



Overview on the Development of Avionics Systems in Canada – CRIAQ Collaborative Research Projects Model

VOL 10^e ANNIVERSAIRE / FLIGHT 10TH ANNIVERSARY

DESTINATION / 2022

Clément Fortin
President and CEO





The aerospace industry in Canada

- 400 companies
 - More than 100,000 jobs
 - 27 billion \$ in sales
 - 5th largest worldwide
-
- Canada exports more than 80 % of its output



The aerospace sector in Quebec

- 234 companies
- Strong presence of OEMs and many SMEs
- More than 42 000 direct jobs
- 13,5 billion \$ in sales annually
- 70% of Canadian R&D is concentrated in Quebec and particularly in Montreal



Industrial Members

BOMBARDIER

Bell Helicopter
A Textron Company

Esterline
CMC Electronics

SAFRAN
Turbomeca Canada

Mastering Innovation
DELASTEK
L'Innovation en tête

MDA

SONACA
MONTREAL

dema aeronautics

MDS COATING TECHNOLOGIES CORPORATION

Avior

COMPOSITES ATLANTIC
AN EADS SOGEMMA Company

MARQUEZ

Vision & Robotics

EPSILON RTO
ALCEN

MELOCHE

TRANSTRONIC inc.

GLOBVISION

MANNARINO
SYSTEMS & SOFTWARE INC.

OPAL-RT

jb martin

BFI
CANADA

GROUPE SOTREM-MALTECH

ALOUETTE

CREAFORM

MECACHROME
technologies

ES

SAFRAN
Messier-Bugatti-Dowty

marinvent
CORPORATION

AVIANOR

dorval technologies
a division of modéltrie dorval inc.

ALTITUDE AEROSPACE

TechnoCap

ITG

Aerosystems International Inc.
AS9100 ISO9001 CAGE 3AC69

Nutaq
INNOVATION TODAY FOR TOMORROW

AÉROPORTS DE MONTRÉAL

RAAS

SILKAN

IMJ
Aéronautique

LIBURDI AUTOMATION

edmit inc

PMG
www.pmgtest.com

LAFLAMME
INGÉNIERIE

asco

Atom
POLYMER LABORATORY

Pratt & Whitney Canada
A United Technologies Company

CAE

Rolls-Royce

THALES

HÉROUX DEVTEK

GE

L3
MAS

3M

University and Research Centres



Industrial Members



University and Research Centres





CRIAQ's history

- Founded in 2002 by Valorisation Recherche Québec (VRQ)
- More than 55 industrial members including 35 SMEs
- More than 20 universities, transfer centers and research centers
- Reference consortium in Quebec and in Canada
- More than 18 international projects including 11 with India



Funding Partners and Associate Members

Enseignement supérieur,
Recherche, Science
et Technologie

Québec



Fondsvert Québec



Programme d'aide à la recherche industrielle du CNRC NRC Industrial Research Assistance Program

