



C A R I C

CONSORTIUM FOR  
AEROSPACE RESEARCH AND  
INNOVATION IN CANADA

# A National Collaboration Initiative for the Canadian Aerospace Industry

AIAC Pacific – Outreach Program  
UBC (O) Kelowna – 25 March 2015

*Funding partner:*



Industry  
Canada

Industrie  
Canada

# Canadian Aerospace Industry\*

## ■ Economic Impact

- Over 700 companies - 172,000 jobs
- Contributes \$28B of GDP to the Canadian economy
- 80% of its production is exported
- 70% Manufacturing and MRO, 30% services

## ■ Canadian Aerospace Activity

- 3<sup>rd</sup> in terms of global civil aircraft.



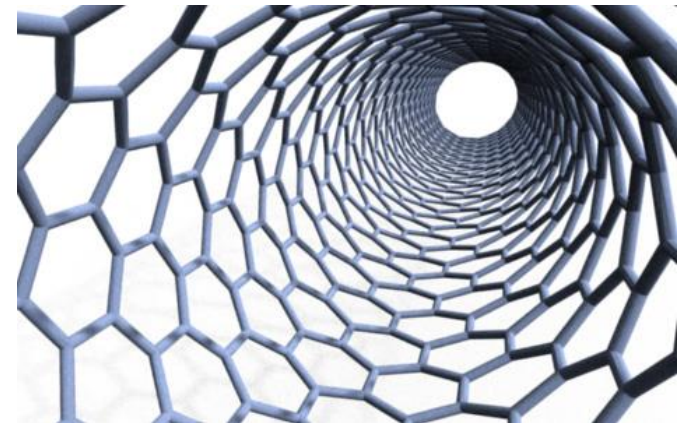
\*Aerospace Industries Association of Canada & Industry Canada (2014). *The State of the Canadian Industry*



# Canadian Aerospace Industry\*

## Innovation

- 20% of the industry's activity is R&D
- Each year the industry invests \$1.7 billion into R&D
- 5 times R&D intensity of Canada's manufacturing average
- R&D investment increased by close to 40% in the last five years



\*Aerospace Industries Association of Canada & Industry Canada (2014).  
*The State of the Canadian Industry*



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INNOVATION

# Canadian Aerospace Industry

## *Business & Technological Challenges*

- Very high demand for next 20 years – Half of it in Asia
- Very innovation intensive
- Long development cycles
- Tight benefit margins of the airlines, airports (the customer)
- Global competition
- Tighter environmental legislation
- Development of supply Chain
- Manpower
- Infrastructure



# About CARIC

*“Collaborative approaches to R&D yield **better results for both participants and the economy**. This is particularly true for an industry like aerospace, in which R&D is a costly, long-term undertaking.” – Emerson Report*

- Officially launched in April 2014
- \$30M financial support from Industry Canada



*Honourable James Moore, announcing his endorsement of the creation of a new national aerospace research and technology network.*



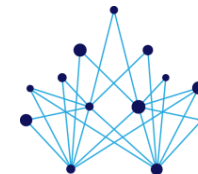
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# CARIC's Mission

1. To **facilitate communications and collaboration** among aerospace companies, researchers and academics...



...and provide **financial support to collaborative R&D** projects.



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# CARIC's Mission

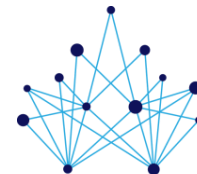
2. To **launch initiatives** whose primary purpose is to:
  - serve as **catalysts for collaboration** that can help to overcome the silo effects;
  - promote **faster, more relevant R&D.**



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# *Our raison d'être*

- **Our core business:** R&D projects that lead to **innovative solutions**
  - Industry focused
- **Our vision:** a **key facilitator** for the Canadian aerospace research and technology development





