long-term capital investment necessary to build domestic defence industrial capacity. A Council of Canadian Innovators (CCI) survey of 428 Canadian businesses with defence or dual-use technologies[8] found a system that was difficult to navigate, took too long to generate contracts, and provided little clarity on capability requirements.[9] The government was simultaneously telling CCI it could not find capable Canadian companies, while those companies were reporting they could not find a way into the system.[10] Security clearance bottlenecks, the absence of a single entry point, and the so-called valley of death (the time between developing and deploying a technology) compounded the problem for Small and Medium Businesses (SMBs).[11]

The Industrial and Technological Benefits (ITB) policy, which was designed to support Canadian industry, compounded the problem rather than correcting it. For example, the Naval Association of Canada's report on defence procurement shows that the ITB's Canadian Content Value (CCV) mechanism—which gives credit for contractors including Canadian elements and investment in their contract bids—caps Canadian owned and SMBs at 100% CCV that they can include in their contract bids, whereas large multinationals can leverage as much as 500%.[12] What was intended as a boost to Canadian industry became a key source of privileging foreign over domestic companies, not necessarily because of superior capabilities or capacity, but because of their ability to leverage more supposed CCV.

Existing Canadian policies did not provide comprehensive protections or requirements for retaining Canadian-funded and developed IP (from universities, government, or businesses). IP lawyer James Hinton has explicitly detailed this issue, arguing that structural IP reform is a precondition for meaningful private-sector participation in defence innovation, and that retaining IP increases Canadian companies' freedom to operate (FTO) and protects data and algorithms, which are increasingly becoming significant value-adding assets that enhance or even power emerging technologies.[13]

An important point to note here is that universities are often centred in discussions of IP retention because so much government-funded research ends up leaving the country without being commercialized or patented in Canada. But university technology transfer offices (TTOs) are funded by each institution on their own. If there is a desire for universities to be a significant part of the plan to solve IP retention challenges in Canadian defence R&D, both the federal and provincial governments will need to provide funding, policy, and other supports to ensure those TTOs can meet that challenge.

Finally, the underlying industrial base faces a capacity constraint that policy signals alone could not easily address. According to a 2024 ISED report, over 85% of Canada's approximately 585 defence firms had fewer than 250 employees,[14] while firms large enough to absorb additional contract volume—those with more than 500 employees—accounted for over 60% of sector revenues despite representing a small fraction of firms.[15] This suggests that larger firms can meet demands more readily but are a smaller portion of the Canadian defence industrial base, implying a need for significant capacity increase in the sector. A 2025 RBC report, argues that spending on infrastructure will yield high value within the NATO 5% GDP spending goals and that government effort to prioritize Canadian defence firms and build infrastructure would be essential to avoid capital leakage where a significant portion of new defence spending could flow to foreign suppliers.[16]

Underlying all these failures is a problem that is harder to see but more fundamental: the federal government lacks the internal capacity to understand its own industrial base well enough to target policy interventions effectively. There is no systematic mapping of where Canadian defence supply chains are strong, where the critical gaps are, or which firms and sectors are positioned to fill them. Without that analytical foundation (likely supplemented by external experts), demand signals, procurement reforms, and innovation programs operate without a shared picture of what they are collectively trying to build.

2. Tools of Industrial Policy for Defence

Canada's existing legislative framework for defence industrial policy—anchored by the *Defence Production Act*,[17] the *Export and Import Permits Act*,[18] and the national security provisions of the *Investment Canada Act*—provides the government with meaningful authority over who can participate in the defence sector, what technologies have security-based export controls on them,[19,20] and which foreign investments pose national security risks. These are necessary instruments, but they are oriented almost entirely toward control and restriction. They were not designed to build manufacturing capacity, retain IP generated through public investment, or create the institutional coordination needed to turn defence spending into lasting industrial value.

