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Canada

Statistical Overview of Canada's Defence Industry in 2018



Objective: Develop relevant, quality and timely strategic information on Canadian production of defence goods and services to brief policy and industry decision makers

- **Canada** is the first among OECD countries to conduct an **in-depth Government Statistical Agency survey** on defence industry capabilities
- Supported by a multi-year collaborative analytics agreement between **ISED** and the **Canadian Association of Defence and Security Industries (CADSI)**



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- This analysis presents a **statistical overview** of **Canada's defence industry activities in 2018**, based on the most recent data available
- As such, these findings provide insights into the state of Canada's defence industry **prior to the onset of the COVID-19 pandemic**
- The **next iteration** of the biennial survey will **measure 2020 industrial activities**, and will therefore reflect **potential pandemic impacts** in 2020 on the industry
 - Publication of **the basic 2020 data by Statistics Canada** is currently scheduled for **early 2022**

Survey Refinement & Preparations (May 2018 – March 2019):

- Consultation with industry, subject matter experts, defence and public security organizations, and policy makers on the research framework and updating the targeted population

Data Development (March 2019 – December 2019):

- ISED sponsored Statistics Canada biennial survey with **completion a legal requirement** under the Statistics Act measuring 2018 statistics (pre-covid)
 - Previous data collection efforts measured 2014 and 2016, with their findings summarised under previous reports
 - The next round of data collection is planned to measure 2020
- **Data quality validation and firm level imputation** based on administrative data

Data Analysis (January 2020 – September 2020):

- Data analytics and report **structure development**
- Economic impact estimation based on a methodology informed by **experts** at the OECD and Statistics Canada

Core areas of research and analysis



Economic Impact



Skills and Diversity



Size of Firm Footprint



Regional Areas of Strength



Innovation



Exports



Suppliers



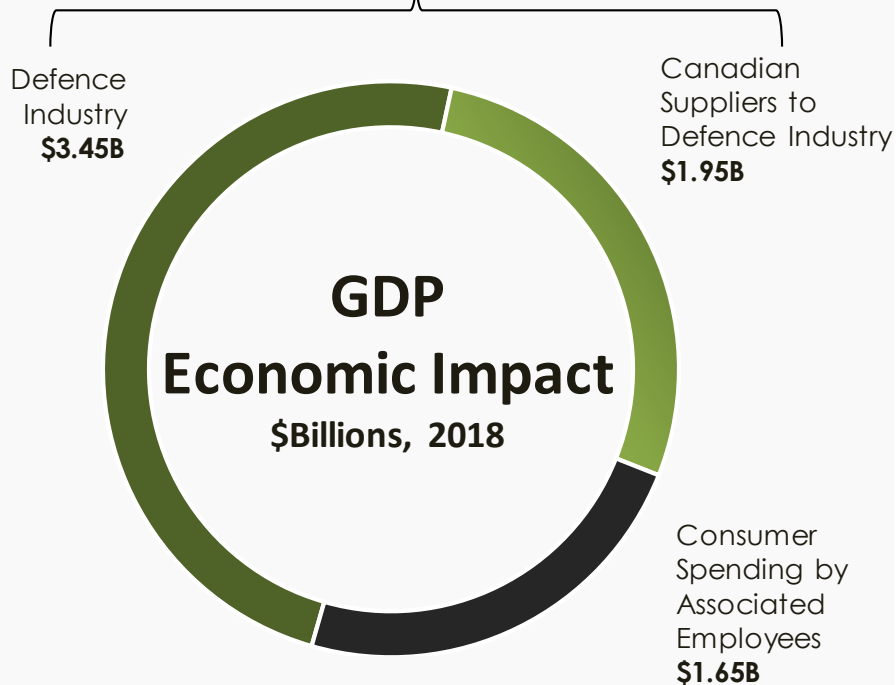
Annex



The Canadian defence industry contributed **over \$7B in GDP** and **close to 64,000 jobs** to the Canadian economy in 2018*

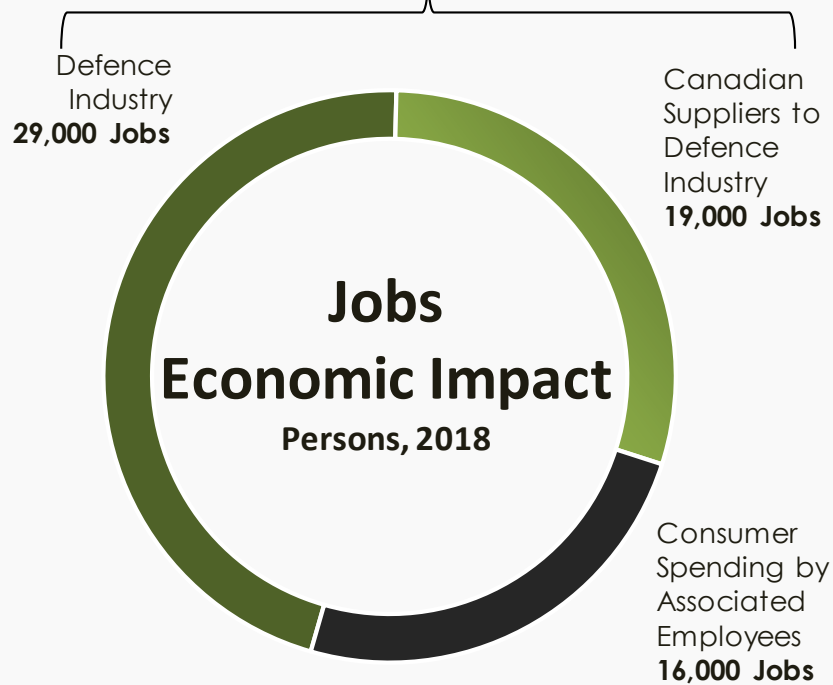
Defence Industry and Value Chain (Direct & Indirect)

\$5.4 Billion



Defence Industry and Value Chain (Direct & Indirect)

48,000 Jobs

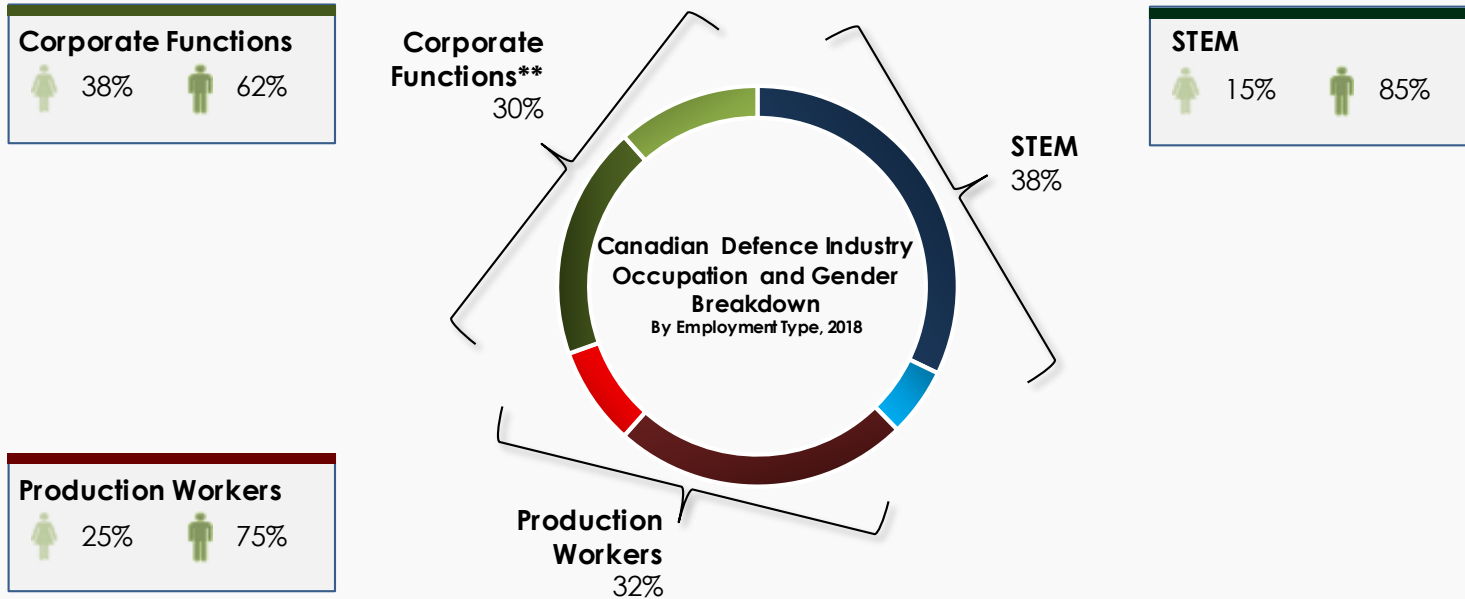


- The defence industry and its value chain contributed close to **\$5.4 billion in GDP** and **48,000 jobs** to the Canadian economy
- Consumer spending by associated employees contributed an additional **\$1.6 billion to GDP** and supported **close to 16,000 jobs**