# Industrial Members

**BOMBARDIER**



**Pratt & Whitney Canada**

Une société de United Technologies / A United Technologies Company

**Bell Helicopter**  
A Textron Company



**Esterline**  
CMC Electronics

**THALES**



MAS

**Rolls-Royce**

**MDA**

**SAFRAN**  
Turbomeca Canada

**3M**

**HÉROUX DEVTEK**



Mastering Innovation  
**DELASTEK**  
L'innovation en tête



**dema aeronautics**

**MECACHROME technologies**

**Avior**

**COMPOSITES ATLANTIC**  
An UACFS SOGEMA Company

**HUTCHINSON**



**AV&R**



**meloché**

**SAFRAN**  
Messier-Bugatti-Dowty

**Ti**  
TRANSTRONIC inc.

**GRUPE SOTREM-MALTECH**



**CREAFORM**

**marinvent**  
CORPORATION

**dorval technologies**  
a division of modélisme dorval inc.

**Aerosystems International Inc.**  
AS9100 ISO9001 CAGE 3AC69

**Nutaq**  
INNOVATION TODAY FOR TOMORROW

**AÉROPORTS DE MONTRÉAL**



**SILKAN**

**asco**

**edmit inc**



**LAFLAMME**  
INGÉNIERIE

**LIBURDI AUTOMATION**

**Atom**  
BY & MICROWAVE

**CORIOLIS composites**



**solaxis**  
Ingéniosité Manufacturière

**PRODEC METAL**  
PROTECTION DÉCORATION

**SOGECLAIR**  
aerospace

**FusiA**

**Osoneo**  
Evolution

**socomore**

**TEXONIC**



**RENISHAW**

**NGCO**  
INTERNATIONAL

**TEKNA**

**APN**

**GASTOPS**

**MESOTEC**

L'art de l'étanchéité  
**ELASTO PROXY**  
The Art of Sealing

**ADVANCED POWDER COATING**

**GLOBVISION**

**COMTEK**  
Advanced Structures

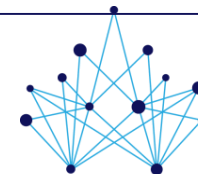


**MDS**  
Measured by the Power of Precision



**CARIC**  
PILOTING INNOVATION

# Universities, Colleges and Research Centres



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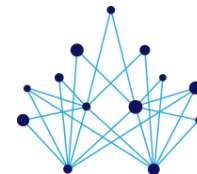
# Outcomes - Metrics

## 1) CARIC accelerates aerospace research

- Research projects launched (TRL 1-6)
- Involvement: academia, research centres and industry
- Funding provided and leveraging factor
- Technologies developed

## 2) CARIC supports student training

- Students trained
- Involvement of colleges



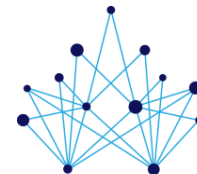
# Outcomes - Metrics (cont'd)

## 3) CARIC facilitates aerospace network outreach

- Research Forum & Workshops on cutting edge research fields
- Web Community Portal usage