On the supply-push side—tools designed to generate research, capability, and industrial capacity—the government has the IDEaS program,[21] which provides funding to move innovations from early concept through to prototype; DRDC's defence research partnerships, which support unclassified university-based research and facilitate technology transfer through licensing and collaborative research agreements;[22] and NRC-IRAP's Defence Industry Assist initiative, which provides funding to high-potential SMBs advancing made-in-Canada defence and dual-use technologies.[23]

> Underlying all these failures is a problem that is harder to see but more fundamental: the federal government lacks the internal capacity to understand its own industrial base well enough to target policy interventions effectively.

The newly created Bureau of Research, Engineering and Advanced Leadership in Innovation and Science (BOREALIS)—responsible for "accelerating, aligning, and connecting" the defence innovation space across Canada[24]—has announced the creation of Defence Innovation Secure Hubs (DISH) intended to add a secure collaborative layer connecting academia, government, and industry in frontier technology areas including AI, quantum, and cybersecurity.[25]

The ITB, described above, is the primary lever for converting large defence procurements into Canadian industrial benefit, but its design has consistently undermined that goal. When Canada signs a major contract with a foreign prime—Lockheed Martin for the F-35, for instance—the ITB requires the prime to generate Canadian economic activity equal to a defined percentage of contract value. In practice, foreign firms satisfy this by subcontracting work to Canadian firms or by claiming CCV credit for including Canadian content in the supply chain, without any requirement that the work builds durable Canadian-owned capabilities, retains IP in Canada, or develops lasting industrial capacity.

Reform needs to shift ITB toward being a strategic capability-building instrument rather than a credit mechanism that can easily be gamed. That means tying offset credit to outcomes rather than activity like Canadian IP ownership, measurable increases in Canadian firm capacity, and priority weighting for investments that connect to the DIS's Key Sovereign Capability areas. The F-35 procurement, with its multi-decade lifecycle and scale, is an immediate opportunity to apply this approach as it could direct a portion of Lockheed's offset obligations toward Canadian supply chain development in aerospace, sensors, and software integration. It must also be understood by government that genuinely accruing value within genuine Canadian firms, or developing homegrown Canadian talent and infrastructure, might be opposed to foreign primes' interests and therefore they are unlikely to make investments to maximize ITB multipliers that are genuinely aiming at building up Canadian defence industrial capacity.

Canada's DIS represents the most significant attempt to restructure the country's defence industrial policy in decades. At its centre is the newly created Defence Investment Agency (DIA), intended to serve as the coordinating authority across DND, PSPC, and ISED, and to apply a new BUILD–PARTNER–BUY framework to all future defence acquisitions.[26] The BUILD tier prioritizes Canadian-made solutions in key strategic areas; PARTNER directs Canada toward allied collaboration, with a stated priority on diversifying toward Europe and the Indo-Pacific; and BUY permits purchasing from others when domestic or allied capacity is unavailable.

The DIS addresses several of the most persistent failures in the pre-existing system. It creates a single point of entry for firms navigating the procurement landscape,[27] accelerates security clearances for defence-sector personnel,[28] reforms the ITB policy through a new Canadian Company Boost mechanism, and provides additional investment supports for SMBs through NRC-IRAP[29] and a $4 billion Business Development Bank of Canada's Defence Platform.[30] Its 10-year targets are ambitious: 70% of defence acquisitions awarded to Canadian firms, SMB defence revenues up by more than $5.1 billion annually, government defence R&D investment up 85%, and 125,000 new jobs created.[31]

3. What the DIS Does Not Resolve

The DIA coordinates procurement across ministries but does not completely absorb or supersede their procurement functions. Philippe Lagassé's immediate analysis identified this as the document's central structural weakness, characterizing the DIS as a strategy that "often hedges" because neither DND-CAF's focus on operational capability and allied interoperability, nor ISED's focus on jobs and industrial growth, won out in steering DIA priorities.[32] Without a clear decision rule for when capability requirements override the Build Canadian preference, implementation will depend on case-by-case ministerial judgement, replicating the same politicized dynamics the DIS was intended to replace.[33] While DIA offers a "single window" of service, its existence does not inherently reform the existing fragmentation.