* Excludes impacts from activities that occurred due to the application of the Industrial & Technological Benefits (ITB) Policy to military procurements if those activities did not relate in anyway to Canadian defence industry production in 2018 (as either supplies to the defence industry, or defence goods production by a defence firm). Furthermore, it was not possible to use existing data to specify exactly what share of the defence industry's estimated 2018 economic impacts were attributable to related industrial activities conducted due to the ITB Policy. In 2020, ISED also revised estimates of 2016 economic impacts by using an updated model with the latest 2016 Statistics Canada input-output multipliers, as only 2014 multipliers were available when the defence industry's 2016 economic impacts were originally estimated in 2018. The revised total GDP impact estimate for 2016 is \$6.6B while the revised jobs impact is 59.4K for 2016. See Annex for detailed economic impact analysis. Jobs refers to full-time equivalent employees
Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2016 and 2018 editions), released in 2018 and in 2020 respectively; ISED economic modelling based on Statistics Canada's latest input-output multipliers (2016) and the specific economic impact multipliers most relevant to the survey's individual defence goods and services categories



STEM* occupations' share of employment was 3.5X that of the Canadian manufacturing average in 2018



Female Employees' Share of Occupation Types		
Occupation Type	Canada's Defence Industry	Canada's Manufacturing Sector
Corporate Functions	38%	44%
STEM	15%	20%
Production Workers	25%	22%
TOTAL	25%	27%

The defence industry had a **similar pattern as the manufacturing average** in terms of its overall **gender breakdown**, but with some differences across occupational types

* Under the survey, Science, Technology, Engineering, & Mathematics (STEM) occupations include engineers, scientists and/or researchers, and technicians and technologists.

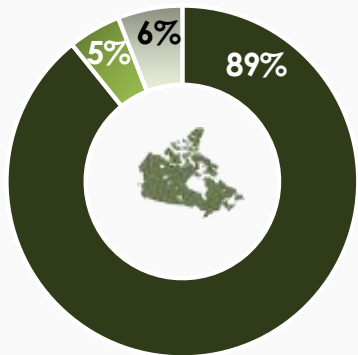
** Includes occupations in: management, administration, marketing, and all other employees.

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020; Statistics Canada Custom Tabulation, Labour Force Survey (2018), 2020

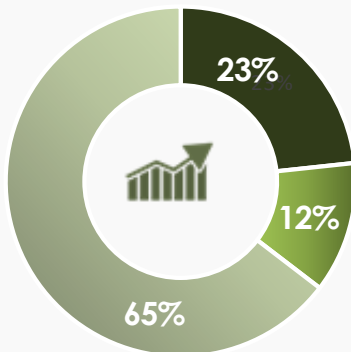


Firms with less than 250 employees represented **close to 90%** of firms in the Canadian defence industry in 2018

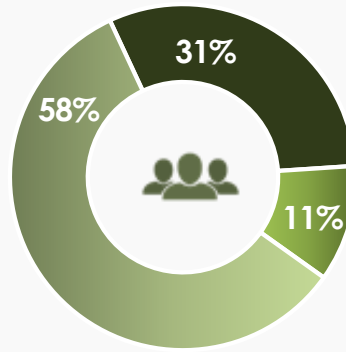
Count



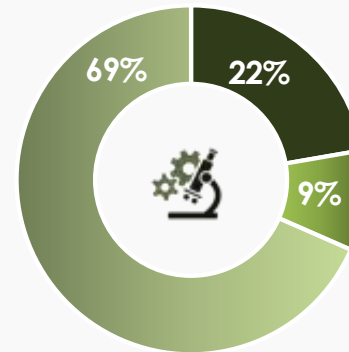
Sales



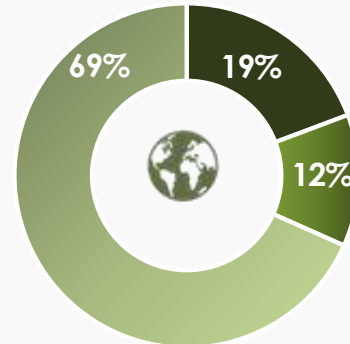
Employment



R&D



Exports



● Less than 250 employees

● 250-499 employees

● 500 or more employees

- **Firms with less than 250 employees** accounted for **23%** of defence industry sales, **31%** of employment, **22%** of R&D, and **19%** of exports



Defence industry sales, employment and exports volume grew during the 2014 and 2018 period*

Key Indicators*, 2014-2018 Growth**



*Estimates are in nominal terms and are not adjusted for inflation; Between 2016 and 2018, the value of R&D performed by the defence industry increased 4% on a current dollar basis. However, 2014 R&D values are not available for comparison with 2018. Among firms accounting for 50.1% of 2014 defence industry sales, it could not be determined whether or not they performed R&D, and/or the value of their R&D. Therefore, it was not possible to derive estimates of defence industry in-house R&D spending and intensity that could be regarded as statistically representative of the total industry with sufficient confidence

**Estimates presented here in relation to 2014 are based on updated 2014 data reflecting necessary revisions which occurred subsequent to both Statistics Canada's original data release, and the ISED-CADSI publication in 2016 of the "State of Canada's Defence Industry, 2014" report.

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020

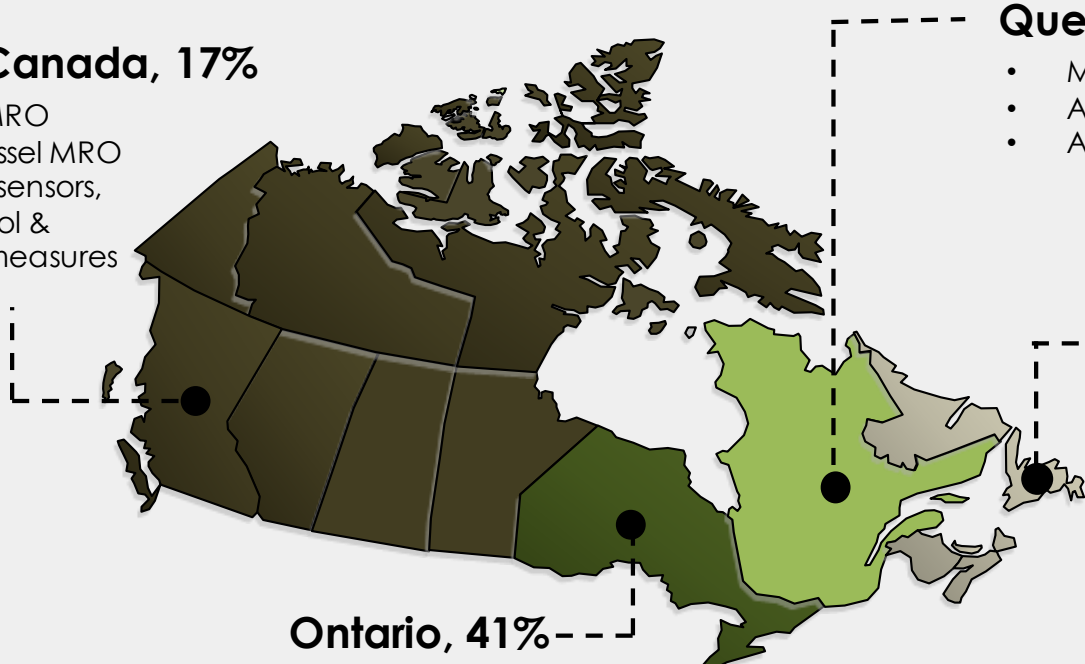


In 2018, the defence industry was present across Canada with regional specializations*

Canadian defence industry employment regional breakdown**, with top regional specializations 2018

Western Canada, 17%

- Aircraft MRO
- Naval vessel MRO
- Airborne sensors, fire-control & countermeasures



Quebec, 23%

- Munitions (excluding firearms)
- Aircraft MRO
- Aircraft simulation systems

Atlantic Canada, 19%

- Naval shipbuilding & conversions
- Aircraft MRO
- Naval vessel MRO

Ontario, 41%

- Combat vehicle fabrication
- Airborne sensors, fire-control & countermeasures
- Aircraft & aircraft parts fabrication

* See Annex for the full official titles of the defence goods and services categories

** Shares of employment by region based on businesses that specified their regional employment breakdown. The rankings of the top 3 activities exclude a survey category which covered a mix of other (unspecified) defence goods and services

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020



Close to **\$10.7B** in defence sales were generated by **almost 640** firms across domains in 2018*

Technological/Functional Types	Share of Defence Sales (%)			Total
	Air & Space Systems Categories	Land & Other Defense Categories	Marine Defence Categories	
	35.5%	44.5%	20.0%	
Platforms & Platform Systems	7.7%	16.4%	10.4%	34.6%
Platform MRO Services	11.3%	4.5%	5.0%	20.7%
Mission Systems / Sensors, Other Electronics, Software and Related Systems	16.5%	7.0%	4.7%	28.2%
Firearms, Missiles, Rockets, and Other Munitions & Weapons		5.1%		5.1%
Military PPE, Load Carriage Systems and Operational Clothing		1.8%		1.8%
Military Training Services		4.7%		4.7%
Other		5.0%		5.0%
TOTAL	35.5%	44.5%	20.0%	100.0%

* In the context of this document, the grouping of defence goods and services categories according to 'domains' is determined by the platform type to which they relate. See Annex 2 for the full official titles and definitions of the survey's defence goods and services categories and Technological and Functional Types