## 4) CARIC supports the innovation system

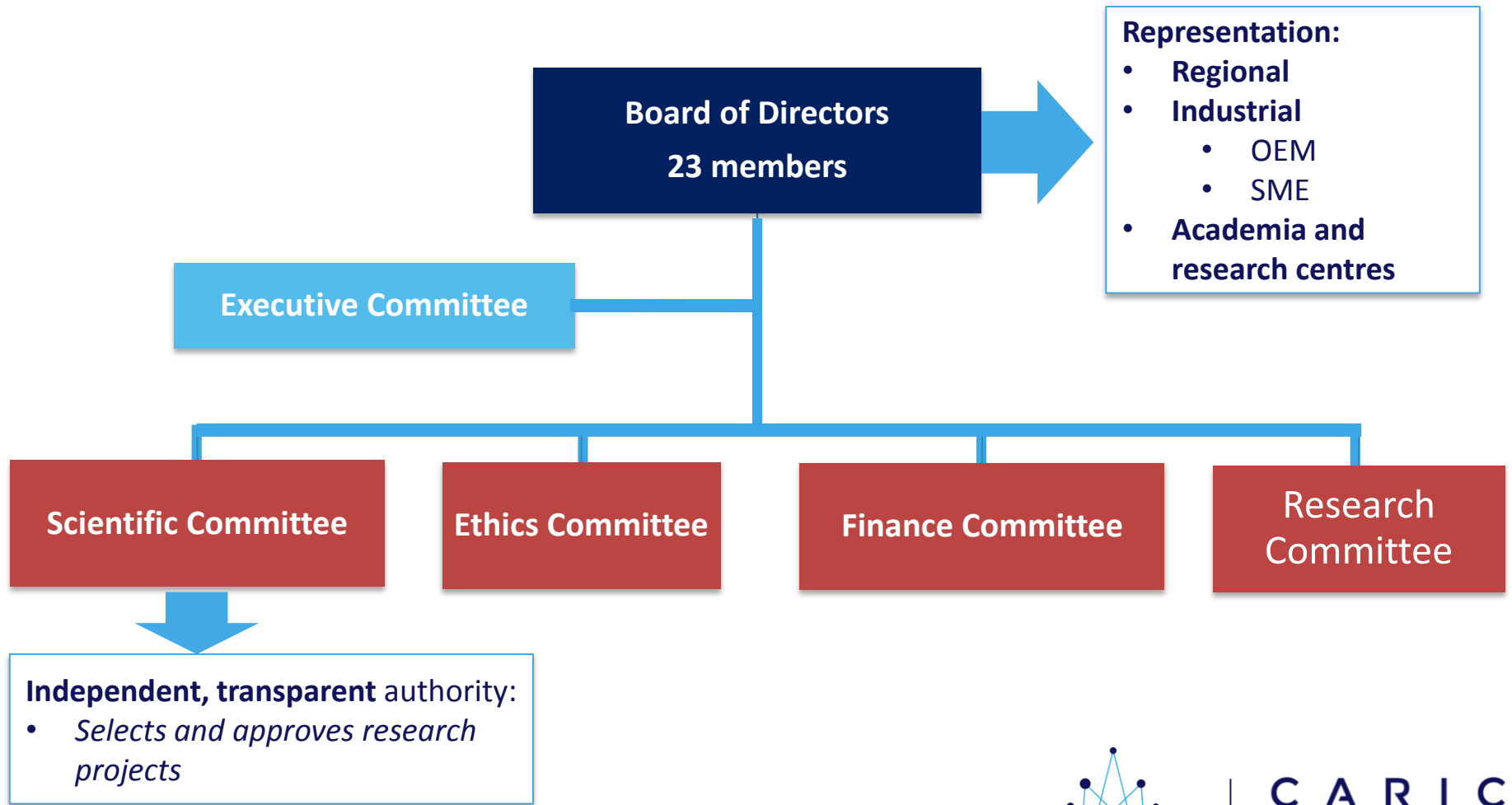
- Inventory of research infrastructures
- Technological road-mapping
- Mobilizing SMEs