Mitacs



AÉRO
MONTREAL

AIAC

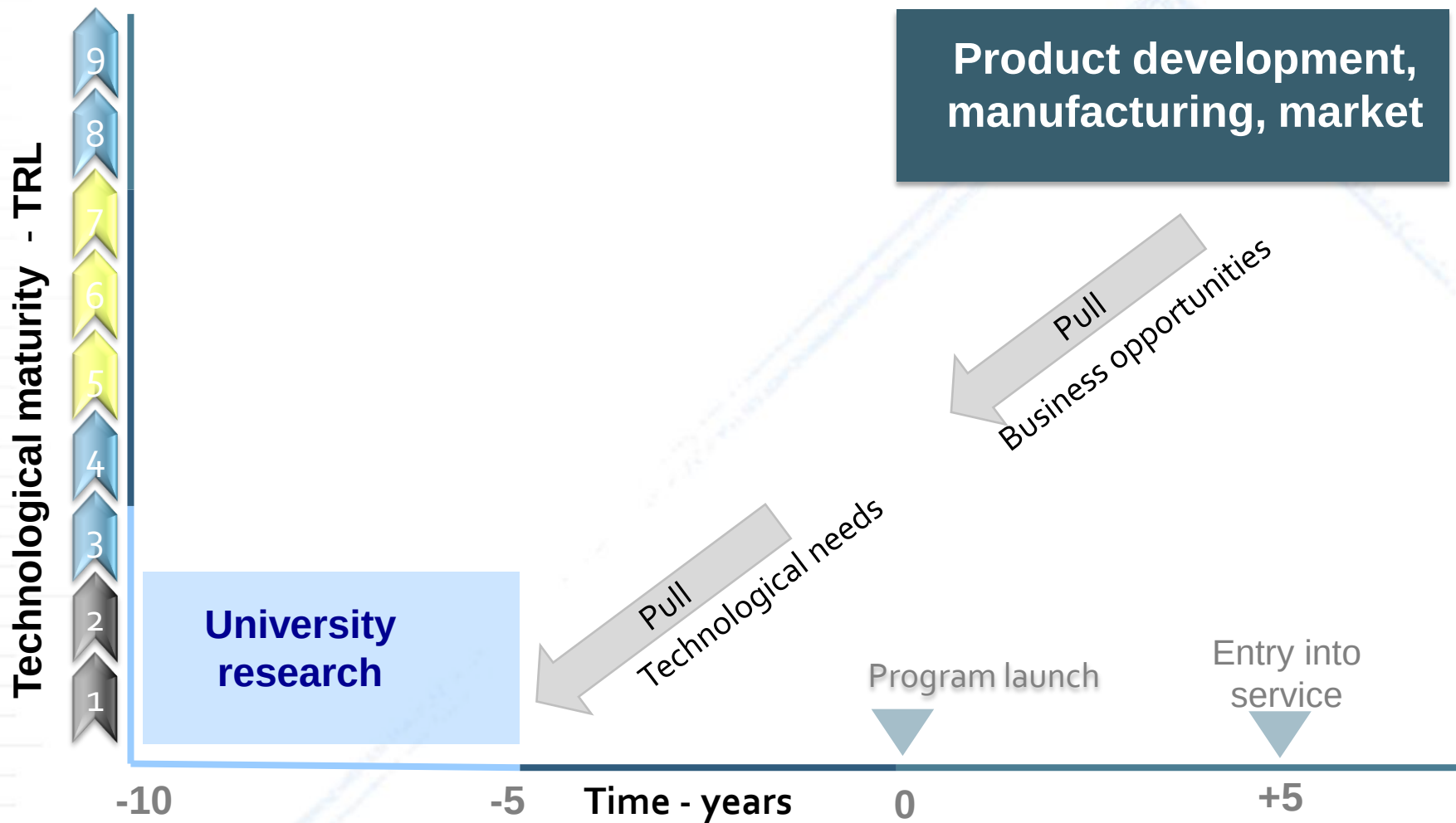


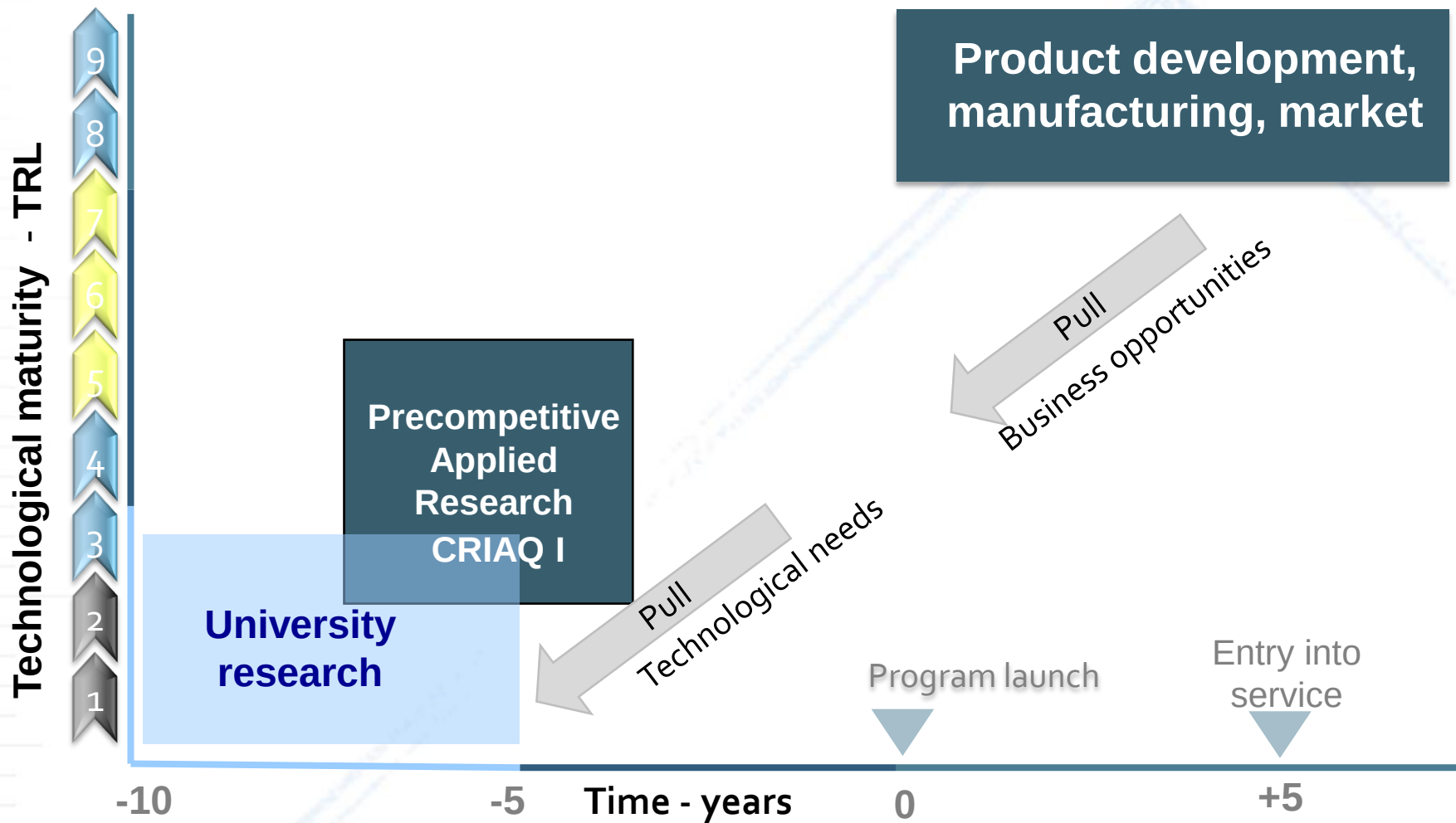
EnviroTREC
Canadian Environmental Test Research & Education Center

