Aerospace Industries Association of Canada
L'Association des industries aérospatiales du Canada

Information, Networking and Engagement Event on Canadian Aerospace Initiatives Post Emerson

Organized by Aerospace Industries Association of Canada

In collaboration with CRIAQ, GARDN, NRC and NRC-IRAP and the provincial associations: AIAC-Pacific, WestDef, Manitoba Aerospace Association, Ontario Aerospace Council in Vancouver, Calgary, Winnipeg, Toronto and Montreal

March 2014

Key presenters

- Fassi Kafyeke, Director, Strategic Technologies, Bombardier Aerospace
- Jonathan Hack, Manager, Strategic Technologies, Bombardier Aerospace
- Pierre Rioux, Manager, Technology & Flight Sciences, Bell Helicopter Textron
- Yves Rabellino, Director, Strategic Cost Management, Research & Technology and Support to Operations, Pratt & Whitney Canada
- François Provencher, Manager, Technology Collaboration Office, Pratt & Whitney Canada
- Clément Fortin, President and CEO, Consortium de Recherche et d'Innovation en Aérospatiale du Québec (CRIAQ)
- Sylvain Cofsky, Executive Director, Green Aviation Research and Development Network (GARDN)
- Jerzy Komorowski, General Manager Aerospace, NRC
- NRC-IRAP:
  - Tom Matulis, Director NRC-IRAP Ontario, Aerospace
  - James Prendergast, Industrial Technology Advisor, NRC-IRAP, Winnipeg
  - Calvin Koskovich, Industrial Technology Advisor, NRC-IRAP, Alberta
  - Denis Lacroix, Industrial Technology Advisor, NRC-IRAP, Québec
- Alain Aubertin, Vice President, Business Development, CRIAQ
- Lucie Boily, Vice President Policy and Competitiveness, Aerospace Industries Association of Canada, (AIAC)

Objectives and Program

Part 1

- Post-Emerson – Where are we now?

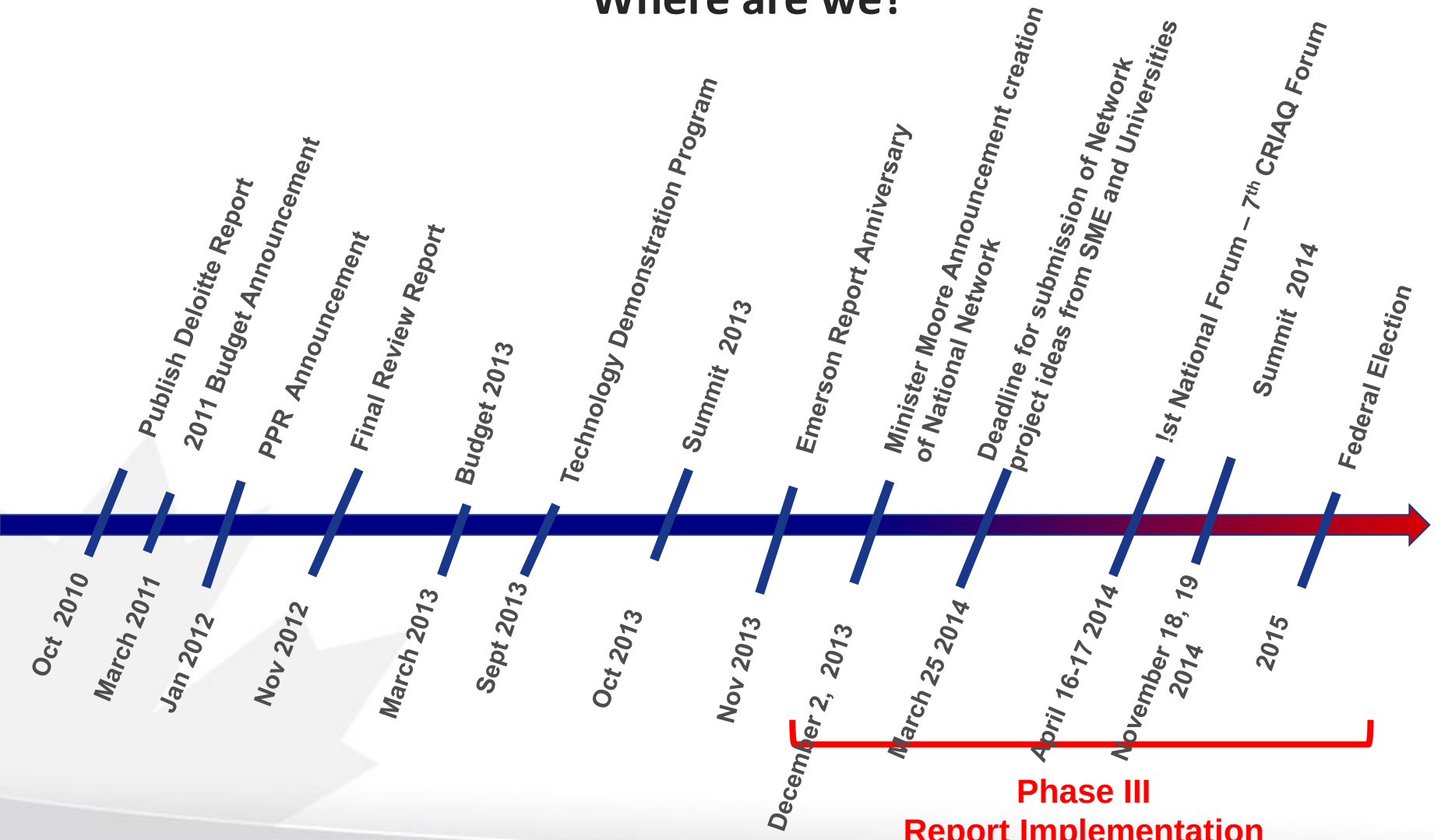
Part 2

- The Technology Support Landscape in Canada
- National Aerospace Research and Collaboration Network

