Industry Canada Industrie Canada

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Chummer Farina
Industry Canada

Jerzy Komorowski
National Research Council

Canada

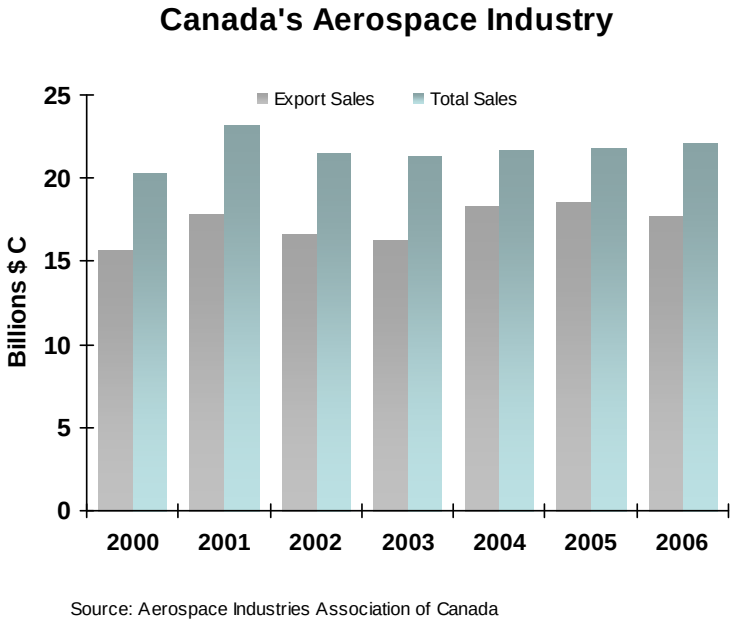
Agenda

- Chummer Farina, Director General
  Aerospace, Defence and Marine Branch, Industry Canada
  - Overview of Canadian Aerospace and Defence Industry
  - Industry R&TD Support Mechanisms
- Jerzy Komorowski, Director General
  Institute for Aerospace Research, National Research Council
  - Overview of National Research Council's Institute for Aerospace Research
  - Canadian Aerospace Innovation System and National and International Collaboration Activities
- Discussion – international collaboration prospects

Canada’s Aerospace Sector – an Overview

Canada's aerospace (civil and defence) industry is an important economic driver…

- Aerospace sales of $22.1 billion in 2006.
- Well-integrated into the global aerospace industry, with 80% output exported.
- Aerospace contributes $9.2 billion (5%) to manufacturing GDP.
- Major industrial R&D performer
  - 11% of all Canadian industrial R&D spending; $1.2 billion in 2006.
- Over 400 firms with over 79,000 employees
  - 12,000 engineers & scientific employees, 20,000 technicians and technologists.

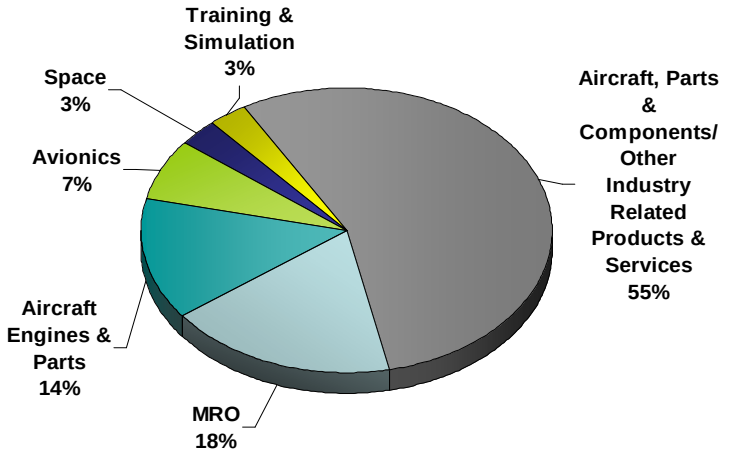


Source: Aerospace Industries Association of Canada

… and a Strong International Competitor

- Ranks 5th in world aerospace sales and employment after US, UK, France and Germany.
- Ranks 3rd in world civil aircraft production after US and France.
- Small domestic market, relatively modest defence and space programs.
- Highly oriented to commercial markets
  - 78% of industry output for civil use, as compared with 44% in the US.
- Several major foreign firms established in Canada.
- Has 5% share of both global aerospace sales and employment.