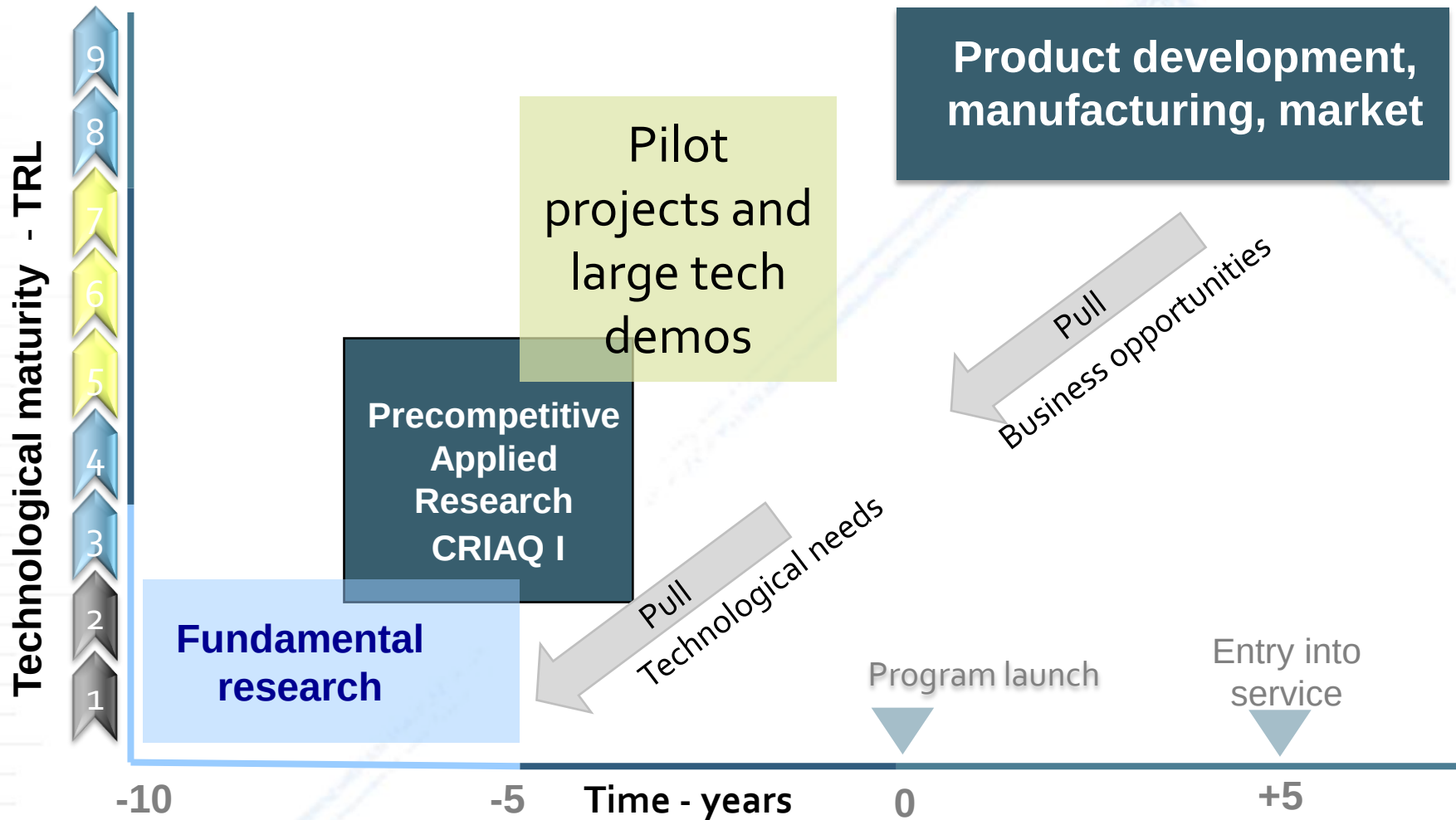


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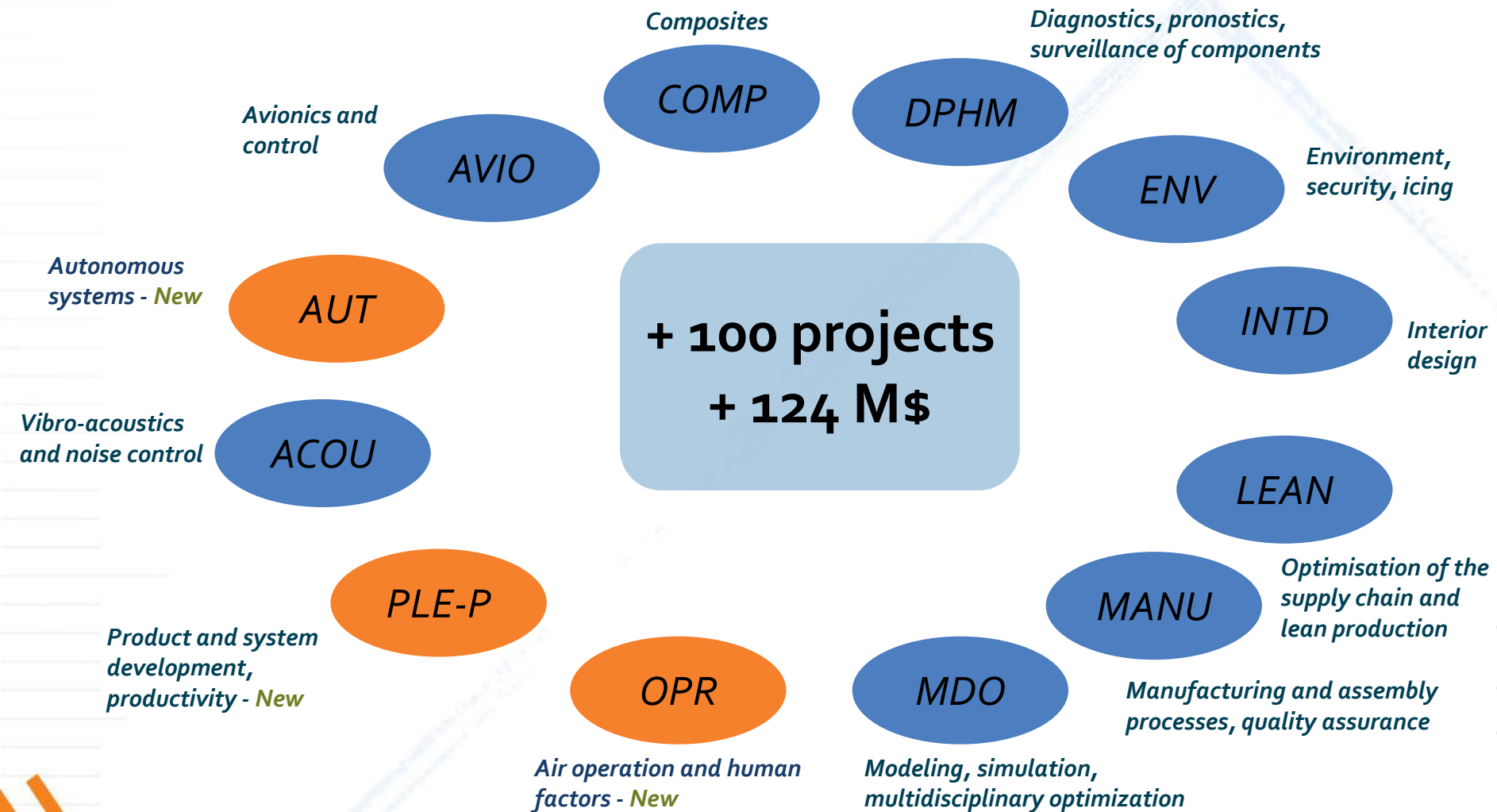








Research Themes



Avionics in research themes

22 projects, 12,5 M\$

Avionics and control

AVIO

Composites

COMP

Diagnostics, pronostics, surveillance of components

DPHM

Environment, security, icing

ENV

Autonomous systems - New

AUT

Vibro-acoustics and noise control

ACOU

+ 100 projects
+ 124 M\$

Interior design

INTD

LEAN

Optimisation of the supply chain and lean production

MANU

Manufacturing and assembly processes, quality assurance

Product and system development, productivity - New

PLE-P

OPR

Air operation and human factors - New

Modeling, simulation, multidisciplinary optimization

MDO



Mission of CRIAQ

- Increase competitiveness of aerospace industry in Quebec and in Canada
- Enhance collective knowledge base through a better training of students





