STATE OF CANADA'S DEFENCE INDUSTRY

2018 Report

Innovation, Science and Economic Development Canada
Innovation, Sciences et Développement économique Canada
Canada

Presentation overview

Methodology principles

I - Research framework

- Methodology informed by the OECD*, U.S. Department of Defense, and Statistics Canada
- Industry concept informed by industry executives (CADSI**) and Government of Canada stakeholders
- Target population developed in concert with industry, Statistics Canada and Government of Canada policy stakeholders

III - Analytics

- Development of a total economic impact model (GDP and jobs) based on latest Statistics Canada's input-output multipliers***
- Cross tabulations on R&D, exports, regional employment rankings by activity, and other key variables

II - Data collection

- ISED sponsored Canadian Defence, Aerospace and Marine Industries Survey (2016) through Statistics Canada, whose completion is legally required under the Statistics Act
- The survey measured 2016 industrial activity and was publically released in 2018
- Targeted approach based on prioritized firms
- Data quality validation and firm level imputation based mainly on administrative data, with coverage of priority firms

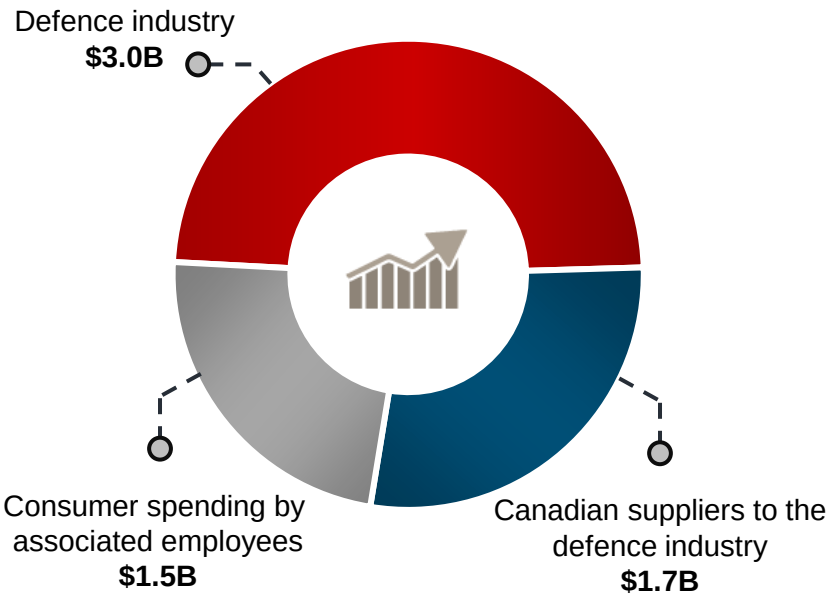
IV - Support decision makers

- Development of an overview of the Canadian defence industry
- Customized analysis for both industry and policy makers
- Integration of research findings into comprehensive market analysis to support decision makers

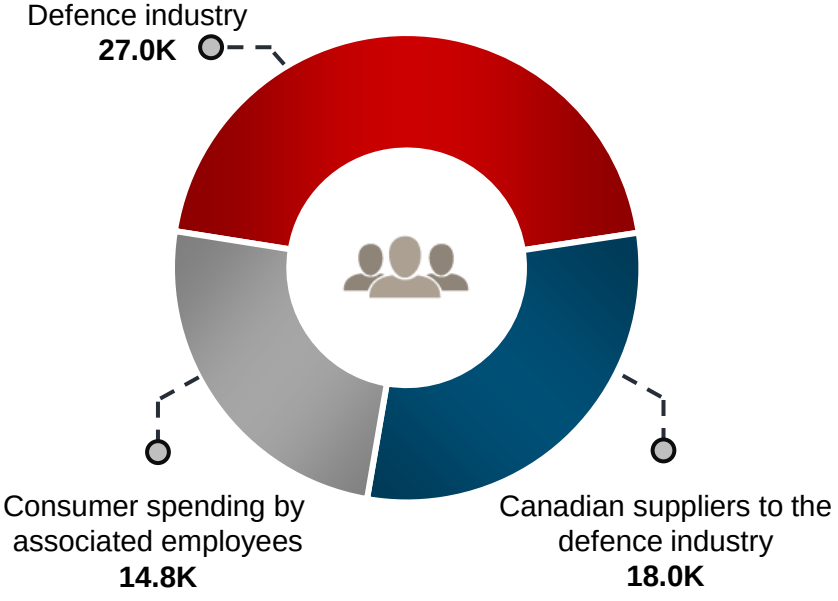
* OECD: The Organisation for Economic Co-operation and Development
** CADSI: Canadian Association of Defence and Security Industries *** See Annex A for economic impact methodology principles

The defence industry contributed close to $6.2B in GDP and 60,000 jobs to the Canadian economy* in 2016

