

The logo graphic features a dark blue background with a white curved line on the left side. Below this line is a red maple leaf. A white starburst is positioned in the upper right area of the graphic.

NRC-CMRC

From *Discovery*
to *Innovation...*

NRC – Information and Communication Technologies

**Wireless Network Workshop
Feb 12, 2009**

**Ruth Rayman
ICT Sector Coordinator**



National Research
Council Canada

Conseil national
de recherches Canada

Canada

NRC-CNRC

From **Discovery**
to **Innovation...**

NRC across Canada

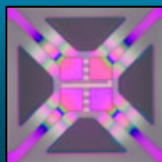


- Facilities across the country
 - 19 research institutes
 - NRC-IRAP
 - NRC-CISTI
 - IPF Incubators
- Staff
 - 4,300 employees
 - 1,500 guest workers
- International Collaboration
 - 300 collaborative projects
 - Memoranda of Understanding
- National Programs
 - Genomics & Health Initiative
 - Fuel Cell
 - Bioproducts



NRC key industry sectors

Medical Devices



Aerospace



Agriculture



ICT



Criteria

- Important to the Canadian economy
- Research essential for their success
- Sectors where NRC can make a significant contribution

Automotive



Construction



Chemicals



Bio-Pharma

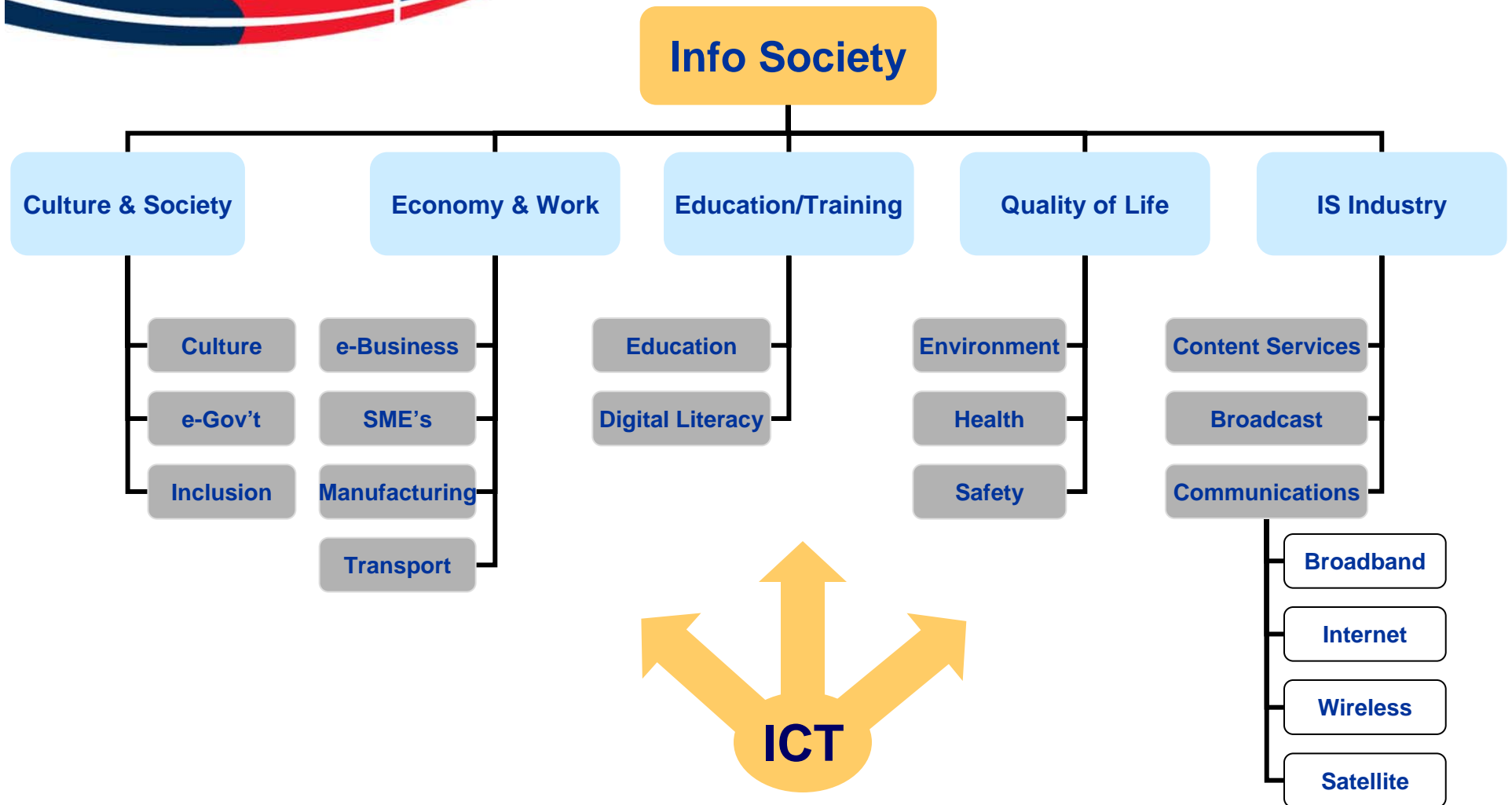


Manufacturing





Defining ICT



Adopting the EU definition, where ICT is considered core and pervasive to the Info Society