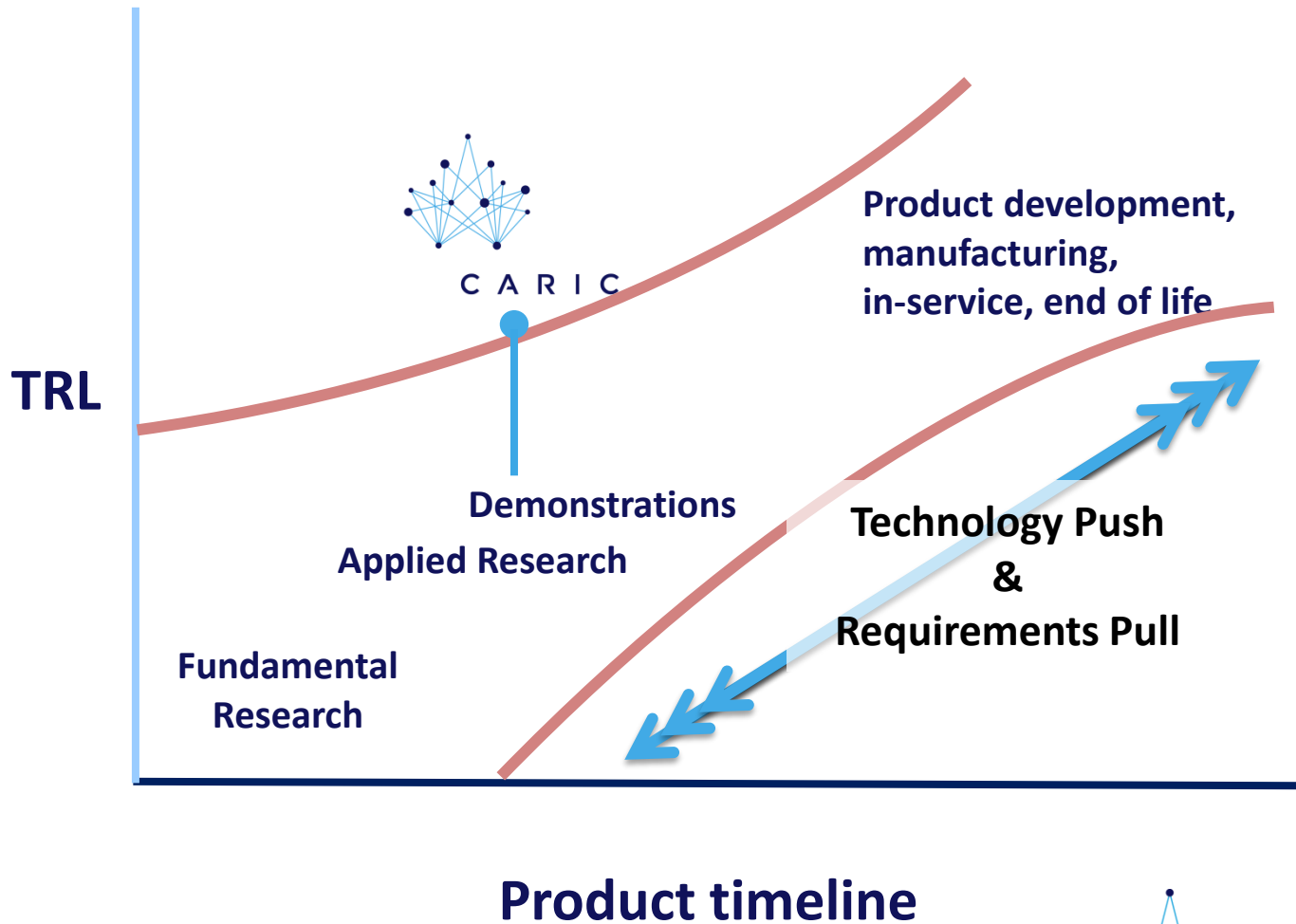
# Coast-to-Coast Footprint



# Governance

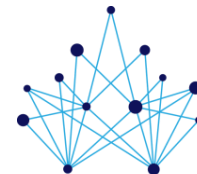


# Canadian Aerospace Research Continuum



# Tackling Real-World Issues

- **Fabrication costs** (new materials, robotics, optimized processes)
- **Cost of operations** (optimized routes (IT), avionics, control systems)
- **Protection of the environment** (fuels, optimized routes, noise reduction)
- **Airborne security** (information systems, sensors, certification of materials)
- **Airfield security** (sensors for traffic control, de-icing)
- **Well-being** of the crew and passengers (interior design, human factors)
- **Training** (simulation)

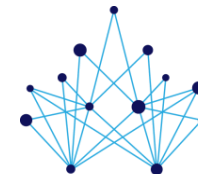




# Research Themes

## *Program management framework*

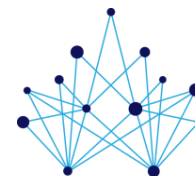
<b>Acoustics, noise control, environment, security, icing</b> (ENV)	<b>Composites</b> (COMP)	<b>Modeling, simulation, multidisciplinary optimization</b> (MDO)
<b>Air operation and human factors - organizational innovation</b> (OPR)	<b>Diagnostics, prognostics, surveillance of components</b> (DPHM)	<b>Product and system development, productivity</b> (PLE-P)
<b>Autonomous systems</b> (AUT)	<b>Interior design</b> (INT)	<b>Supply chain optimization and LEAN</b> (LEAN)
<b>Avionics and control</b> (AVIO)	<b>Manufacturing and assembly processes, quality assurance</b> (MANU)	