Economic impact in GDP
2016



Economic impact in jobs
2016



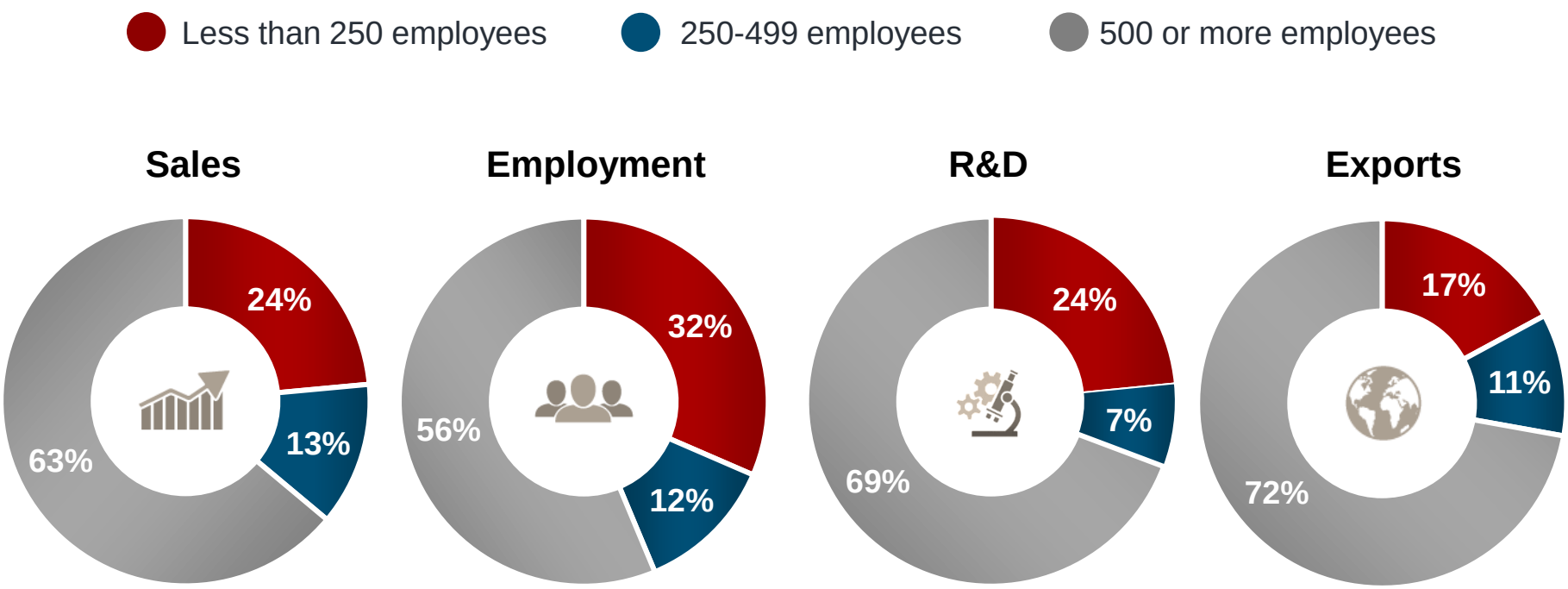
- **Over 660 firms generated over $10B in sales of defence goods and services, up 9% from 2014****

* 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 any way to Canadian defence industry production in 2016 (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 2016 economic impacts were attributable to related industrial activities conducted due to the ITB Policy. In 2018, ISED revised Statistics Canada based estimates of 2014 defence industry sales, resulting in revised ISED estimates of 2014 economic impacts—the revised total GDP impact estimate was $6.4B while the revised jobs impact was 59.7K for 2014. See Annex C for detailed economic impact analysis. Jobs refers to full-time equivalent employees

** Estimates are in nominal terms and are not adjusted for inflation. The total industry growth rate reflects ISED's 2018 revisions to Statistics Canada estimates of defence industry sales in 2014. See Annex B for the list of individual defence goods and services sales categories under the survey, their full titles, and their shares of total defence industry sales

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2014 and 2016 editions), released in 2016 and in 2018 respectively; ISED economic modelling based on Statistics Canada's latest input-output multipliers (2014) and the specific economic impact multipliers most relevant to the survey's individual defence goods and services categories

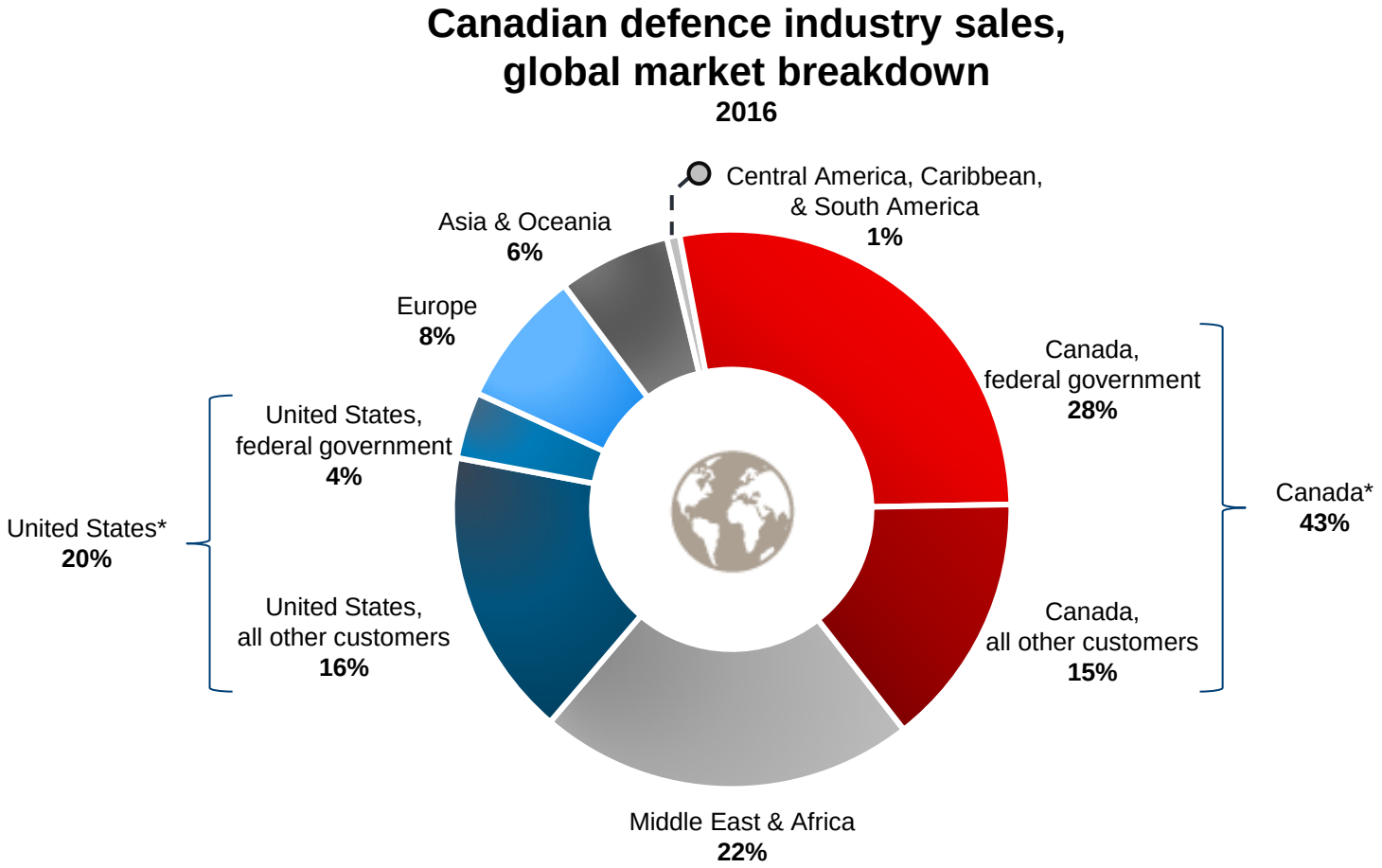
SMEs* represented more than 90% of firms in the Canadian defence industry