ICT technology platforms

**Electronic and Photonic
Materials, devices and systems**

IMS, ICPET, SIMS, NINT, IMI

Communication

IMS, HIA

Knowledge from Data

IIT, IAR, CSTT, ICPET, IFCI, INMS, IMI,
SIMS, IBD, IMB

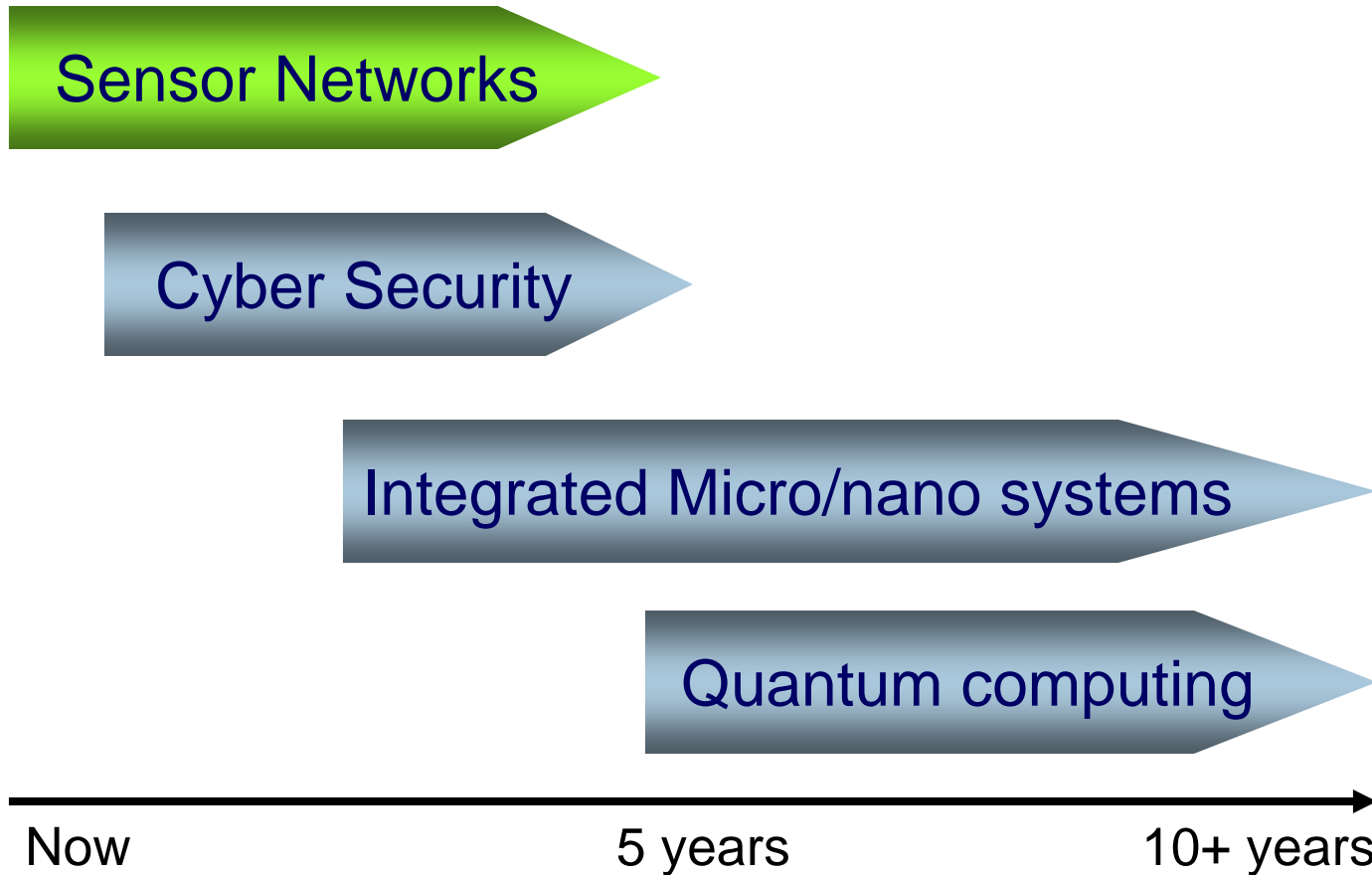
**Information/society
interface**

IIT, IRC, IAR, NINT

13 Institutes contribute directly to NRC competency in ICT



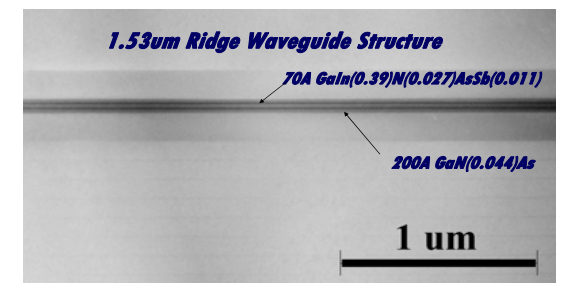
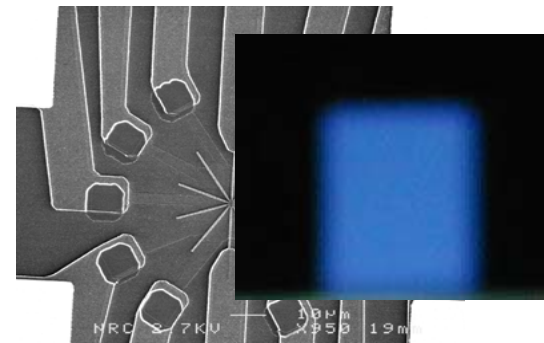
ICT demonstration projects





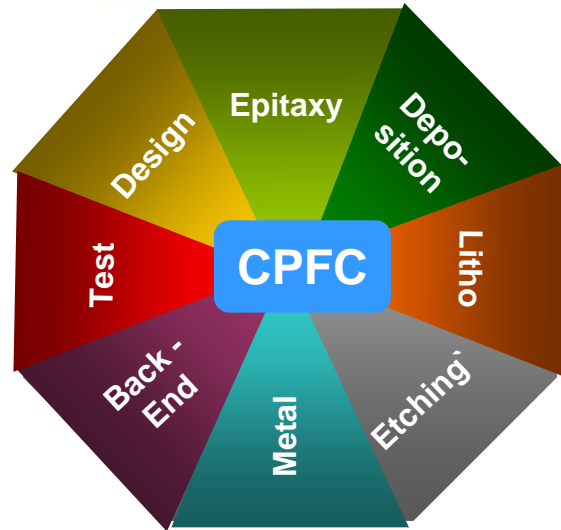
Institute for Microstructural Sciences

- Photonic & Quantum devices
 - Design & test
- Engineered materials
 - Organic & inorganic semiconductors
 - Optical interference coatings
- Nanofabrication
- Pilot-scale mfg (photonics)
- Acoustics





Canadian Photonics Fabrication Centre (CPFC)



Complete Pilot Run Manufacturing

- A pure play foundry serving Industry
- Component and device fabrication – pilot run production/prototyping (controlled monitored processes)



Size: 40,000 ft² lab and office space
Clean room: bay & chase configuration: total area 12,000 ft²
Personnel: 20 fabrication engineers



Institute for Information Technology

R&D programs related to sensors

- Data Mining
 - Develop tools to help people and machines find patterns in data and relationships between data elements
- Data Fusion
 - Develop tools to combine data from several sources, including sensors, in order to make inferences that are (presumably) better than if they were made from single sources
- Knowledge-Based Systems and Machine Learning
 - Develop tools that allow machines to learn and to make inferences from input data — advance state-of-the-art in neural nets, case-based reasoning, rule-based systems, etc.