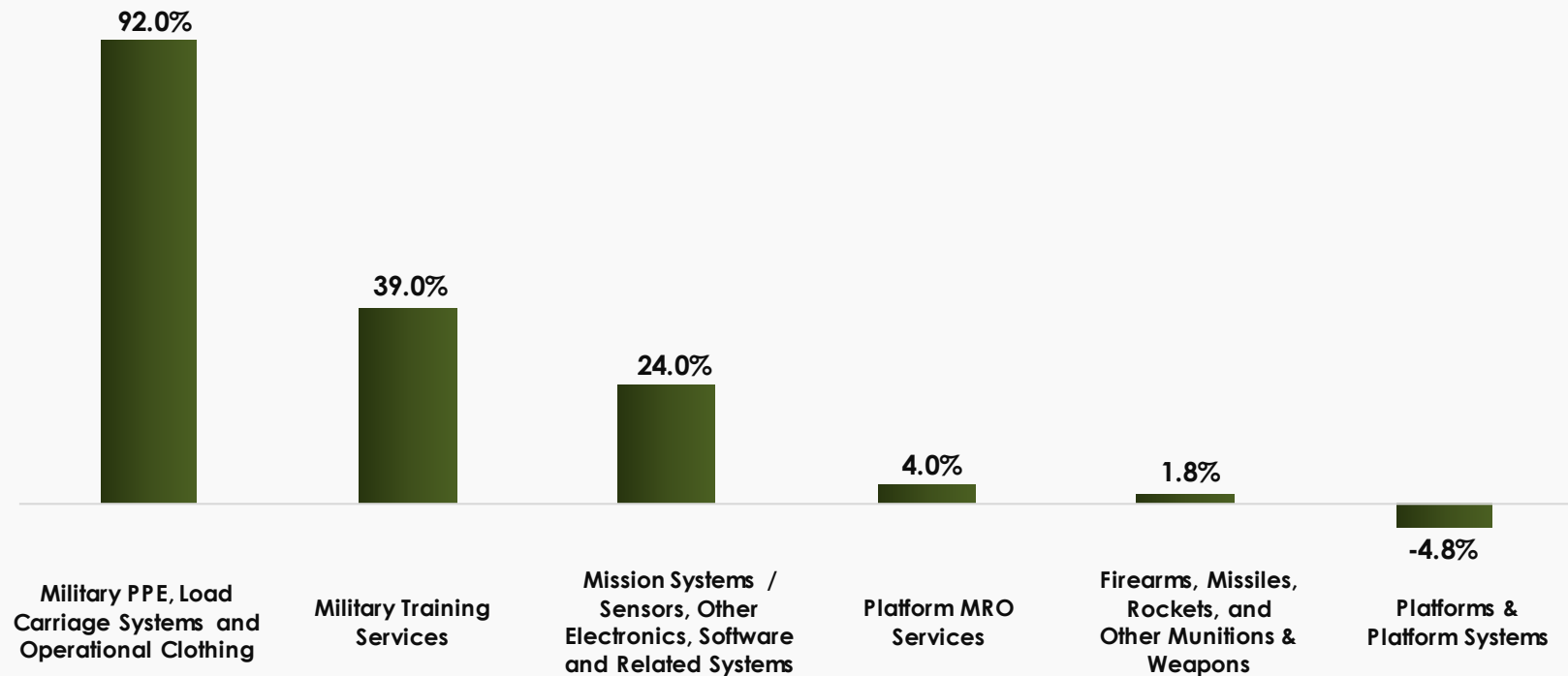
**MRO (Maintenance, repair and overhaul)

Source: Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2018 survey released in 2020



Sales growth varied significantly across different types of products and services in 2018

Defence Products and Services Sales Growth by Technological/Functional Type, 2016-2018*

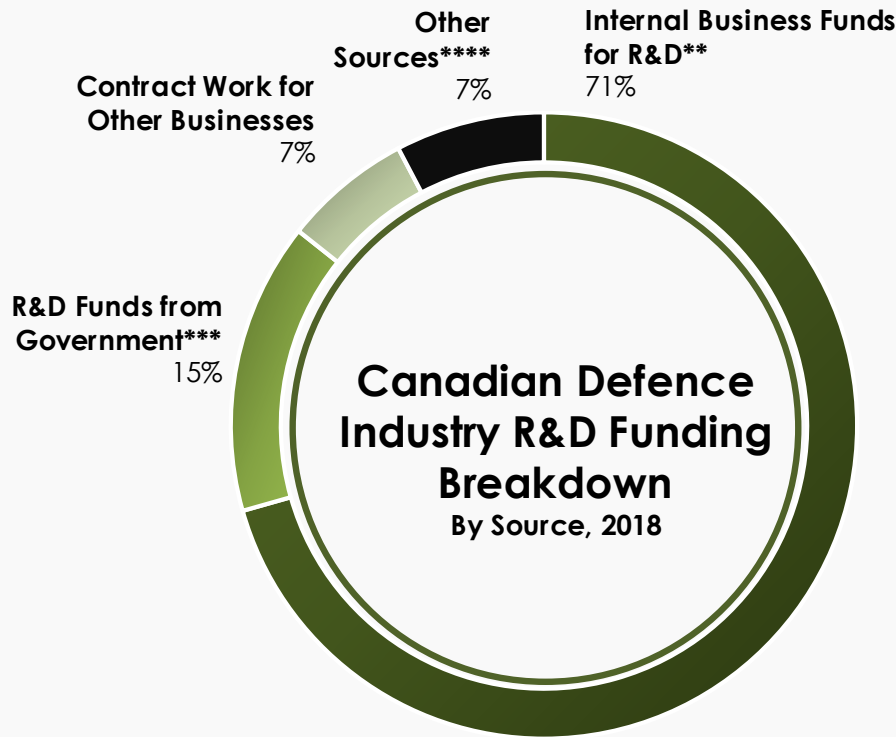


* Estimates are in nominal terms and are not adjusted for inflation. The survey results of individual defence goods and services categories were combined into special groupings according to similarities in categories' technological and functional nature, and associated production processes. See Annex 2 for a list of the goods and services categories comprising these technological/functional groupings. The grouping of published 2014 data in a comparable manner was not possible, mainly due to Statistics Canada's merger of several 2014 goods and services categories to address confidentiality requirements; as well as due to differences in the specification of some 2014 categories versus subsequent surveys.

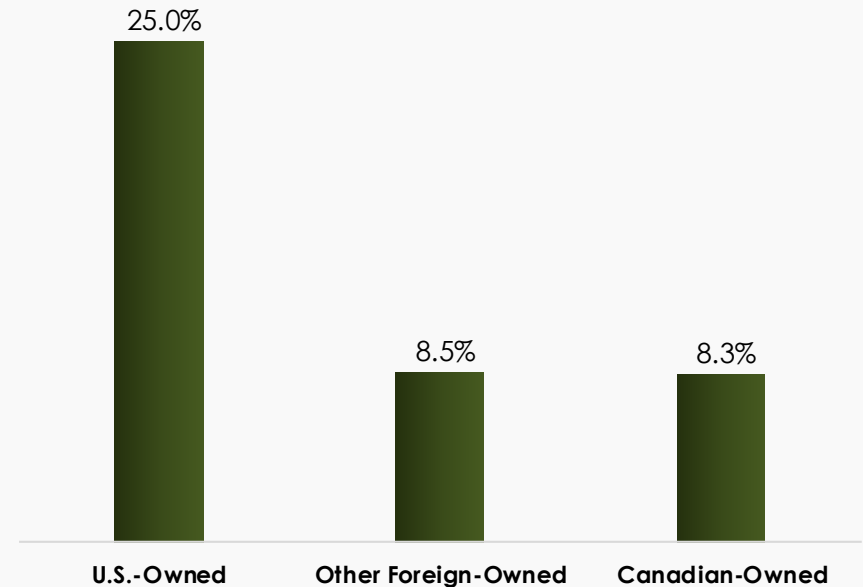
Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020



The defence industry's R&D intensity*, was **more than 4.5X** that of the Canadian manufacturing average in 2018



Share of Canadian vs. foreign-owned firms' R&D funded by Canadian government grants & contracts, 2018



- **Close to \$415M of R&D** activity took place — largely funded by industry
- Canadian **government contracts and grants** funded **15%** of total R&D, with differences between Canadian and foreign-owned companies

* R&D intensity is measured as the ratio of R&D performed by a given industry or sector relative to its own GDP

** This includes funds from the defence businesses performing the R&D, plus some funds from their parent, affiliated and subsidiary companies