- **SMEs accounted for 24% of defence industry sales, 32% of employment, 24% of R&D, and 17% of exports**

* Small and medium-sized enterprises (SMEs) are firms with less than 250 employees
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

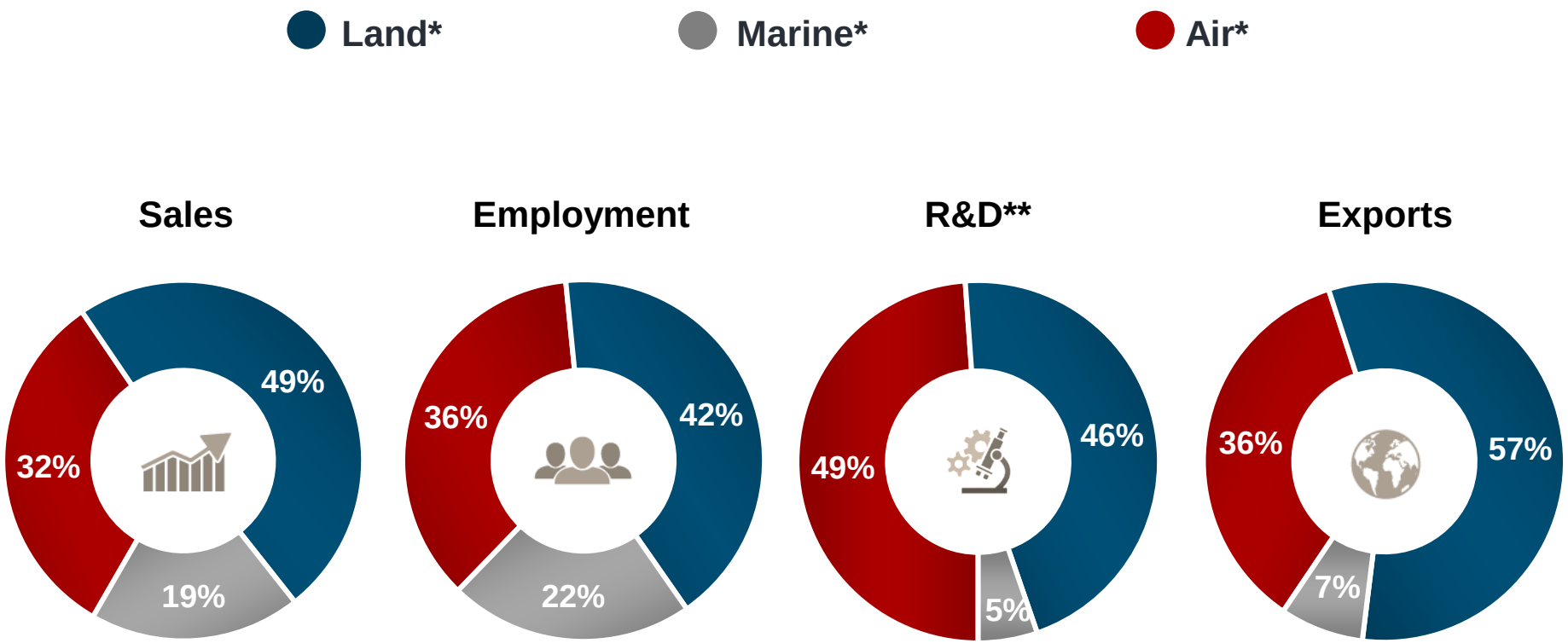
In 2016, close to 60% of sales were exports



- **The Government of Canada was the industry's single largest customer**
- **Canadian exports to the U.S. were led by industrial supply chain sales**

* Breakdown of domestic and U.S. sales by type of customer, based on sales for which the customer type was specified
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

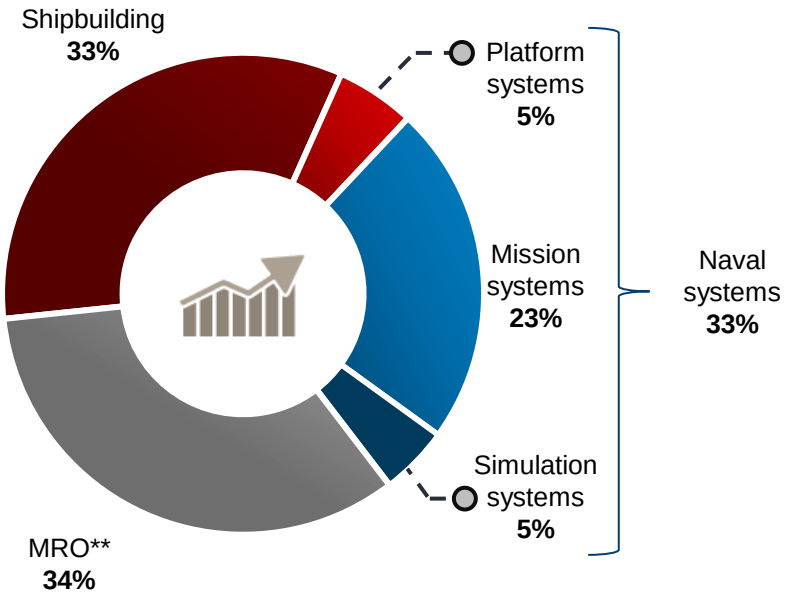
Land, marine, and air domains presented different characteristics in terms of sales, employment, R&D, and exports in 2016