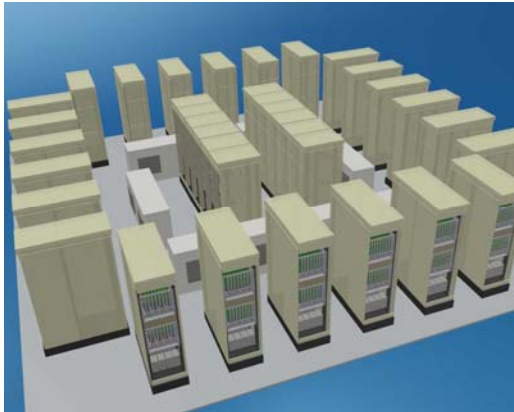
Making sense of information so technology can be used effectively anytime, anywhere



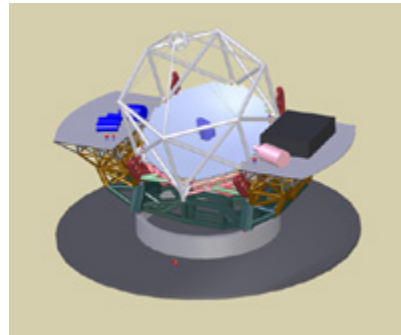
IIT – R&D programs related to sensors

- **Statistical Natural Language Processing and Text Mining**
 - Develop tools that use statistical approaches to process natural (human) languages to discover information (text mining)
 - Allows text to be used
 - As one source of data for data fusion
 - Extract expert knowledge automatically
- **Example**
 - Integrated Diagnostic System: Equipment Health Diagnostic and Prognostic tool that learns data-problem-response associations automatically from historical maintenance records and that fuses data from multiple sources, including aircraft onboard sensors, to implement maintenance decision support systems

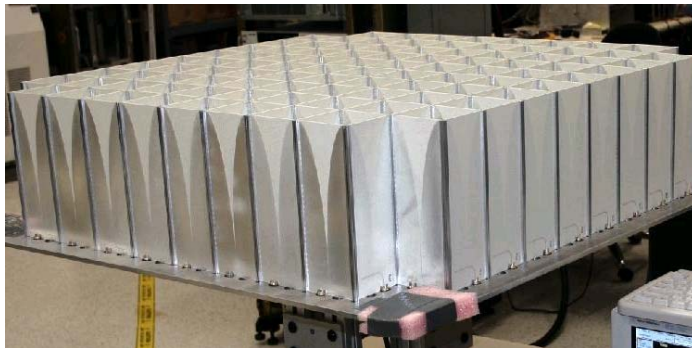
Hertzberg Institute for Astrophysics (DRAO)



The EVLA

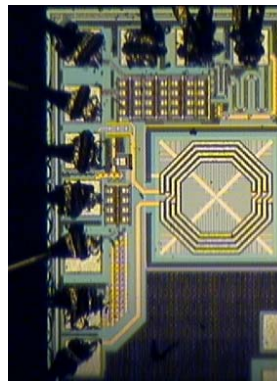


TMT-RTC



PHased Array Demonstrator (PHAD)