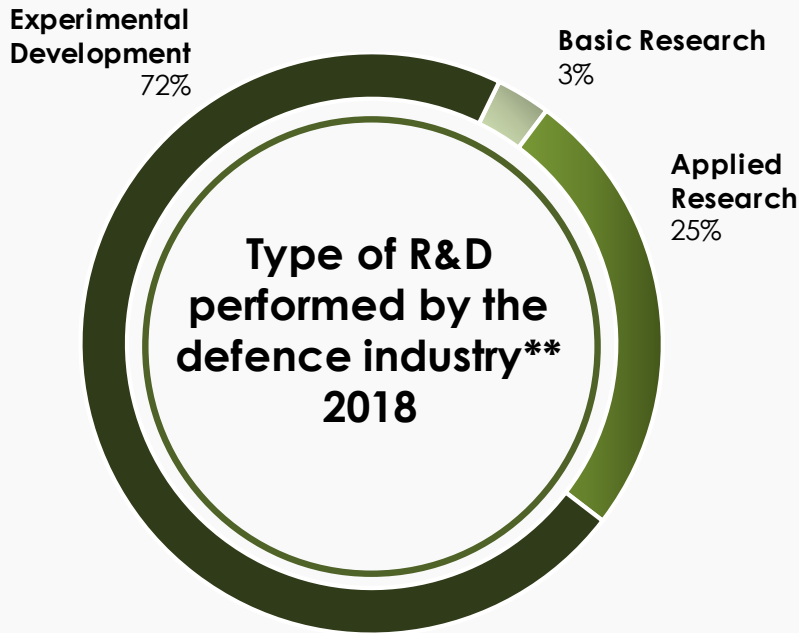
*** Government funded R&D is dominated by grants

**** Other sources may include universities, foreign governments, individuals, etc.

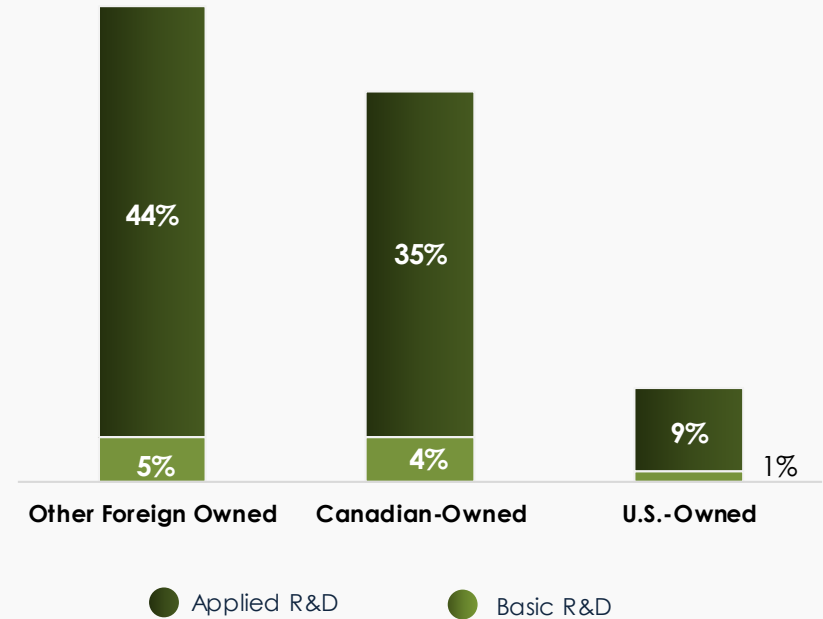
Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020; ISED estimates of defence industry GDP; Statistics Canada's Table 27-10-0333-01 R&D data in current dollars; and Tables 36-10-0434-01 and 36-10-0222-01 for GDP in current dollars (2018), 2020



The share of applied R&D was close to 3X that of the Canadian manufacturing average* in 2018



Share of Canadian vs. foreign-owned firms' R&D that was Basic and Applied research, 2018



- Defence industry R&D was led by **experimental development**, with types of R&D performed varying between Canadian vs foreign-owned firms

* Manufacturing average is for 2017, based on latest available Statistics Canada table 27-10-0344-01

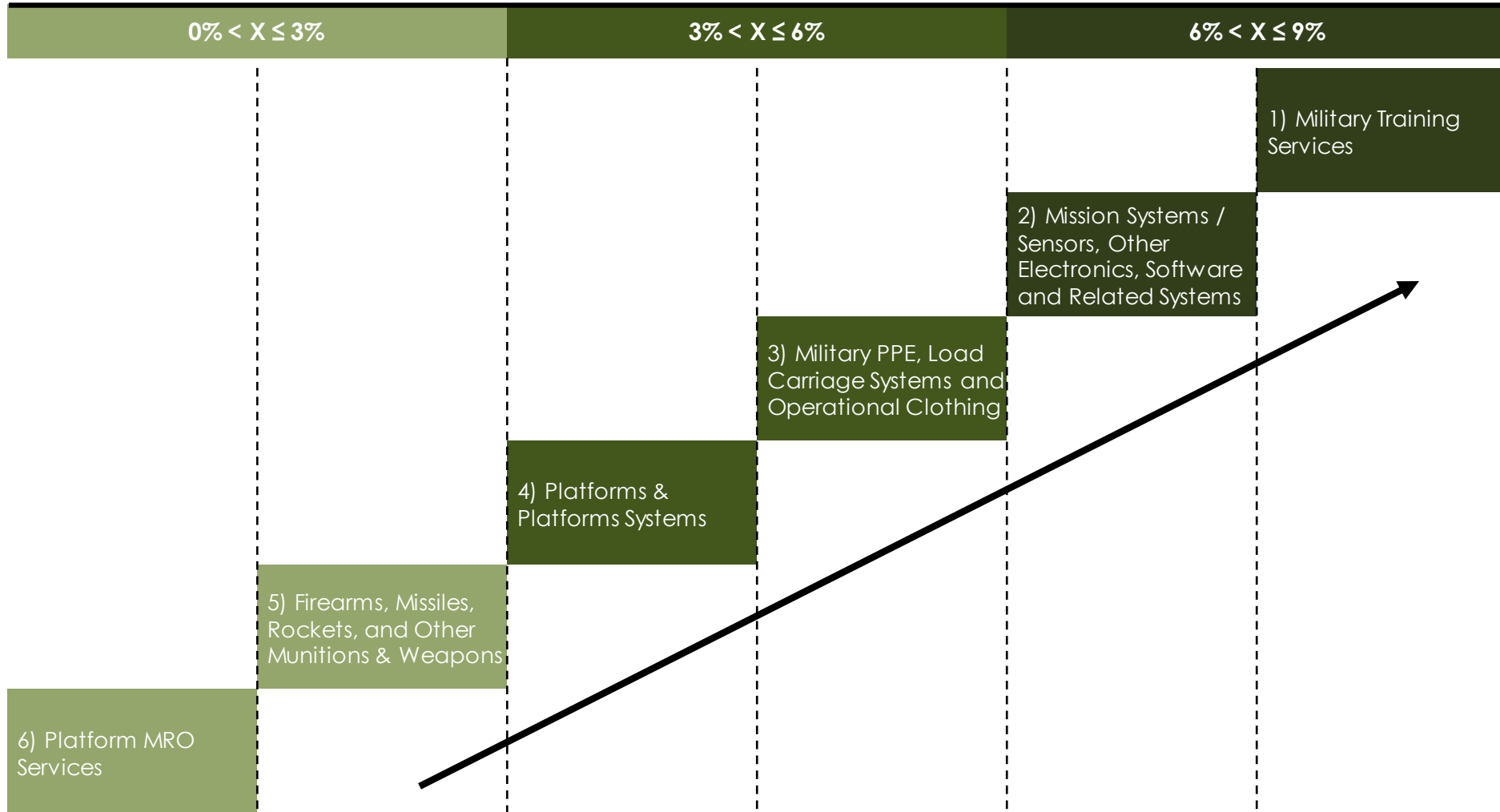
** Defence industry R&D breakdown by nature based on R&D activities for which their nature was specified by respondents

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020; Statistics Canada's Table 27-10-0344-01 R&D data.



R&D to sales ratios varied greatly by type of products and services in 2018

R&D to Sales Ratio Ranking of Defence Products and Services by Technological/Functional Type, 2018