# 1<sup>st</sup> Research Forum

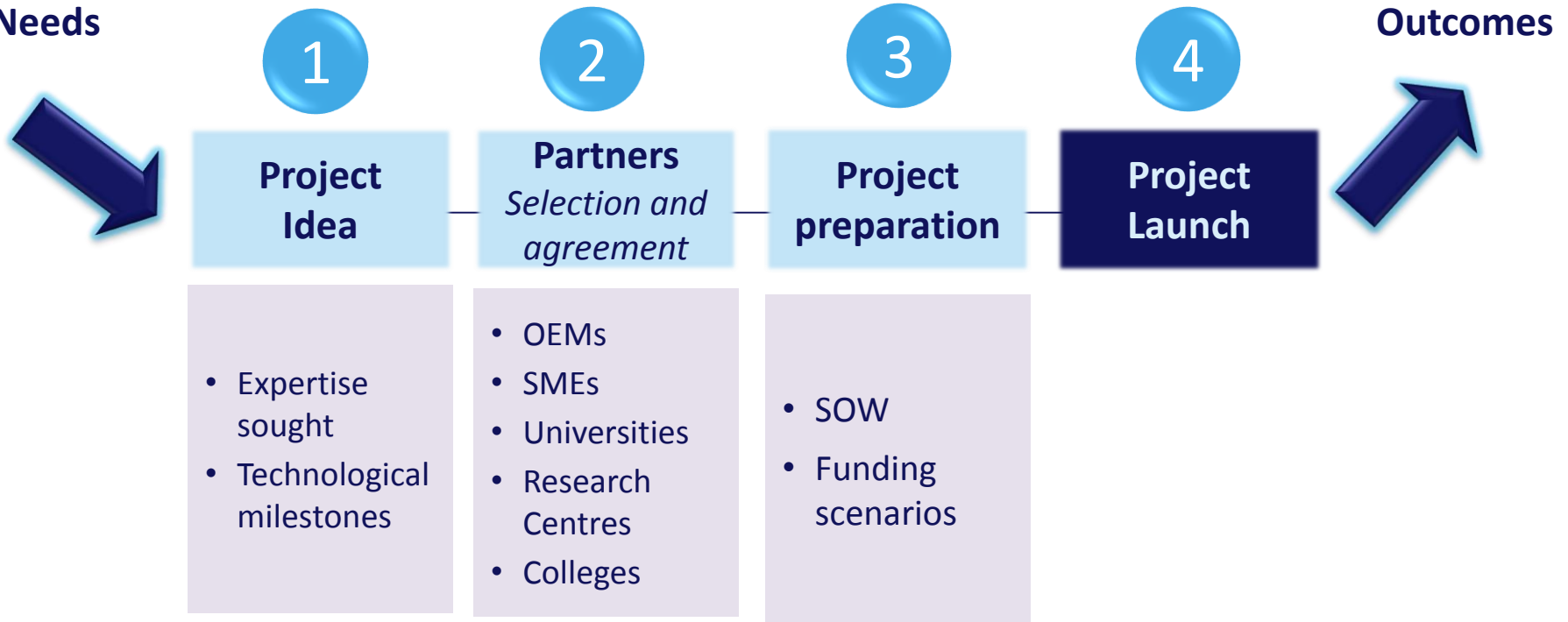
*Focus: generate project ideas*

- Jointly with **CRIAQ's 7<sup>th</sup> Forum**
- April 16-17, 2014
- Official launch of CARIC
- **1,300** registered participants
- **89** submitted project ideas
- **10** represented countries

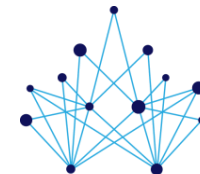


# Project Launch Process



Industrial Needs

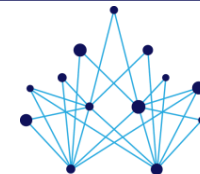


Business Outcomes



# CARIC Collaborative Projects

	<b>Low TRL – Understanding Technology</b> 	<b>Mid TRL – Maturing Technology</b> 
<b>Partnership</b>	2 industrial partners + 2 academic partners	
<b>Stacking limit</b>	75%	
<b>CARIC funding</b>	max. 10% of eligible project expenditures	max. 50% of eligible project expenditures
<b>Funding recipients</b>	Universities or colleges delivered	Industries delivered