Canada's Aerospace Products (2006)



Source: Aerospace Industries Association of Canada

Global Leadership (% of global market share)

Regional Aircraft	47%
Small gas turbine engines	34%
Visual simulation equipment	70%
Aircraft environmental control systems	60%
New large aircraft landing gear	60%
Civil helicopters	14%

Source: Aerospace Industries Association of Canada, Teal Group, 2006

Aerospace leaders have chosen Canada as a good place for doing manufacturing and R&D

Canadian

BOMBARDIER

CAE

HÉROUX DEVTEK

MAGELLAN AEROSPACE CORPORATION

American

Bell Helicopter TEXTRON

BOEING

GENERAL DYNAMICS Canada

L3 communications

GOODRICH

Honeywell

LOCKHEED MARTIN

Pratt & Whitney Canada
A United Technologies Company

Raytheon

European

asco

EADS

Messier-Dowty
SAFRAN Group

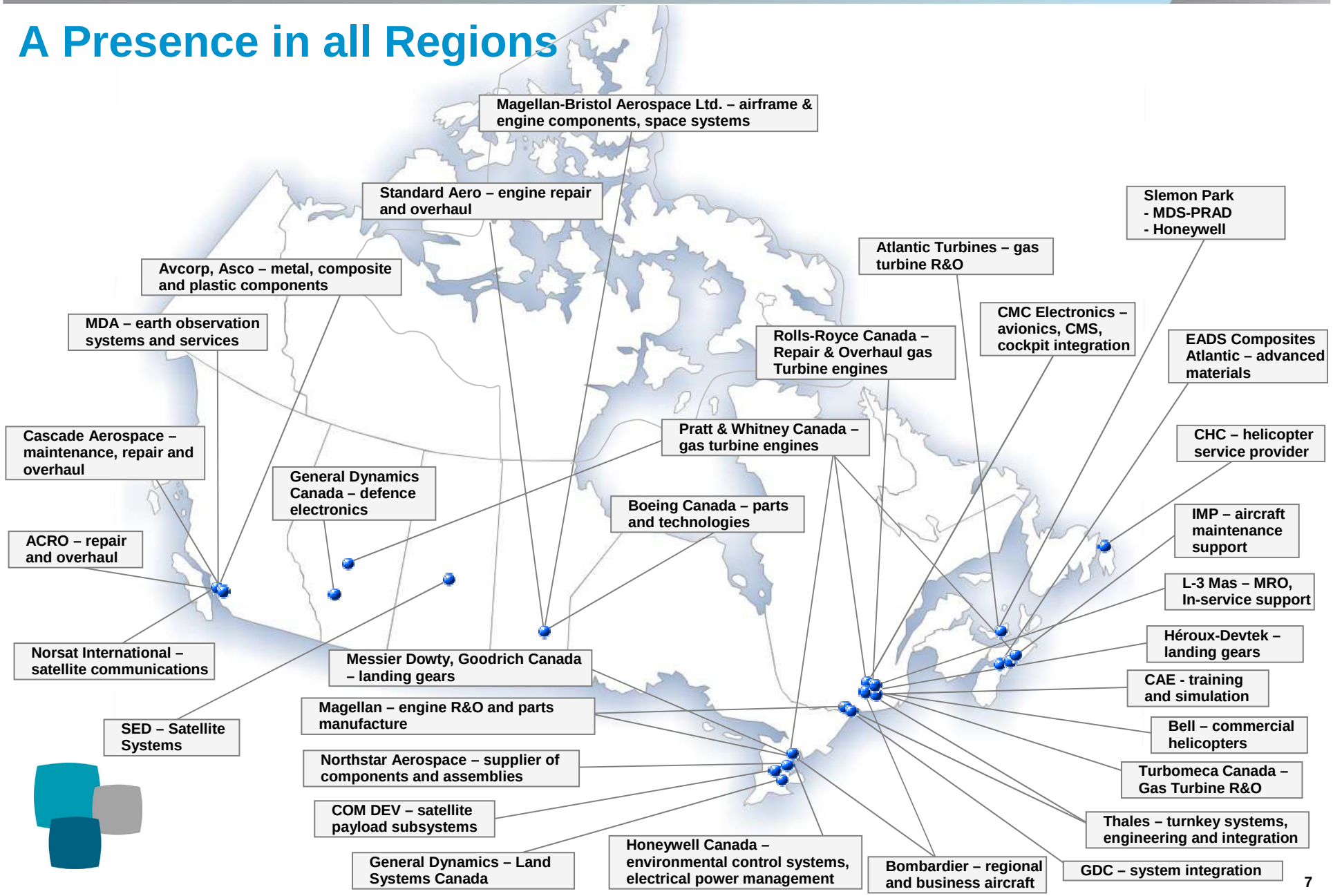
ROLLS ROYCE

snecma

SONACA NMF CANADA

THALES

A Presence in all Regions



The Industry Portfolio – Portal for Business Development

- Business Development Bank of Canada
- Canadian Space Agency
- Canadian Tourism Commission
- Copyright Board Canada
- **Industry Canada**
- **National Research Council Canada**
- **Natural Sciences and Engineering Research Council of Canada (NSERC)**
- Registry of the Competition Tribunal
- Social Sciences and Humanities Research Council of Canada (SSHRC)
- Standards Council of Canada
- Statistics Canada

With the key departments and agencies responsible for science and technology, micro-economic policy, regional development and marketplace services, the *Industry Portfolio* offers a wide range of services and partnership opportunities with the private sector in support of economic growth and jobs.