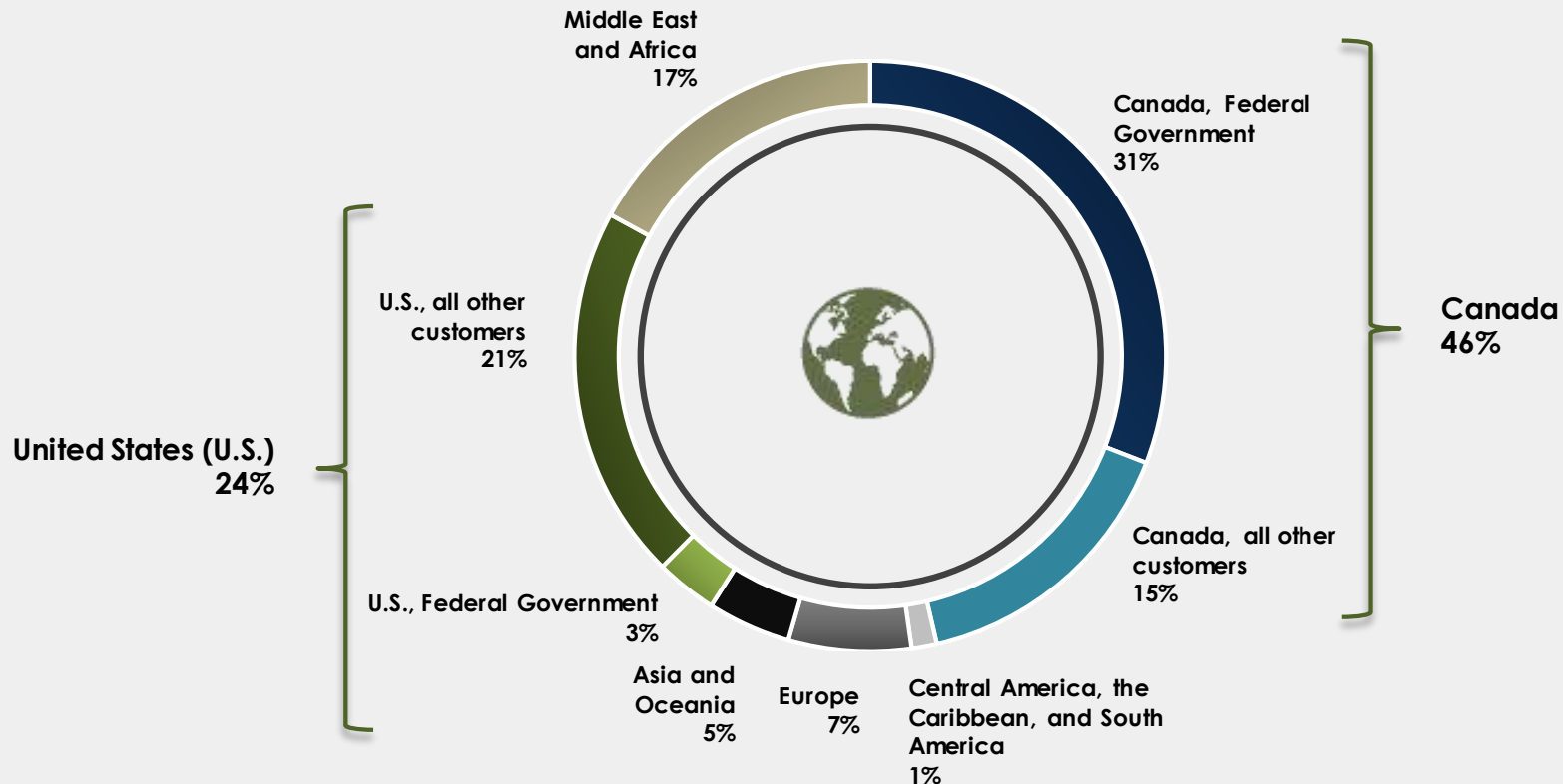


* The 'Other Defence Goods and Services' category is excluded from this ranking
Source: Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2018 survey released in 2020



The Canadian defence industry is export oriented across various markets

Canadian Defence Industry Global Market Breakdown By Sales, 2018



- **Export value increased** from \$5.5B in 2014* to \$5.7B in 2018
- **Export intensity** went from 60% in 2014* to 54% in 2018, driven by a **larger increase in domestic sales**

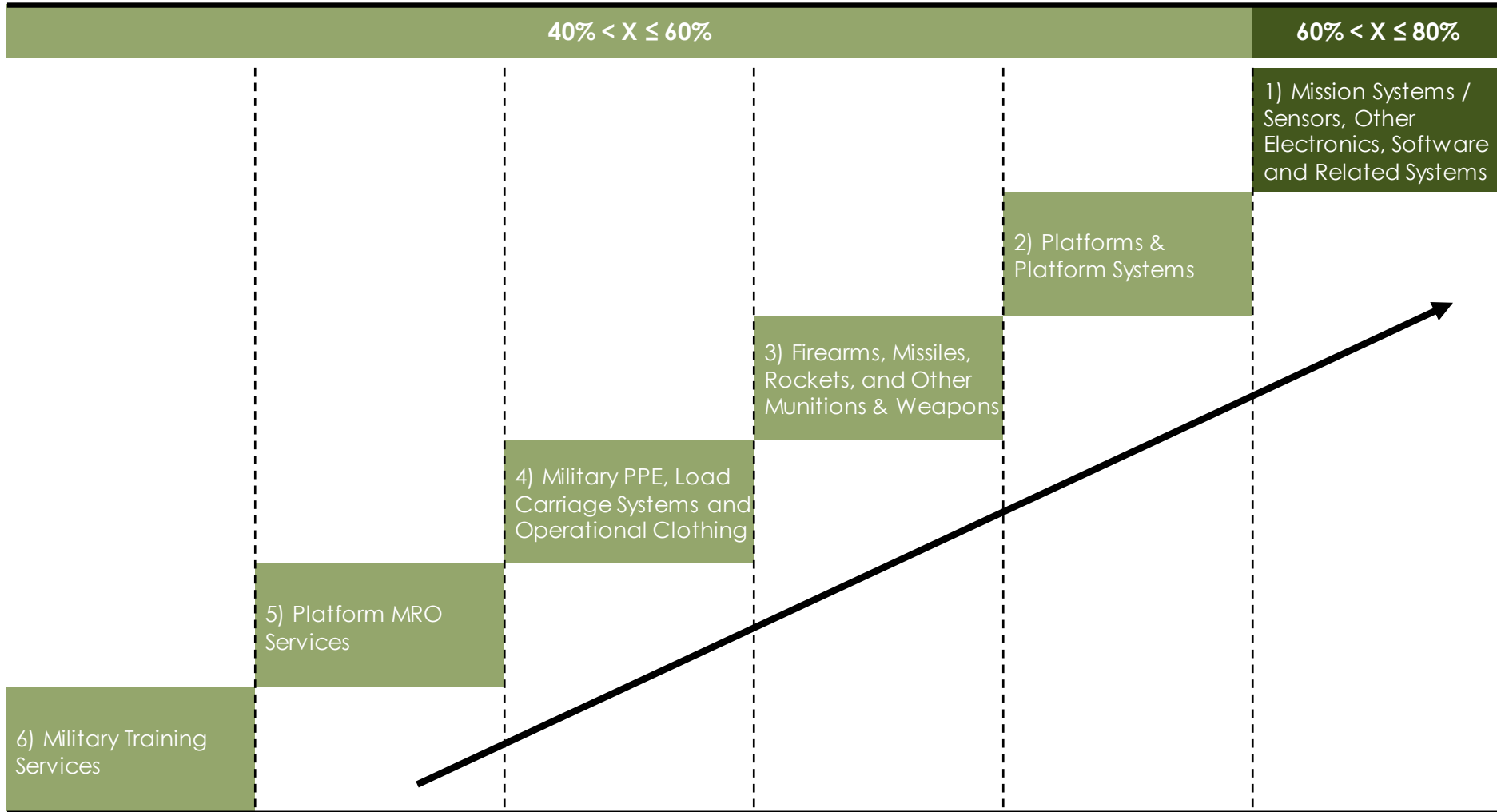
*Estimates presented here in relation to 2014 are based on updated 2014 data reflecting necessary revisions which occurred subsequent to both Statistics Canada's original data release, and the ISED-CADSI publication in 2016 of the "State of Canada's Defence Industry, 2014" report.

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020



In 2018, export intensity varied across defence products and services

Export Intensity Ranking* of Defence Products and Services by Technological/Functional Type**, 2018



* At the level of individual goods and services categories, export intensities ranged from as low as 0% to 20%, to as high as 80% to 100%

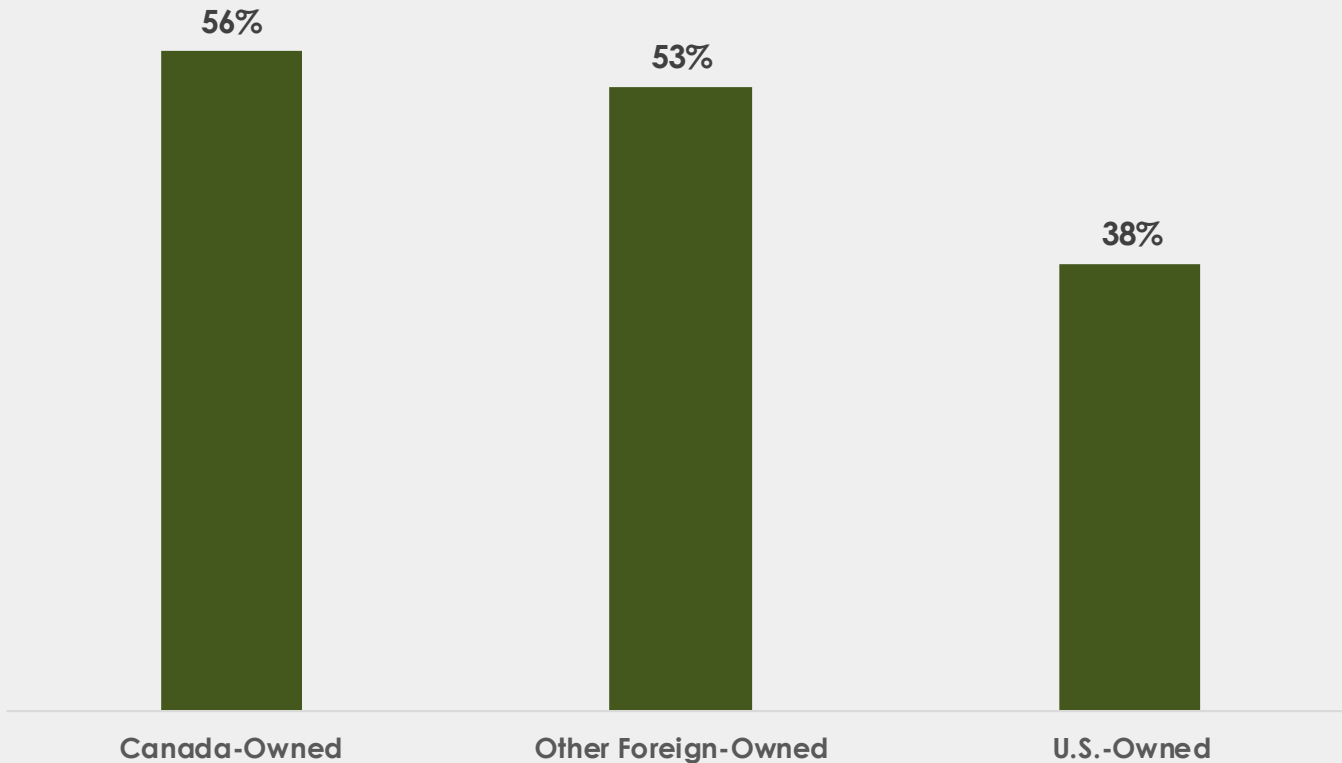
** The "Other defence goods and services" category is excluded from the ranking