The federal government also continues to lack the internal analytical capacity to analyze and make policy to improve defence supply chains, and the DIA lacks a built-in capacity to build this knowledge base. Having BOREALIS or NRC involved in institutional knowledge mobilization would be valuable.

On procurement timelines, the DIS contains no binding targets, no specific standards, and no accountability mechanisms that would accelerate procurement timelines.[34] The DIA is mandated to "accelerate" procurement but without measurable commitments. On IP, the DIS identifies Canadian ownership and control of critical defence technology as a priority but does not specify how this will be achieved.[35] To solve the valley of death, the commitment to strengthen procurement pathways within IDEaS and Innovative Solutions Canada is not accompanied by specific contractual mechanisms, dollar thresholds, or time-to-contract standards to provide SMBs with clarity while in development.[36]

The ITB reforms are similarly thin, with the DIS Annex describing proposed changes as a list of policy directions rather than a finalized instrument,[37] and there is no clarity on whether the structural dynamic by which international primes outbid Canadian SMBs through 500% will be remedied. The DIS has shown a great shift in the right direction, but more clarity and detail is needed in several key areas.[38]

4. Building a Dual-Use Industrial Commons

To address these significant remaining issues with Canada's defence industrial base and procurement system in ways that also drive broader economic outcomes, significant institutional and infrastructural design will be needed. To drive benefits in Canada, retain value, and build up manufacturing capacity and policy expertise, Canada must invest in and design policy to grow a dual-use industrial commons, which is to say an industrial commons that is built by design to both support defence manufacturing and industrials needs, and provide the expertise and channels for other benefits to flow into civilian contexts for greater economic value.

Canada lacks the manufacturing capacity for many essential elements of emerging tech sectors like drones, EVs, computation, etc. Berger shows that separating R&D

from production, often enabled by digitalization,[39] causes systemic breakdown: spillover effects disappear when firms shed manufacturing, and especially smaller firms struggle to afford R&D without foreign capital.[40] Pisano and Shih demonstrate why this separation of ideas and building is harmful to an economy: once manufacturing is absent, process engineering atrophies, and without it firms lose the capacity to develop next-generation products entirely.[41] Canada did not lose production capacity; it built up a strong research sector without accompanying manufacturing capacities. Dan Breznitz shows further that durable value accumulates in process and manufacturing innovation, not just research, and Canada's failure has been in designing programs around research outputs but leaving capacity underdeveloped.[42]

This means the DIS's innovation hubs, procurement reforms, and SMB supports cannot deliver dual-use dividends on their own. Co-locating manufacturing capacity with innovation infrastructure is therefore essential for true success of the DIS and related defence spending programs. Canada has the upstream assets: advanced manufacturing in automotive and aerospace, world-class research in AI and quantum, and critical minerals strength. But existing industrial capacity in key areas and the usage of existing industrial capacity is weak, declining in key high tech sectors over the past decade (Table 1). Addressing this requires a targeted government-led effort to build this base and reorganize existing strengths to support it. The task is to build around existing strengths, identifying midstream nodes—building from Allan and Kabbara exploring midstream inputs to EV manufacturing[43]—where targeted investment can generate supply chain leverage.

Table 1.

