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

State of Canada's Aerospace Industry 2019 Report

Presented by:
Innovation, Science and Economic Development Canada and AIAC

ISED and the AIAC have partnered to provide evidence-based, relevant, quality and timely analysis to both industry and government decision makers

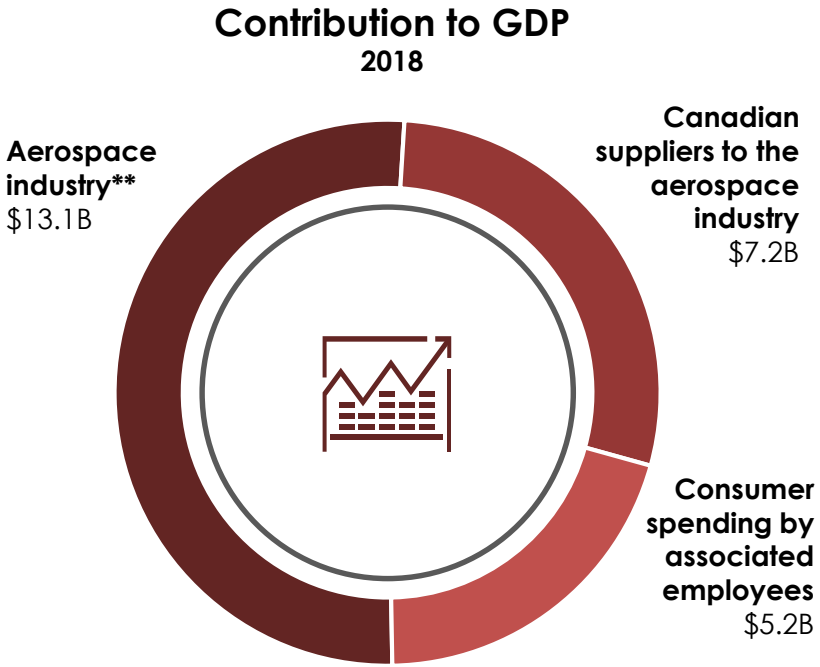
For the State of Canada's Aerospace Industry 2019 Report:

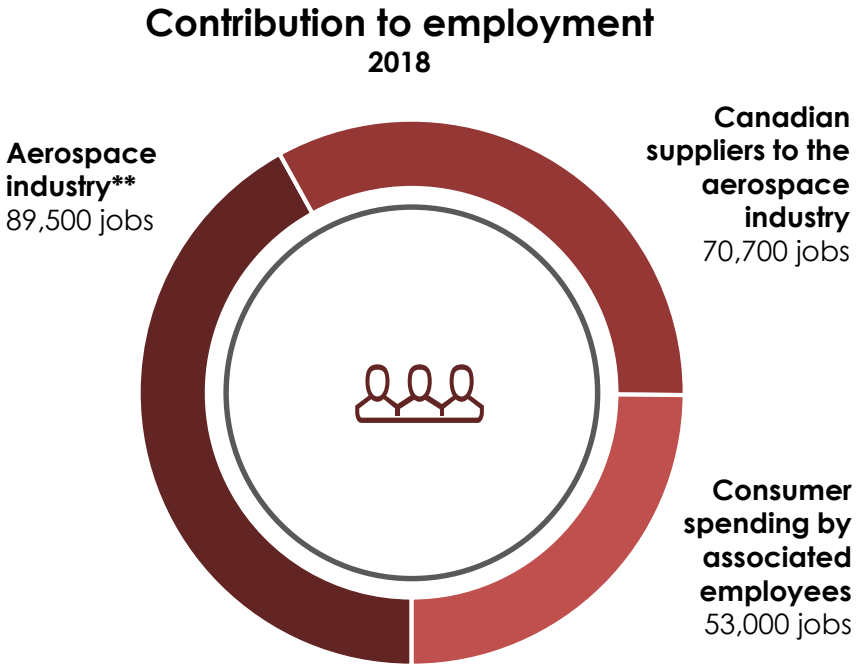
- Innovation, Science and Economic Development Canada (ISED) developed detailed economic models, statistics and analysis* based on Statistics Canada and global private independent research organizations' data
- Analysis reflected the latest Statistics Canada revisions of economic impact multipliers, including the measurement of jobs and gross domestic product (GDP) impact from the Canadian aerospace industry, its value chain, and associated consumer spending
- The Aerospace Industries Association of Canada (AIAC) consulted and validated research findings with its network on business drivers, issues and trends
- ISED and the AIAC jointly published the latest statistics

* See Annex A1 and A2 for aerospace industry definitions and economic impact methodology principles, respectively

Features of the 2019 report

The Canadian aerospace industry contributed over $25B in GDP and 213,000 jobs to the Canadian economy* in 2018



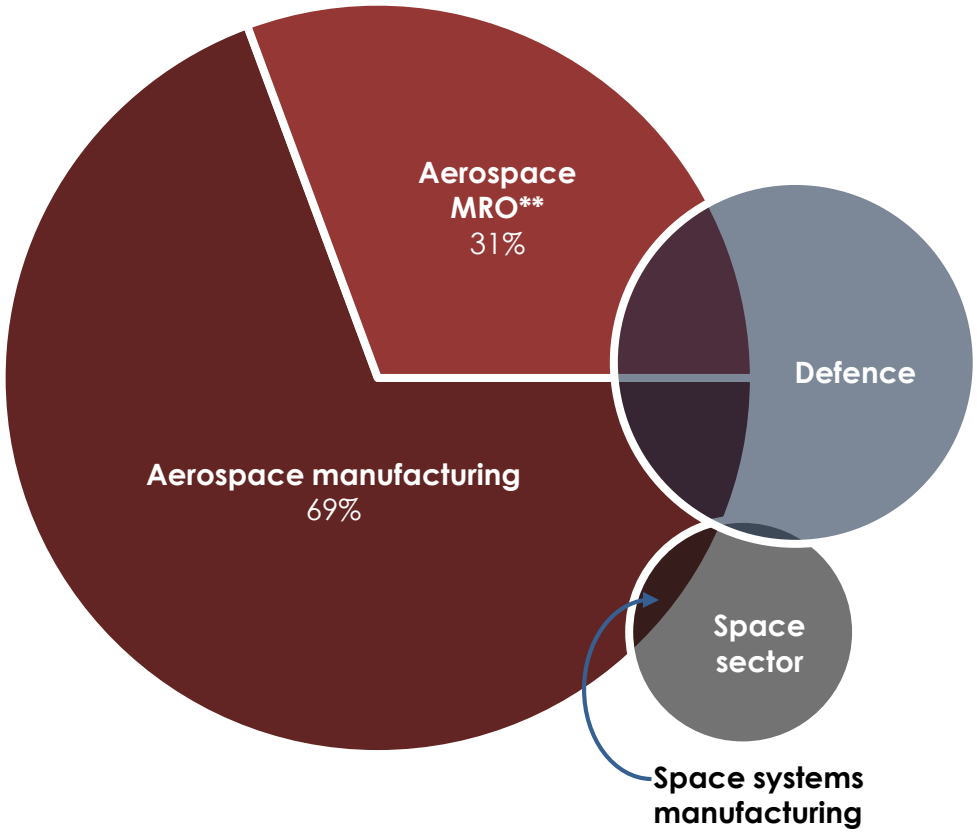


- The aerospace industry ($31 billion in revenues***) and its value chain contributed over $20 billion in GDP and 160,000 jobs to the Canadian economy* (direct and indirect)
- Consumer spending by associated employees contributed an additional $5 billion to GDP and supported 53,000 jobs (induced)