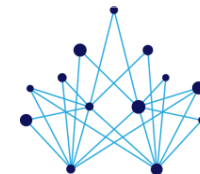
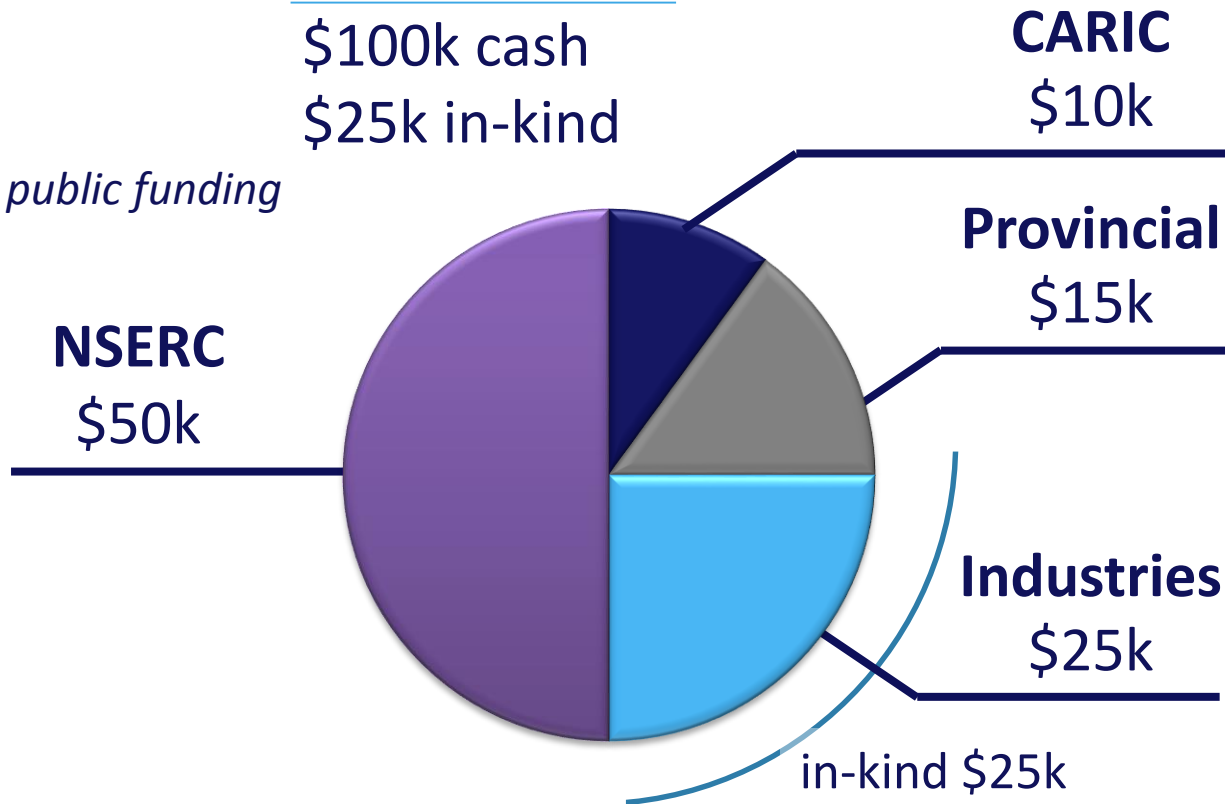