Strong partnership between government and industry. Consensus view of the future

Canada will be home to a growing, innovative and diversified industry, recognized as a leader in serving global aerospace and defence markets and a preferred location for investment.

For its part the Government works with industry in the following aspects:

- Securing Strategic Aerospace and Defence Investments
- Technology Development and Commercialization
- Skills Development
- Trade Policy and Trade Development Initiatives
- Sales Financing
- Security and the Environment
- Procurement

Securing a Position in the Global Value Chain
There is Room for All

- The aerospace industry is an important element of our respective economies:
  - a driver of economic growth
  - a source of safe and efficient air travel
  - a provider of enhanced national security
  - a developer of R&D “spin-offs” that find application in other sectors

- Aerospace is an industry in transition

- The issues and challenges we face are much the same:
  - OEMs are becoming “systems integrators”
  - SMES are moving up the Global Supply Chain
  - unprecedented changes at all levels of the Supply Chain

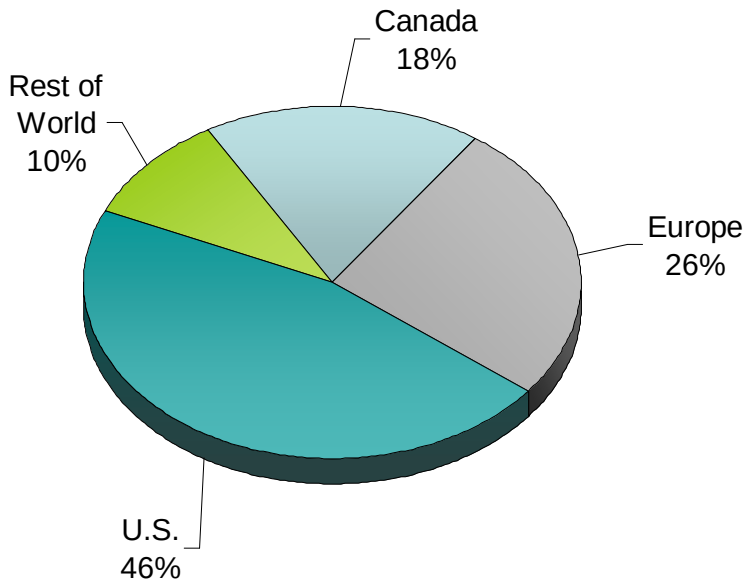
Securing a Position in the Global Value Chain
There is room for All

- The aerospace industry, perhaps more than any other industry, is global in nature

- Partnerships are being established through Global Value Chains
  - Company to their respective government
  - Company to company on a national basis
  - Company to company on an international basis

- Global Value Chains could be strengthened through increased government to government communication and collaboration

Bombardier Supplier Mix
"By Number of Suppliers"



Future Major Platforms Initiative

- Participation on future major platforms is seen as critical to maintaining Canada's competitive position in the aerospace industry.

- The Future Major Platforms Initiative is an industry-led effort in partnership with governments to position Canadian firms on new aircraft programs through:
  - early identification and development of key technologies
  - strategic use of existing support mechanisms.
  - development of capacity to support Canadian positioning
  - maximizing use of marketing support mechanisms

- R&D collaboration, internationally, would serve to further our common objectives

R&TD Support Mechanisms for Aerospace and Defence Industries

Strategic Aerospace and Defence Initiative

- The Strategic Aerospace and Defence Initiative (SADI) is delivered by Industrial Technologies Office (ITO), a Special Operating Agency of Industry Canada.

- SADI Program Objectives:
  - Encourage strategic R&D that will result in innovation and excellence in new products and services
  - Enhance the competitiveness of Canadian aerospace and defence companies; and
  - Foster collaboration between research institutes, universities, colleges, and the private sector

- SADI was launched April 2, 2007

- SADI is expected to invest nearly $900 million over the next 5 years, with funding to reach a maximum of $225 million per year.