Source: Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2018 survey released in 2020



Firm ownership location and intensity of sourcing from Canadian suppliers in 2018

Share of businesses' purchases* made from Canadian suppliers, 2018



*This includes purchases of items such as raw materials and components for manufacturing

Source: Statistics Canada's Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2020



In 2018, Canada's defence industry:

- Generated close to **\$10.7B in defence sales** by almost **640 firms** across domains
- Contributed close to **64,000 jobs** to the Canadian economy
- Increased its **jobs, revenues** and **export volume** for the 2014-2018 period
- Was national in scope, with regional specializations
- Was **4.5X more R&D** intensive than the broader manufacturing sector—led by industry funded R&D
- Had a more **STEM oriented workforce**, with STEM-related occupations' share of its employment more than **3.5X** that of the manufacturing sector
- Was globally engaged and **export oriented**
- Varied greatly by firm ownership in terms of **sourcing from Canadian suppliers**



Annex 1: Economic Impact Methodology Principles

Annex 2: Technological/Functional Groupings of Defence Goods and Services Categories

Annex 3: Regional Ranking of Activities

Annex 4: Data Tables

Annex 5: Defence Goods and Services Category Definitions



Annex 1: Economic Impact Methodology Principles

- Foundation data is based on the latest (2018) Canadian Defence, Aerospace, Marine, and Cybersecurity Industries Survey released in 2020
- ISED economic modelling based on Statistics Canada's latest Input-Output multipliers (2016) and closest related specific economic impact multipliers that relate to defence activities
- Economic model is based on Statistics Canada Input-Output (I/O) multipliers
 - Defence activity has been linked to the latest (2016) and most relevant specific economic impact multipliers per defence industry products and services category
 - GDP impact is reported cumulatively and on a yearly average basis
 - Job impact is reported on the annual average basis and measured in terms of full-time equivalent employment (FTE)
 - Total economic impact of the defence industry includes the activity that occurs within the Canadian defence industry, Canadian suppliers to the Canadian defence industry, as well as consumer spending by associated employees across the Canadian economy
 - Economic impact estimates are reported at the national level and cannot be broken down at the regional level



Annex 2: Technological/Functional Groupings of Defence Goods and Services Categories

Platforms & Platform Systems

Naval Ships' Structural Elements, Platform Systems, Parts and Components (Excludes: Ship-Borne Naval Mission Systems)

New Naval Vessels Constructed by Shipyards, and Naval Conversions

Combat Vehicles and Components

Aircraft Fabrication, Structures and Components

Unmanned Aerial Systems/Vehicles (UAS/V) and Components

Platform MRO Services

Naval Ship Maintenance, Repair and Overhaul

Combat Vehicles Maintenance, Repair and Overhaul

Military Aircraft Maintenance, Repair and Overhaul Services

Mission Systems / Sensors, Other Electronics, Software and Related Systems

Military Systems Deployed in Space, Space Launch Vehicles, Land-based Systems for the Operation, Command and Control of Space Launch Vehicles or Systems Deployed in Space and Related Components

Primarily Airborne Electro-Optical, Radar, Sonar and Other Sensor/Information Collection Systems; Fire Control, Warning and Countermeasures Systems and Related Components

Primarily Land-Based, Ground Vehicle-Borne, Man-Portable or Non-Platform Specific Electro-Optical, Radar, Sonar and Other Sensor/Information Collection Systems; Fire Control, Warning and Countermeasures Systems and Related Components

Primarily Airborne Communications and Navigation Systems; and Other Information Systems (Including Processing and Dissemination), Software, Electronics and Components

Primarily Land-Based, Ground Vehicle-Borne, Man-Portable or Non-Platform Specific Communications and Navigation Systems; and Other Information Systems (Including Processing and Dissemination), Software, Electronics and Components

Naval Ship-Borne Mission Systems and Components

Simulation Systems for Aircraft

Simulation Systems for Naval Vessels

Simulation Systems for Land Vehicles or Other Applications



Annex 2: Technological/Functional Groupings of Defence Goods and Services Categories (Cont.)

Firearms, Missiles, Rockets, and Other Munitions & Weapons

Ammunition and Other Munitions

Missiles and Rockets

Firearms and Other Weapons

Military PPE, Load Carriage Systems and Operational Clothing

Military Personal Protective Equipment, Load Carriage Systems and Operational Clothing

Military Training Services

Military Training Services

Other

Other Defence



Annex 3: Regional Ranking of Activities

Ranking	Western and Northern Canada Top 10 Ranking of Activities
1	Aircraft MRO
2	Naval MRO
3	Airborne sensors, fire-control & countermeasures
4	Aircraft & aircraft parts fabrication
5	Naval shipbuilding and conversions
6	Land based communications systems and components
7	Naval Ship-Borne Mission Systems
8	Combat vehicle fabrication
9	Military training services
10	Naval Structural Elements and Platform Systems

Ranking	Ontario Top 10 Ranking of Activities
1	Combat vehicle fabrication
2	Airborne sensors, fire-control & countermeasures
3	Aircraft & aircraft parts fabrication
4	Land based communications systems and components
5	Airborne communications systems and components
6	Naval Ship-Borne Mission Systems
7	Military PPE, load carriage systems and operational clothing
8	Aircraft MRO
9	Combat vehicle MRO
10	Naval Structural Elements and Platform Systems



Annex 3: Regional Ranking of Activities (Cont.)

Ranking	Quebec Top 10 Ranking of Activities
1	Munitions (excluding firearms)
2	Aircraft MRO
3	Aircraft simulation systems
4	Military training services
5	Airborne communications systems and components
6	Aircraft & aircraft parts fabrication
7	Combat vehicle fabrication
8	Land based communications systems and components
9	Naval Ship-Borne Mission Systems
10	Airborne sensors, fire-control & countermeasures

Ranking	Atlantic Canada Top 10 Ranking of Activities
1	Naval shipbuilding and conversions
2	Aircraft MRO
3	Naval MRO
4	Airborne sensors, fire-control & countermeasures
5	Aircraft & aircraft parts fabrication
6	Naval Structural Elements and Platform Systems
7	Airborne communications systems and components
8	Naval Ship-Borne Mission Systems
9	Combat vehicle fabrication
10	Military training services



Annex 4: Data Tables

Table I: Economic Impact

GDP Economic Impact (\$M)				
Defence Industry (\$M)	Suppliers to Defence Industry (\$M)	Defence Industry and Value Chain (\$M)	Consumer Spending by Associated Employees (\$M)	Cumulative Total GDP (\$M)
\$3,450M	\$1,950M	\$5,400M	\$1,650M	\$7,050M

Jobs Economic Impact				
Defence Industry	Suppliers to Defence Industry	Defence Industry and Value Chain	Consumer Spending by Associated Employees	Total Annual Average Jobs
29,000 Jobs	19,000 Jobs	48,000 Jobs	16,000 Jobs	64,000 Jobs

Source: Canadian Defence, Aerospace, Marine and Cybersecurity Industries Survey (2018), 2018 survey released in 2020; ISED economic modelling based on Statistics Canada's latest Input-Output multipliers (2016) and closest related specific economic impact multipliers that relate to defence activity



Annex 4: Data Tables (Cont.)

Table II: Regional Breakdown

Regional Breakdown	Western and Northern Canada	Ontario	Quebec	Atlantic Canada
Distribution of Employment in the Defence Industry	17%	41%	23%	19%

Table III: Firm Size Breakdown

Size Breakdown	Share of Total Defence Industry Enterprise Counts	Share of Total Defence Industry Sales	Share of Total Defence Industry Employment	Share of Total Defence Industry R&D	Share of Total Defence Industry Exports
Enterprises with less than 250 employees	89%	23%	31%	22%	19%
Enterprises with between 250 and 499 employees	5%	12%	11%	9%	12%
Enterprises with 500 or more employees	6%	65%	58%	69%	69%
Total Enterprises	100%	100%	100%	100%	100%

Table IV: Domain Breakdown

Domain	Share of Total Defence Industry Sales	Share of Total Defence Industry Employment	Share of Total Defence Industry R&D	Share of Total Defence Industry Exports
Aerospace and Space	36%	39%	45%	43%
Land and Other	44%	41%	50%	48%
Marine	20%	20%	5%	9%
Total Enterprises	100%	100%	100%	100%



Annex 4: Data Tables (Cont.)