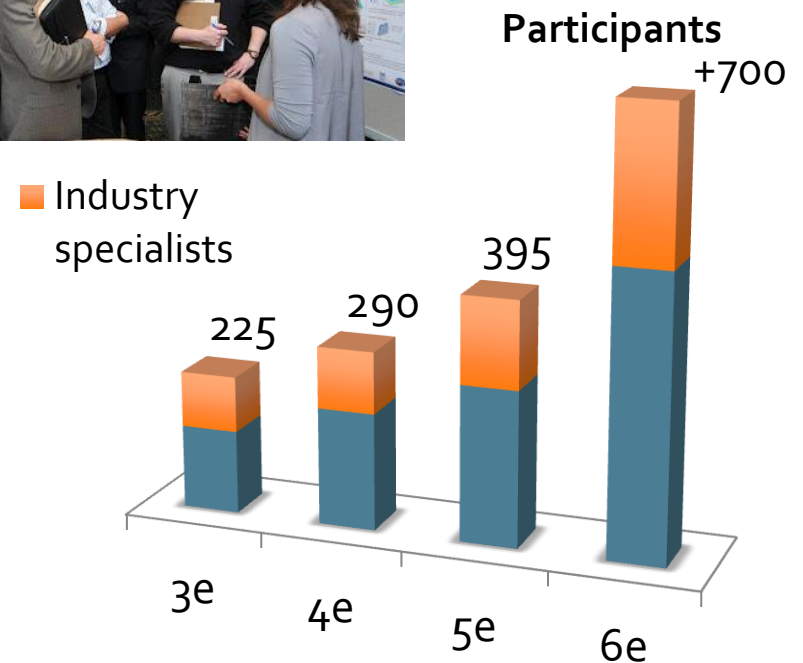
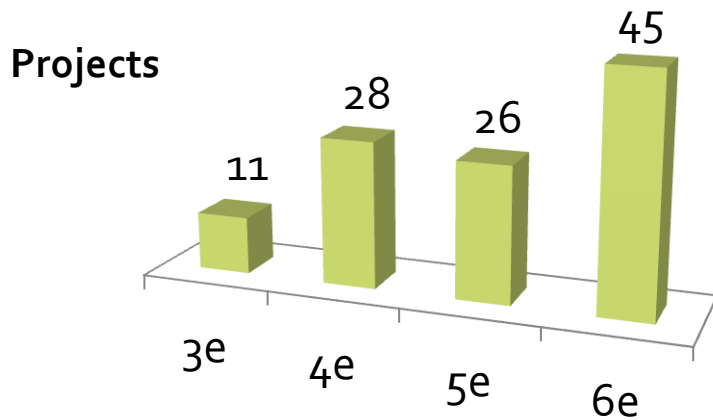
5 Strategic Pillars

- Collaborative research
- Open innovation process and IP
- Training through research
- Promotion of aerospace sector
- National and international collaborations

