

# NATIONAL RESEARCH COUNCIL OF CANADA

## The Canadian RTO Model

EARTO Annual Conference, Helsinki

March 20, 2019



# National Research Council of Canada

## 2018-19 Budget: \$1.1B

- NRC Research: \$640M
- IRAP: \$370M
- Internal Services: \$140M

## Constellation of Research Centres

- 2,116 scientists, engineers & technicians
- Specialized facilities at 22 locations
- 968 peer reviewed publications
- 303 patents filed
- \$221M total earned NRC revenues
  - 86% of clients indicated that NRC enables results: jobs; sales; R&D

## SME Innovation Funding Agency

- 255 Industrial Innovation Advisors
- 120 locations across the country
- 4,923 firms received advice
- 3,255 firms received project funding
  - IRAP supported clients reported an annual increase of 25% in revenues and 13% increase in # of employees (between 2014 and 2016)

# Research Centres

## Transportation and Manufacturing

1. Aerospace
2. Automotive and surface transportation

## Engineering

3. Construction
4. Energy, mining and environment
5. Ocean, coastal and river engineering

## Life Sciences

6. Aquatic and crop resource development
7. Human health therapeutics
8. Medical devices

## Emerging Technologies

9. Advanced electronics and photonics
10. Digital technologies
11. Herzberg astronomy and astrophysics
12. Metrology
13. Nanotechnology
14. Security and disruptive technologies

# R&D Facilities at 22 Locations Across Canada



## Vancouver, BC

- Batteries, fuel cells and industrial tribology



## Saskatoon, SK

- Plant biotechnologies and plant-growth facilities



## Ottawa, ON

- Aerospace, vaccines, construction, quantum, photonics, machine vision, big data analytics, metrology, materials characterization and testing



## Halifax, NS

- Photobioreactors, bioprocessing
- Natural product chemistry, bioactive characterization



## Victoria and Penticton, BC

- Optical and radio telescopes
- Adaptive optics



## Mississauga, ON (*in progress*)

- Advanced materials for digital manufacturing, printed electronics, smart objects, devices, sensors



## Saguenay, QC

- Aluminium and multi-materials assembly
- Hybrid manufacturing (extrusions, forgings, castings)



## Charlottetown, PE

- Natural product and functional ingredient development



## Edmonton, AB

- Nanotechnology, electron microscopy



## London, ON

- Additive manufacturing, product development, laser consolidation, micro-machining



## Montreal/Boucherville/ Royalmount, QC

- Intelligent machining, robotics
- Medical devices, advanced biologics analytics, biomanufacturing pilot plant



## St. John's, NL

- Ocean engineering
- Ice and vessel management

# R&D Programs

NRC DIVISION	NRC RESEARCH CENTRE	NRC R&D PROGRAM
TRANSPORTATION AND MANUFACTURING	AEROSPACE	Aerospace Product Development and Certification Civilian Unmanned Aircraft Systems Working and Travelling on Aircraft Defence Technologies and Sustainment
	AUTOMOTIVE AND SURFACE TRANSPORTATION	Advanced Transportation Systems Advanced Manufacturing
ENGINEERING	CONSTRUCTION	Building Regulations for Market Access High-Performance Buildings
	ENERGY, MINING AND ENVIRONMENT	Bioenergy Systems for Viable Stationary Applications Energy Storage for Grid Security and Modernization Environmental Advances in Mining High-Efficiency Mining
	OCEAN, COASTAL AND RIVER ENGINEERING	Arctic (Accessing Canada's North) Marine Infrastructure, Energy and Water Resources

# R&D Programs

NRC DIVISION	NRC RESEARCH CENTRE	NRC R&D PROGRAM
LIFE SCIENCES	AQUATIC AND CROP RESOURCE DEVELOPMENT	Canadian Wheat Improvement Bio-based Specialty Chemicals
	HUMAN HEALTH THERAPEUTICS	Biologics and Biomanufacturing Therapeutics Beyond Brain Barriers Vaccines and Immunotherapeutics
	MEDICAL DEVICES	Health Technologies
EMERGING TECHNOLOGIES	DIGITAL TECHNOLOGIES	Multimedia Analytic Tools
	ADVANCED ELECTRONICS AND PHOTONICS	Advanced Photonic Components Printable Electronics
	SECURITY AND DISRUPTIVE TECHNOLOGIES	Quantum Photonic Sensing and Security Security Materials Technology
	METROLOGY	Measurement Science and Standards