Part 3

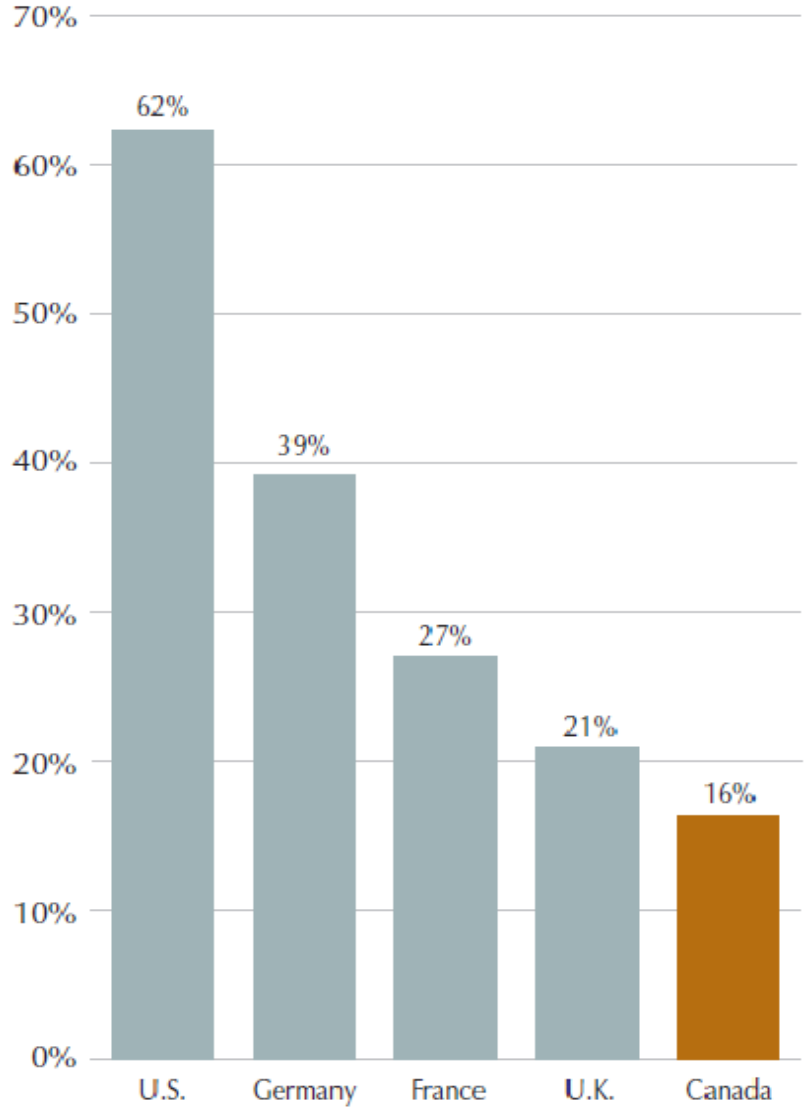
- Open discussion – engagement and dialogue

Where are we?


Oct 2010
Publish Deloitte Report
March 2011
2011 Budget Announcement
Jan 2012
PPR Announcement
Nov 2012
Final Review Report
March 2013
Budget 2013
Sept 2013
Technology Demonstration Program
Oct 2013
Summit 2013
Nov 2013
Emerson Report Anniversary
December 2, 2013
Minister Moore Announcement creation of National Network
March 25 2014
Deadline for submission of Network project ideas from SME and Universities
April 16-17 2014
!st National Forum – 7th CRIAQ Forum
November 18, 19 2014
Summit 2014
2015
Federal Election
Phase III
Report Implementation

Emerson Review - Significant Outcomes

- 25 Recommendations include:
  - Market Access and Development
  - Supply Chain Development
  - Technology
    - Technology as a country priority
    - Technology Demonstration
    - Research Collaboration Network
      - CANNAPE
  - Defence Procurement
  - People and Skills
  - Small Business
  - Space

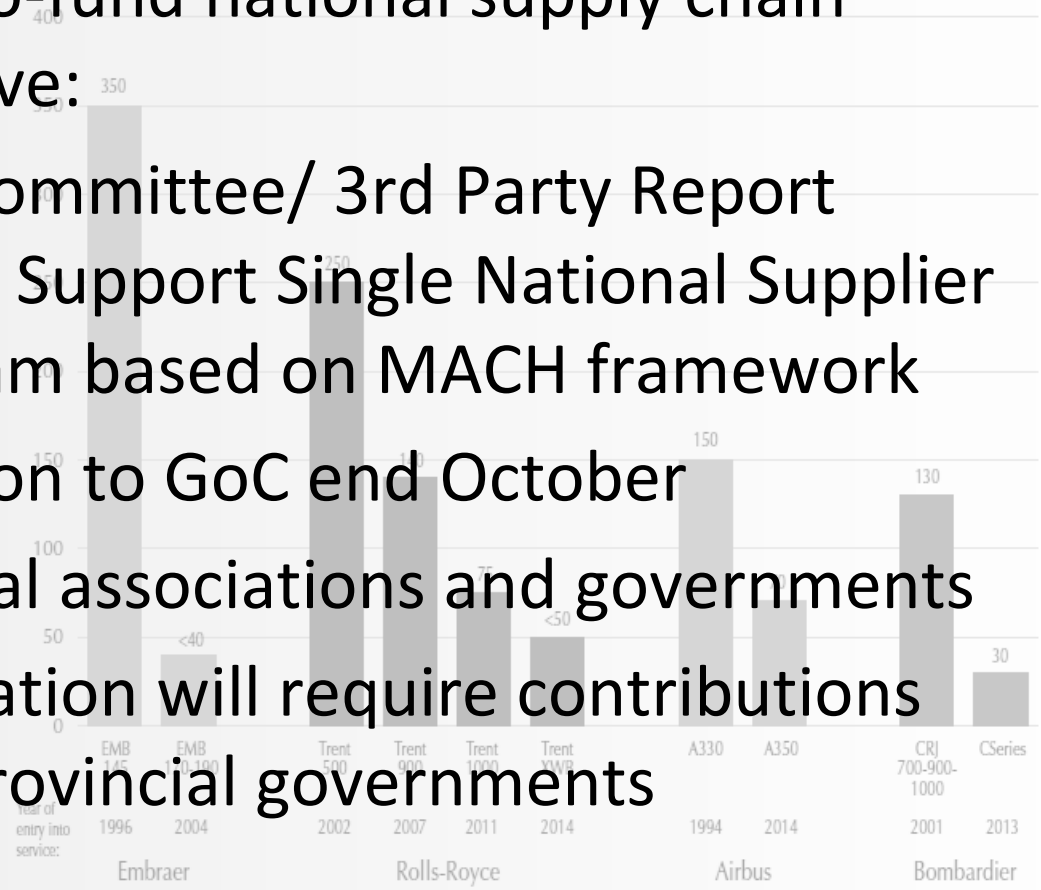


R&D Funding by Government

National Supply Chain Initiative

Recommendation to Co-fund national supply chain development initiative:

- AIAC Supply Chain Committee/ 3rd Party Report Recommendation to Support Single National Supplier Development Program based on MACH framework
- AIAC recommendation to GoC end October
- Key role for provincial associations and governments
- National implementation will require contributions from participating provincial governments