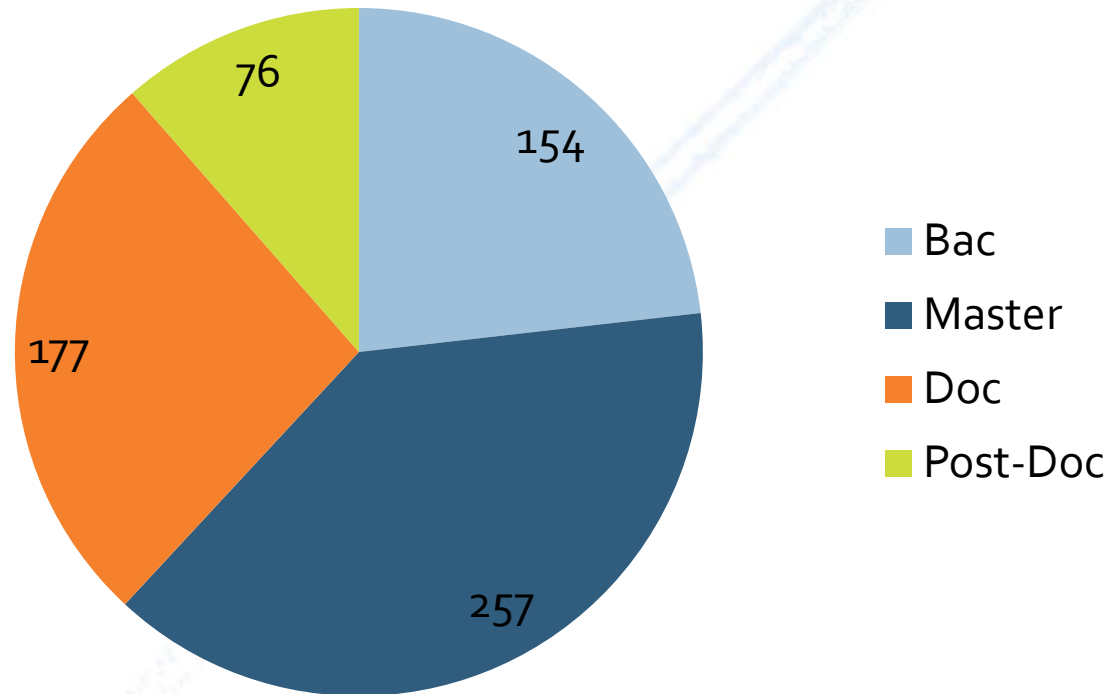


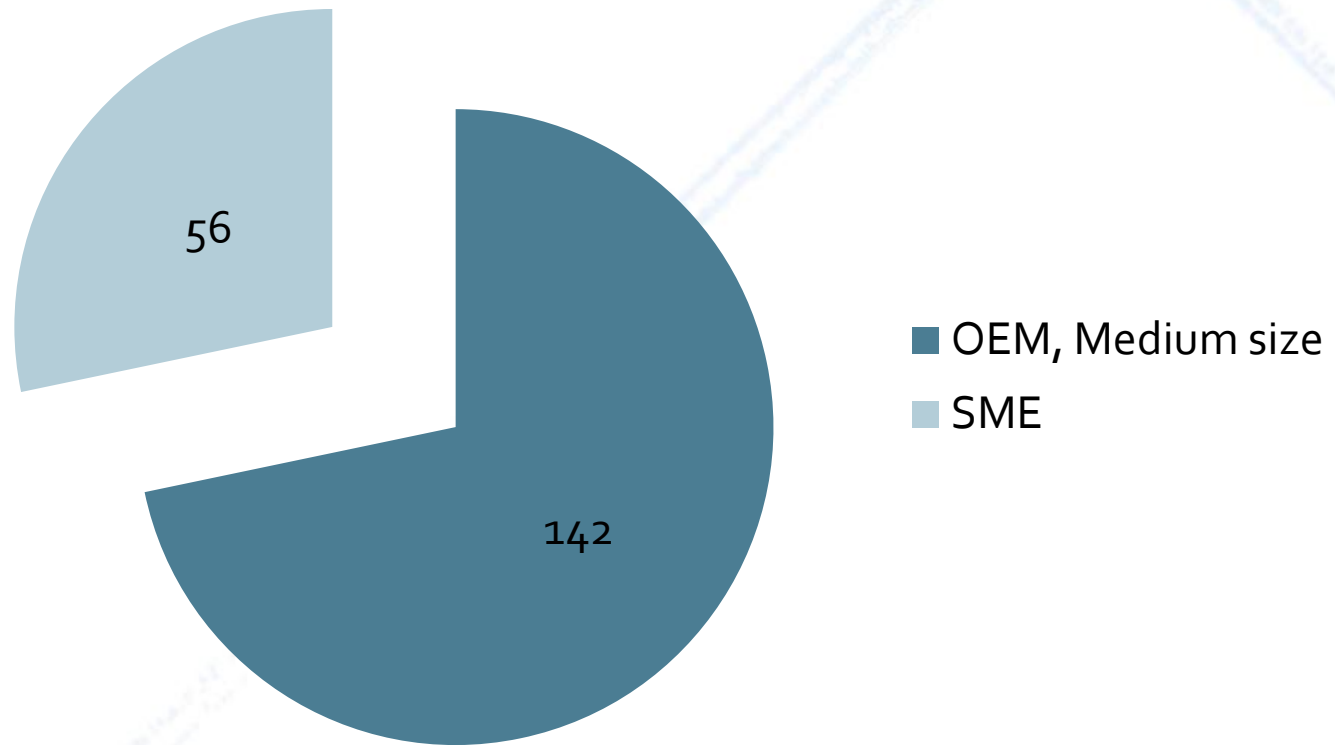


The CRIAQ Research Forums



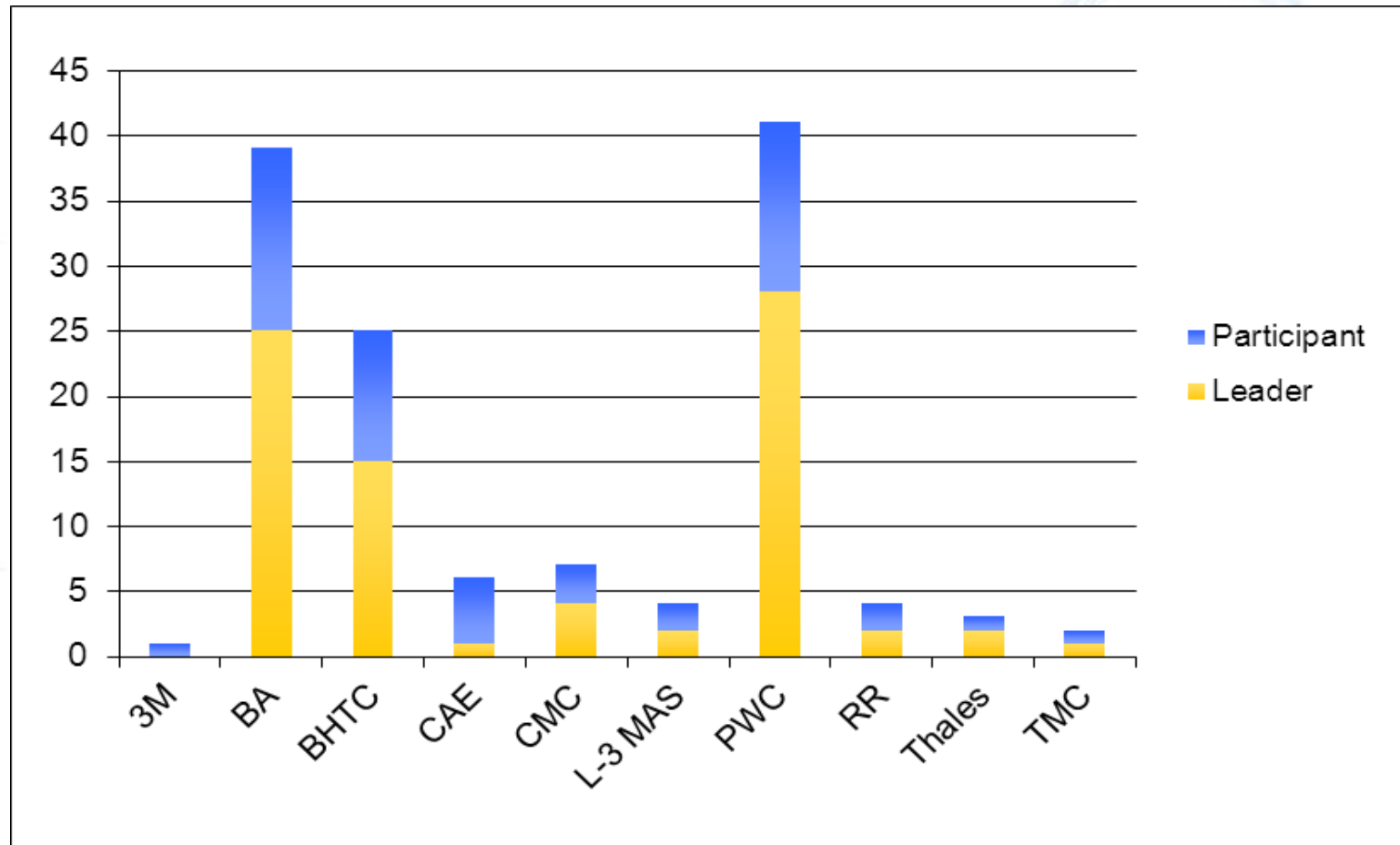
Students and Highly Qualified Personnel in CRIAQ Projects

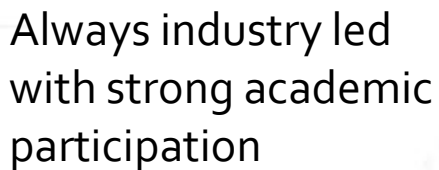






Participation of OEM's and Medium-sized Companies in CRIAQ Projects





CRIAQ I Projects Funding

Industry

cash + in-kind



Funding to consortium



Project funding

Universities

NRC

Research
Centers

+ 2 industries

+ 2 research entities



Intellectual Property

- Background IP remains the property of its original owner
 - A royalty free license to Background IP is granted (i) for use during the Project and (ii) if required to exploit Foreground IP.
 - Royalties may be payable if the Background IP is identified in a Schedule to the Project Agreement and a basis for the payment of royalties is agreed upon.
- Foreground IP owned by Project Partners
 - whose researchers have had a substantive creative, inventive or intellectual contribution to its generation.