* Gross Domestic Product (GDP) is the total unduplicated value of the goods and services produced in an industry, country or region during a given period. Jobs refer to full-time equivalent employees. Economic impact indicators include the aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact). See Annex B1 and B3 for detailed aerospace industry GDP and employment contributions to the Canadian economy by year (2014-2018)
** Direct economic impact from enterprises for which aerospace is the main activity
*** See Annex B2 for comparative analysis of aerospace and average manufacturing backlog
Source: ISED's economic model estimates (GDP in 2012 chained dollars) based on the latest Statistics Canada National Input-Output Multipliers (2015), adjusted using 2018 employment, 2019

The Canadian aerospace ecosystem is interlinked with the defence and space industries

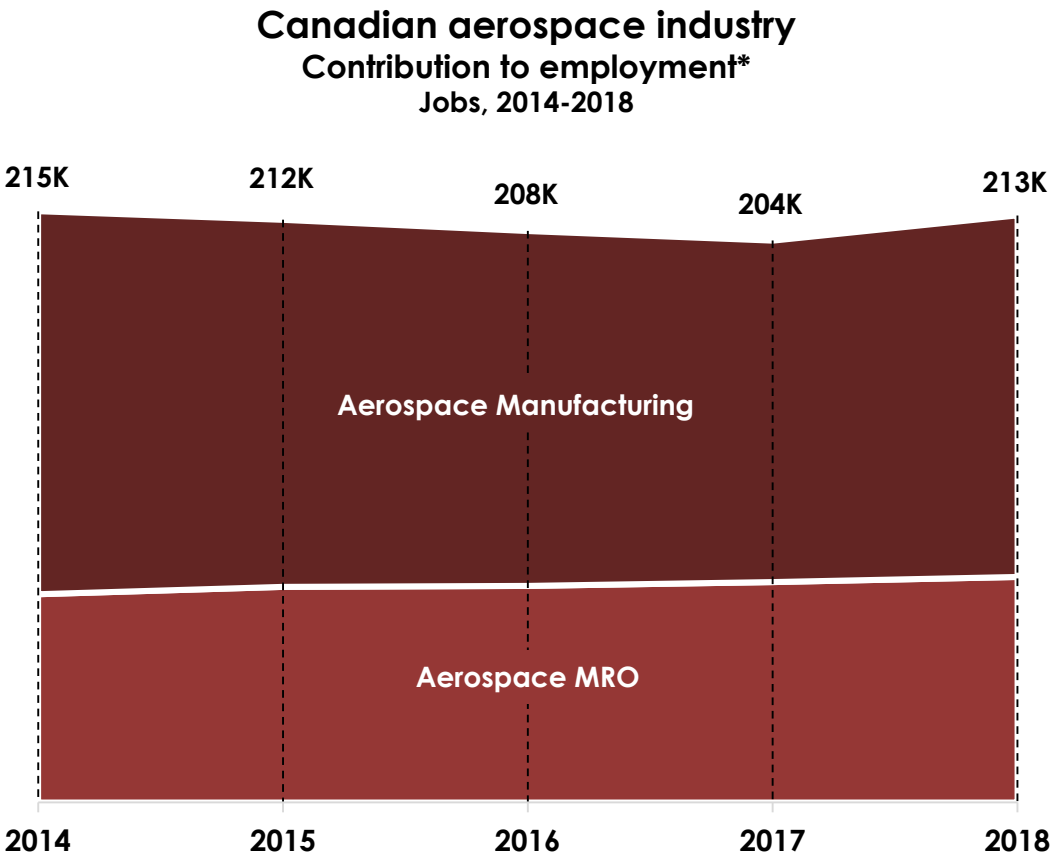
Share of GDP by industry segment*
2018



- The aerospace and space systems manufacturing industries in Canada were civil oriented
- More than a quarter of aerospace MRO revenues were related to defence
- Beyond space systems manufacturing, the space sector encompassed many downstream service industries***

Note: graph depicts approximate relative scale of the aerospace, defence and space sectors
* See Annex A1 and A2 for aerospace industry definitions and methodology principles, respectively
** MRO is maintenance, repair, and overhaul
*** Downstream space sector activities include applications such as satellite operations, value-added applications, and space-based broadcasting
Sources: ISED's economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, the Canadian Space Agency, and enterprise-level observations, 2019; Canadian Defence, Aerospace and Marine Industries Survey, 2016

The job impact* to the Canadian economy was relatively stable between 2014 and 2018

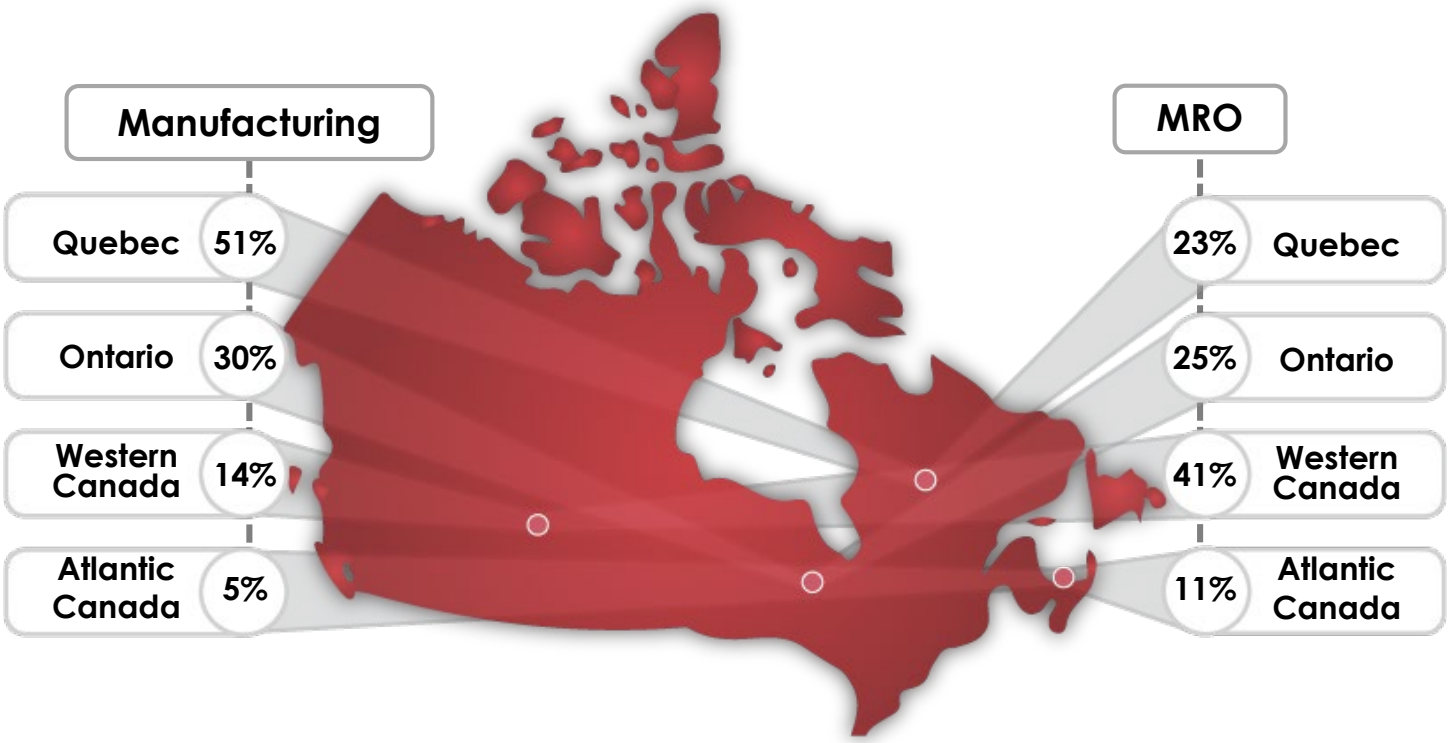


- Canada has followed the OECD's aerospace manufacturing employment trend over the past 5 years
- STEM employment was 2X higher in aerospace manufacturing than the manufacturing average