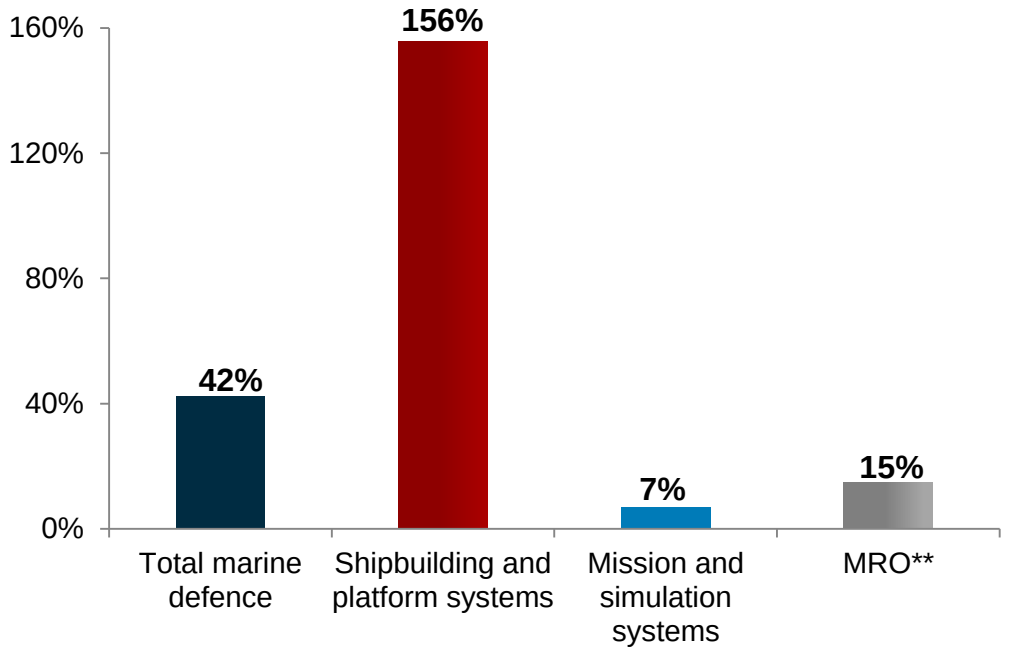
* See Annex D for the categories comprising domain groupings
** ISED adjusted estimate based on the data of firms that fully responded to the R&D questions and specified their R&D activity
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Among the domains, marine sales* had the highest growth with a 40% increase from 2014 to 2016

Canadian marine defence industry sales by key category
2016



Canadian marine defence industry key category trends
2014-2016

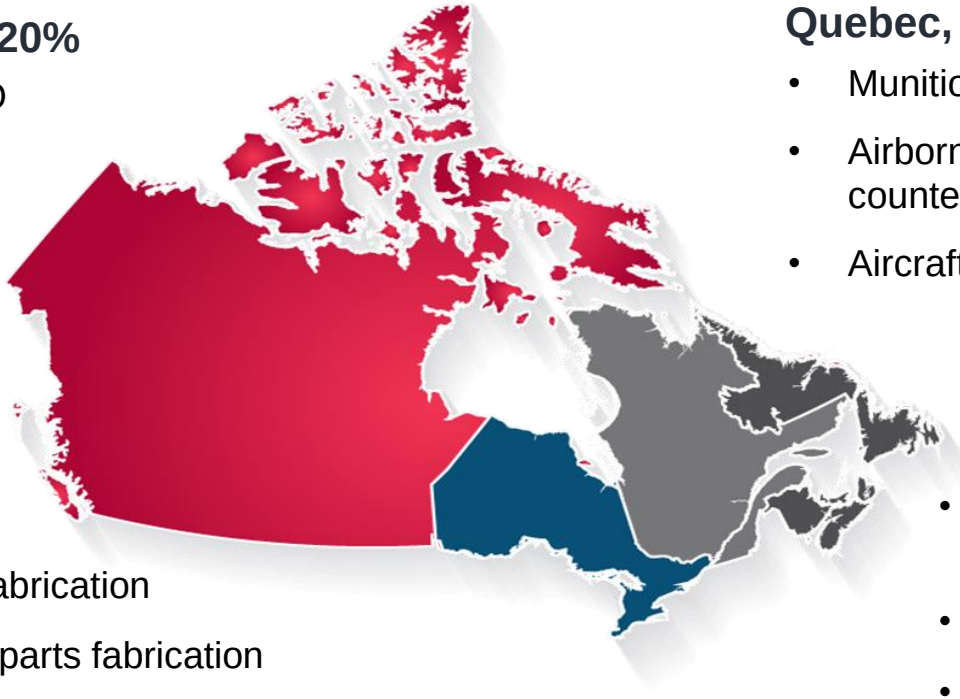


- **The shipbuilding and platform systems category grew over 150% between 2014 and 2016, leading overall defence marine sales**

* Estimates are in nominal terms and are not adjusted for inflation. See Annex D for detailed domain groupings
** MRO: Maintenance, repair & overhaul
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

In 2016, the defence industry was present across Canada with regional specializations*

Canadian defence industry employment share by region with top 3 regional specializations**
2016



Western Canada, 20%

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

Quebec, 28%

- Munitions
- Airborne sensors, fire-control & countermeasures
- Aircraft simulation systems