Table V: R&D

Sources of Funds for R&D	Share of R&D Breakdown
Internal Business Funds for R&D	71%
R&D Funds from Federal and Provincial Government	15%
R&D Contract Work for Other Businesses	7%
Other Sources	7%

Types of R&D	Share of R&D Breakdown
Basic Research	3%
Applied Research	25%
Experimental Development	72%

Table VI: Basic and Applied Research's Share of Canadian vs. foreign-owned Firms' R&D

Types of R&D	Other Foreign Owned	Canadian-Owned	U.S.-Owned
Basic Research	5%	4%	1%
Applied Research	44%	35%	9%

Table VII: Share of Canadian vs. foreign-owned firms' R&D funded by Canadian government grants & contracts

	U.S.-Owned	Other Foreign-Owned	Canadian-Owned
Share of firms' R&D Funded by Canadian Government Contracts & Grants	25.0%	8.5%	8.3%



Annex 4: Data Tables (Cont.)

Table VIII: Occupation and Gender Breakdown

Occupation Breakdown	Share of Employment by Occupation	Gender Breakdown	Share of Occupations' Employment by Gender
STEM	38%	Male	85%
		Female	15%
Production Workers	32%	Male	75%
		Female	25%
Corporate Functions	30%	Male	62%
		Female	38%

Table IX: Domestic and Foreign Market Breakdown

Defence Domestic Sales		46%	Defence Export Sales		54%
Domestic Sales by Customer Type*			Export Sales by Destination		
• Canadian Federal Government	69%		• United States	45%	
• Other Canadian Customers	31%		• Middle East and Africa	32%	
			• Europe	12%	
			• Asia and Oceania	8%	
			• Central America, the Caribbean, and South America	3%	
Defence Industry Domestic Sales Total	100%		Defence Industry Export Sales Total	100%	



Annex 5: Defence Goods and Services Category Definitions

Definition of Defence Categories

Ammunition and other munitions

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services, and disposal activities such as relating to:

conventional ammunition in small/medium/large calibers, artillery and mortar rounds, bombs, grenades, torpedoes, mines, other munitions and related precision manufacturing;

related propellants and explosives like explosive plastics, gels, liquids, and powders; and nuclear, biological and chemical warheads.

Excluded are sales of missiles, rockets and other related parts and components which should be reported under the category for, 'Missiles and Rockets'.

Missiles and Rockets

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services relating to military missiles and rockets, including advanced missiles used by anti-ballistic missile (ABM) systems.

Excluded here are sales relating to:

Space launch vehicles;

Munitions/sub-munitions and other types of warheads carried on, or delivered by missiles and rockets.

Those are to be reported under either the categories for 'Ammunition and Other Munitions' or for military space systems as appropriate.

Firearms and other weapons

This category **includes** military sales related to production as well as research, development, design, engineering, testing and evaluation services relating to technologies aggressively used to gain or defend a tactical advantage over an adversary; to attack, defend and protect assets and personnel. This **includes** lethal and non-lethal kinetic and non-kinetic weapon systems like:

light/medium/heavy firearms;

vehicle-based or mobile weapons like tank guns, howitzers, mortars and missile launchers;

acoustic, laser, and other electromagnetic based weapon systems.

Military systems deployed in space, space launch vehicles, land-based systems for the operation, command and control of space launch vehicles or systems deployed in space, and related components

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services:

Relating to primarily military systems deployed in space (**e.g.** satellites, spacecraft, and space robotic systems) and their sub-systems and components; as well as space launch vehicles.

Related design, engineering and production of earth-based systems used for the operation, Command & Control of military systems deployed in space and space launch vehicles (**e.g.** ground stations, satellite tracking systems, and launch facilities).



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Primarily airborne electro-optical, radar, sonar and other sensor / information collection systems; fire control, warning and countermeasures systems, and related components

This category includes sales related to production as well as research, development, design, engineering, testing and evaluation services relating to primarily airborne: electro-optical systems (**e.g.**, image intensification night-vision systems, thermal imaging systems, lasers), radars, dipping sonar, other sensors, and fire-control systems used to aid weapons in target acquisition, tracking and engagement;
warning systems (**e.g.**, technologies that detect enemy radars, enemy laser targeting systems, and approaching threats such as missiles);
countermeasures (**e.g.**, electronic jamming equipment, smoke screens, flares to counter heat-seeking missiles).
other related aircraft avionics systems.

Note: sales relating to similar systems, parts and components but which are integrated into naval vessels should be reported under the category for "Naval Ship-Borne Mission Systems and Components".

Primarily land-based ground vehicle borne, man-portable or non-platform specific electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems, and related components

This category includes sales related to production as well as research, development, design, engineering, testing and evaluation services relating to primarily land-based, ground vehicle-borne, man-portable or non-platform specific:
electro-optical systems (**e.g.**, image intensification night-vision systems, thermal imaging systems, lasers), radars, sonar, other sensors, and fire-control systems used to aid weapons in target acquisition, tracking and engagement;
warning systems (**e.g.**, technologies that detect enemy radars, enemy laser targeting systems, and approaching threats such as missiles), and countermeasures (**e.g.**, electronic jamming equipment, smoke screens, flares to counter heat-seeking missiles).

Note: sales relating to similar systems, parts and components but which are integrated into naval vessels should be reported under the category for: "Naval Ship-Borne Mission Systems and Components".

Primarily airborne communications and navigation systems; and other information systems (including processing and dissemination), software, electronics and components

This category includes sales related to production as well as research, development, design, engineering, testing and evaluation services relating to primarily airborne: military communications systems, secure cyber/information systems, and other military Information Technologies (including software);
navigation and guidance systems (**e.g.**, Global Positioning System [GPS] based systems, gyroscopes, accelerometers) and other geomatics related systems and services (**e.g.**, geographic information system (GIS) products and services for military applications, remote sensing services for military applications);
other technologies for the receipt, exchange/disseminating, processing, synthesizing, analysis and integration of multiple types of data;
display technologies, digital control systems and other avionics; Other mission system avionics, computers and electronics;
other aircraft avionics for military aircraft not elsewhere specified.

Note: sales relating to similar systems but which are integrated into naval vessels should be reported under the category for: "Naval Ship-Borne Mission Systems and Components".



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Primarily land-based, ground vehicle-borne, man-portable or non-platform specific communications and navigation systems; and other information systems (including processing and dissemination), software, electronics and components

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services relating to land-based, ground vehicle-borne, man-portable or non-platform specific:

military communications systems, secure cyber/information systems and other military Information Technologies (including software); navigation and guidance systems (**e.g.** Global Positioning System [GPS] based systems, gyroscopes, accelerometers) and other geomatics related systems and services (**e.g.** geographic information system (GIS) products and services for military applications, remote sensing services for military applications); other technologies for the receipt, exchange/disseminating, processing, synthesizing, analysis and integration of multiple types of data; display technologies and digital control systems; other defence computer and electronics related products not elsewhere specified.

Note: sales relating to similar systems but which are integrated into naval vessels should be reported under the category for: "Naval Ship-Borne Mission Systems and Components".

Naval ship-borne mission systems and components

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services relating to such systems as: Naval vessel mission/combat systems: command, control, and communications; radar, sonar, electro-optical and other sensors, navigation systems, displays, other Information Technologies (including Software) and electronics, countermeasures; guns, and missile or torpedo launchers.

Excluded from this category are sales related to the actual missiles, torpedoes and other munitions or projectiles launched or fired from/by naval vessels' weapon systems; as well as associated warheads.

Such sales are to be reported under either the category for 'Missiles and Rockets' or the category for 'Ammunition and Other Munitions' as appropriate.



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Naval ship's structural elements, platform systems, parts & components (excluding shipborne naval mission systems)

This category **includes** sales for production as well as research, development, design, engineering, testing and evaluation services relating to:

Platform systems, subsystems, structural parts and components intended for either existing manned naval surface ships/submarines or for use during the building of new manned naval vessels (**e.g.**, vessels that were specifically designed or modified for use by militaries in combat or the transportation of military goods and personnel).

For example, this would **include** sales of bulkheads, ship propulsion plant and electrical power systems, ship propellers and propeller shafts, steering mechanisms, machinery control systems, ballistic protection materials, fire extinguishing systems, climate control/ventilation and water treatment systems, plumbing, deck machinery, living spaces, and hull compartments and other hull sections, naval ships' helicopter handling systems, **etc.**

Excluded from this category are sales related to shipborne naval mission systems/naval vessels' combat systems like command, control, and communications systems; radars, sonar, electro-optical systems, naval countermeasures, navigation systems, displays and other sensors and electronics, naval guns and missile launchers. Those are to be reported under the category for:

Naval ship-borne mission systems and components.