SADI / Strategic Aerospace and Defence Initiative

Industrial and Regional Benefits Program (IRB)

- Approved by Cabinet in 1986, the IRB Policy provides the framework for using federal government procurement to lever long-term industrial and regional development.

- An IRB is a contractual commitment by prime contractor to place work in Canada as a result of successfully bidding a Canadian defence program. (100% of contract value)

- IRBs are mandatory for projects over $100 million (usually Major Crown Projects), discretionary in the $2-100 million range, and are not applied to small projects.

- Currently $10 billion under contract.

IRB Objectives

- Objective: focused strategy for long-term industrial and regional development
  - High quality technology as identified through a key technology list developed by industry stakeholders
  - Lasting economic value for Canadian industrial base
  - Provide opportunities and access to export markets for Canadian industry
  - Enables Canadian company participation in global value chain

Sustainable Development Technology Canada (SDTC)

- Established in 2001 as a not-for-profit foundation that finances and supports the development and demonstration of clean technologies which provide solutions to issues of climate change, clean air, clean water, and clean soil technologies.

- SDTC operates two funds:
  - $550 million SD Tech Fund™: late stage development and pre-commercial demonstration of climate change focused technology solutions
  - $500 million NextGen Biofuels Fund™: large demonstration-scale facilities for the production of next-generation renewable fuels (launched Sept 2007).

- SD Tech Fund: Two funding rounds per year – calls issued, proposals received. To date, SDTC has completed eleven funding rounds and allocated a total of $308 million to 137 projects involving all major Canadian economic sectors.

- NextGen Biofuels Fund: Open for applications at all times.

SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA™

Natural Science and Engineering Research Council of Canada (NSERC)

- NSERC is a separate employer of the Government of Canada, reporting to Parliament through the Minister of Industry
- NSERC promotes and assists research in the natural sciences and engineering
- Fund more than 10,000 university professors every year and encourage more than 800 Canadian companies to invest in university research
- Several programs, including University and Industrial Research chairs
- 2007/08 budget $958 million
- Over the last ten years, NSERC has invested $6 billion in basic research, university-industry projects, and the training of Canada's next generation of scientists and engineers.

NSERC CRSNG

Scientific Research and Experimental Development (SR&ED) Program

- Federal tax incentive program to support and foster science and technology, particularly R&D conducted by Canadian companies

- Eligible project areas:
  - Experimental Development; Basic Research; Applied Research; Support Work

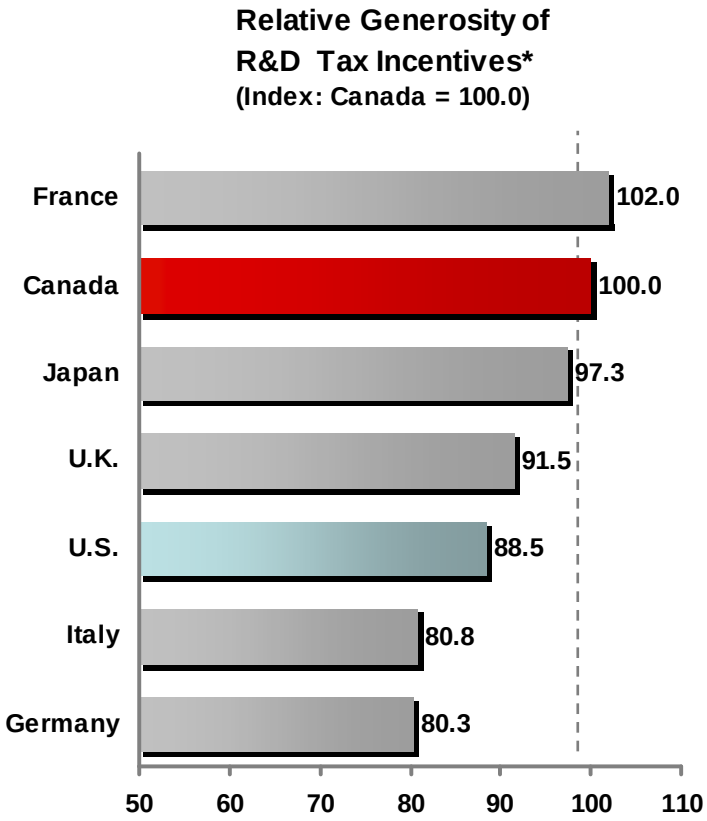
- Complementary Provincial Programs in most provinces.

- Largest single source of government R&D support to Canadian universities

- Investment tax credits vary from 20 to 35% of eligible R&D expenditures depending upon the amount of those expenditures and size of company.