# Industrial Research Assistance Program (IRAP)

## 9 streams

1. Core IRAP – Contributions to firms
2. Large Value Contributions
3. Third party SME services
4. EUREKA, Eurostars
5. Canadian International Innovation Program (CIIP)
6. Youth Employment Program (YEP)
7. International Initiatives
8. White Label (OGDs)
9. CanExport (GAC)

- **70-year** proven track record (since 1946)
- **\$295M** contribution funding to SMEs (2018-19)
- **3,255 firms** received funding
- **6,617 jobs** supported in SMEs
- **2,140 youth** internships supported
- **1,200 assessments** completed for other government departments (OGDs)

# Supporting International SME Collaborations

## Connecting clients to the global value chain

- Large enterprise initiative
- Sector Teams

## New tools to support international growth

- Member of Eurostars™
- Increased participation in Eureka
- CanExport

**EUREKA! and Eurostars –**  
EU and Canada working together  
(127 projects, 578 partners, €268M project value since 2012)



# New Directions for the NRC



# Canadian Innovation System (R&D Performing Sectors)

Business:  
\$17,929M

Higher Education:  
\$14,107M

Federal  
government:  
\$1,973M

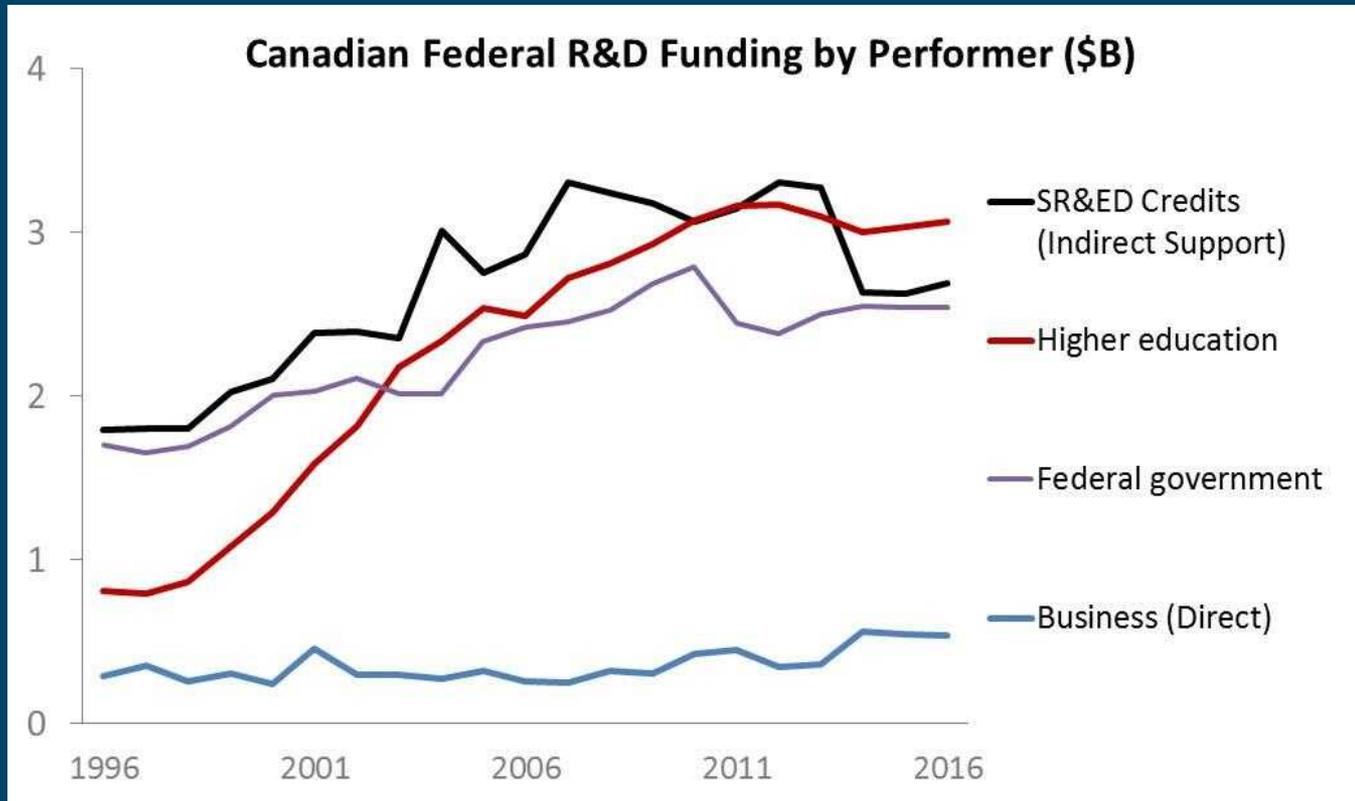
Provincial  
governments  
\$311M

Non-profits  
\$137M

**Total GERD: \$34,457 (2018)**

Source: Statistics Canada, Table 27-10-0273-01

# Federal Support for R&D (1996 to 2016)



Source: Statistics Canada  
and Finance Canada

# Government's Innovation and Skills Plan

- **People Focused** to capitalize on our diversity
- **Partnership Driven** to collectively take action
- **Whole of Government** to maximize results

## 4 Key Themes

### People & Skills



Global Skills Strategy  
CanCode/digital skills  
Work Integrated Learning

### Research, Technology, Commercialization



Innovation Superclusters  
Intellectual Property Strategy  
**National Research Council**

### Program Simplification



Innovation.Canada.ca  
Clean Growth Hub  
Strategic Innovation Fund  
Economic Strategy Tables