Ontario, 38%

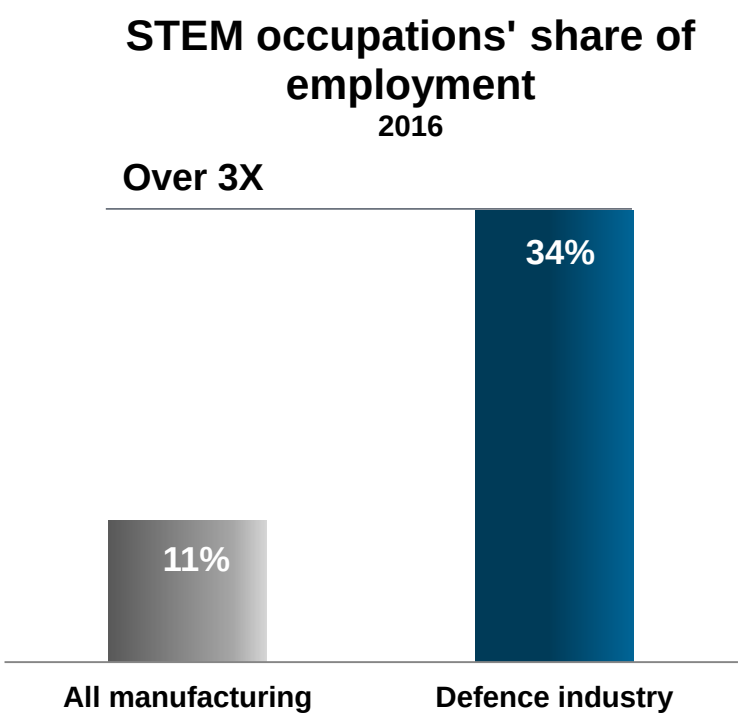
- Combat vehicle fabrication
- Aircraft & aircraft parts fabrication
- Land-based sensors, fire-control & countermeasures

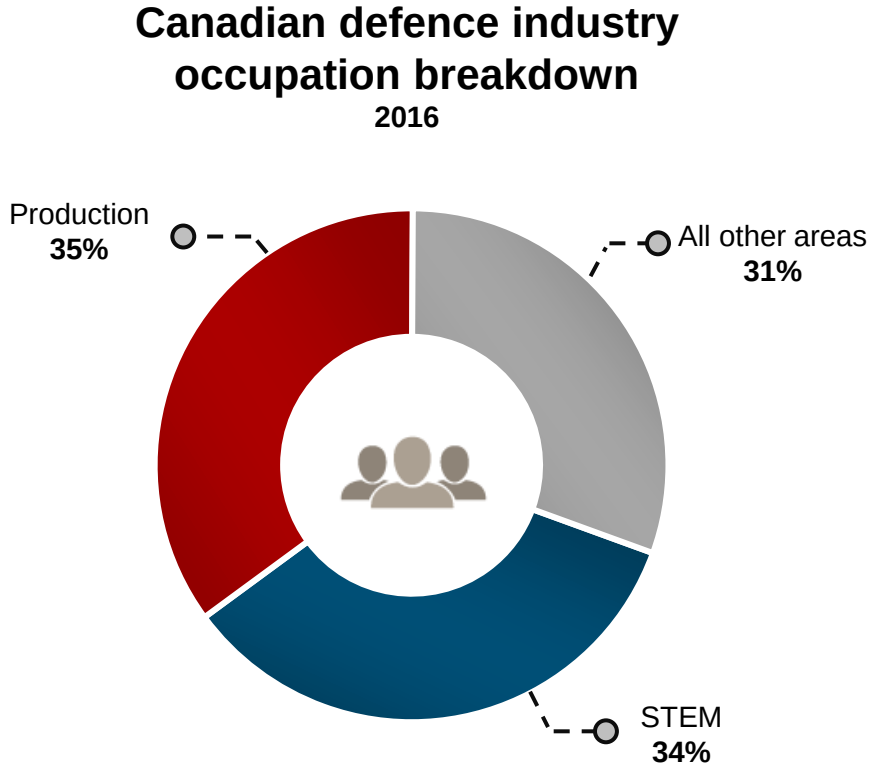
Atlantic Canada, 14%

- Naval shipbuilding & conversions
- Aircraft MRO
- Airborne sensors, fire-control & countermeasures

* See Annex E for the full 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 and Marine Industries Survey (2016), 2018

The share of STEM occupations* was 3X that of the Canadian manufacturing average in 2016