Canada has a strong competitive R&D infrastructure

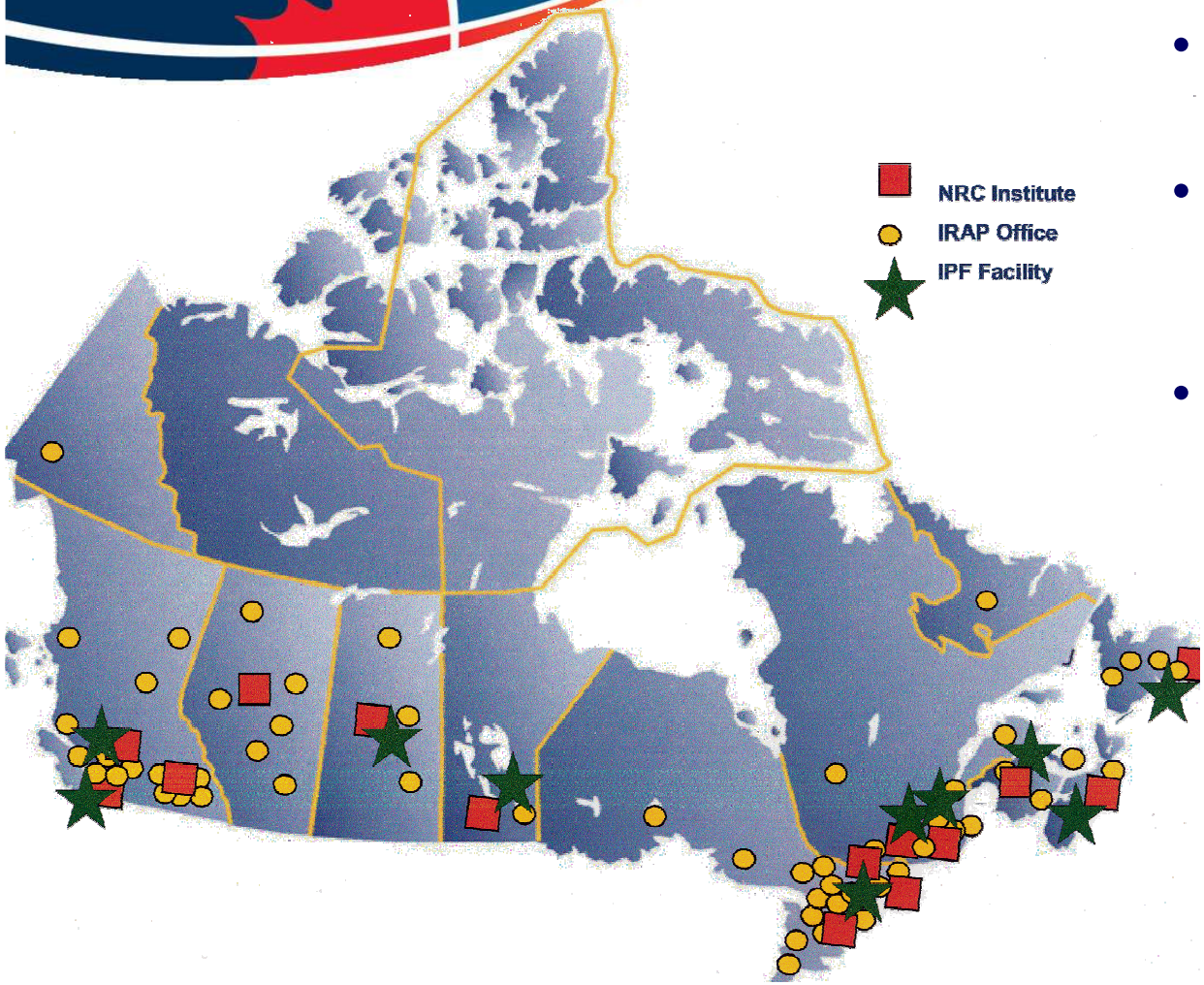
- Canada offers one of the most favourable tax treatments for R&D among the G-7:
  - Canada provides a system of tax credits and accelerated tax deductions for a wide-variety of R&D expenditures.
  - Eligible costs include: salaries, overhead, capital equipment, and materials
- These federal and provincial tax-based incentives permit firms to significantly reduce R&D costs through direct investment or sub-contracting in Canada
- Strong capability in advanced technologies
- Large pool of scientific and engineering personnel
- Wide range of research facilities
- Strong technology collaboration between universities and industry