### Investment & Scale



Innovative Solutions Canada  
VC Catalyst Initiative  
Clean Technology  
Regional Growth Strategies

# Government Directions to NRC

## 2016 Mandate Letter:

How the NRC can support the *Innovation & Skills Plan*, examining:

- **Research Excellence**
- **Engagement**
- **Governance & Management**

Resulted in a *NRC Dialogue*:

- **3,000 staff participated**
- **62 actions over four year timeline**

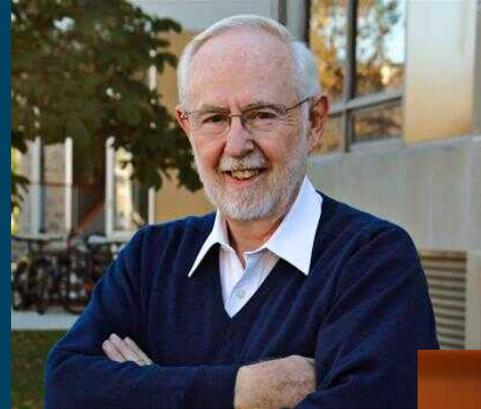
## 2018 Mandate Letter:

1. Invest in **research excellence** (e.g. NRC Chief Scientist, Ideation Programs,)
2. Be a **collaboration** partner and platform – e.g. with “superclusters” and challenge programs
3. Help high potential **SMEs achieve scale**
4. **Management** improvements
  - Renew digital research
  - Renew buildings and facilities
  - Increase staff diversity and inclusiveness

**Budget 2018:** Unprecedented increase in NRC funding of **\$258M**, bringing total combined resources to **\$1.1B** for FY2018/19

# 1. Research Excellence

- **Renewed focus on research excellence**
  - Chief Science Officer
  - President's Research Excellence Committee (PREAC) of most senior researchers
- **Ideation programs**
  - New Beginnings for individual researchers
  - Small Teams for Research Centres



Arthur McDonald  
2015 Nobel Prize



Donna Strickland  
2018 Nobel Prize

## 2. Collaboration: Challenge Programs

Addressing Government Priorities through seven year Challenge Programs – 2018 round includes:



### High Throughput Secure Networks

Radio frequency and optical satellite communication, core photonics, cryptography, quantum communications, and metrology



### Improved Health

Engineered cell and gene therapies, for cancer and genetic diseases



### Clean Energy

Net-zero industrial scale hydrogen & captured CO2 conversion to synthetic fuels



### Artificial Intelligence in Support of Design

Machine learning, complex simulation, search, and automated prototyping tools to assist in all aspects of design