- investigate beamforming
- LNA integration
- calibration and imaging



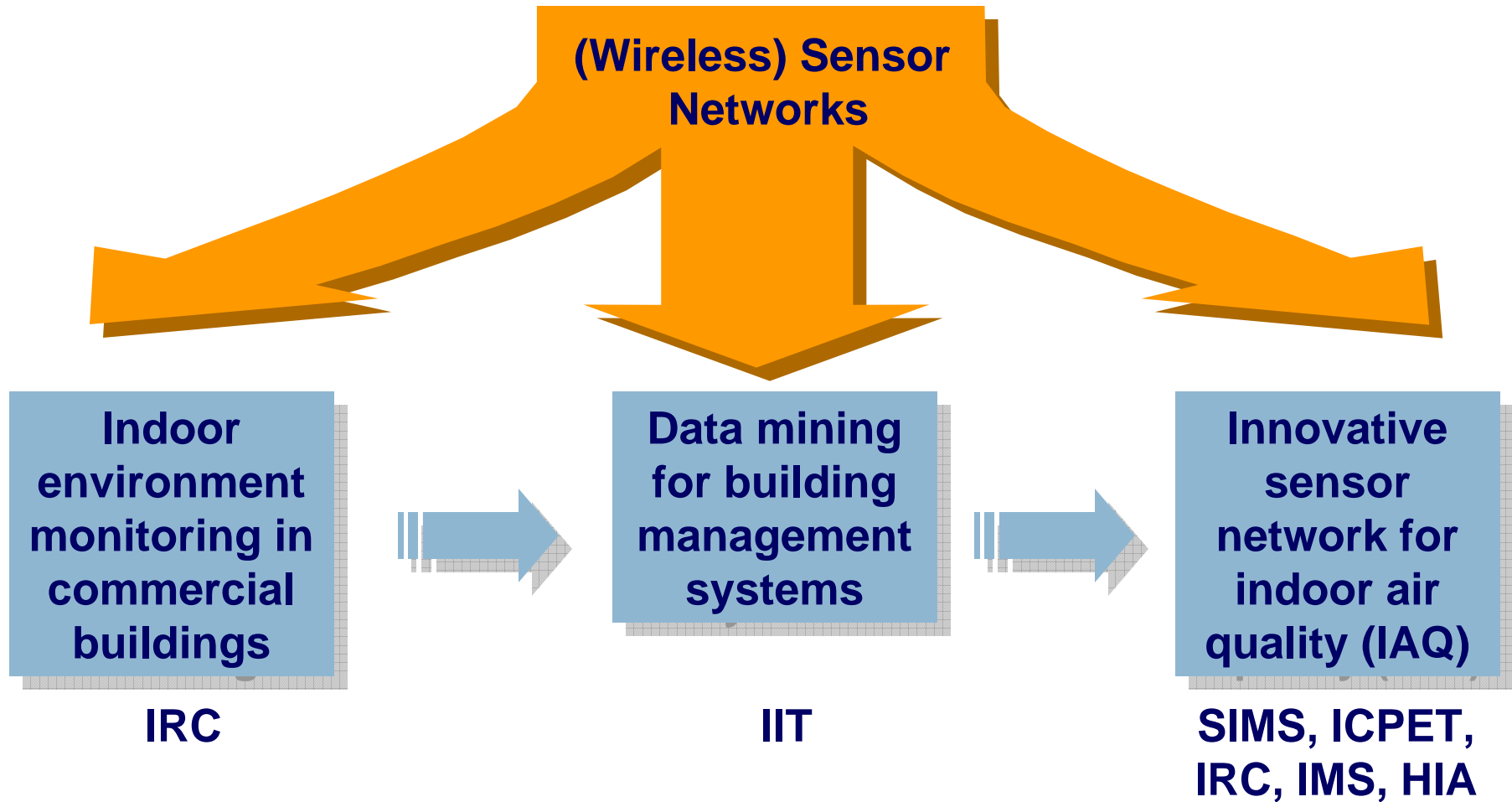
University of Calgary
 90 nm 14K LNA



Composite Applications for
 Radio Telescopes (CART)



Sensor network demonstration project - 3 years



First application – Construction Sector



Indoor environment monitoring

IRC Indoor Environment Research Facility



- Occupancy and location tracking
- Temp, lighting monitor
- Energy predictor
- Personal preferences
- Hotelling
- Security

- Led by Institute for Research in Construction (IRC)





Data mining for intelligent building management systems

- Increase efficiency of intelligent buildings through data mining and artificial intelligence
 - Control of temp, lighting, HVAC, etc.
 - Reduce energy consumption
 - Equipment health management
- Led by Institute for Information Technology (IIT)



Commercial and institutional buildings account for 14% of all energy use and greenhouse gas (GHG) emissions in Canada. – NRCan



Monitoring indoor air quality

- Air contaminants for which Health Canada is establishing guidelines for exposure
- Priorities: aldehydes (formaldehyde), VOCs (toluene), radon
- Research involves developing air sampling, sensor, communication technology, data analysis, actuation
- Design goals
 - low cost,
 - high sensitivity,
 - low power,
 - fast, continuous monitoring
 - wireless
- Sensor is challenging
 - Sensitivity – ppb
 - Selectivity



What's next

- Program launch Dec 08
- System definition phase
- Welcome industrial/research partners that can direct, augment, commercialize technology



Merci

Thank you

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CNRC-NRC

De la **découverte**
à l'**innovation...**

La
Science
— à l'œuvre pour le —
Canada



Conseil national
de recherches Canada

National Research
Council Canada

Canada