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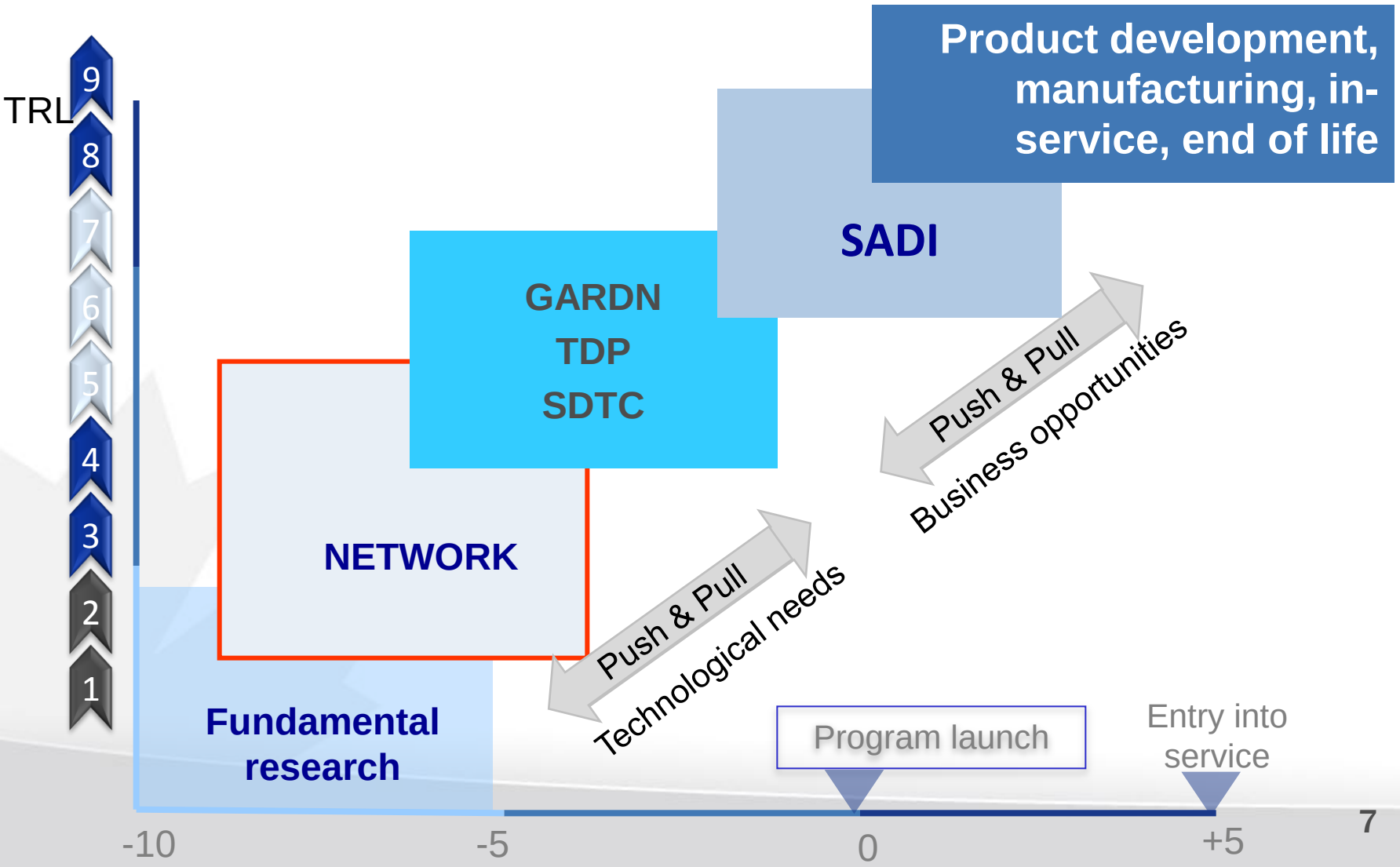
Focus on Technology



Going forward with the National Aerospace Collaborative Network

February 2014

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From Vision to Reality

- Emerson's Recommendation
- Minister Moore's commitment
- Industry's Vision
- What does success look like?
- How does it work
- How do I get involved

Emerson and Moore

- Emerson Report Recommendation #5
  - *It is recommended that the government co-fund a Canada-wide initiative to facilitate communications and collaboration among aerospace companies, researchers and academics.*

- Minister James Moore announcement – Dec 2, 2013
  - *"I am also pleased to announce today the government's support for using the Consortium for Research and Innovation in Aerospace in Quebec's (CRIAQ) approach to collaborative research as the basis for a new national aerospace research and technology network."*

Industry's Vision for the Network

- Aerospace competitiveness through collaboration and innovation
- Excellence in science & technology
  - Enhance knowledge base (Researchers, HQP and Industry)
- An open environment for its governance
  - Welcome close working relationships with existing R&D consortia
- Long term ambition to mature technology up to TRL-7
- Industry-led
- Supported by provincial governments
- To be the voice of Canada for aerospace R&TD collaboration

A dynamic national aerospace R&I network

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Network Parameters and Scope

- Focus on projects (TRL 1-5) and networking
- Focus on building strategic aerospace research capability across Canada
- Consolidate and streamline R&T efforts in aerospace
- Network reach: Science & Technology, R&T Infrastructure and Training of HQP through research/projects

BENEFITS FROM NETWORK PROJECTS

- Answer to a growing need for pre-competitive aerospace R&D.
- Access test equipment to perform testing and analyses.
- Work with the best researchers in universities and research centers.
- Advantageous leverage for industry (8:1) .
- Train high qualified personnel (Students are future employees).
- Maintain alignment of University R&D with Aerospace Industry needs.
- Increase the competitiveness of the Canadian aerospace industry.

Translating Vision into Success

- Characteristics of Success:
  - Open Innovation
  - Partnerships across Canada

100th Research Project

MANU-601 – a national success

Additive Manufacturing Technologies for Aerospace Components

Financial Partners

NSERC CRSNG

CRIAQ

Industrial Partners

MDA

HÉROUX DEVTEK

LIBURDI AUTOMATION

edmit inc

Pratt & Whitney Canada
A United Technologies Company

Bell Helicopter
A Textron Company

BOMBARDIER

McGill

POLYTECHNIQUE MONTRÉAL

CMQ
Centre de métallurgie du Québec

Canadian Light Source | Centre canadien de rayonnement synchrotron

100th Research Project

MANU-601 "Additive Manufacturing Technologies for Aerospace Components"

Gathers all the elements that have made CRIAQ a success as a unique model of open innovation in terms of:

- **Strengthening the competitiveness of the aerospace industry** => AM is considered as the 3rd manufacturing revolution
- **Collaborative research** => One of our biggest projects
  - 13 partners including 8 industries (OEMs, intermediate members, SMEs) and 5 academic partners (anglophone and francophone universities, research centre, college)
- **Training through research** => 10 students who will become HQP to serve the industry
- **Financial leverage** => 10 to 1 on overall project
- **A project in line with the creation of The Network** => 2 partners located in Saskatchewan (Canadian Light Source) and Ontario (Liburdi – SME).

Pilot Project :TRL 4+

MANU_604 "Additive manufacturing"

- *1 year exploratory project*

Financial Partners

CRIAQ

MITACS

Industrial Partners

Pratt & Whitney Canada
A United Technologies Company

Bell Helicopter
A Textron Company

BOMBARDIER

Research Partners

McGill

POLYTECHNIQUE MONTRÉAL

UNIVERSITÉ LAVAL

Pilot Project :TRL 4+

MANU_604 "Additive manufacturing"

- BA, BHTC and P&WC have initiated a 1-year project on Additive Manufacturing (AM) (MANU 604) to define a high TRL program on AM development
- Guiding principles:
  - **Share and Improve** collaborative technology management best practices
  - **Increase speed of execution and flexibility** to maintain relevance for future years
  - **Increase interaction between universities and industries** by embedding researchers in industries.
  - **Maximize incentives for industries to use academia** and for academia to add value
  - **Develop an innovation ecosystem** where all members have capability to learn and adapt.