# Funding Scenarios

## Low TRL-Projects – *Provincial Funding*

Total Project Value: \$125k  
\$100k cash  
\$25k in-kind

*Max. 75% in public funding*

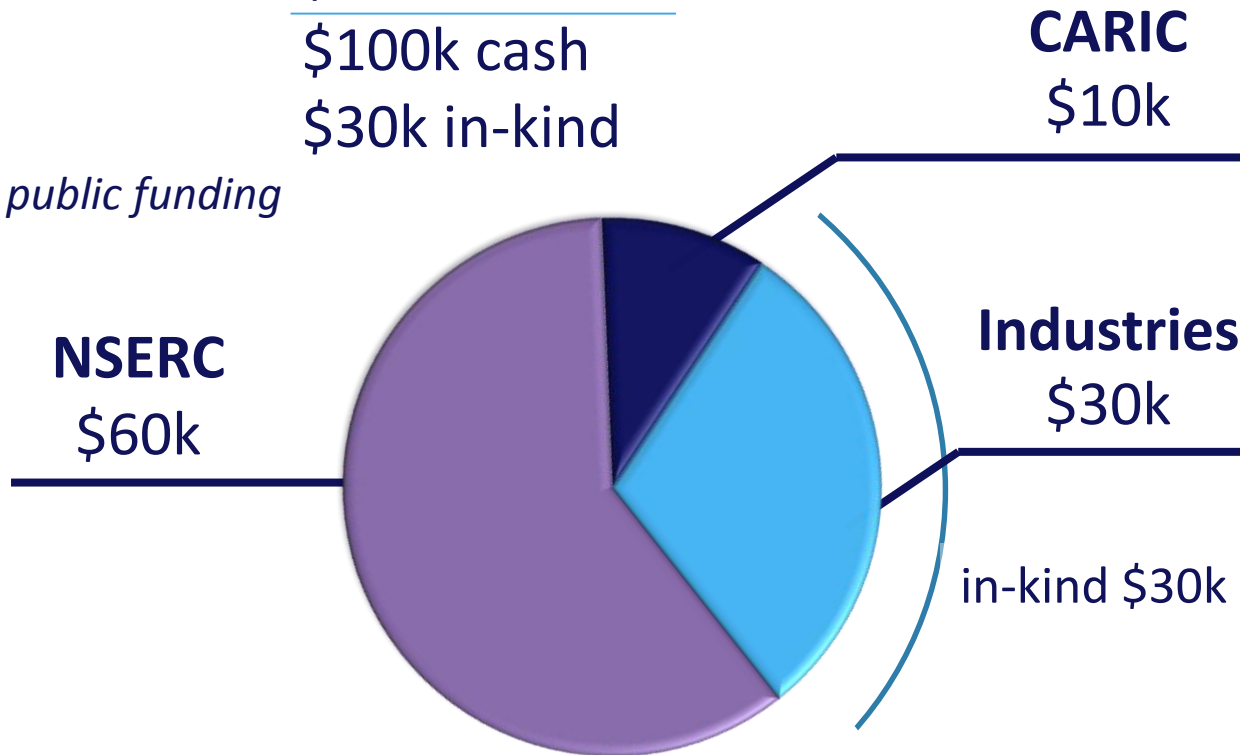


# Funding Scenarios

## Low TRL-Projects – *No Provincial Funding*

Total Project Value: \$130k  
\$100k cash  
\$30k in-kind

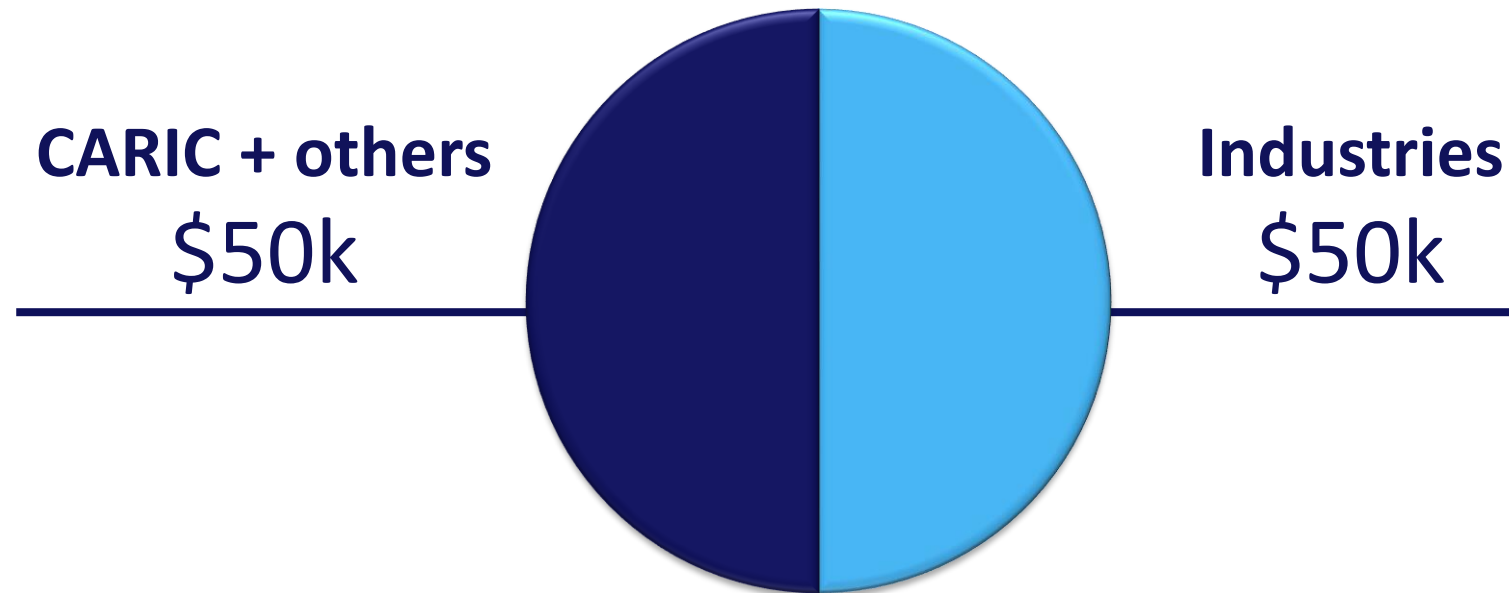
*Max. 75% in public funding*



# Funding Scenarios

## Mid TRL-Projects

Total Project Value: \$100k (cash + in-kind)

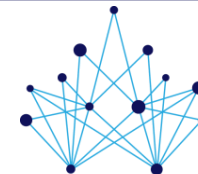


# Canada-EU Collaboration (2015)



## *Areas of common interest :*

1. Reducing environmental impact through advanced design of novel aircraft configurations
2. Reducing engine and airframe noise through improved design or novel materials applications
3. Resource-efficient high-performance development of materials and manufacturing processes
4. Reducing energy consumption through more electrical aircraft and highly integrated systems