Source: Warda, Jacek, Rating Canada's R&D Tax Treatment: A 2006 Update, March 31, 2007
Note: Relative generosity is determined by dividing the after tax cost of performing $1.00 of R&D by 1 less the corporate tax rate.
Results are indexed to the relative generosity of Canada's system of tax-based support for R&D. The higher the ratio the more competitive the tax system.
* Calculations based on large firms

NRC·CNRC
NRCaerospace

NRC: A National Institution



- Federal government agency
- Provides essential elements of national S&T infrastructure
- Labs and facilities across the country
  - 20 research institutes
  - Industrial Research Assistance Program or NRC-IRAP
  - Industrial Partnership Facilities
  - CISTI

Staff: Approx. 4,300 employees; 1,500 visiting / guest workers
Total expenditures 2005-06: **$835 M**
Total Income 2005-06: **$166 M**

NRC Aerospace Mission Statement

To increase the global competitiveness of Canadian industry by engaging all of NRC competencies in the development and application of leading aerospace technologies.

Institute for Aerospace Research

- Institute for Aerospace Research is one of 20 NRC institutes providing support in national standards, information technologies and manufacturing

- NRC Institute for Aerospace Research is Canada's national laboratory for aerospace research and development:
  - Over 350 professional, technical and support staff in five laboratories
  - Annual budget of $64M
  - Locations in Ottawa and Montreal, Canada

- R&D expertise and facilities in:
  - Aerodynamics
  - Flight Research
  - Structures and Materials
  - Propulsion
  - Manufacturing Technology

- The Institute for Aerospace Research offers:
  - Access to technical expertise and information
  - Access to national test facilities and data bases
  - Cost-shared programs with Canadian and foreign aerospace firms

National Research Council Industrial Research Assistance Program (NRC-IRAP)

- NRC-IRAP provides a range of both technical and business oriented advisory services along with potential financial support to growth-oriented Canadian small- and medium-sized enterprises.

- Impacts more than 12,000 SMEs (<500 employees) each year

- Nation-wide network of more than 260 Industrial Technology advisors in 100 communities across the country

- Offers two kinds of financial assistance:
  - R&TD - provides mentoring support and invests on a cost-shared basis for research and pre-competitive development technical projects
  - Youth Employment Strategy Programs - provide firms with support to hire post-secondary graduate

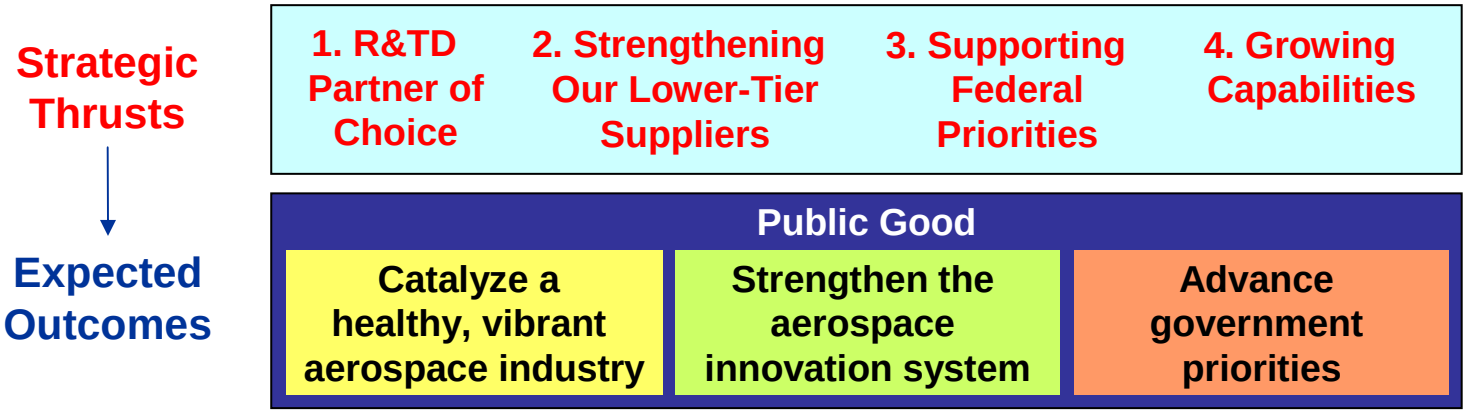
IAR buildings and facilities*

- 4 sites (2 in Ottawa, 2 in Montreal)
- 15 buildings (565,000 sq.ft.)
- Major facilities:
  - 8 wind tunnels
  - 8 research aircraft
  - Full-scale structural test rigs
  - Engine and combustion test cells
  - Materials characterization and testing equipment
  - Aeroacoustic reverberant chambers
  - Lubrication/tribology test rigs
  - Flight Recorder Playback Centre
  - Manufacturing research facilities