* Includes direct, indirect, and induced jobs
Source: ISED's economic model estimates (GDP in 2012 chained dollars) based on the latest Statistics Canada National Input-Output Multipliers (2015), adjusted using 2018 employment, 2019; Labour Force Survey (LFS) custom tabulation (2018), 2019; OECD Structural Analysis Database, 2019

The Canadian aerospace industry is national

Aerospace employment share by region
2018

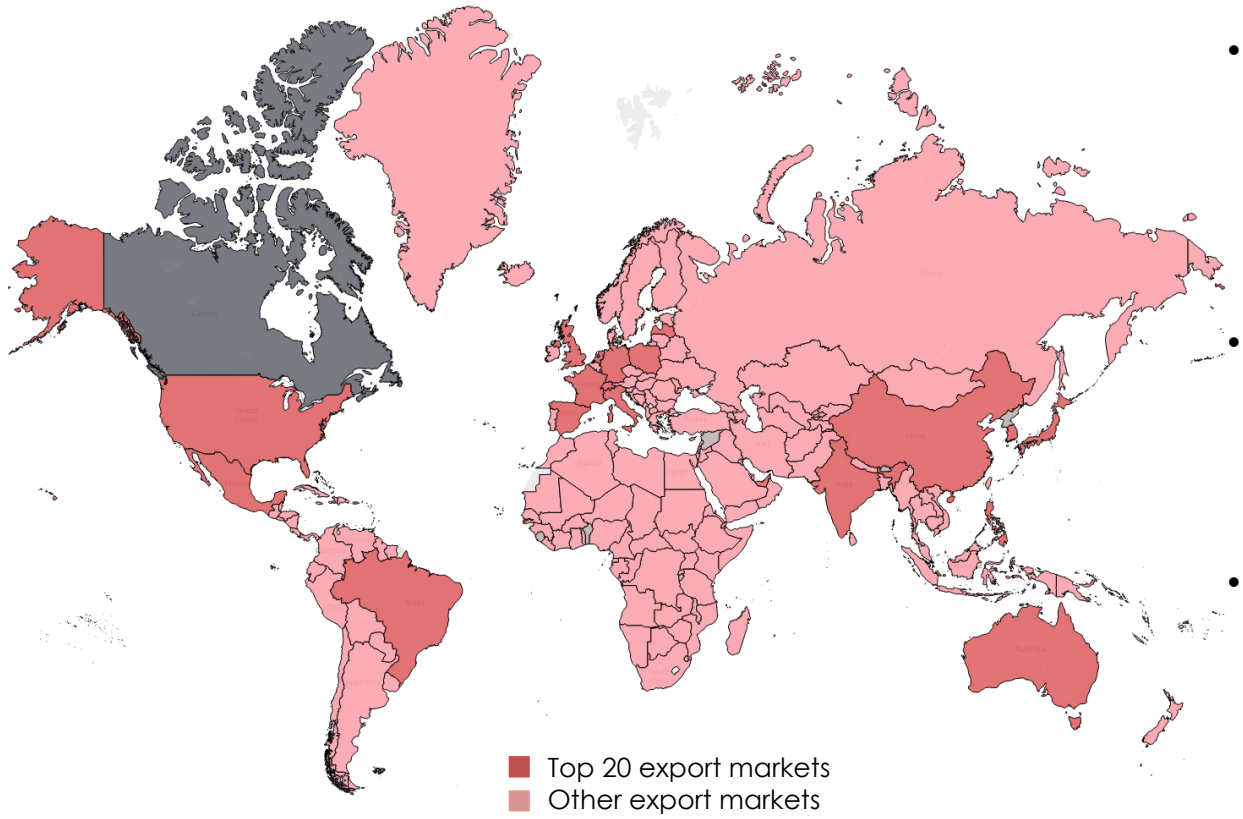


- Most manufacturing activity took place in Central Canada, while the Western and Atlantic regions captured over 50% of MRO activities

See Annex B3 for detailed aerospace industry GDP and employment contributions to the Canadian economy by year (2014-2018)
Source: ISED's economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, and enterprise-level observations, 2019

Canadian aerospace manufacturing firms export to over 190 countries across 6 continents

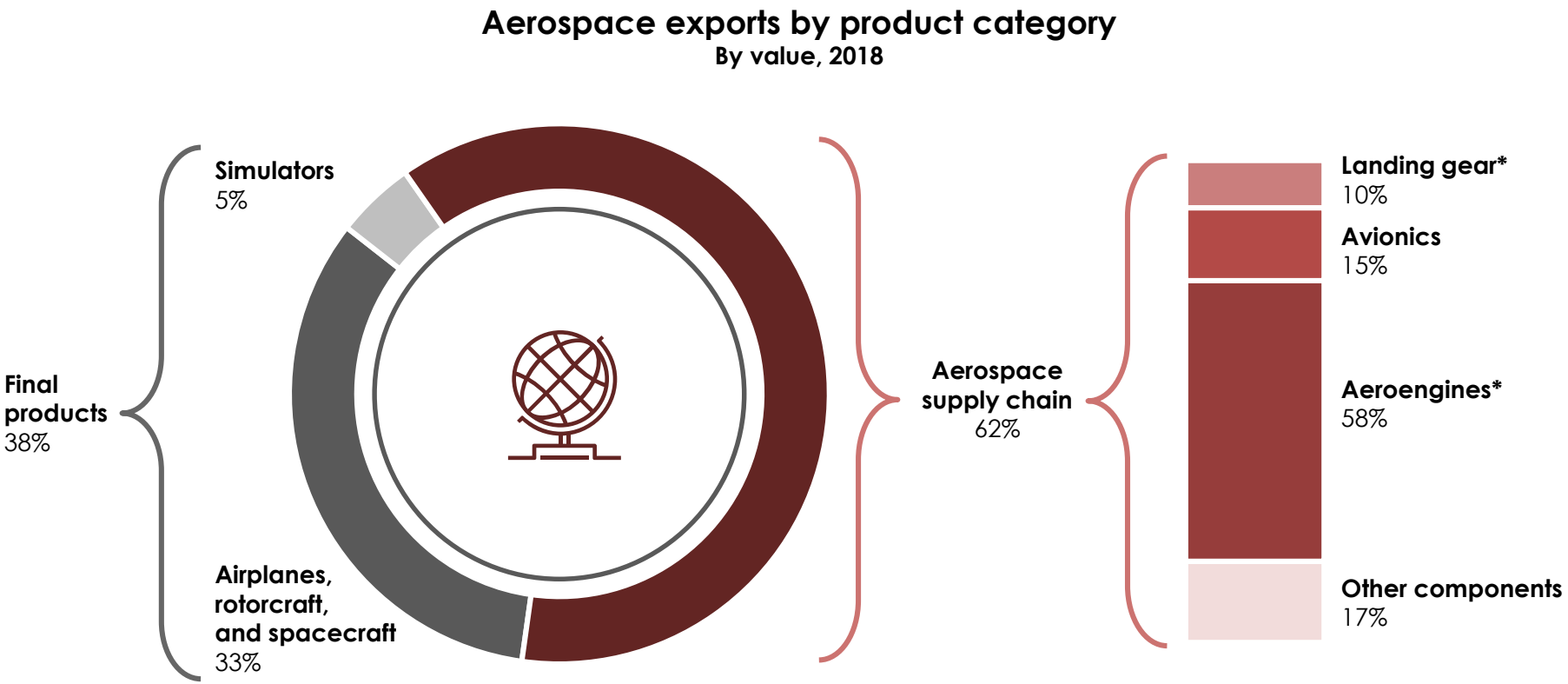
Canadian aerospace manufacturing export markets*
2018