Pilot Project :TRL 4+

MANU_604 "Additive manufacturing"

Work and management structure:

- 4 Post-doctoral fellows working on-site in industry as part of Integrated technology teams
- Matrix organization structure where knowledge is shared among the 3 industries
- Three-tiered management structure: Steering Committee, Project Management Office and Integrated technology teams.
- Bi-monthly reports (at all three levels) by teleconference and constant monitoring of progress
- More than 25 industry specialists involved

Typical Project: COMP-1

COMP-1: Out-of-autoclave composite manufacturing

Financial Partners

NSERC CRSNG

CRIAQ

Industrial Partners

Bell Helicopter A Textron Company

BOMBARDIER

Mastering Innovation DELASTEK L'innovation en tête

Research Units

McGill

Université Concordia University

UBC

CDCQ Centre de développement des composites du Québec

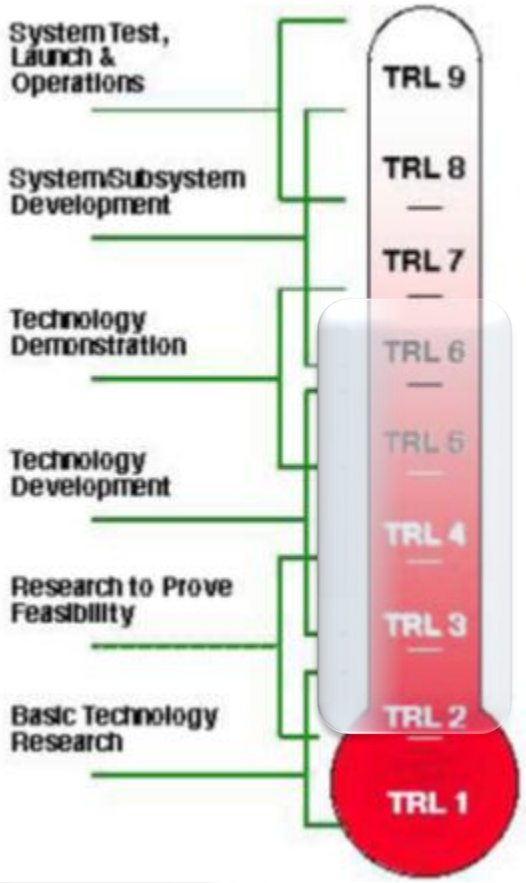
CNRC-NRC

COMP-1: Out-of-autoclave composite manufacturing

The project gathers all the elements that have made CRIAQ a success as a unique model of open innovation in terms of:

- **Collaborative research** => 9 partners including 3 industries and 5 academic partners
- **Training through research** => 15 students (4 Undergraduates, 7 Masters, 3 Ph.D, 1 Post-doc) who will become HQP to serve the industry
- **Collaborative environment** =>
  - Prof. sabbatical leave at Ind. partner (9 months)
  - Direct technological transfer to active industrial programs
- **Financial leverage** =>
  - 8 to 1 on overall project
  - $60 000 investment of one partner leads to $1,000,000 project with related IP

TRL Scale – Technology Readiness Level



- **TRL 9** — Actual system "flight proven" through successful mission operations
- **TRL 8** — Actual system completed and "flight qualified" through test and demonstration (Ground or Flight)
- **TRL 7** — System prototype demonstration in a space environment
- **TRL 6** — System/subsystem model or prototype demonstration in a relevant environment (Ground or Space)
- **TRL 5** — Component and/or breadboard validation in relevant environment
- **TRL 4** — Component and/or breadboard validation in laboratory environment
- **TRL 3** — Analytical and experimental critical function and/or characteristic proof-of-concept
- **TRL 2** — Technology concept and/or application formulated
- **TRL 1** — Basic principles observed and reported

