Canadian Shield Institute

Defining Dual-Use Technology

Canada is ramping up defence and dual-use technology investments after years of underspending relative to NATO's 2% GDP target and underinvestment in defence R&D. Having met 2% spending this year (2026) and with commitments to meet 5% by 2035, private sector interest in providing defence solutions to the government has surged. However, this creates the risk of over-designating "dual use," leading to misallocated funding and a cluttered landscape that makes it harder for DND to identify genuinely strategic investments.

The term "dual use" carries different meanings across contexts. For DND-CAF, it's about military capabilities. For policy experts looking to make Canada meet our NATO commitments, defining "dual use" determines what R&D counts toward our 5% GDP spending goals. In existing Canadian legislation, it usually refers to weapons control, nuclear materials, and export controls. For business, it's about market access—companies need civilian markets alongside defence to sustain growth and support the military industrial base. In research (private, public and academic), dual-use enables worthwhile 'moonshot' projects that may be high-risk but given their broad cross-domain potential will ensure high return on investment if successful.

True dual-use technologies that can or do serve both defence and civilian markets are abundant, but not all warrant the same investment.

We mus distinguish between commonplace technologies and those that are strategically foundational meriting significant moonshot R&D investments.

Not all dual-use technologies follow the same path. Commercial off-the-shelf (COTS) technologies may incidentally serve defence needs; modified off-the-shelf (MOTS) and 'exquisite' technologies are built for defence but can generate powerful civilian spillovers—jet engines for example. COTS procurement is better addressed through a separate track: challenge programs and communicating operational needs. Canada's investment strategy should skew toward MOTS and exquisite technologies, while building the industrial base that maximizes those spillovers.

Canada needs a new, agile definition of dual-use technology that balances defence innovation, economic development, and non-proliferation while ensuring high-value investments in strategically important technologies and industrial capacity. The Defence Industrial Strategy identifies dual-use capability development as a priority but does not provide an operational definition sufficient for procurement decisions or R&D investment screening. This framework fills that gap, building from NATO DIANA's focus on dual-use technology acceleration.

Definition

Dual-use technologies are those whose core R&D breakthroughs transfer across multiple application domains—including at least one with defence or national security relevance—without requiring separate fundamental research or significant retooling. The defining characteristics are convertibility of both R&D and industrial capacity: the same research, development, and manufacturing investment generates value across sectors, either through direct application with minimal adaptation, by creating foundational national capabilities that unlock development in other critical areas, or by building industrial and manufacturing capacity that is transferable across sectors. This includes technologies developed primarily for defence whose research base, manufacturing capacity, or enabling infrastructure generates spillover value into civilian industries.

Framework

The following five criteria are designed to help the Canadian government screen investments and to help companies self-assess whether their technology fits government needs. The intention of the framework is that each of these categories could be scored based on a low-medium-high scale to aid in determining if a technology is in fact dual use in a meaningful way.

1. Domain Portability: To what degree does the technology transfer across domains?
    a. The technology must at least cross between one civilian and one defence use case.
    b. More domains may be valuable but not essential as some very strategic technologies may be of high strategic value but only apply narrowly within them.
2. R&D and Industrial Convertibility: How much does R&D and infrastructure investment in one domain directly benefit other domains? How much does it take to make it work in a new domain?
    a. The more that investments can have value across use cases and domains, the better return and value will come out of R&D spending and investment in manufacturing capacity without having to retool or do new fundamental research.
3. Technological Maturity Level: What is the technological maturity of the technology in question based on the technology readiness level (TRL) scale of 1-9 or some other metric?
    a. The more mature a technology is the less likely to have emergent capabilities or open-ended R&D value but the more likely a clear market and value of the outputs can be determined.

4. Strategic Value: Is the technology essential for enabling other technologies or is it strategically essential (i.e. quantum encryption is strategically essential)?

    a. Even with low portability (1 defence and 1 civilian use case for example), high costs to convert across domains (low convertibility), and high maturity or locked-in use cases, a technology may still be strategically essential and therefore worth investing significantly in.

5. Application Duality and Risk: How much does the inherent dual-use value and risk of the technology depend on expertise and intent versus inherent characteristics? What level of controls needs to be placed on the technology that might hinder commercialization?

    a. If the technology is inherently dangerous or easily converted into its military use case with low expertise required (i.e LLM-enabled AI agents with coding abilities and potential for cyber capabilities lift) it may be subject to higher export restrictions out of necessity.

    b. Designation as a controlled good carries significant consequences for a company's ability to raise private capital, access export markets, and scale — particularly for early-stage firms. The framework must therefore avoid over-designating technologies as controlled goods prematurely while also taking care to be specific about exactly which elements of the technology need to be controlled (a special engine versus the whole truck). MOTS and exquisite technologies with genuine defence primacy should be assessed for controlled goods status carefully and in coordination with investment and scaling timelines, so that designation does not inadvertently suppress the industrial base Canada is trying to build.

Application Across Technology Categories

The framework criteria apply across all three dual-use trajectories, but MOTS and Exquisite technologies should receive procurement and R&D investment priority while COTS designation should require a higher bar on Criteria 2 (R&D and Industrial Convertibility) and 4 (Strategic Value).

There are phases to this:

- Defining what dual-use is and why
- Clarifying what enabling technologies we want to invest in for future dual-use capabilities and development
- Short-and-medium term procurement from relevant Canadian firms
- Coupled with a better definition of a Canadian company
- Building MOTS and exquisite industrial capacity with conditions for civilian spillover