- 93% of aerospace manufacturing firms were exporters, 44% higher than the manufacturing average
- Aerospace manufacturing firms were 38% more trade diverse** than the manufacturing average
- Aerospace manufacturing firms were 29% more export intensive*** than the manufacturing average

* Countries shaded in red imported Canadian aerospace goods in 2018; See Annex A4 for export market rankings
** Trade diversity is measured as a share exports destined for non-US markets
*** Export intensity is measured as a share of sales
Source: Global Trade Atlas (2018), 2019; Trade Data Online (2018), 2019; Statistics Canada Table 16-10-0047-01 (2018), 2019, Survey of Innovation and Business Strategy (SIBS) Tables 33-10-0150-01, 33-10-0173-01 (2017), 2019

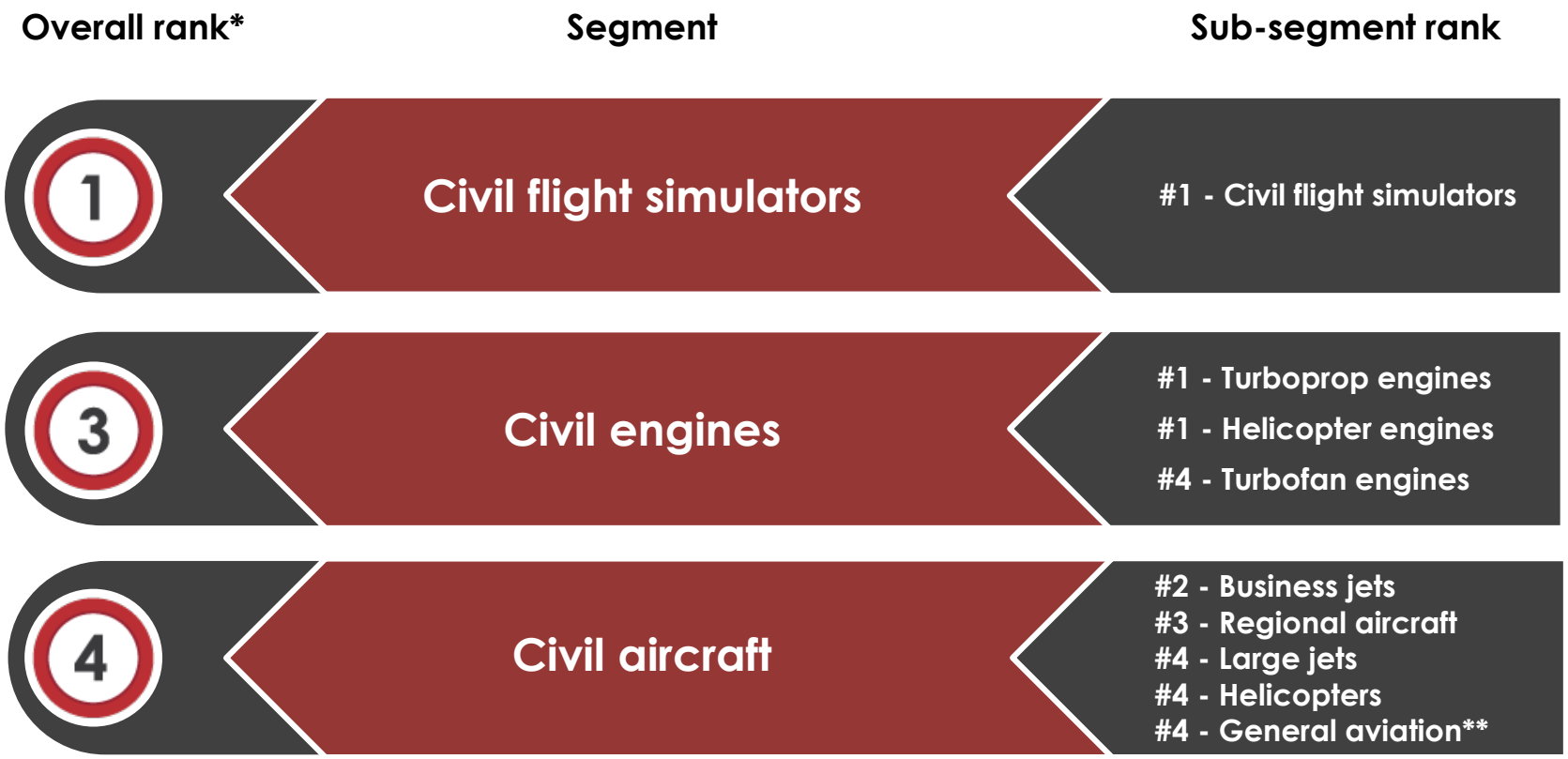
Over 60% of aerospace manufacturing exports were supply chain related



- Aerospace supply chain exports rose by 33% between 2014 and 2018

* Aeroengines and landing gear include their respective systems and components
Sources: Global Trade Atlas (2018), 2019; Statistics Canada Survey of Innovation and Business Strategy (SIBS) Table 33-10-0150-01 (2017), 2019

Canada ranked in the top 3 globally in the production of civil simulators, turboprop and helicopter engines, business jets, and regional aircraft

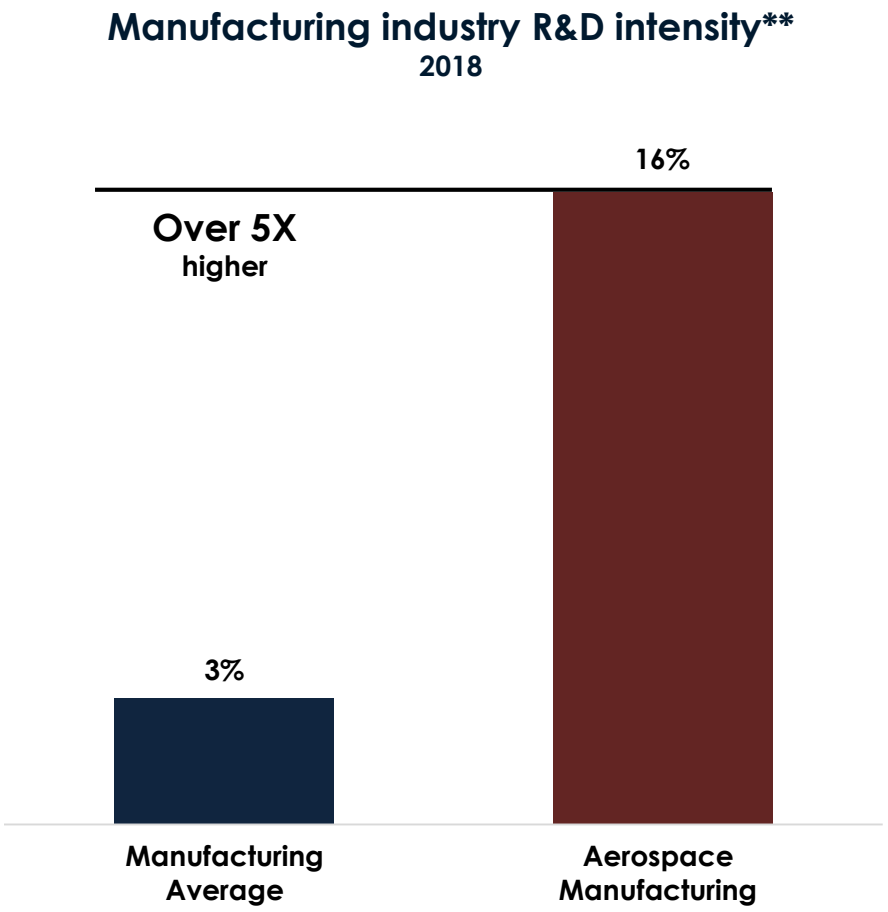


- Canada is the only country that ranked* in the top 5 in all civil flight simulator, engine, and aircraft sub-segments