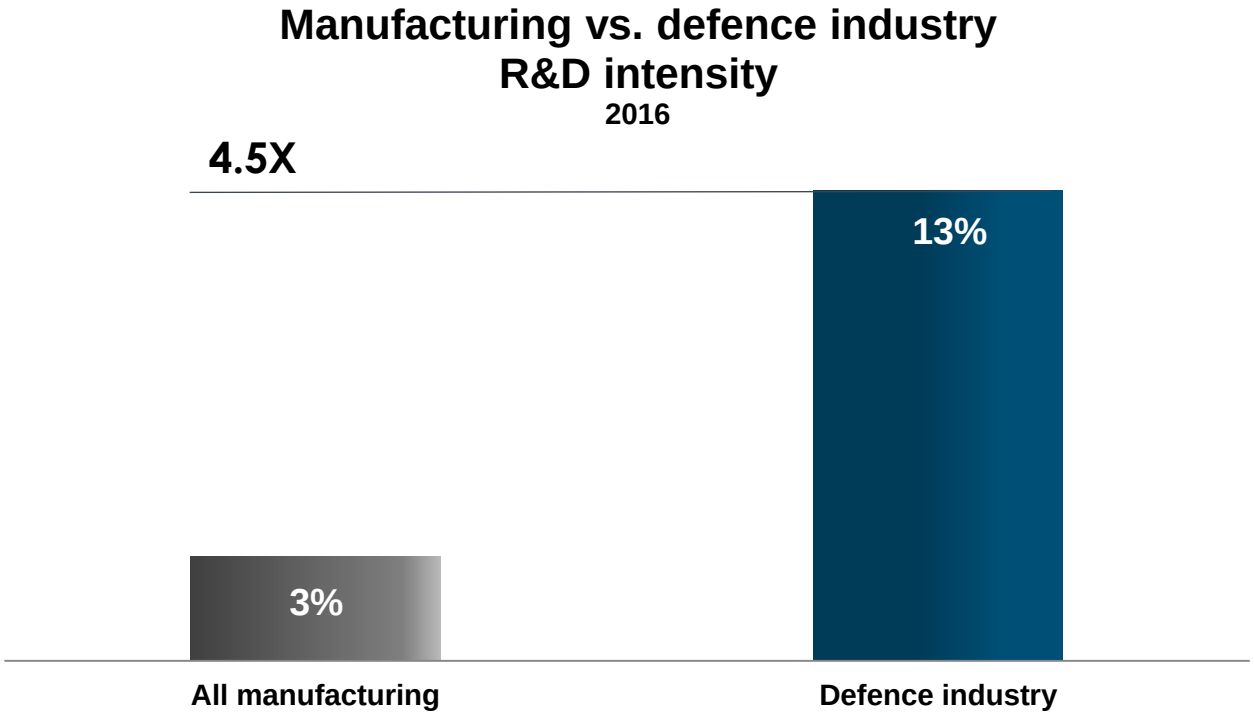




- **Close to 35% of defence industry occupations were related to STEM in 2016**

* Under the survey, Science, Technology, Engineering, & Mathematics (STEM) occupations include engineers, scientists and/or researchers, and technicians and technologists
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018; Statistics Canada Custom Tabulation, Labour Force Survey (2016), 2018

R&D intensity* was close to 4.5X that of the Canadian manufacturing average in 2016

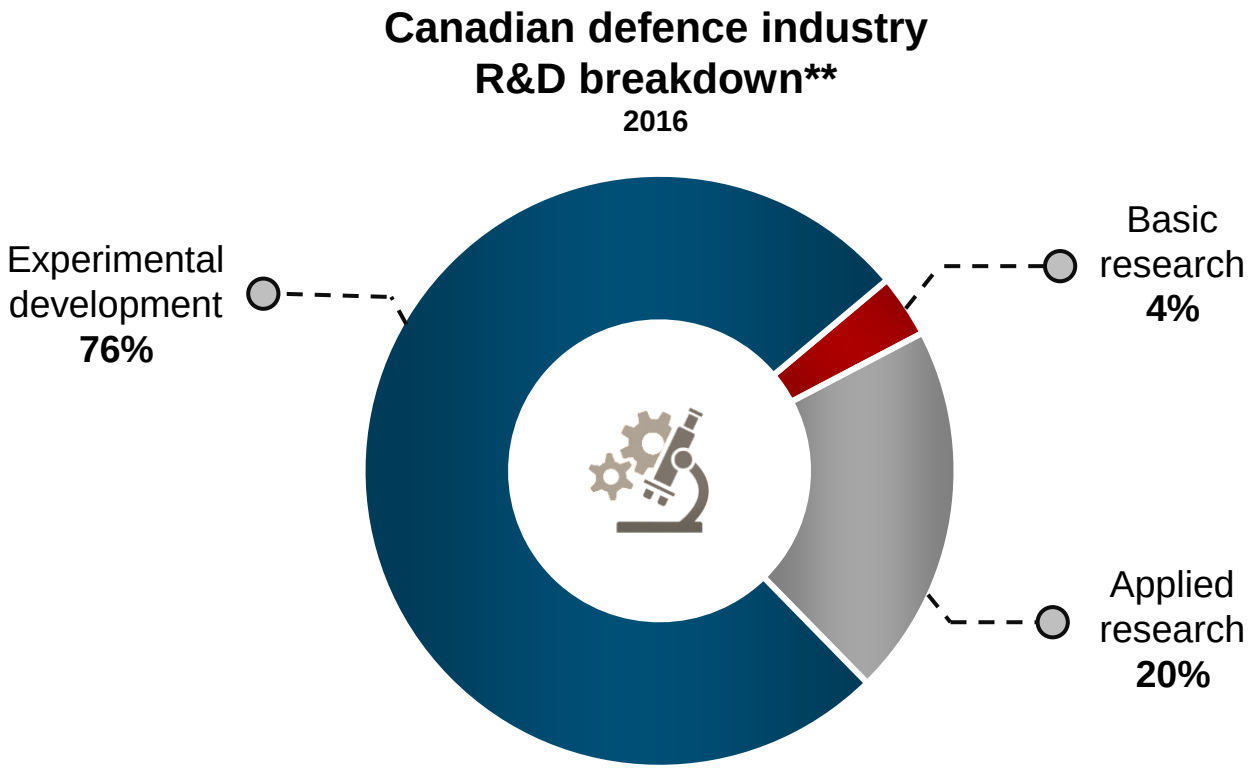


- **Close to $400M of R&D activity took place, largely funded by industry, with around 20% of funds coming from government contracts and grants**

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

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018; ISED estimates of defence industry GDP; Statistics Canada's CANSIM Table 358-0510, Annual Survey of Research & Development in Canadian Industry (2016), 2018; and Statistics Canada's CANSIM Table 379-0031, gross domestic product by industry – national (2016), 2018