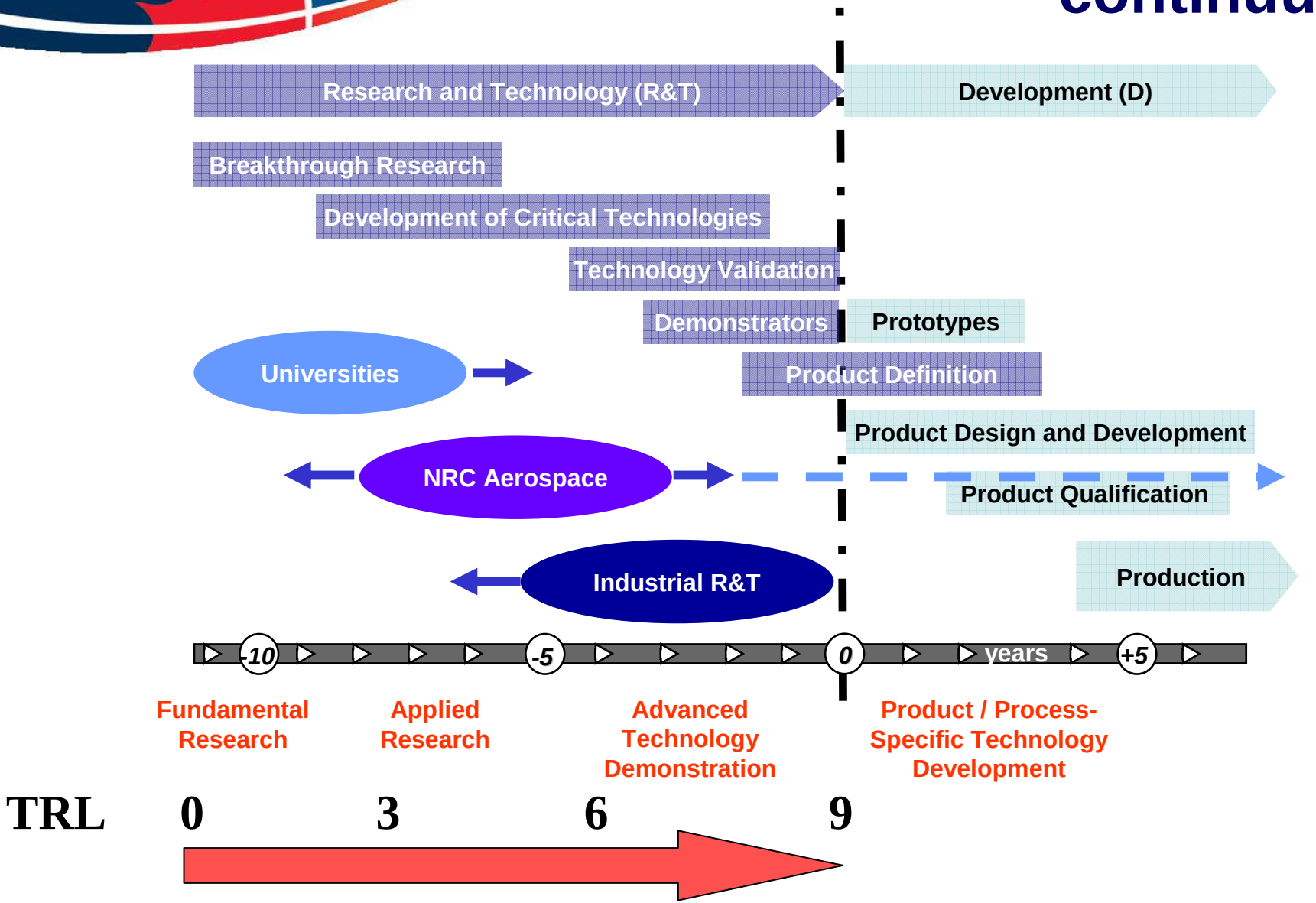
* ~$1Billion replacement value

Our strategy

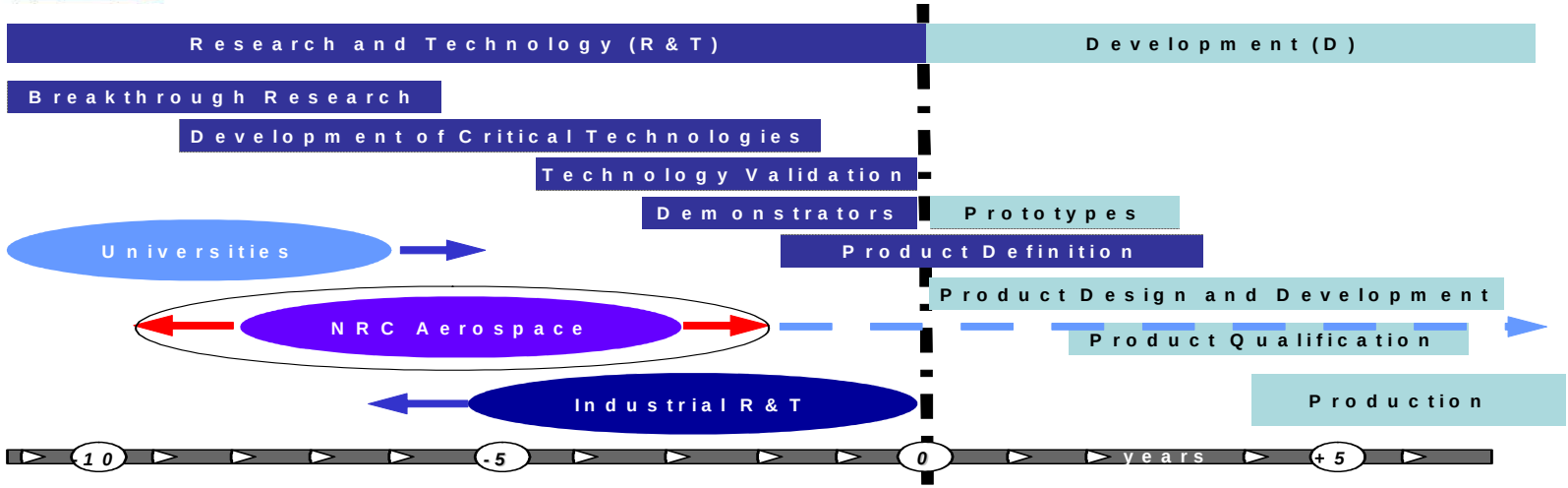
Leverage our role with industry, academia, and government to globally strengthen Canadian industry.



Our role in the R&TD continuum



R&TD continuum funding support



CFI

NSERC

SADI

CRIAQ(C)

Industry (SR&ED, VISA)

NRC I/P/B

IRAP

NCE*

* not intended for aerospace

Weakness in the Canadian Innovation System

- The middle to high TRL R&T Development not sufficiently supported
- These TRLs are best addressed through pre-competitive collaborations and repayable programs are not attractive for these programs
- While high TRLs (technology validation and demonstration) are lower risk they are typically very expensive
- Lower tier suppliers must become active in these TRLs if Canadian supply chain is to remain competitive

- NRC is the primary delivery organization in these TRLs and focusing and leveraging our A base will have significant impact

NRC Tools

- National Network – AIAC, AQA, OAC, CASI, AeroMontreal
- IRAP – offices, support for SMEs
- Collaborations with Universities
- CRIAQ (C) – NRC is a board member and strong participant in the consortium
- Collaborations with OEMs linking OEMs and SMEs (i.e. Bell-Bombardier-NRC-CAL composites work)
- Strong partnership with DRDC (NRC as delivery organisation) and other OGDs