* Rankings based on final production value
** General Aviation: includes all aircraft not used in either commuter services or airline service (excluding business jets and rotorcraft)
Sources: Frost & Sullivan, Commercial Flight Training and Simulation Market (2016); Teal Group (2018), 2019; Forecast International (2018), 2019

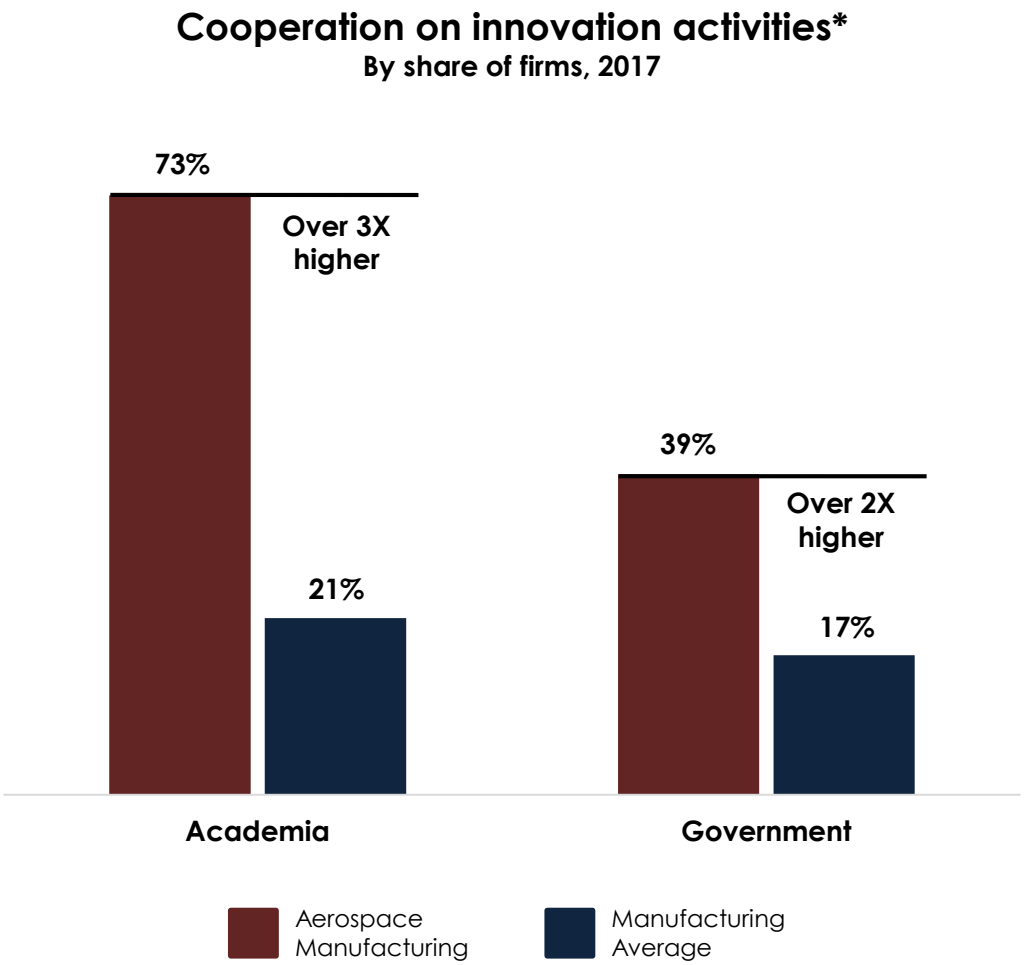
Aerospace was the number one R&D player* among all Canadian manufacturing industries

- In 2018, the Canadian aerospace manufacturing industry:
  - Invested $1.4 billion in R&D, contributing close to a quarter of total manufacturing R&D in Canada
  - Achieved over 5X higher R&D intensity** than the manufacturing average



* In terms of value of R&D activity
** R&D intensity is calculated using the ratio of R&D to GDP
Source: Statistics Canada Tables 27-10-0333-01 and 36-10-0434-01 (2018), 2019

Significantly more aerospace manufacturing firms cooperated on innovation activities* with academia and government than the manufacturing average



- Over 70% of aerospace manufacturing firms cooperated on innovation activities with academic partners
- Aerospace manufacturing firms also cooperated with partners across the public and private sectors

* Innovation activities includes good or service innovation, process innovation, marketing innovation, and organizational innovation
Source: Statistics Canada Survey of Innovation and Business Strategy (SIBS) Table 27-10-0178-01 (2017), 2019

Advanced and emerging technology* use in the Canadian aerospace manufacturing industry

Analysis of advanced and emerging technology* use based on newly released data from the ISED-sponsored Survey of Innovation and Business Strategy from Statistics Canada

Top 5 advanced technologies used in aerospace manufacturing

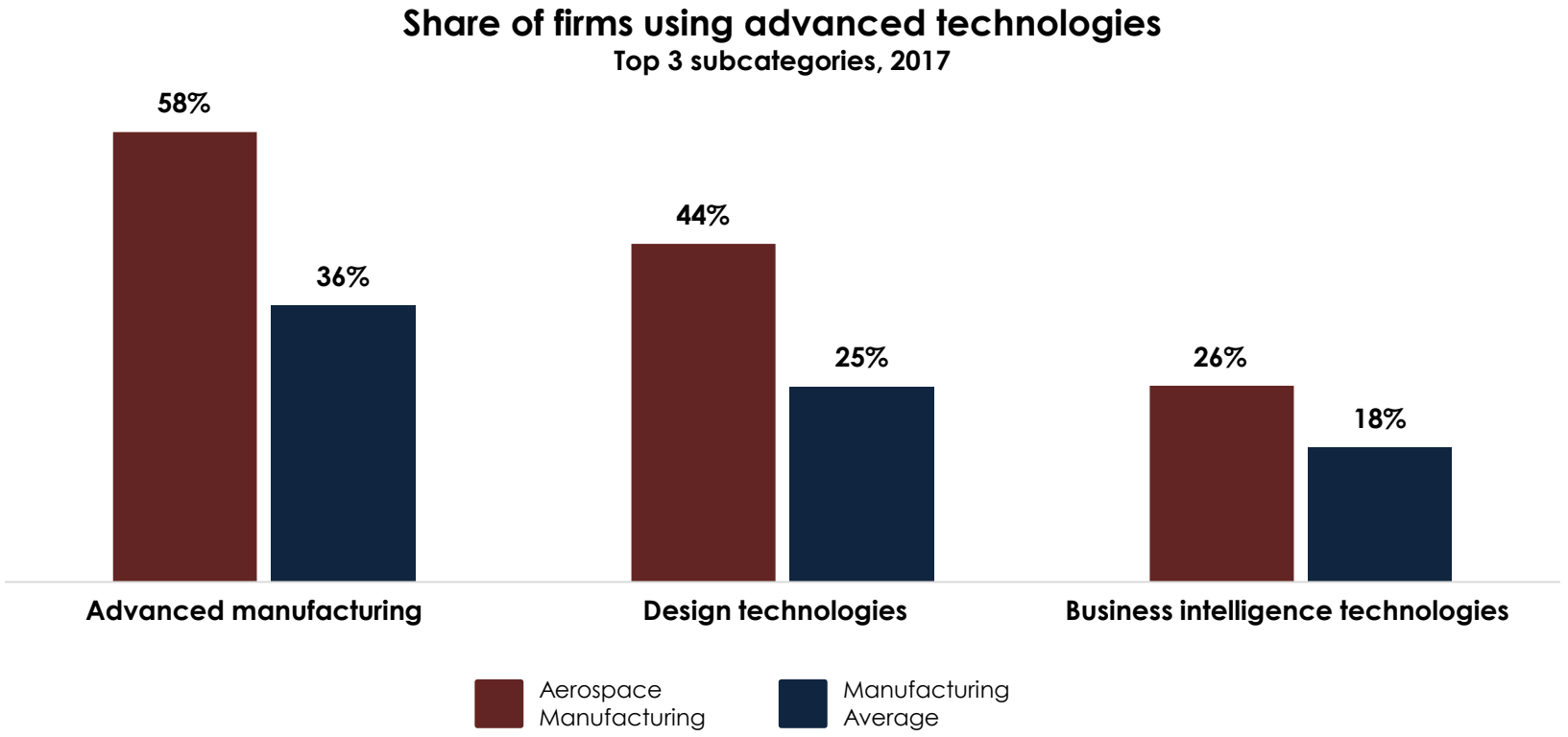
Rank**	Subcategory
1	Advanced manufacturing
2	Design and information control technologies
3	Business intelligence technologies
4	Material handling, supply chain or logistics technologies
5	Cybersecurity