Excluded from this category are sales related to maintenance, repair and overhaul services provided for manned naval surface ships/submarines. Those sales should instead be reported under the separate category for: Naval ship maintenance, repair and overhaul.

Excluded from this category are sales by shipyards relating to their design or construction/assembly and delivery of newly built naval ships (including submarines); and/or naval conversions. These should instead be reported under the separate category for: New naval vessels constructed by shipyards, and naval conversions

New naval vessels constructed by shipyards, and naval conversions

Only to be reported here are sales by shipyards in relation to their construction/assembly work (and/or related research, development, design and engineering work) conducted by their operations in Canada in relation to the: Assembly of new manned naval surface ships or submarines at a business' shipyards in Canada (**i.e.**, vessels that were specifically designed for use by militaries in combat, the transportation of military goods and personnel, or to otherwise perform military/naval specific functions).

Conversion of existing vessels that were originally designed and built as commercial/civil vessels into naval vessels for future use by militaries in combat, the transportation of military goods and personnel, or to otherwise perform military/naval specific functions.

Excluded from this category are sales of goods and services related to shipborne naval mission systems such as naval radars, battle management command and control systems, mine detection and naval countermeasures, naval guns and missile launchers **etc.** Those are to be reported under a preceding category for:

Naval ship-borne mission systems and components.

Excluded from this category are sales related to maintenance, repair and overhaul services (MRO) for manned naval surface ships and submarines. Those sales should instead be reported under a separate category for: Naval ship maintenance, repair and overhaul.

Excluded from this category are sales of goods and services relating to structural elements, other platform systems, subsystems, parts and components of naval vessels not elsewhere reported. Such sales should instead be reported under the separate preceding category for: Naval ships' structural elements, platform systems, parts, & components (**excludes** shipborne naval mission systems)

Further **exclusions** or guidance: if the business is not a shipyard in Canada but was nonetheless responsible for, (and paid by a government/military for progress on) the eventual delivery of naval vessels being assembled by a shipyard in Canada that is not its subsidiary, or otherwise owned by the business or by a common parent company—then, such a business should not report sales figures which **include** the amount of associated sales made by the shipyard(s).

For such businesses, they should only report any relevant sales relating to work done by their respective operations' employees in Canada, which **exclude** the sales value of work the businesses contracted/subcontracted or passed through to shipyards in Canada.

This is necessary in order to prevent potential large scale double counting of the actual value of naval vessels being delivered by shipyards in Canada, and hence overestimation of the actual volume of associated industrial activity at shipyards in Canada



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Naval ship maintenance, repair and overhaul

This category **includes** sales, carried out under contract, related to the provision of services for maintenance, repair, and overhaul of naval surface and subsurface marine vessels (**e.g.**, submarines); as well as for related training activities.

Combat vehicles and components

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services relating to:

Land-based vehicles designed for use in combat and to transport and protect soldiers, and the systems, sub-systems and components of such vehicles (**e.g.**, vehicle structures, electrical systems, armour, engines, transmission systems, heating/cooling systems, engineering).

Excluded are sales relating to combat vehicle-based weapons systems such as guns and missiles launchers as such sales should be reported under the 'Firearms and other weapons' category.

Sales relating to associated projectiles like tank gun rounds or missiles should be reported separately under the 'Ammunition and other munitions' or 'Missiles and rockets' categories as appropriate.

Combat vehicle communication systems, electronics, sensors, fire-control and navigation systems sales should be reported under either the appropriate categories for:

'[Primarily land-based or man-portable] electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems; and related components';

'[Primarily land-based, man-portable or non-platform specific] communications and navigation systems; and other information systems (including processing and dissemination), software, electronics, and components'.

Similarly, sales relating to maintenance, Repair, overhaul (MRO) and/or training services relating to combat vehicles should also be reported separately in the category for: 'Combat vehicles maintenance, repair and overhaul

Combat vehicles maintenance, repair and overhaul

This category **includes** sales, carried out under contract, related to the provision of services for maintenance, repair, and overhaul of land-based vehicles designed for use in combat and to transport and protect soldiers; as well as for related training activities.

Aircraft fabrication, structures and components

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services relating to:

Military aircraft, and military aircraft structural elements, control surfaces, systems, sub-systems, parts and components of manned military aerial platforms, and complete manned military aerial platforms, intended for use in combat and military transport. This **includes** things like landing gear (**e.g.**, wheels, shock absorbers and related parts for the retraction and extension of aircraft landing gear, helicopter pontoons); flight control actuators; and propulsion and power systems for military aircraft (**e.g.**, aircraft gas turbine engines, compressors, fuel systems).

Excluded from this category are sales related to military aircraft maintenance, repair and overhaul (MRO) services; aircraft communication systems; navigation systems; avionics; air-borne sensors; missiles, rockets and projectiles made to be fired from aerial platforms; display units; and other electronics for manned military aerial platforms—these are to be reported under separate defence product and service categories as appropriate



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Military aircraft maintenance, repair and overhaul services

This category **includes** sales relating to maintenance, repair and overhaul activities (carried out under contract) in relation to military aircraft, engines and accessories; as well as for related training activities.

Unmanned aerial systems and vehicles and components

This category **includes** sales related to production, research, development, design, engineering, testing and evaluation services relating to: Military unmanned aerial vehicles/systems and drones, and related sub-systems, parts, components and accessories (**including** related ground control systems and launchers).

Excluded are sales relating to missiles; or to weapon systems (**e.g.**, guns, missile launchers) and ammunition, munitions, and missiles carried on/delivered by unmanned aerial systems or vehicles.

Such sales should be reported under either the category for: 'Firearms and other weapons' or under the category for 'Missiles & rockets'.

Simulation systems for aircraft

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services for the hardware and software technologies used by military and security forces to develop, experiment and test operational doctrines and to train personnel using situational scenarios (**e.g.**, intelligent software, visual systems, network simulations, real-time simulators) as primarily related to aircraft and operations in the air-domain.

Simulation systems for naval vessels

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services for the hardware and software technologies used by military and security forces to develop, experiment and test operational doctrines and to train personnel using situational scenarios (**e.g.**, intelligent software, visual systems, network simulations, real-time simulators) as primarily related to naval vessels and operations in the maritime-domain.

Simulation systems for land vehicles or other applications:

This category **includes** sales related to production as well as research, development, design, engineering, testing and evaluation services for the hardware and software technologies used by military and security forces to develop, experiment and test operational doctrines and to train personnel using situational scenarios (**e.g.**, intelligent software, visual systems, network simulations, real-time simulators) as primarily related to land vehicles/ground-based systems and operations; or for other applications not elsewhere specified.



Annex 5: Defence Goods and Services Category Definitions (Cont.)

Definition of Defence Categories

Military training services

This category **includes** sales related to the provision and development (by operations in Canada) of:

Live military training services to military personnel such as in relation to combat training exercises, including military airborne training services and any similar land or maritime training services; military marksmen and sniper training, *etc.*

Relevant activities are those that occur in real/natural physical environments mirroring expected operational environments/ conditions to the extent possible, using actual platforms and/or other systems and equipment.

Training services involving individuals/trainees operating simulated platforms and/or other warfighting systems/equipment in simulated/synthetic environments mirroring expected operational environments/scenarios.

Such activities may relate to training of specific military personnel in isolation, or to training of multiple individuals. **For example**, multiple individuals simultaneously operating separate but networked military aircraft simulators.

Training and simulation based services involving simulated actors/ forces operating simulated systems/equipment in simulated/ synthetic environments and scenarios, based at least in part on inputs entered into simulations prior to the running of simulations (*e.g.*, war-gaming models).

Excluded are sales of actual simulation system hardware and associated software—which should instead be reported under the three categories relating to 'Simulation Systems' as appropriate.

Excluded are sales for training services related to the maintenance, repair and overhaul (MRO) of military platforms and systems—as these should be reported under appropriate MRO categories under the survey.

Military personal protective equipment, load carriage systems and operational clothing

This category **includes** sales related to production, research, development, design, engineering, testing and evaluation services; as well as to the maintenance and repair of:

Soldiers' personal protective equipment (PPE) including:

ballistic/blast protection and related military body armor, helmets, eyewear and related accessories; as well as soldier flame/thermal protection;

chemical, biological, radiological & nuclear (CBRN) military protective suits, as well as military respirators and associated

soldier load carriage systems (**includes** exoskeletons and other personal equipment designed specifically to help soldiers carry their respective fighting, battle and sustainment loads);

other personal military items designed for use by individual soldiers to aid in their concealment from enemy detection;

other operational military clothing and footwear.

Excluded from this category are sales relating to ceremonial uniforms, as well as commercial/civil market items purchased for soldiers. Nor are these to be reported as defence goods and services sales under any of the other defence sales categories.

Excluded from this category are sales relating to sensors/electronics designed for military use in the detection and identification of **CBRN** and explosives related threats. Sales of goods and services relating to such sensors/electronics should instead be reported under the most appropriate category relating to:

"Electro-optical, radar, sonar and other sensor / information collection systems; fire control, warning and countermeasures systems, and related components"

Other defence (specify)

Other defence products and services not otherwise captured in the above categories.

Canada 