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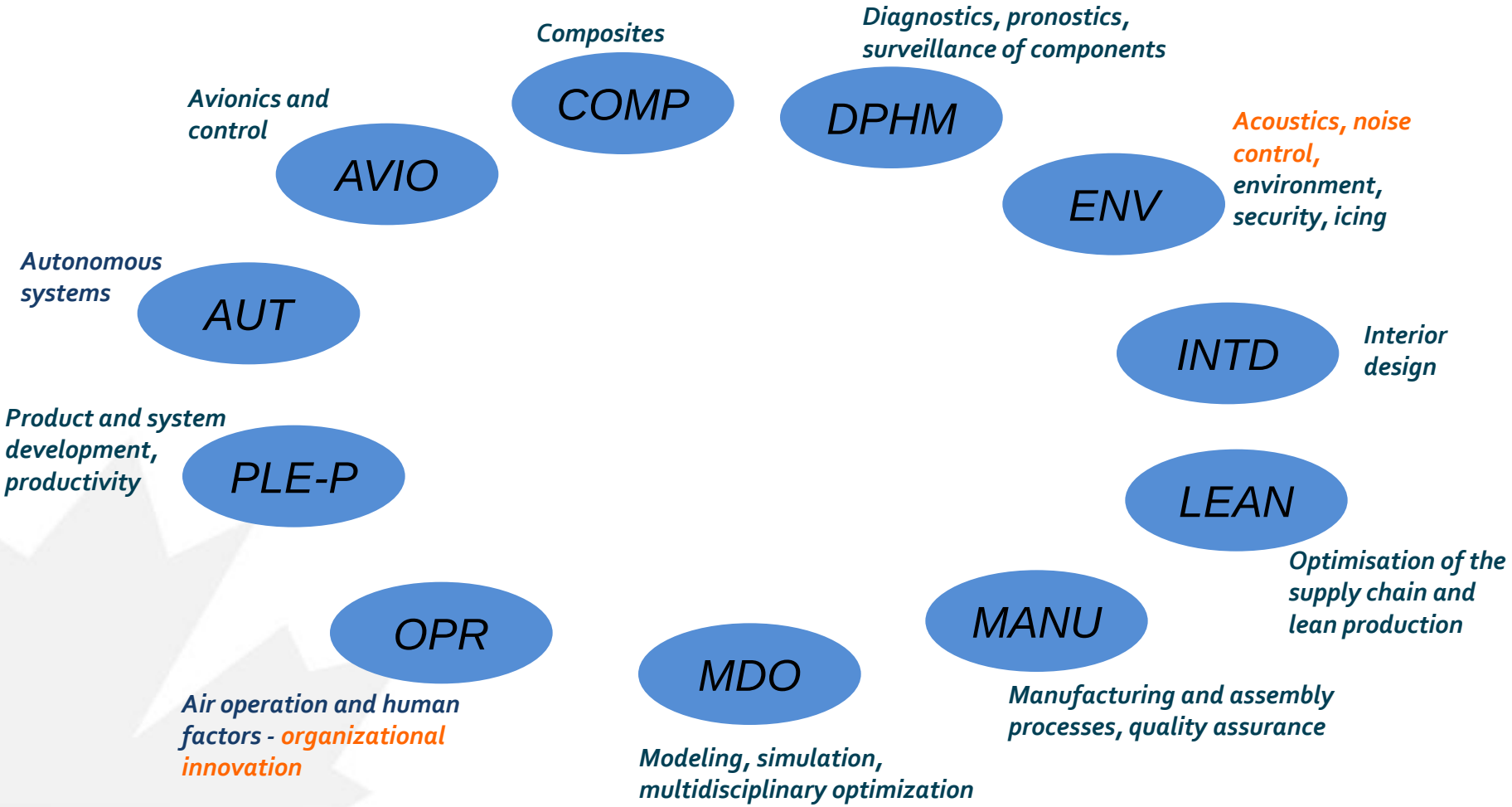
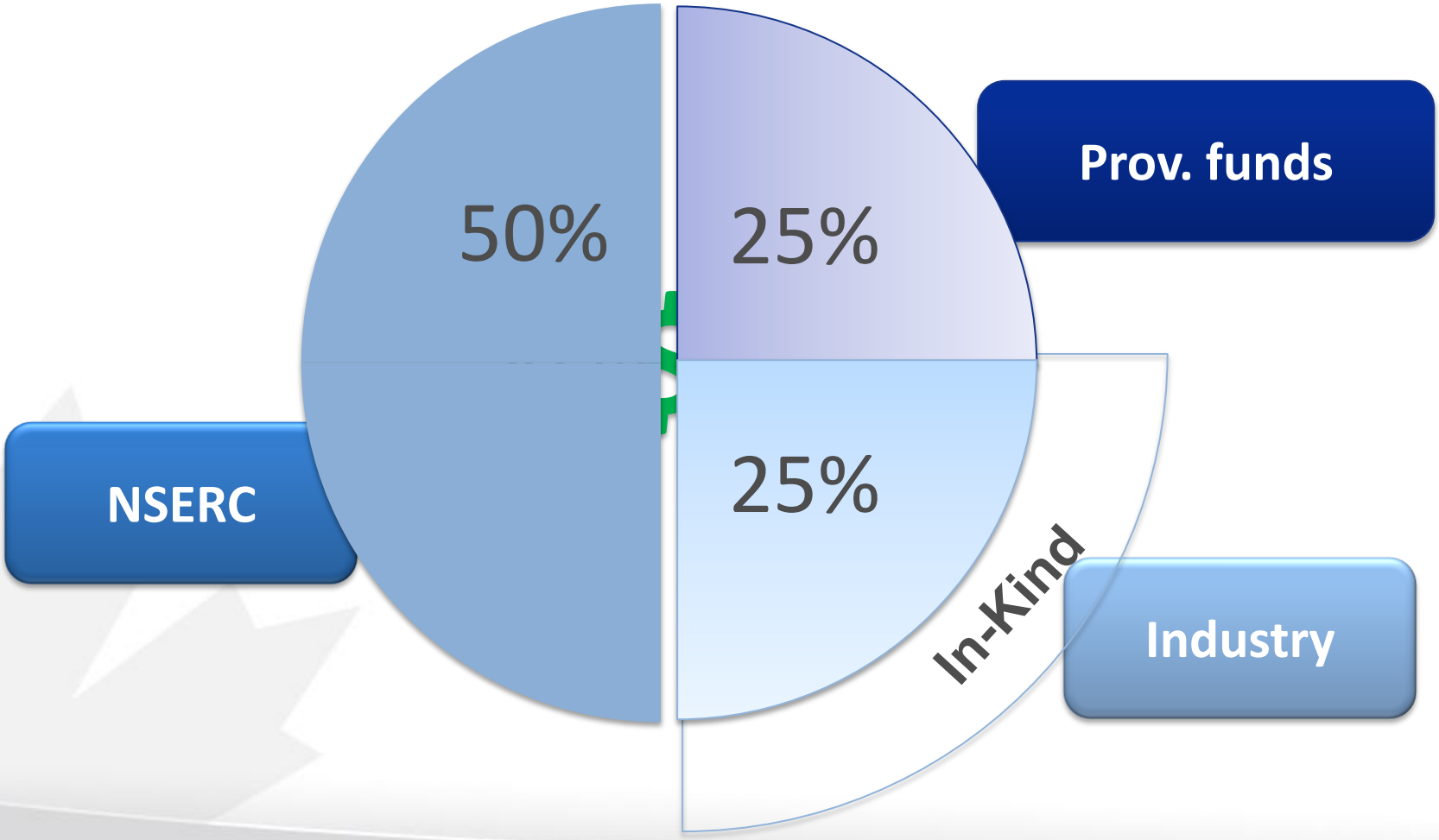
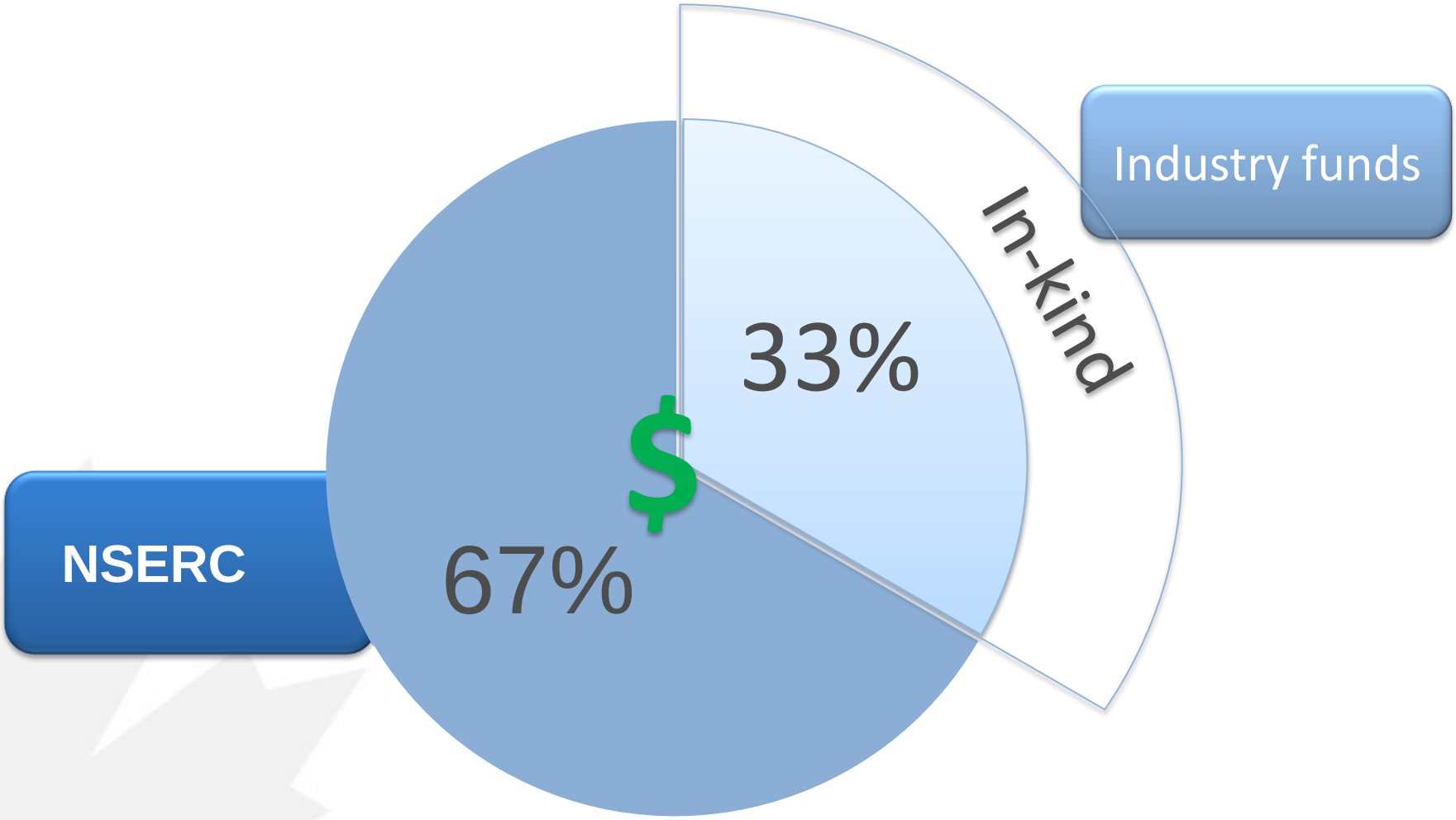
Research Themes