Top 5 emerging technologies used in aerospace manufacturing

Rank**	Subcategory
1	Internet of Things (IoT) systems
2	Artificial intelligence (AI)
3	Geomatics or geospatial technologies
4	Nanotechnology
5	Biotechnology

* See Annex A3 for advanced and emerging technology subcategory definitions
** Rank is defined as the percentage of aerospace manufacturing firms using each technology subcategory
Source: Statistics Canada Survey of Innovation and Business Strategy (SIBS) Table 27-10-0178-01 (2017), 2019

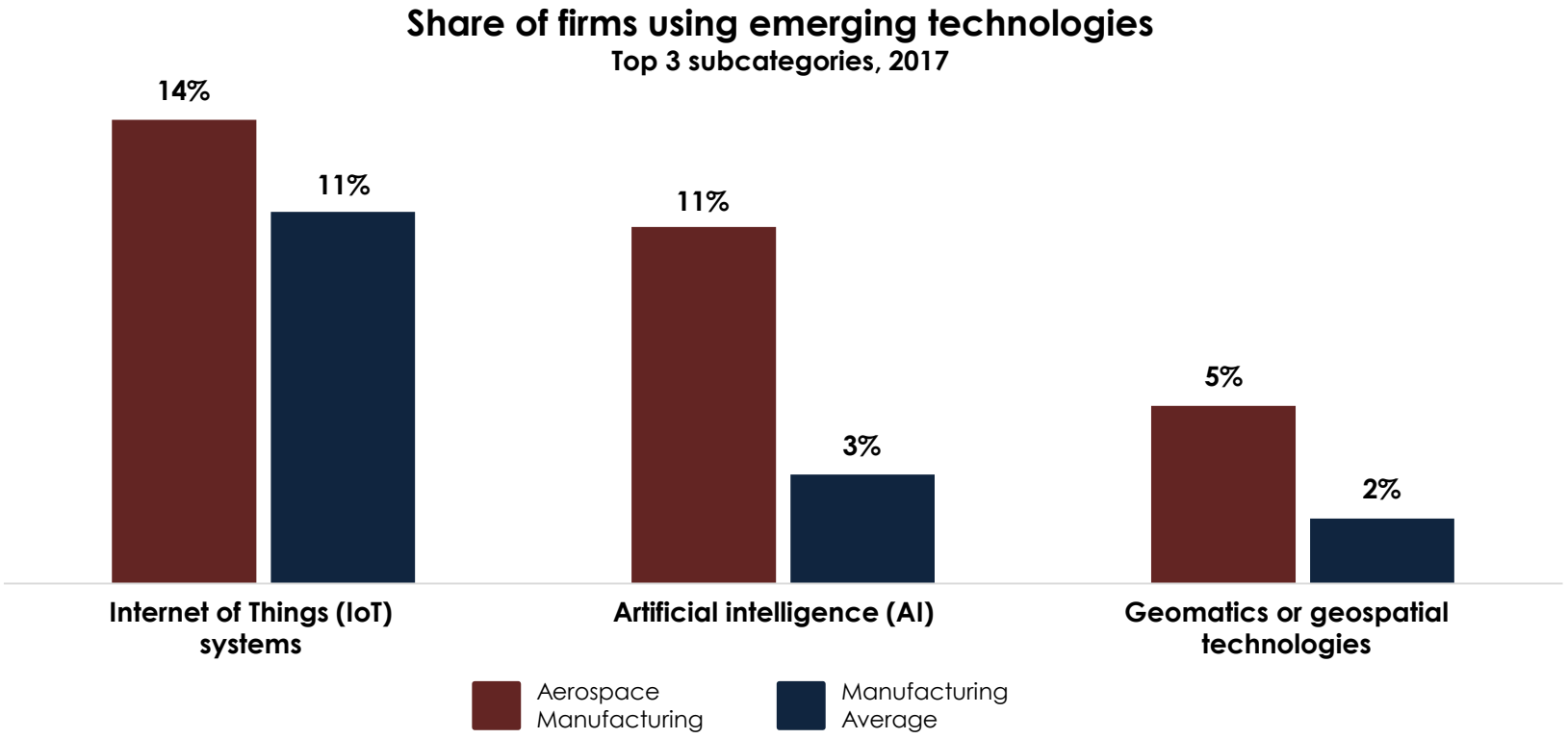
Aerospace manufacturing firms used advanced technologies* nearly 50% more than the manufacturing average



- Small and medium sized (SME**) aerospace manufacturers used advanced technologies 33% more compared to the SME manufacturing average

* Advanced technologies are new technologies that perform a new function or improve some function significantly better than commonly used technologies in the industry. They include advanced manufacturing, design technologies, business intelligence technologies (cloud-based computing systems and big data analytics tools), material handling, supply chain or logistics technologies, security or advanced authentication systems, and clean technologies. See Annex A3 for advanced and emerging technology subcategory definitions
** SMEs are defined as firms with less than 250 employees
Source: Statistics Canada Survey of Innovation and Business Strategy (SIBS) Table 27-10-0367-01 (2017), 2019

Aerospace manufacturing firms used key emerging technologies* 2X more than the manufacturing average



- Small and medium sized (SME**) aerospace manufacturers used emerging technologies 80% more compared to the SME manufacturing average

* Emerging technologies include Internet of Things (IoT) systems, artificial intelligence, geomatics or geospatial technologies, nanotechnology, and biotechnology. *See Annex A3 for advanced and emerging technology subcategory definitions
** SMEs are defined as firms with less than 250 employees
Source: Statistics Canada Survey of Innovation and Business Strategy (SIBS) Table 27-10-0367-01 (2017), 2019

Key Findings

The Canadian aerospace industry is:

- A nationwide and highly skilled industry that contributed over $25 billion in GDP and 213,000 jobs to the Canadian economy in 2018
  - The job impact to the Canadian economy was relatively stable between 2014 and 2018
- More export intensive and trade diverse than the manufacturing average, exporting to over 190 countries across 6 continents
- Ranked in the top 3 globally in the production of civil simulators, turboprop and helicopter engines, business jets, and regional aircraft
- The number one R&D player among Canadian manufacturing industries, with an R&D intensity 5X higher than the manufacturing average
- Outpacing the manufacturing average in the use of key advanced and emerging technologies, especially among SMEs