Intellectual Property (2)

- **Licensing :**
 - Industrial Project Partners obtain an exclusive world-wide royalty-free license for aerospace applications in their respective defined field of interest (with right to sublicense to affiliated companies) on any Project Foreground IP owned by University Partners or NRC (similar scheme applies to Joint Intellectual Property);
 - specific benefits sharing or financial compensation may be addressed to in a Schedule to the Project Agreement.
 - Use in teaching and academic research is guaranteed.
- **Publication:**
 - Subject to certain limitations concerning inventions and confidential information, publication rights are guaranteed to all Project Partners (maximum delay 6 months).



SA²GE demonstrator program

1. Composite fuselage

BOMBARDIER

Bell Helicopter
A Textron Company

2. Next generation turbo-prop compressors

 **Pratt & Whitney Canada**
A United Technologies Company

3. Modular integrated avionics for cockpit applications

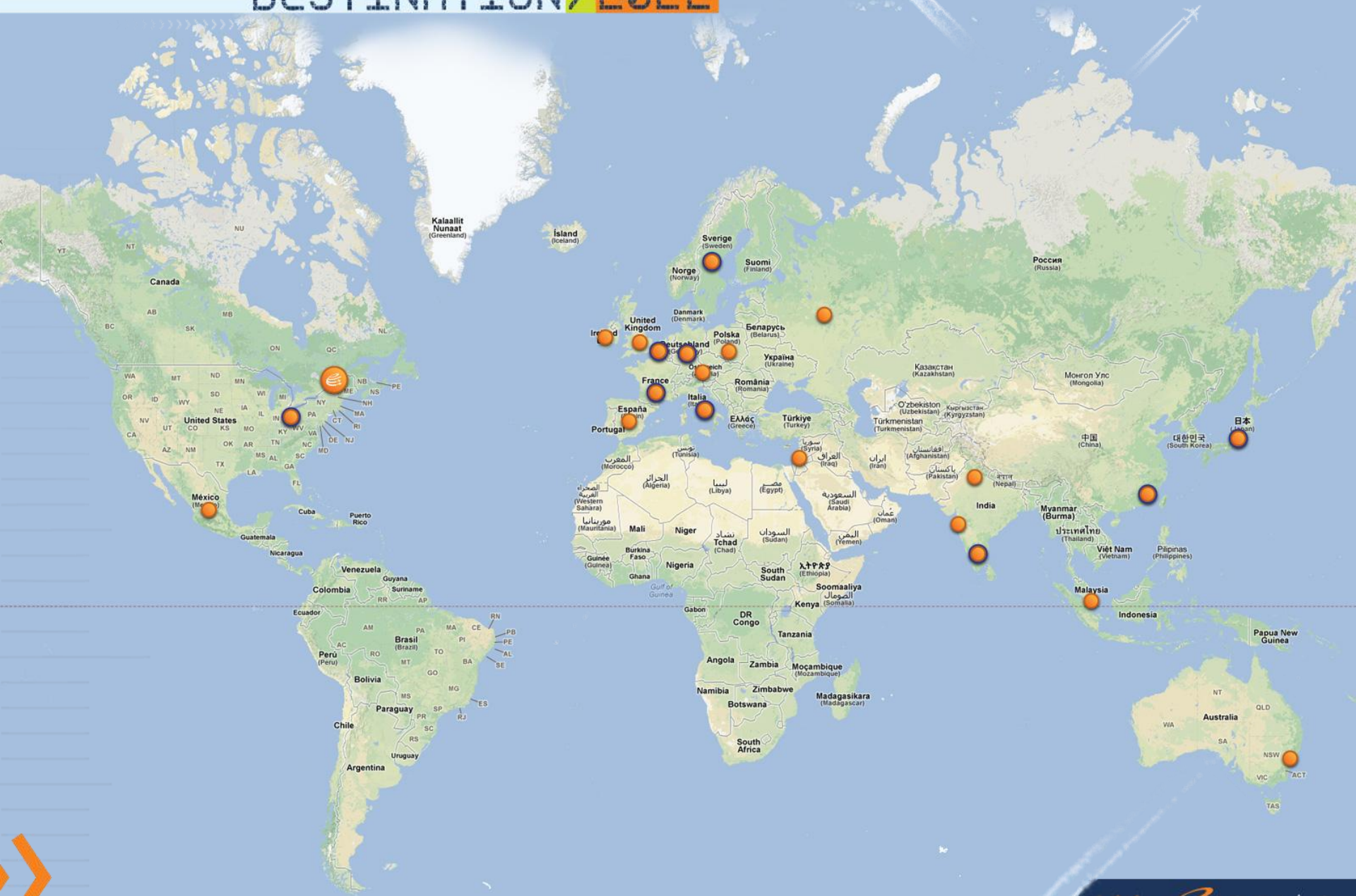
Esterline
CMC Electronics

4. Integrated avionics for critical systems

THALES

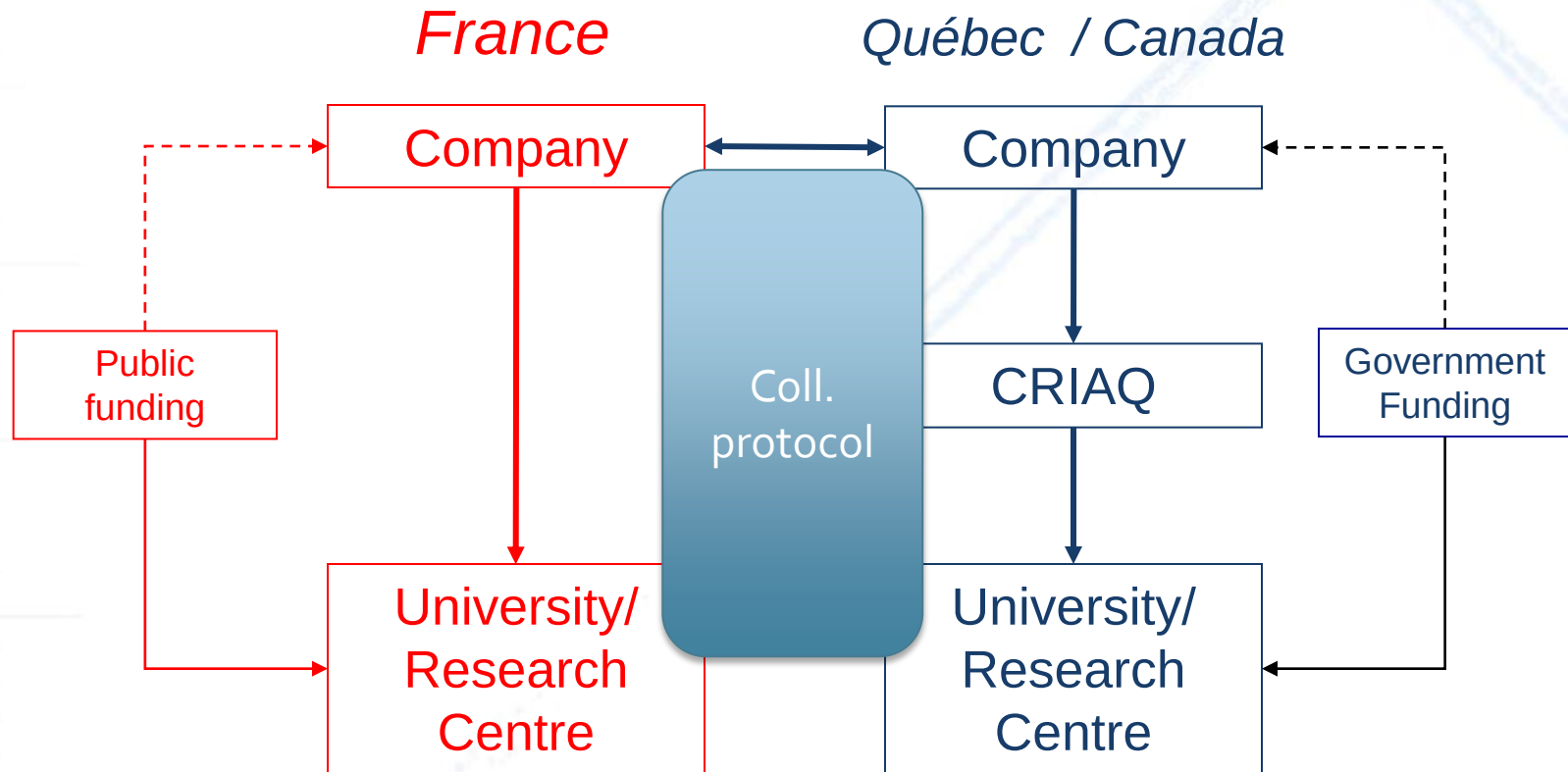
5. Landing gear of the future

HÉROUX DEVTEK





International R&D Collaboration Industry-driven Project Scenario

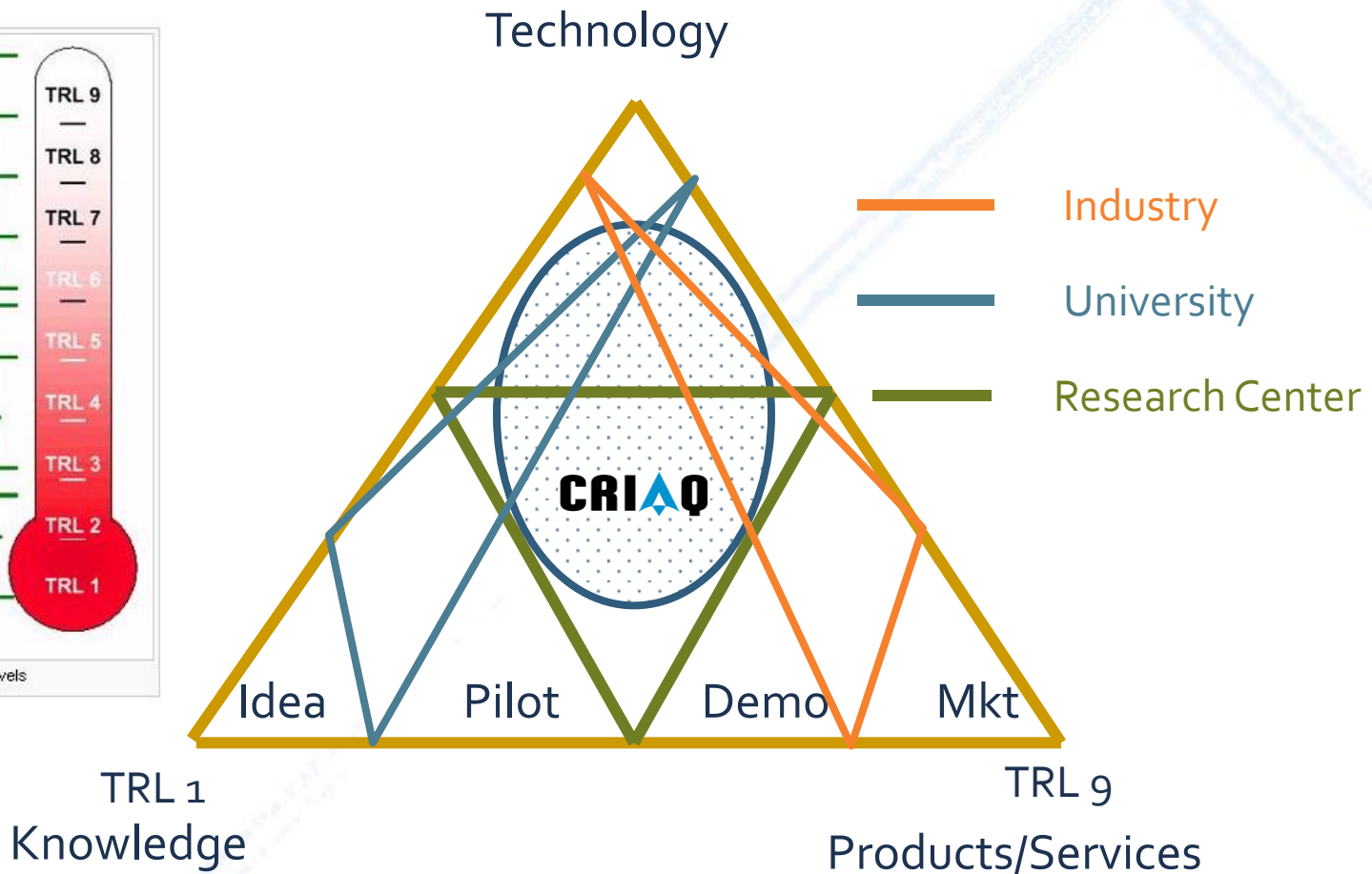
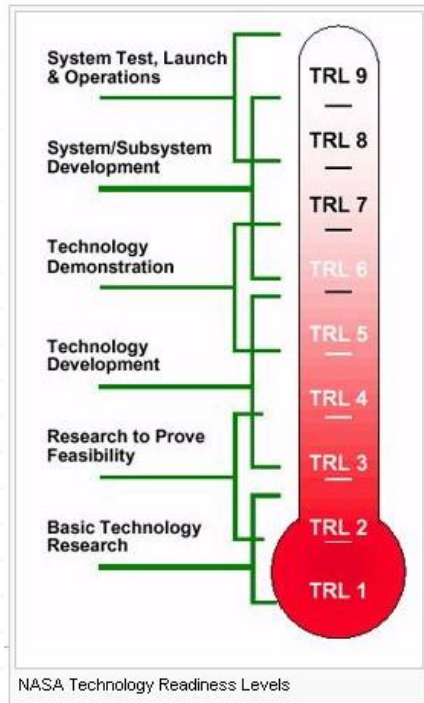