With provincial funding “Classic- TRL1-4”



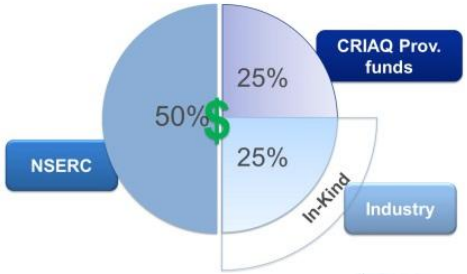
"TRL 1-4" without provincial funding



National Network – coupled project structure

Project A

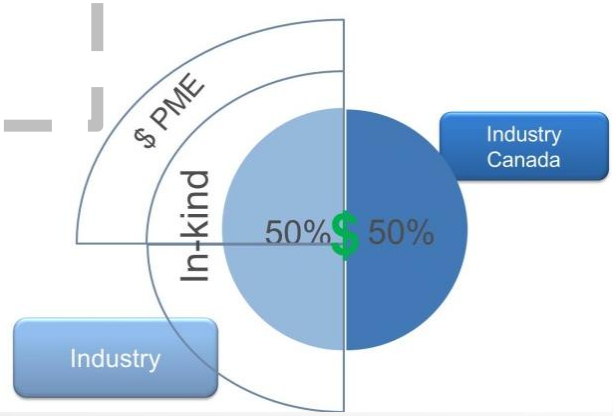
"CRIAQ classic" – TRL 1-4
Going deeper into knowledge and technology understanding



OR

Project B

TRL 4+
Technology maturation



Industry engagement – Key milestones

- 1st National Network Forum, April 16, 17, 2014 jointly with CRIAQ's 7th Forum April 16, 17
- Canadian Aerospace Summit
  - November 18 and 19th 2014
  - November 17th – Technology pre-program including

Join forces to the benefit of all industry

7th CRIAQ Forum

Concurrent with …

DAY 1
WEDNESDAY, APRIL 16, 2014

	RESEARCH FORUM		STUDENT AEROSPACE FORUM (SAF)
12:00 14:00	Welcome & Registration		
14:00 15:00	Opening Remarks | Guest Speakers	14:30 16:00	Welcome & Registration
15:00 16:00	Projects Ideas (Part 1)		
16:00 17:00	Poster Teaser Session (research projects)		
17:00 19:00	Cocktail | Project Poster and Prototype Exhibit		
19:00 22:00	Gala		

DAY 2
THURSDAY, APRIL 17, 2014

	RESEARCH FORUM		STUDENT AEROSPACE FORUM (SAF)	
8:00 9:00	Networking Break			
9:00 9:30	Opening Remarks | Guest Speakers			
9:30 10:30	Projects Ideas (Part 2)	9:30 12:00	Conferences (3 of 45 min)	Fair
10:30 11:00	Information Session			
11:00 14:00	Theme-based Workshops Non-projects Workshop (lunch box included)	12:00 13:00	Lunch	
14:00 14:30	Projects Launch	13:00 15:30	World Café (upon invitation)	Challenge
14:30 16:30	I2I Workshop (8 meetings of 15 min)	16:30		
16:30 17:00	Closing Remarks Conclusion			

…

1st National Network Forum

Project ideas Presentation

- During the **plenary session***:
  - Large and Medium-sized companies members
  - SMEs members
  - **Universities, research centres members (**
    - **industrial endorsement (letter of support)**
  - National and International collaborators: through an industrial member
- New project ideas can emerge from **Thematic Workshops**

*presentation by a representative, adjustments could be made depending on the number of proposed project ideas

Project Proposal Submission: template use

- Project idea title
- Network/CRIAQ theme
- Technology Readiness Level
  - CRIAQ Classic model (TRL 1 @ 4)
  - TRL 4+
- Targeted project duration
- Needs and research objectives description
- Expertise wanted
- Potential partners
- Opened to international collaboration, project continuation

  - 2 pages/ project template
  - To submit in English and French version (simultaneous distribution)
  - Submit before deadline to projets@criaq.aero