Annex A

- **Annex A1 – Definitions of the Canadian aerospace manufacturing and MRO service industries**
- **Annex A2 – Economic impact methodology principles**
- **Annex A3 – Definitions of advanced and emerging technology subcategories**
- **Annex A4 – Ranking of Canadian aerospace export markets**

Annex A1 – Definitions of the Canadian aerospace manufacturing and MRO service industries

Aerospace manufacturing industry	Aerospace MRO service industry*
Main activities: • Aircraft assemblies, subassemblies and parts • Aircraft engines and engine parts • Aircraft fuselage, wing, tail and similar assemblies • Tail and wing assemblies and parts (empennage) • Flight simulators • Developing and producing prototypes for aerospace products • Space systems • Telecommunication satellites and components • Avionics • Helicopters, propellers and parts	Main activities: • Aircraft heavy maintenance, servicing and repairing • Aircraft engines maintenance, servicing and repairing • Aircraft components and other systems maintenance, servicing and repairing • Aircraft line maintenance (aircraft servicing at airports – excluding sales of fuel revenues) • Aircraft ferrying services • Aircraft inspection services • Aircraft testing services • Aircraft upholstery repair

* Excludes MRO activity performed by manufacturers and airlines

Annex A2 – Economic impact methodology principles

- Aerospace industry data is compiled from various government agencies such as Statistics Canada, the Canada Revenue Agency, and the Canadian Space Agency, with firm-level adjustments to capture all key industry firms and segments*
- Economic impact analysis is based on gross domestic product (GDP)** and full-time equivalent employees
- The economic impact estimates of the State of Canada's Aerospace Industry Report were based on the most recent Statistics Canada economic impact multipliers***

* Inclusion of key firms in space manufacturing, avionics manufacturing, flight simulator manufacturing and MRO service providers
** GDP better represents activity that actually occurs within Canada in contrast to revenues that include foreign content as well as R&D, employment and revenues from outside of Canada (even if it was performed by a Canadian firm)
*** Economic model estimations are not comparable to older estimates in previously published reports as Statistics Canada's Input-Output multipliers were updated in April 2019

Annex A3 – Definitions of advanced technology subcategories

Advanced technology

Processing or fabrication technologies (advanced manufacturing)

Include flexible manufacturing cells (FMC) or flexible manufacturing systems (FMS), lasers used in materials processing (including surface modification), robots with sensing or vision systems, robots without sensing or vision systems, 4-9 axis computer numerically controlled (CNC) machinery, additive manufacturing including rapid prototyping for plastics and 3D printing for plastics, additive manufacturing including rapid prototyping for metals and 3D printing for metals, additive manufacturing including rapid prototyping for materials other than plastics and metals and 3D printing other than plastics and metals, automated machinery for sorting, transporting or assembling parts, plasma sputtering, micro-manufacturing (e.g., micro-machining or micro-molding) or micro-electro-mechanical systems (MEMS).

Design and information control technologies

Include virtual product development or modelling software including computer-aided design (CAD), computer aided engineering (CAE), computer aided manufacturing (CAM), virtual manufacturing, enterprise resource planning (ERP), manufacturing execution system (MES), software integration of quality results with planning and control softwares, manufacturing resource planning (MRP II), inter-company computer networks including extranet and electronic data interchange (EDI), wireless communications for production, sensor network and integration, computer-integrated manufacturing (CIM), automated systems for inspection (e.g., vision-based, laser-based, X-ray, high-definition (HD) camera or sensor-based) or unmanned aerial system (e.g., drone).

Business intelligence technologies

Include executive dashboards for analytics or decision-making, advanced technologies that are owned, leased or licensed, used as a service (e.g., cloud computing) or acquired through partnership. Executive dashboards for analytics or decision-making, software for large-scale data processing (e.g., Hadoop), live stream processing technology or real-time monitoring, software as a service (SaaS) (e.g., cloud computing - software) or infrastructure as a service (IaaS) (e.g., cloud computing - hardware).

Material handling, supply chain or logistics technologies

Include customer relationship management (CRM) software, software for demand forecasting or demand planning, transportation management system, warehouse management system (WMS), supply chain collaboration and visibility systems, automated storage (AS) and retrieval system (RS), part identification for automation (e.g., bar or QR coding) or radio frequency identification (RFID).

Security or advanced authentication systems (cybersecurity)

For example: software tokens, hardware tokens, smartphone tokens, cryptographic keys, biometrics (fingerprints, or other), multifactor authentication.

Source: Statistics Canada 2017 Survey of Innovation and Business Strategy (SIBS) – Reporting Guide

Annex A3 – Definitions of emerging technology subcategories

Emerging technologies

Internet of Things (IoT) systems

IoT refers to an ecosystem in which applications and services are driven by data collected from devices that sense and interface with the physical world. IoT application domains span all major economic sectors: health, education, agriculture, transportation, manufacturing, electric grids, and more.

Artificial intelligence

Computer systems able to perform tasks normally requiring human intelligence or able to learn without being explicitly programmed; for example: systems that can learn tasks through repetition (machine learning), identify patterns in big sets of data, recognize visuals and speech, and make decisions.

Geomatics or geospatial technologies

Geomatics is the science and technology of gathering, analyzing, interpreting, distributing and using geographic information. Geomatics encompasses a broad range of disciplines that can come together to create a detailed but comprehensible picture of the physical world and where each individual fits. The disciplines include surveying, mapping, remote sensing, geographic information systems, and global positioning systems.

Geospatial technologies refer to hardware and software systems that relate and display data of geographic, spatial or location nature. The technology helps to increase the speed of data interpretation and analysis for geomatics research.

Nanotechnology

Nanotechnology is the manufacturing of devices and products from molecular or nano-scale components with extraordinary properties. One nanometer (1 nm) is one billionth of a metre (.000000001 m), three to four atoms wide. Examples of nanotechnology: nanoparticles, nanomaterials, nanocoatings, nanostructures, nanosystems, nanophotonics, nanoelectronics, nanomedicine, nanobiotechnology.

Biotechnology

Biotechnology is the application of science and engineering in the direct or indirect use of living organisms in their natural or modified forms, in an innovative manner, when producing goods and services or improving existing processes. For the purpose of this survey, exclude fermentation for the production of beer, bread, cheese or yogurt.

Source: Statistics Canada 2017 Survey of Innovation and Business Strategy (SIBS) – Reporting Guide; OECD (2016), The Internet of Things: Seizing the Benefits and Addressing the Challenges

Annex A4 – Ranking of Canadian aerospace export markets (2018)