- NRC visiting workers
- Control Goods Program, ITARS, ISO certification
- International Network – RTO, TTCP, significant role in international professional societies

Flexible business arrangements

- Negotiated contracts & partnerships on case-by-case basis
- Both Canadian and foreign clients
- Fee-for-service contracts
- Collaborative research agreements
- Licensing arrangements (technologies usually from core research activities)

Key Websites

- Industry Canada http://www.ic.gc.ca/ic_wp-pa.htm
- NRC Institute for Aerospace Research http://iar-ira.nrc-cnrc.gc.ca/main_e.html
- NRC/IRAP http://irap-pari.nrc-cnrc.gc.ca/
- Industrial Technologies Office http://ito.gc.ca/
- NSERC http://www.nserc.gc.ca/index.htm
- Sustainable Development Technology Canada http://www.sdtc.ca/
- Scientific Research and Experimental Development http://www.cra-arc.gc.ca/taxcredit/sred/menu-e.html

The Way Forward

- Canada has achieved some collaboration success on both a national and international scale but much more can be accomplished.

- Canada welcomes the opportunity for ongoing dialogue with international stakeholders to foster increased international collaboration.

- Contact points:
  - Chummer Farina, Director General, ADMB, Industry Canada
    Farina.Chummer@ic.gc.ca
    1-613-941-8123
  - Jerzy Komorowski, Director General, IAR, NRC
    jerzy.komorowski@nrc-cnrc.gc.ca
    1-613 993-3999