From proven model

- Benefits of proven model to whole of the Canadian industry…

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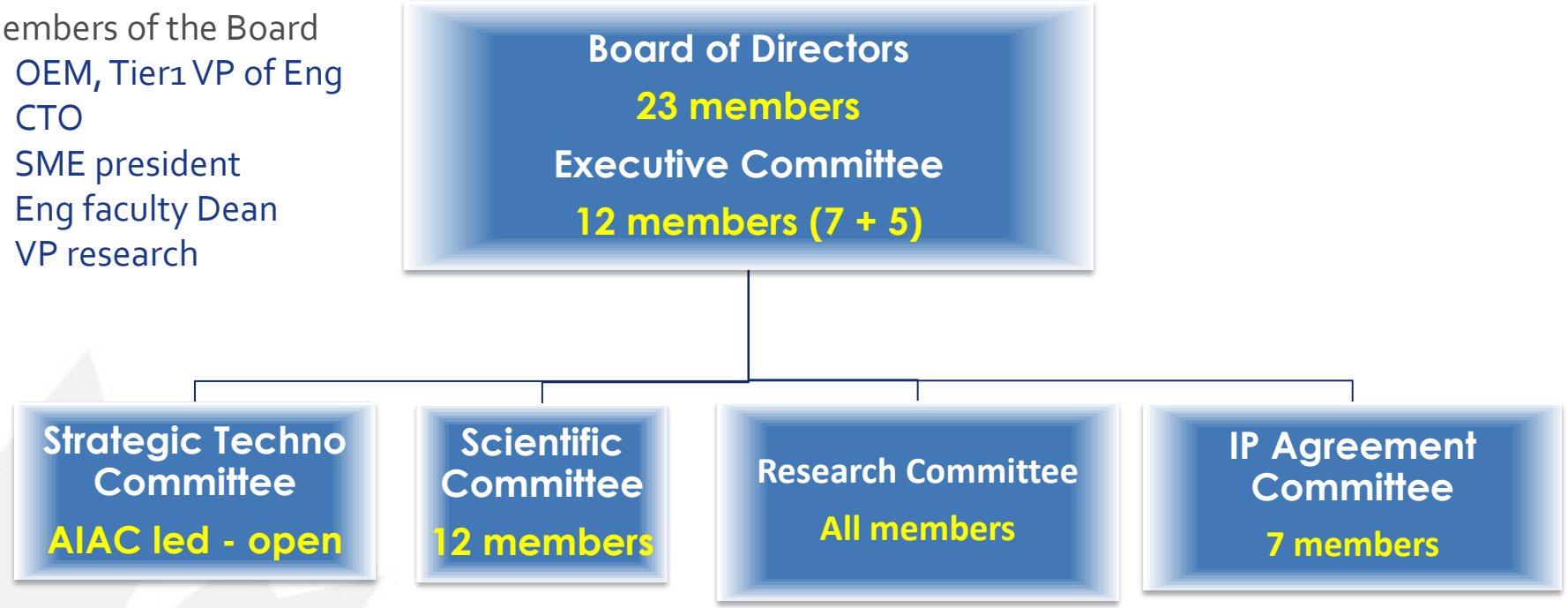
Network

Inclusive Governance:

Industry-led with strong academia partnership

Members of the Board
- OEM, Tier1 VP of Eng
- CTO
- SME president
- Eng faculty Dean
- VP research



Network success will greatly rest on the shoulders of individual members to the board, committed and engaged

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BoD seat distribution

- Industry-led with strong academic involvement
  - 60% Industry (12) + 40% Academia (incl. colleges) (8)
- Ensure regional representation & encourage participation to Network
  - 40% regional seats and 60% participant seats
- Regional seats (8)
  - 1 Industry + 1 Academia for each region (East, Quebec, Ontario, West)
  - Elected by NETWORK members from each region
- Participant seats (12)
  - 4 University/college + 8 Industry
  - Elected by Network members at large
  - Must include two seats for SMEs

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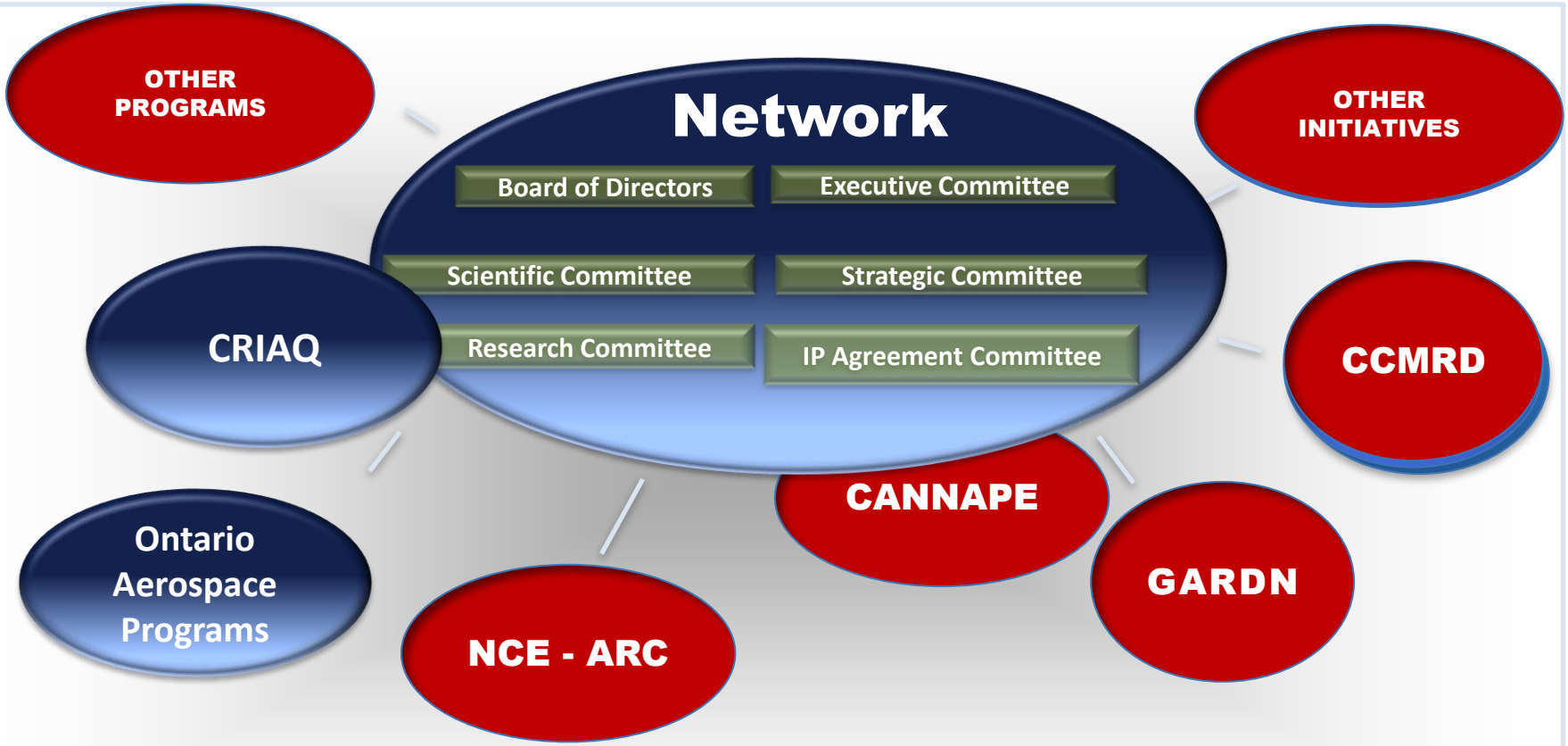
Network

Structure & Interactions



Hybrid, Network extends its governance to interested programs and interfaces with the structure of existing organizations