Minimum 1 Industry + 1 Univ/Res Inst in each country



The Innovation Triangle

Research Performers





Destination 2022

1. Develop performance indicators and learn more about the impacts of CRIAQ projects
2. Launch the platform for the “CRIAQ Community”
3. Create CRIAQ TRL 4+ and extended CRIAQ
4. Enhance training through research and creation of the “CRIAQ Academy”
5. Institute CRIAQ’s open “Out of the Box” process



A map of North America, including Canada and the United States, with various provinces and states labeled. The text "Autonomous systems needs are everywhere up here and up to the North pole !!!" is overlaid in large black font. The map shows the Great Lakes, the Atlantic Ocean, and the Gulf of Mexico. Labels for Canada include Northwest Territories, Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, Newfoundland and Labrador, and Nova Scotia. Labels for the United States include Washington, Oregon, California, Nevada, Idaho, Montana, Wyoming, North Dakota, South Dakota, Nebraska, Kansas, Missouri, Illinois, Indiana, Ohio, Pennsylvania, New York, Vermont, New Hampshire, Maine, New Brunswick, Prince Edward Island, and St. Pierre and Miquelon. Major cities like Vancouver, Seattle, Portland, San Francisco, Sacramento, Denver, Colorado, Minneapolis, Chicago, Detroit, Toronto, Montreal, and New York are also labeled.

Autonomous systems
needs are everywhere up
here and up to the North
pole !!!

Avionics, complex systems

22 projects, 11 M\$

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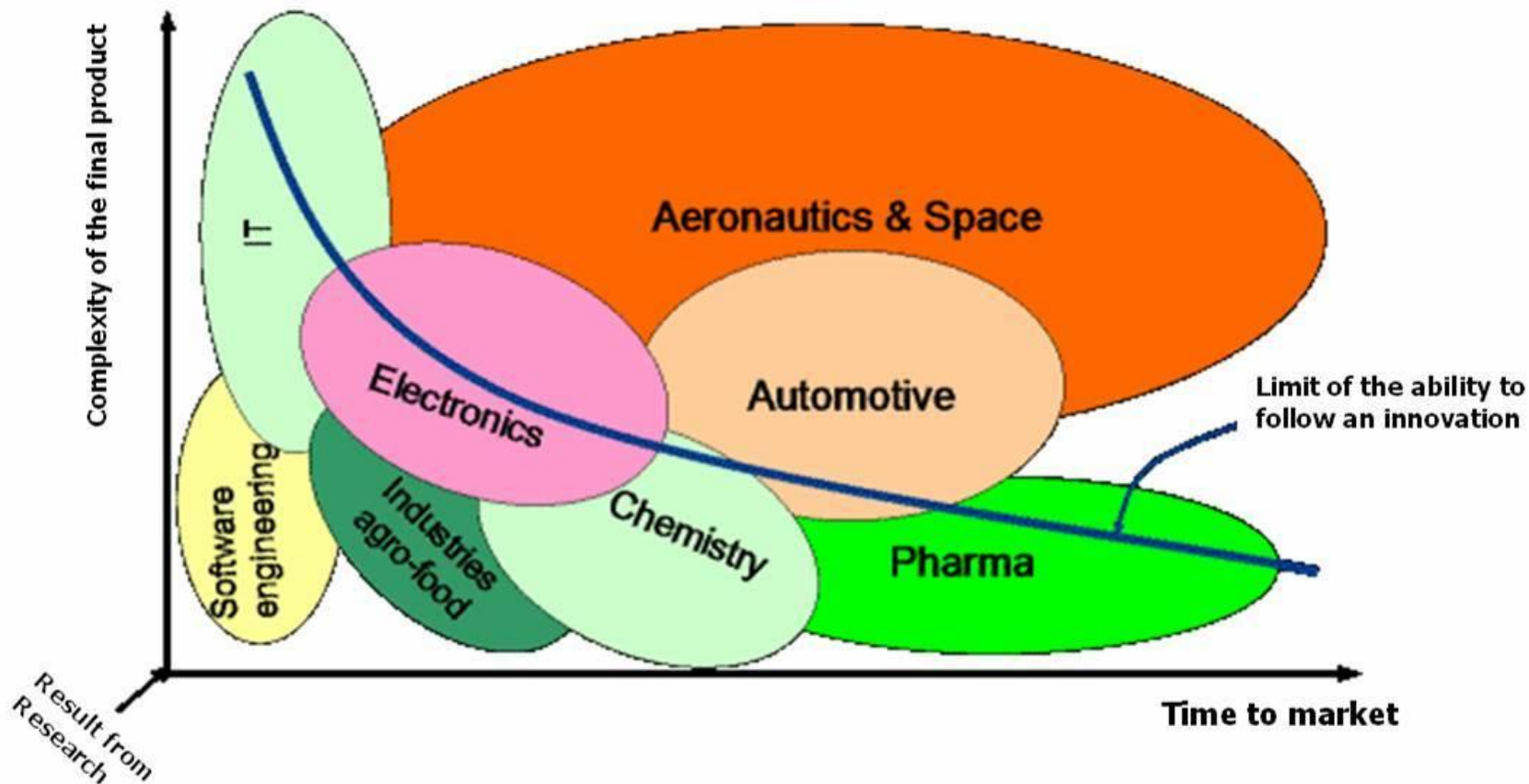
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R. Stephan, Université de Compiègne, "Which practices for universities to enhance exchanges and transfer"





Merci

Questions?

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