CANADIAN INDUSTRIAL CAPACITY UTILIZATION RATES

Industry Sector	Q1 2015	Q2 2025	Percentage Point Change
Manufacturing	82.3	77.8	-4.5
Chemical manufacturing	84.2	74.7	-9.5
Non-metallic mineral product manufacturing	75.6	70.7	-4.9
Fabricated metal product manufacturing	78.6	73.7	-4.9
Machinery manufacturing	76.7	77	0.3
Computer and electronic product manufacturing	78.8	86	7.2
Electrical equipment, appliance and component manufacturing	77	74.5	-2.5
Transportation equipment manufacturing	90.1	86.1	-4

Source: Statistics Canada. Table 16-10-0109-01Industrial capacity utilization rates, by industry, https://doi.org/10.25318/1610010901-eng

Canada cannot build capacity in every strategic area. It must focus on identifying the key areas for investment with the clearest paths, the "easy wins" of defence spending in clear, strategic areas, especially when Canada already has significant resource bases to support this.[44] This also means understanding how existing upstream strengths in research and raw materials can be channelled into midstream and downstream value—through expanded critical minerals processing, added manufacturing infrastructure, or deeper integration of R&D ecosystems with production capacity.[45]

For example, the recent BOREALIS Challenge call for proposals (CFP) identifies uncrewed systems and quantum technologies as its two priority areas, with winning projects to be housed in DISHs.[46] Using those priorities as anchors, we can identify three categories of technology development that any credible Canadian defence industrial roadmap would need to engage: specific strategic technologies requiring direct advancement (drones); broad research areas where existing Canadian strengths need to be converted into industrial capacity (quantum technologies); and cross-cutting manufacturing capabilities needed across sectors to support both defence-specific and dual-use production goals.

Drones and uncrewed systems are examples of urgently needed capability in a very clear technical domain. Canada has over 1,000 firms in the sector,[47] strong regulatory frameworks, and clear defence demand—the DIS's BOREALIS challenge CFP and the announced NRC drone hub[48] both signal priority intent. But the hub model as currently designed is an innovation infrastructure investment, not a manufacturing one. The Chinese drone company DJI captures approximately 74% of Canadian drone market revenue[49] not because Canada lacks the research capacity to compete, but because it lacks the production infrastructure to convert that research into manufactured systems at scale. China's significantly more advanced manufacturing sector allows firms to quickly respond to demand.

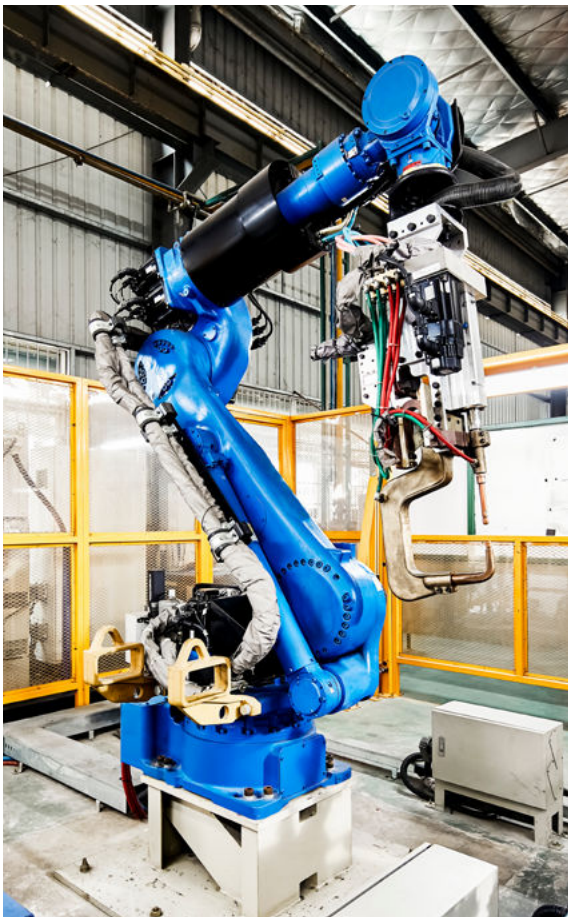
Building this capacity would require co-locating manufacturing capacity with the innovation hubs the DIS is already funding, designing that capacity for dual-use outcomes from the outset so that new manufacturing hubs can move seamlessly from meeting defence needs to commercial needs, and treating upstream critical mineral supply,[50] which Canada already has strengths in, as a supply-push on manufacturing. This approach allows us to round out existing industries in Canada and to link up our strengths—such as R&D—with new investment in manufacturing capabilities to expand the value chain.[51]