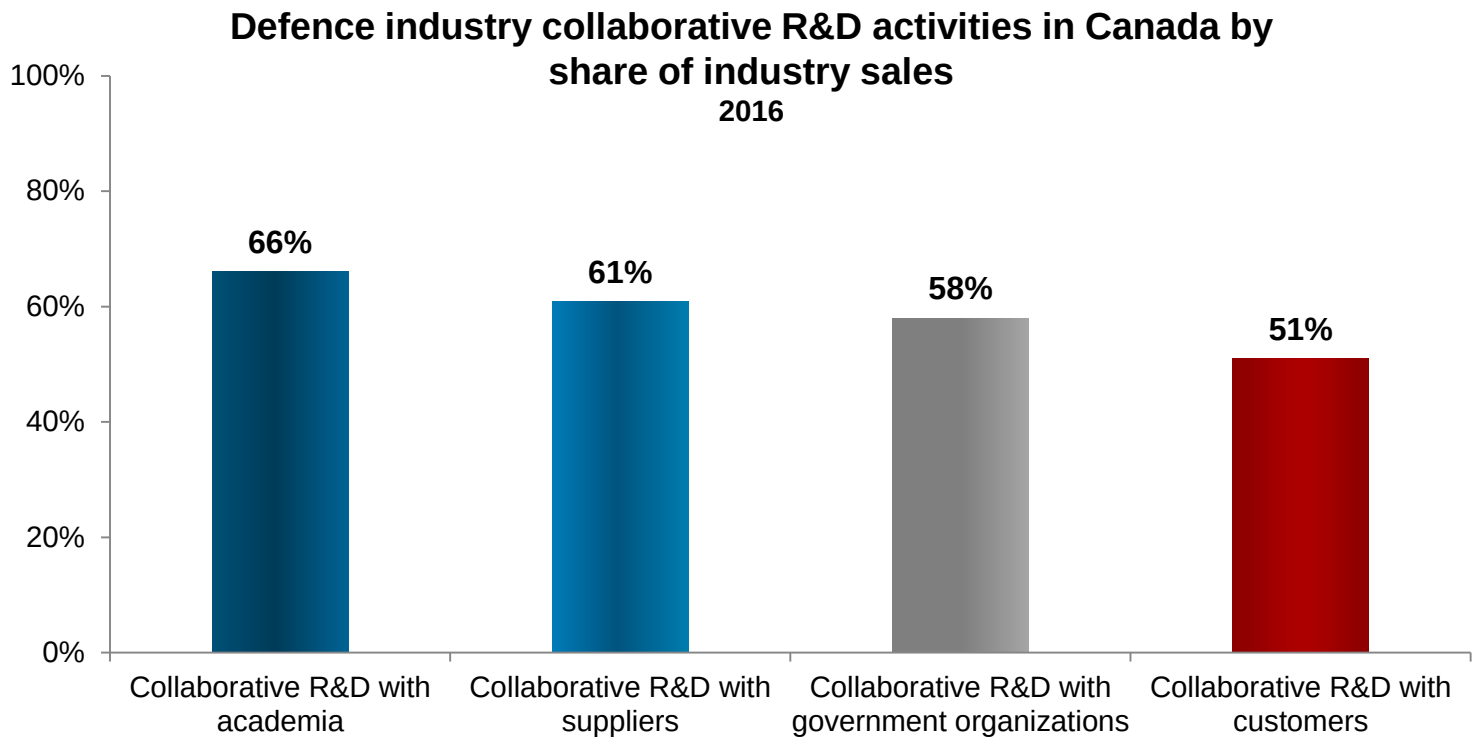
The share of applied research performed was 2X that of the Canadian manufacturing average*



- **Defence industry R&D was led by experimental development for particular applications or uses**

* Manufacturing average is based on latest available CANSIM tables
** 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 and Marine Industries Survey (2016), 2018; ISED estimates of defence industry GDP; Statistics Canada's CANSIM Table 358-0521, Annual Survey of Research& Development in Canadian Industry

The defence industry was actively engaged in collaborative R&D with a variety of partners



- **Firms representing close to 60% of the defence industry's sales collaborated on R&D* with suppliers, academia and government**

* ISED estimates based on the survey data and activity among firms that more fully responded to the collaborative business practices questions
Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Key Findings

In 2016, the Canadian defence industry:

- Contributed close to $6.2B in GDP, and 60,000 jobs to the Canadian economy
- Was national, with regional specializations in specific defence industrial activities
- Saw the highest growth in the marine domain (40% between 2014 and 2016)
- Had a share of STEM occupations 3X higher than its share of the Canadian manufacturing average
- Performed $400M of R&D, resulting in an R&D intensity of close to 4.5X higher than that of the Canadian manufacturing average
- Was actively engaged in collaborative R&D with a variety of partners including suppliers, customer, academic institutions and government

Annex A – Economic impact methodology principles

- In 2018, the economic impact estimates of the State of Canada's Defence Industry Report were based on Statistics Canada economic impact multipliers reflecting a comprehensive revision of the Canadian system of macroeconomic accounts, as well as revised 2014 survey respondent data and economic impact estimates

- These revisions contributed to updated ISED estimates:
  - 2016 GDP* impact estimate of $6.2B, with a jobs impact of 59.8K**
  - 2014 GDP* impact estimate of $6.4B (compared to $6.7B, pre-revision), with a jobs impact of 59.7K (compared to 62.7K, pre-revision)

- Using the latest Statistics Canada Input-Output multipliers compared to the previously available multipliers resulted in a difference of 2% between estimates of the total economic impact to the Canadian economy in 2016***

* GDP better represents economic activity that actually occurs within Canada in contrast to revenues that include both foreign content and the double counting of revenues relating to domestically produced intermediate inputs
** Economic model estimations are not comparable to older estimates in previously published reports as Statistics Canada's Input-Output framework has been updated for all industries in April 2018
*** The difference of 2% relates to estimates that are based on the 2014 multipliers released in April of 2018 (the most current available) versus initial estimates that were based on 2013 multipliers

Annex B

Full titles of all 21 published individual defence goods & services sales categories, and their respective (%) shares of total defence industry sales in 2016	
	Share of total defence industry sales (%)
Firearms, ammunition, missiles, rockets, and other munitions and weapons	5.3%
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	0.2%
Primarily airborne electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems and related components	6.4%
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	3.1%
Primarily airborne communications and navigation systems; and other information systems (including processing and dissemination), software, electronics and components	4.1%
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	2.4%
Naval ship-borne mission systems and components	4.4%
Naval ships' structural elements, platform systems, parts and components (excludes: ship-borne naval mission systems)	1.0%
New naval vessels constructed by shipyards, and naval conversions	6.3%
Naval ship maintenance, repair and overhaul	6.4%
Combat vehicles and components	23.3%
Combat vehicles maintenance, repair and overhaul	3.7%
Aircraft fabrication, structures and components	7.1%
Military aircraft maintenance, repair and overhaul services	11.0%
Unmanned aerial systems/vehicles (UAS/V) and components	0.7%
Simulation systems for aircraft	2.6%
Simulation systems for naval vessels	0.9%
Simulation systems for land vehicles or other applications	0.1%
Military training services (including live, virtual and constructive)	3.6%
Military personal protective equipment, load carriage systems and operational clothing	1.0%
Other defence	6.4%