1	United States	34	Argentina	67	Finland	100	Cameroon	133	Nicaragua	166	Guam
2	Switzerland	35	Tanzania	68	Trinidad & Tobago	101	Cuba	134	Zambia	167	Namibia
3	France	36	New Zealand	69	Morocco	102	Niger	135	Cyprus	168	Montserrat
4	Germany	37	South Africa	70	Uganda	103	Jamaica	136	Barbados	169	Swaziland
5	Latvia	38	Belgium	71	Curacao	104	Belize	137	Kyrgyzstan	170	Tajikistan
6	China	39	Vietnam	72	Panama	105	Bahrain	138	Honduras	171	Albania
7	United Kingdom	40	Algeria	73	Yemen	106	Angola	139	El Salvador	172	Mozambique
8	Mexico	41	Chile	74	Somalia	107	Cook Islands	140	Paraguay	173	Comoros
9	Singapore	42	Indonesia	75	Nepal	108	Estonia	141	Venezuela	174	Iran
10	South Korea	43	Romania	76	Oman	109	Madagascar	142	Senegal	175	Central African Republic
11	Spain	44	Colombia	77	Ukraine	110	Slovakia	143	Gabon	176	Congo Dem. Rep.
12	Italy	45	Qatar	78	Botswana	111	Serbia	144	Azerbaijan	177	Moldova
13	United Arab Emirates	46	Kenya	79	Antigua & Barbuda	112	Dominican Republic	145	Mauritius	178	Suriname
14	Australia	47	Fiji	80	French Polynesia	113	Congo	146	Zimbabwe	179	Laos
15	Japan	48	Taiwan	81	Uruguay	114	Mali	147	Aruba	180	Faroe Islands
16	Brazil	49	Thailand	82	Luxembourg	115	Sri Lanka	148	Belarus	181	Cambodia
17	Poland	50	Afghanistan	83	Macau	116	Brunei Darussalam	149	Myanmar	182	Malawi
18	India	51	Malaysia	84	Seychelles	117	Bahamas	150	Bosnia & Herzegovina	183	Turkmenistan
19	Philippines	52	Papua New Guinea	85	Kazakhstan	118	Dominica	151	Burkina Faso	184	Virgin Islands (British)
20	Netherlands	53	Iceland	86	Ecuador	119	Guatemala	152	Equatorial Guinea	185	Falkland Islands
21	Sweden	54	Bangladesh	87	Egypt	120	U.S. Minor Outlying Is.	153	Mongolia	186	Armenia
22	Israel	55	Maldives	88	Guyana	121	Anguilla	154	East Timor	187	Eritrea
23	Turkey	56	Hungary	89	Libya	122	Kuwait	155	Sudan	188	Montenegro
24	Malta	57	Lithuania	90	Djibouti	123	Cape Verde	156	Macedonia	189	Rwanda
25	Ethiopia	58	Greenland	91	Slovenia	124	Togo	157	Sint Maarten	190	Liberia
26	Czech Republic	59	Nigeria	92	Georgia	125	Lebanon	158	St. Kitts & Nevis	191	Haiti
27	Denmark	60	Ireland	93	Jordan	126	Mauritania	159	Cote d'Ivoire	192	Gambia
28	Portugal	61	Cayman Islands	94	Bolivia	127	New Caledonia	160	Solomon Islands	193	Grenada
29	Norway	62	Saudi Arabia	95	Bulgaria	128	Iraq	161	Wallis & Futuna Islands		
30	Austria	63	Greece	96	Costa Rica	129	St. Vincent & the Grenadines	162	St. Pierre & Miquelon		
31	Hong Kong	64	Croatia	97	Ghana	130	Guinea	163	Vanuatu		
32	Russia	65	Peru	98	Chad	131	Tunisia	164	Turks & Caicos Islands		
33	Pakistan	66	South Sudan	99	Uzbekistan	132	British Indian Ocean Terr.	165	St. Lucia		

Source: Global Trade Atlas (2018), 2019

Annex B

- **Annex B1 – Economic impact indicators (2018)**
- **Annex B2 – Industrial indicators (2018)**
- **Annex B3 – Industrial indicators (2014-2018)**

Annex B1 – Economic impact indicators (2018)*

	Impact on Canadian GDP ($ millions)				Impact on Canadian employment (jobs)			
	Aerospace industry	Suppliers to aerospace industry	Consumer spending by associated employees	Total**	Aerospace industry	Suppliers to aerospace industry	Consumer spending by associated employees	Total**
Aerospace manufacturing	9,077	4,046	3,171	16,295	56,707	40,088	34,508	131,302
Aerospace MRO	4,012	3,183	2,041	9,236	32,756	30,645	18,505	81,907
Aerospace total	**13,089**	**7,230**	**5,212**	**25,530**	**89,463**	**70,733**	**53,013**	**213,209**

* National Input-Output Multipliers (2015) adjusted to 2018 GDP (in 2012 chained dollars) and employment
** Includes the aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact)
Note: Due to rounding, numbers presented may not add up precisely to the totals provided
Source: ISED's economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, and enterprise-level observations, 2019

Annex B2 – Industrial indicators (2018)*

	Aerospace manufacturing	Aerospace MRO	Aerospace industry total
GDP ($ millions)	9,077	4,012	13,089
Employment (jobs)	56,707	32,756	89,463
Revenues ($ millions)	23,559	8,016	31,576
R&D ($ millions)**	1,421	43	1,464
Exports ($ millions)	16,704	N/A***	16,704

	Average Monthly Backlog****
Aerospace manufacturing	29.8 months
Average manufacturing	2.5 months

* National Input-Output Multipliers (2015) adjusted to 2018 GDP (in 2012 chained dollars) and employment. Revenues and R&D are in current annual dollars
** Several aspects of the Statistics Canada Annual Survey of Research and Development in Canadian Industry have been redesigned since 2016, including concepts, methodology, the collection method and the data processing system. The concepts and definitions employed in the collection and dissemination of R&D data are provided in the Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development (Organisation for Economic Cooperation and Development (OECD), 2015). According to this definition: "R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge"
*** Export figures are sourced from Trade Data Online (2018), 2019. Export data for aerospace MRO is not available
**** Average ratio of backlog (finished goods, work in process, unfilled orders) to sales
Note: Due to rounding, numbers presented may not add up precisely to the totals provided
Source: ISED's economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, and enterprise-level observations, 2019; Statistics Canada Table 16-10-0118-01, (April 2019 Release), 2019

Annex B3 – Industrial indicators (2014-2018)*

	Industry	2014	2015	2016	2017	2018	% Change 2017-2018	% Change 2014-2018
GDP ($ millions)	Aerospace manufacturing	9,810	9,267	8,956	8,613	9,077	5.39%	-7.48%
	Aerospace MRO	3,293	3,660	3,809	4,025	4,012	-0.33%	21.81%
	Aerospace total	13,104	12,927	12,766	12,638	13,089	3.56%	-0.12%
	Aerospace contribution to Canadian economy**	25,193	25,061	24,848	24,728	25,530	3.24%	1.34%
Employment (jobs)	Aerospace manufacturing	60,074	57,583	55,663	53,588	56,707	5.82%	-5.60%
	Aerospace MRO	30,243	31,314	31,458	31,998	32,756	2.37%	8.31%
	Aerospace total	90,316	88,897	87,121	85,586	89,463	4.53%	-0.94%
	Aerospace contribution to Canadian economy**	214,720	211,632	207,545	204,091	213,209	4.47%	-0.70%
Revenues ($ millions)	Aerospace manufacturing	20,806	22,497	20,083	21,151	23,559	11.38%	13.23%
	Aerospace MRO	7,401	7,663	7,699	7,831	8,016	2.37%	8.31%
	Aerospace total	28,208	30,161	27,782	28,982	31,576	8.95%	11.94%
R&D* ($ millions)**	Aerospace total	1,914	1,868	1,703	1,786	1,464	-18.06%	-23.50%

* National Input-Output Multipliers (2015) adjusted to 2018 GDP (in 2012 chained dollars) and employment. Revenues and R&D are in current annual dollars

** Includes aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact)

*** Several aspects of the Statistics Canada Annual Survey of Research and Development in Canadian Industry have been redesigned in 2016, including concepts, methodology, the collection method and the data processing system. The concepts and definitions employed in the collection and dissemination of R&D data are provided in the Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development (Organisation for Economic Cooperation and Development (OECD), 2015). According to this definition: "R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge"

Note: Due to rounding, numbers presented may not add up precisely to the totals provided

Source: ISED's economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, and enterprise-level observations, 2019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