Quantum technologies, AI, and advanced materials provide an example of another category for a roadmap that would include broader research and technology areas that cannot easily be reduced to one industry or class of technologies. While IP retention is of course essential for gaining advantage in these emerging domains, on the manufacturing side, the government of Canada must identify elements of the supply chain for emerging technologies that we can lead on even if they are not the most value-adding element, to make the Canadian market more central in the supply chain.

> Canada has over 105 homegrown quantum firms, world-class research institutions, and a Canadian Photonic Fabrication Centre that is a national asset. Yet 61% of quantum-related patents filed in Canada are owned by U.S. entities, with Canadian owners accounting for only 14%.

Canada has over 105 homegrown quantum firms,[52] world-class research institutions, and a Canadian Photonic[53] Fabrication Centre that is a national asset. Yet 61% of quantum-related patents filed in Canada are owned by U.S. entities,[54] with Canadian owners accounting for only 14%.[55] The value generated by Canadian research is being assigned abroad before it can anchor domestic firms. Building a full chip development infrastructure may be an essential long-term goal because of the technology's enabling function for other tech, but the most readily available element that Canada can scale now to seize a greater share of the supply chain is in silicon wafer packaging and connectivity tool manufacturing.[56]

Canadian Quantum company Xanadu's advanced photonic packaging facility was developed to meet the company's own needs to package silicon wafers in connective housing that allows it to be hooked up in a data centre.[57] But the facility has already had a knock-on effect for other Canadian companies in multiple industries, not just quantum, who are able to make use of this downstream manufacturing capacity leading to additional business for Xanadu outside of its core work and enhanced local capacity in an essential (though not the most essential) part of the chip supply chain, and will continue to yield benefits. This is an excellent example of how one company building a relatively small manufacturing capacity can contribute a commons effect. Photonics is one excellent space for Canada to continue to invest.



The final category that Canada can consider when developing a DIS and dual-use manufacturing roadmap is generalizable manufacturing capabilities that can meet defence needs while being adaptable to dual-use applications. As shown in Table 1, Canada underuses its industrial capacity in several key areas that are relevant to defence. Thus, a sensible initial point on the roadmap is to invest in better management of existing manufacturing capacity to improve utilization through efforts like reorganizing shift schedules to maximize use of production lines and free up others for use.

Existing capacity can also be repurposed through retooling to meet new needs and fill gaps left in waning sectors. Canada's automotive sector, concentrated in Ontario and increasingly retooling in response to EV supply chain shifts, represents the kind of advanced manufacturing base that defence production requires. The same is true of Canada's IT services sector, which has the systems integration and software capability that modern defence platforms depend on, but which has rarely been formally connected to defence procurement pathways. A credible dual-use industrial commons would map these existing assets systematically and create the procurement and partnership mechanisms to activate them, rather than assuming that defence industrial capacity must be built entirely from scratch.

Submarine procurement offers an even more immediate illustration of this logic. Canada's planned acquisition of submarines will require sustained, decades-long investment in various capacities to support submarine fabrication and maintenance. Depending on the company contracted for this procurement, there will be different orientations of the supply chain with different elements being made in Canada, as well as maintenance and sustainment capabilities needing to be developed in-country. Ontario's automotive corridor has precisely this kind of transferable manufacturing base. Rather than building submarine-specific industrial capacity from scratch in isolation, a dual-use industrial commons approach would map these existing assets deliberately, design the procurement to activate them, and create the contractual mechanisms to ensure that the capabilities built to meet the submarine requirements remain available for civilian industrial use between production runs. Retooling existing manufacturing in Ontario to support shipbuilding capacity on the coasts is the kind of cross-Canada supply chain-building that Canada must develop and that will lead to spillover value.