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Annex C

Key variables of the defence industry itself in 2016				
	Sales	**Exports**	**Employment**	**R&D**
Defence industry	$10.1B	$5.8B	27.0K	$399M

Estimated economic impacts on Canada's overall economy resulting from defence industry activity in 2016*				
	The Canadian defence industry	**Canadian suppliers to the defence industry**	**Consumer spending by associated employees**	**Total national impact** (Defence industry + Supplier + Employee consumer spending impacts)
Jobs	27.0K	18.0K	14.8K	59.8K
GDP	$3.0B	$1.7B	$1.5B	$6.2B

* ISED economic modelling based on Statistics Canada's latest input-output multipliers (2014) and the specific economic impact multipliers most relevant to survey's individual defence goods and services categories

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Annex D

2016 sales categories as grouped according to the types of platforms / domains to which they related	
	Share of total defence industry sales (%)
Air & space	**32.1%**
Aircraft fabrication, structures and components	7.1%
Military aircraft maintenance, repair and overhaul services	11.0%
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	0.2%
Primarily airborne communications and navigation systems; and other information systems (including processing and dissemination), software, electronics and components	4.1%
Primarily airborne electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems and related components	6.4%
Simulation systems for aircraft	2.6%
Unmanned aerial systems/vehicles and components	0.7%
Land; man-portable; non-platform or domain specific; or unspecified	**48.9%**
Firearms, ammunition, missiles, rockets, and other munitions and weapons	5.3%
Combat vehicles and components	23.3%
Combat vehicles maintenance, repair and overhaul	3.7%
Military personal protective equipment, load carriage systems and operational clothing	1.0%
Military training services (including live, virtual and constructive)	3.6%
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	2.4%
Primarily land-based, 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	3.1%
Simulation systems for land vehicles or other applications	0.1%
Other defence	6.4%
Naval/marine	**19.0%**
Naval ship-borne mission systems and components	4.4%
Naval ships' structural elements, platform systems, parts and components (excludes: ship-borne naval mission systems)	1.0%
New naval vessels constructed by shipyards, and naval conversions	6.3%
Naval ship maintenance, repair and overhaul	6.4%
Simulation systems for naval vessels	0.9%

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Annex E

Top 3 defence goods and services activities in a given region, based on shares of regions' defence industry employment, 2016	
Simplified titles of the top 3 defence goods & services categories per region	**Full official titles of the defence goods & services categories**
Western Canada	
Naval vessel MRO	Naval ship maintenance, repair and overhaul
Aircraft MRO	Military aircraft maintenance, repair and overhaul services
Naval shipbuilding & conversions	New naval vessels constructed by shipyards, and naval conversions
Ontario	
Combat vehicle fabrication	Combat vehicles and components
Aircraft & aircraft parts fabrication	Aircraft fabrication, structures and components
Land-based sensors, fire-control & countermeasures	Primarily land-based, 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
Quebec	
Munitions & weapons	Firearms, ammunition, missiles, rockets, and other munitions and weapons
Airborne sensors, fire-control & countermeasures	Primarily airborne electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems and related components
Aircraft simulation systems	Simulation systems for aircraft
Atlantic Canada	
Naval shipbuilding & conversions	New naval vessels constructed by shipyards, and naval conversions
Aircraft MRO	Military aircraft maintenance, repair and overhaul services
Airborne sensors, fire-control & countermeasures	Primarily airborne electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems and related components

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018

Annex F

Approximate rankings of the 21 defence goods and services categories according to their relative importance within a given region's own defence industry—based on employment metrics in 2016*				
Full titles of the 21 published defence goods & services categories	**Atlantic Canada**	**Quebec**	**Ontario**	**Western Canada**
Firearms, ammunition, missiles, rockets, and other munitions and weapons	18	1	10	11
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	21	21	18	21
Primarily airborne electro-optical, radar, sonar and other sensor/information collection systems; fire control, warning and countermeasures systems and related components	3	2	14	6
Primarily land-based, 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	14	13	4	18
Primarily airborne communications and navigation systems; and other information systems (including processing and dissemination), software, electronics and components	7	5	5	17
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	15	16	13	9
Naval ship-borne systems (i.e., mission systems) and components	5	9	8	8
Naval ships' structural elements, platform systems, parts & components (excludes: ship-borne naval mission systems)	13	14	15	16
New naval vessels constructed by shipyards, and naval conversions	1	8	17	4
Naval ship maintenance, repair and overhaul	4	15	9	1
Combat vehicles and components	11	10	1	7
Combat vehicles maintenance, repair and overhaul	19	17	7	19
Aircraft fabrication, structures and components	8	7	3	5
Military aircraft maintenance, repair and overhaul services	2	11	6	2
Unmanned aerial systems/vehicles (UAS/V) and components	16	18	16	13
Simulation systems for aircraft	9	3	19	12
Simulation systems for naval vessels	10	20	21	14
Simulation systems for land vehicles or other applications	20	19	20	20
Military training services (including live, virtual and constructive)	12	4	12	10
Military personal protective equipment, load carriage systems and operational clothing	17	12	11	15
Other defence	6	6	2	3

* The rankings are considered approximate, as they are based on estimates of associated employment shares derived from breakdowns of sales as related the various defence goods/services categories, and breakdowns of employment across regions. As these are simple rankings, the gap between one category and a following category could be relatively small, or relatively large

Source: Statistics Canada's Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018


Canada