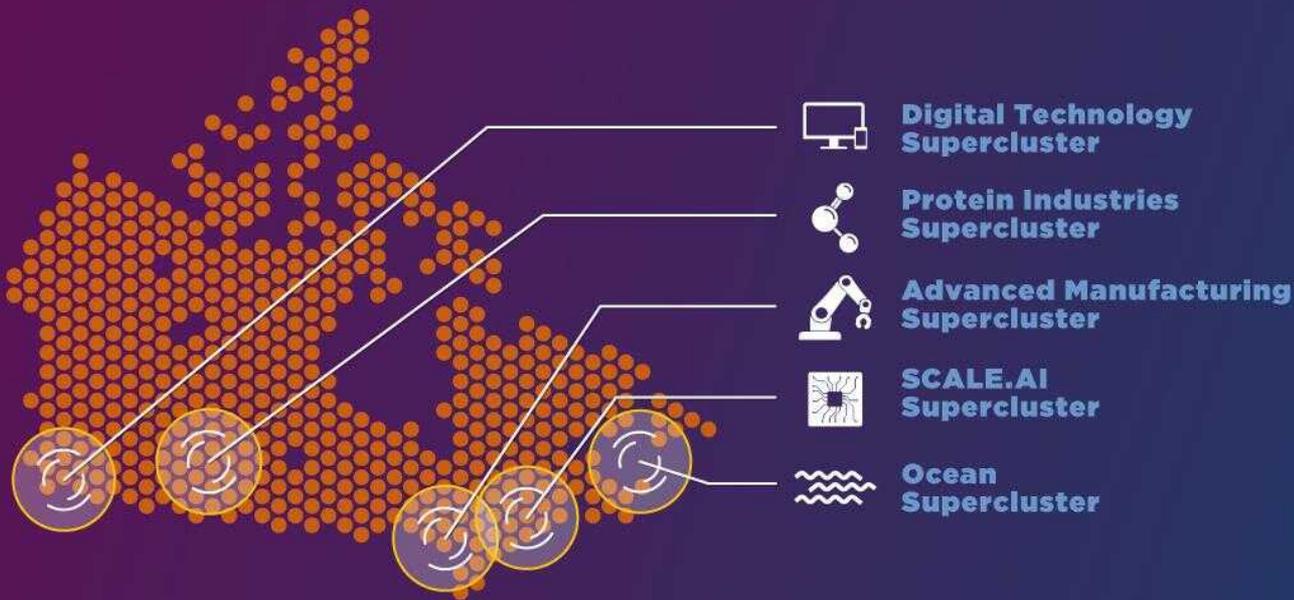
### Upcoming Challenges (2021):

- The North (infrastructure, remote health)
- Sensors for Internet of Things
- Aging in Place

# Collaboration: NRC Supercluster Programs

Over the next 10 years, the 5 selected superclusters are expected to:

- Create more than 50,000 jobs
- Grow Canada's GDP by more than \$50 billion



- Up to **\$950M** over five years for selected industry-led innovation superclusters
- Industry partners match program contributions **dollar for dollar**

# NRC-University Collaboration Centres

## Examples:

- **Pediatric Cancer** – Ste. Justine Hospital (Montreal)
  - **Microfluidics** – CRAFT with University of Toronto
  - **Ultrafast Quantum Photonics** – University of Ottawa
  - **Oceans Technologies** – Memorial University (Newfoundland)
- ... and other Collaboration Centres in development



# 3. Growing SMEs to Scale

- **Support to more Canadian SMEs**
  - Annual increase of \$150M contribution funding
- **Support to firms further along the value chain**
  - New Large Value Contributions



# 4. Management

- **Chief Digital Research Officer & IT Visioning**
  - New approaches to IT Support
- **Facilities review, and real property renewal through FSTII**
  - Targeting of priority investments
- **Reviewing internal services**
  - Reduce researcher time on non-research activities
  - Procurement, IT service delivery, onboarding...



# Diversity & Inclusion as Innovation Driver

- **Current gaps**
- **Renewal initiative underway (250 students, post-doctoral fellows)**
- **Strategic approach to retirement replacements**
- **Diversity Strategy for 2018-2021**
  - Tools & resources to recruit & retain representative, diverse, inclusive workforce
  - Identify & resolve systemic barriers
  - Foster inclusive culture



# Summing Up...

- **Canadian innovation system** characterized by low business R&D, high higher education R&D
- **Federal support** has emphasized business R&D and university R&D
- **Government role of RTO evolving away from revenue emphasis** towards research excellence and role as convenor and collaborator of multidisciplinary, team-based approach to issues and opportunities
- **Focus on diversity, inclusive innovation going forward & renewed infrastructure:** Challenges for NRC to increase diversity, renew capital facilities and real estate

# Thank you

Iain Stewart  
President  
National Research Council of Canada