Building on existing capacity, investment in automated manufacturing is also a key area for investment because it enhances capacity while also combining existing strengths like applied AI R&D in Canadian universities and companies with specific and multi-purpose tools that need to be built. Channeling Canadian AI expertise into robotics can help fill gaps in manufacturing and also build dual-use robotics capabilities that can feed into drone development, general manufacturing, health, and other uses. The history of the Canadian company Spar's (now MDA) CANADARM demonstrates that Canadian robotic capability has historically produced spillover value well beyond its original defence application.[58] However, the shift away from robotics toward AI as an investment and strategy priority for the government since the 2010s has meant that Canada never fully capitalized on its lead in robotics but instead focused on pure AI research, where we have also mismanaged our leadership position.[59] Investing in automated manufacturing capacity explicitly designed to be convertible between defence and civilian production would create the infrastructure flexibility the dual-use industrial commons will require.

5. Institutional Design: Canadian-Owned Manufacturing Capacity Around Hubs

Canada's defence innovation ecosystem consistently produces valuable IP that then leaves the country. Programs like BOREALIS' new DISHs are well designed to connect research talent, defence requirements, and business innovation, but they are investments almost entirely in what Dan Breznitz calls the first stages of innovation—novelty and incremental improvement—while neglecting the later stages where value is actually captured and retained. Breznitz's four-stage framework of innovation distinguishes between novel product creation, incremental improvement, process innovation, and manufacturing, arguing that durable economic value accumulates primarily in the latter stages, where firms learn to profitably produce complex products at scale and adapt to changing requirements.[60]

Canada's persistent policy error, in his account, is confusing innovation with invention and designing programs around research outputs while leaving out manufacturing capacity. The result is the structural pattern Atkinson and Coleman identified in Canadian industrial policy: firms that commercialize and sell rather than scale, because the domestic ecosystem does not provide the manufacturing infrastructure needed to grow without foreign capital.[61] So, while IP retention is essential, so is providing companies the manufacturing base to operationalize their IP.

This dynamic is not unique to defence. Allan and Kabbara's roadmap for Canada's battery value chain identifies the same failure across Canada's resource industries, observing that "in mining, forestry, agriculture, and oil & gas, Canada has failed to leverage its vast and abundant resources into value-added industries."[62] The core argument is that the midstream segment of chemical processing is the "linchpin" of an integrated battery supply chain precisely because it is where raw upstream inputs are transformed into high-value exportable products. This translates directly to growing Canadian control of the value chain in the defence context.[63] Without investment in the essential middle layer elements, upstream Canadian inputs will continue feeding value creation elsewhere.

Pisano and Shih's industrial commons framework explains why this happens and why it is self-reinforcing. Once manufacturing capacity is absent, "process-engineering expertise can't be maintained, since it depends on daily interactions with manufacturing," and without process engineering, firms progressively lose the ability to develop next-generation products entirely. The commons—defined as the collective infrastructure of "R&D know-how, advanced process development and engineering skills, and manufacturing competencies"—must exist as an integrated whole or it begins to erode.[64] Applied to DISHs, hubs that house research and innovation without connected manufacturing capacity will over time hollow out even their research functions, as the tacit knowledge embedded in production migrates to wherever manufacturing has been established. Pisano and Shih show how this has happened with the U.S. through offshoring of perceived low-skill jobs in coding to India, for example, that slowly led to the India developing advanced elements of computer engineering supply chains co-located with manufacturing capacity the U.S. no longer has.