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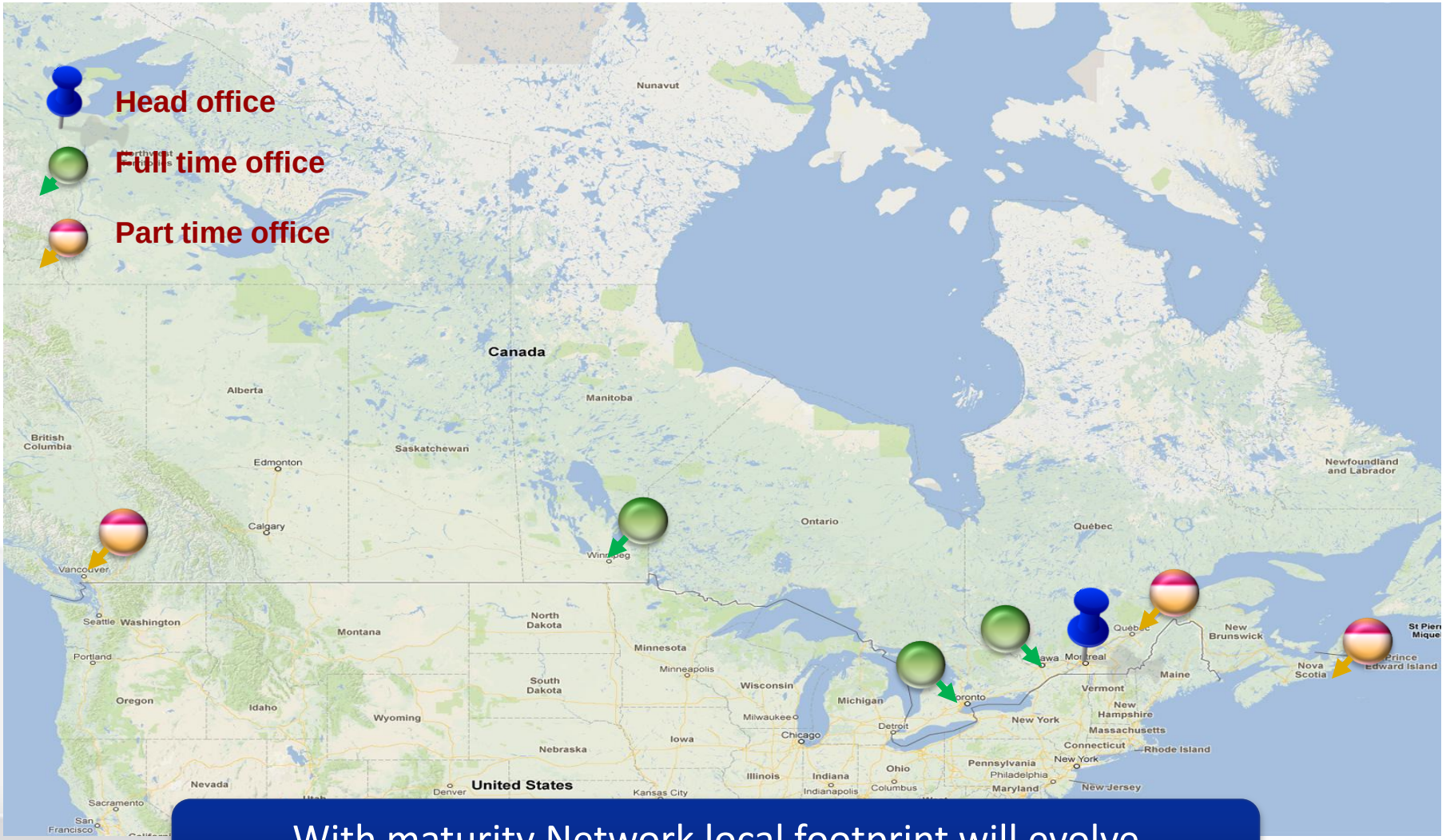
Deployment



With maturity Network local footprint will evolve

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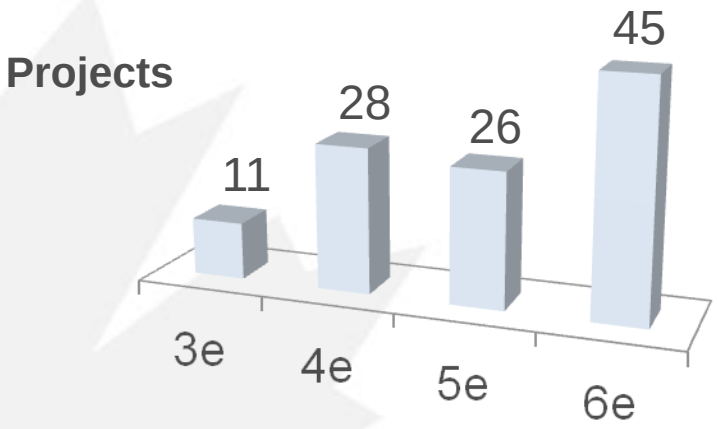
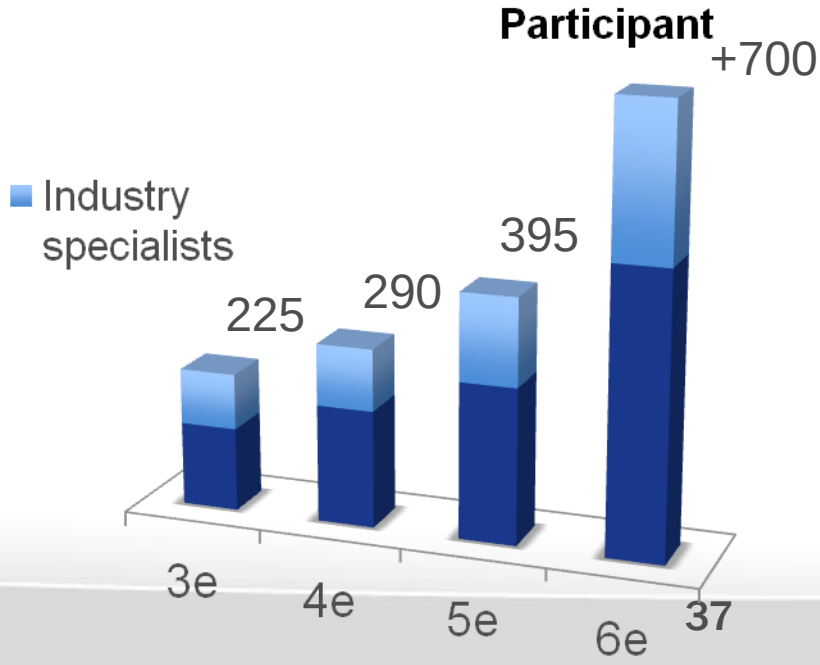
A proven model - a connected communitv

2012 CRIAQ researchers forum





Next Steps

- Board and AGM meeting
  - Membership
- Engage the Community
  - Tour across Canada
- Submit your projects –
  - Forum April 16, 17th

Invitation

- A one-time opportunity for Canadian industry to join forces and create the best national aerospace collaborative research network
- National engagement is key to the success of the Network

Invitation to dialogue