# Canada-European Union Collaborations



## Canada-European Union Coordinated Call

<b>Partnership (TRL 2-4)</b>	<p><b>Canada:</b> minimum <b>2</b> industrial + <b>2</b> academic partners</p> <p><b>EU:</b> minimum <b>3</b> independent organizations from <b>3</b> different EU member states</p>
<b>Stacking limit</b>	<p>75%</p>
<b>CARIC funding</b>	<p>up to <b>50%</b> of the Canadian side's eligible expenditures</p>
<b>Funding destination</b>	<p>Academic and industrial</p>



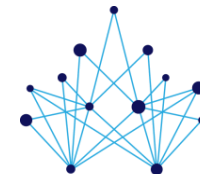
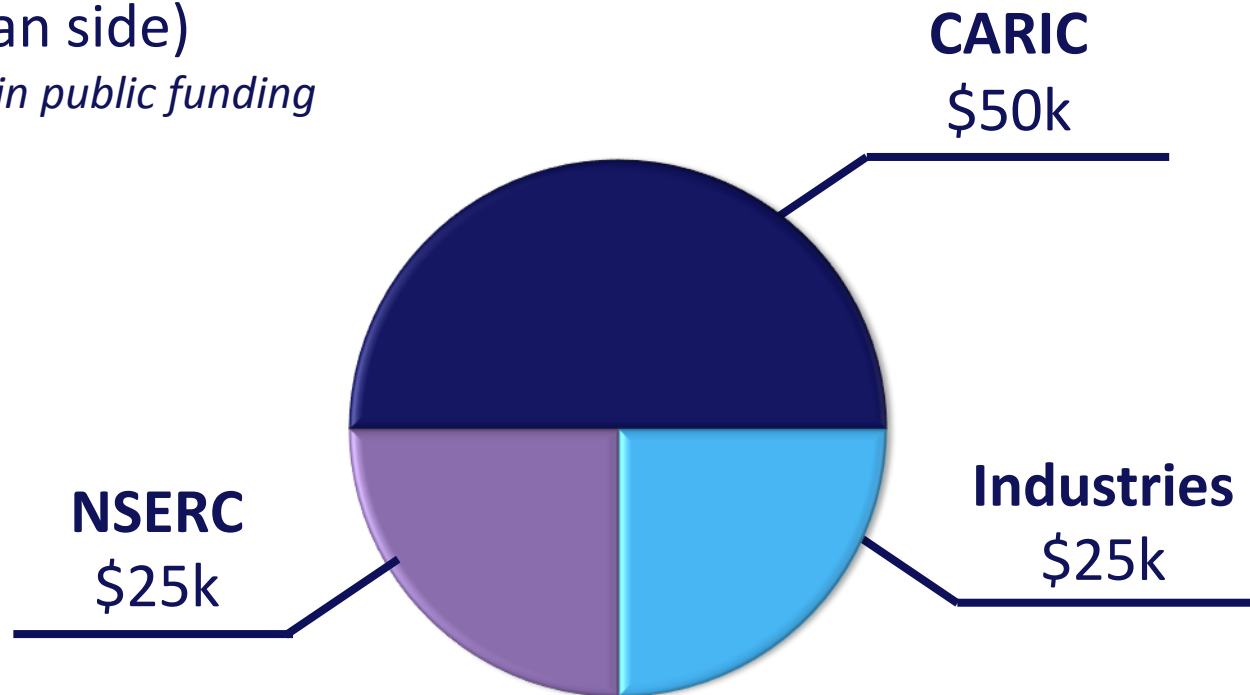
# Funding Scenarios

## Canada-EU Collaboration

Project Value: \$100k (cash + in-kind)

(Canadian side)

*Max. 75% in public funding*



# CARIC Agenda

## *Important dates*



- December 11, 2014: Webinar
- Winter 2015: Workshop tour
  - Montreal: January 20, 2015
  - Toronto: January 22, 2015
  - Winnipeg: February 3
  - Vancouver: February 5, 2015
  - Halifax: TBC
- April 23, 2015 : Canada-EU Collaboration Full proposal submission



# Conclusion

- Collaboration and mobilisation are the keys to consolidate Canada's competitiveness...

...and CARIC is the tool enabling it.