Expanding DISHs and similar programs to integrate significant manufacturing capacity alongside their research and innovation functions would begin to build this connective tissue, creating the conditions under which Canadian IP is commercialized domestically, allied partners become dependent on Canadian production nodes, and the structural indispensability that genuine industrial sovereignty requires starts to take shape. ISED and DND should work closely to ensure that the DISHs and other hubs have capacity to add on necessary, specialized manufacturing capabilities either through directly building manufacturing facilities alongside DISHs or by co-locating DISHs and other hubs in regions where relevant manufacturing infrastructure is located. This provides added dual-use value when non-defence companies are drawn into defence manufacturing based on their manufacturing capacity which in turn creates more opportunity for cross-pollination of IP and capital from defence into civilian contexts.

6. Institutional Design: Intangible Asset Collective

The Canadian federal government spends about $4.5 billion annually on university and college R&D,[65] yet the share of Canadian-invented patents transferred to foreign firms has tripled from 18% to 56% over two decades.[66] Despite roughly $7 billion in annual R&D funding flowing to research institutions from public and private sources, those institutions earned only $126.6 million from commercialization in 2020.[67] The U.K. and U.S. convert R&D spending into IP income at nearly double Canada's rate, pointing to systemic failure, not a research gap.[68]

Canada's approach has been largely laissez-faire—historically relying on economic spillovers rather than deliberate ownership strategies. Policies and programs attempting to address these issues have done some work to improve awareness for SMBs but have done little to build strategic IP value.[69] With fewer than 22% of Canadian businesses owning any IP assets and only 6% holding patents, Canadian SMBs are routinely outgunned by foreign firms wielding large IP portfolios as defensive moats — forcing weak licensing deals, early exits, or costly FTO battles they can't afford to fight.[70]

Beyond IP, other intangible assets like data are increasingly becoming essential to economic opportunity. Canada also lacks strong protections for proprietary institutional and government data, and where strong protections exist, like in health data, there are significant difficulties with mobilizing such data to be of use in R&D across jurisdictions. Mobilizing and protecting data is as essential as retaining and commercializing IP. To meet the needs of Canada's expectation of up to $1 trillion in value from defence over the next decade, a dual-use Intangible Asset Collective is essential to provide Canadian companies and institutions working on strategic technologies with the FTO and data access they lack.

The collective would conduct value chain and patent landscape analysis to identify Canadian strengths and gaps; acquire patents globally—including from early-stage startups and multinationals divesting redundant portfolios—to build defensive and offensive leverage while allowing SMBs to retain their own IP while accessing the pool; attach IP ownership guardrails to public funding with payback mechanisms if publicly funded IP leaves Canada; and create a governed market for the exchange and licensed use of proprietary research and data from Canadian universities, research institutions, and government. Governed through a membership model with dedicated IP management for acquisitions, licensing, and enforcement, the collective would function as the connective tissue the dual-use industrial commons requires—ensuring that intangible assets generated anywhere in the ecosystem can be mobilized across it rather than leaking out at the point of maximum value.

There is precedent in other jurisdictions that have had successful defence and dual-use IP and other asset retention and commercialization. The U.S.'s Bayh-Dole Act (1979) mandates commercialization of federally funded research and domestic manufacturing of resulting products, with federal march-in rights for non-compliance. China's Made in China 2025 and its 2021–2035 IP strategy have built dominant patent portfolios in AI and blockchain through specialized IP courts and state-backed campaigns. Germany's Fraunhofer Institutes have transferred valuable IP directly to domestic SMBs, while South Korea and Taiwan have centered patents and trade secrets as guarantors of FTO in export markets.[71]

To ensure the success of the IAC, universities will need to receive funding for TTOs to be adequately resourced to enhance commercialization and other value capture at the source, as well as building deeper links between the DIA, BOREALIS and all Canadian TTOs to ensure there is effective cross-pollination of intangible assets across sectors. TTOs are the primary institutional interface between publicly funded university research and commercial or defence applications, yet they are funded almost entirely by their home institutions, without dedicated federal or provincial support. The costs of meeting defence-sector requirements such as security requirements, specialized defence expertise, and security clearances are prohibitive for institutions. Federal and provincial governments must treat TTO funding as part of the overall ecosystem infrastructure by dedicating federal-provincial investment in TTO capacity and attaching IP retention and commercialization requirements to funding.

7. Institutional Design:
Strategic Standardization Office

It is a common misconception that standards are requirements and regulations—constraints imposed after technologies are built. But leading jurisdictions like China, the EU, and the U.S. treat standards as an upstream instrument that shapes what gets built, by whom, the competitive conditions, and interoperability guarantees.[72] Standards are industrial policy expressed through governance, and a direct conduit for national security imperatives to connect to R&D, manufacturing, and supply chains. Canada participates in this environment as a largely passive recipient, adopting standards others set without a strategic framework for when to adopt, when to contest, and when to lead.

The U.S. has applied this strategic approach to defence procurement with the Modular Open Systems Approach (MOSA), now mandated by law for defence acquisitions.[73] Its core logic is to create systems built from interchangeable, interoperable, open, and verifiable components[74] designed so that individual elements can be bid for separately by different contractors, replaced by any qualified vendor, and upgraded without redesigning the whole system. This also reduces vendor lock-in and promotes more competitive bids and more transparency in the business domain of defence R&D and procurement.[75] The government retains data rights over interfaces; implementations can remain proprietary.[76] Vendor replaceability is built in by design rather than negotiated after the fact.

The MOSA framework is a standards-first approach that lays out governance, interoperability, and performance requirements ahead of time, which then define the entire process from the beginning. In turn, additional standards for specific systems or classes of systems can flow from this framework to govern their use afterwards.[77]

Canada requires a Strategic Standards Office (SSO) to assess the landscape of national and international standards, map where Canadian interests overlap with standardization efforts, identify gaps where Canadian representatives are not participating, define and support standardization in key areas that serve Canada's strategic industrial interests, and develop governance standards to properly shape the defence and dual-use manufacturing base. This would involve developing a Canadian MOSA framework to define procurement standards and governance of potentially dual-use technologies. The SSO would operate with a small strategic core activating existing standards expertise across councils, firms, and universities to build policy capacity and expertise to pursue more strategic industrial policy. It would connect to the IAC, governing IP rights regimes that standards must interface with, and the DIA, governing procurement that the standards would shape.

8. Conclusion:
Meeting the Moment

The Government of Canada's goals to develop a competitive defence industrial base will require building the sovereign industrial foundations to ensure that spending generates lasting national value. The DIS represents a step forward, consolidating fragmented governance and sending a demand signal to industry, but it leaves three critical gaps unaddressed: manufacturing capacity, intangible asset retention, and strategic standardization. Building these capacities is essential to ensure investment in the entire industrial environment and to grow capacity for both defence and general manufacturing. Co-located manufacturing capacity around DISHs builds the necessary base for a dual-use industrial commons. The Intangible Asset Collective retains more intangible value from R&D and manufacturing and allows it to be used by other firms and bodies. The Strategic Standards Office builds a more strategic approach to governance and develops the frameworks that shape how all of these DIS-related bodies and tools relate and how they should be used.

Most importantly, these institutions would build and convene significant expertise from various sectors that could be directly plugged in to government policy development, helping to expand the capacity to engage in strategic industrial policy and supply chain management which the government currently lacks. True industrial capacity comes with an ecosystem that can think, build, retain value, repurpose, and share knowledge over time. By building toward a dual-use industrial commons in Canada, the government will be investing in long-term and sustainable capacities that will have their own gravity, drawing in more ideas, manufacturing capacity, elements of the supply chain, and talent over time. This is not just a moment to build defence capacities—it is an opportunity to develop a new, robust industrial base across the country that can meet all emerging challenges in the 21st century and beyond. The government must meet this moment while there is a relatively unified spirit of wanting to build Canadian sovereignty in meaningful ways.

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