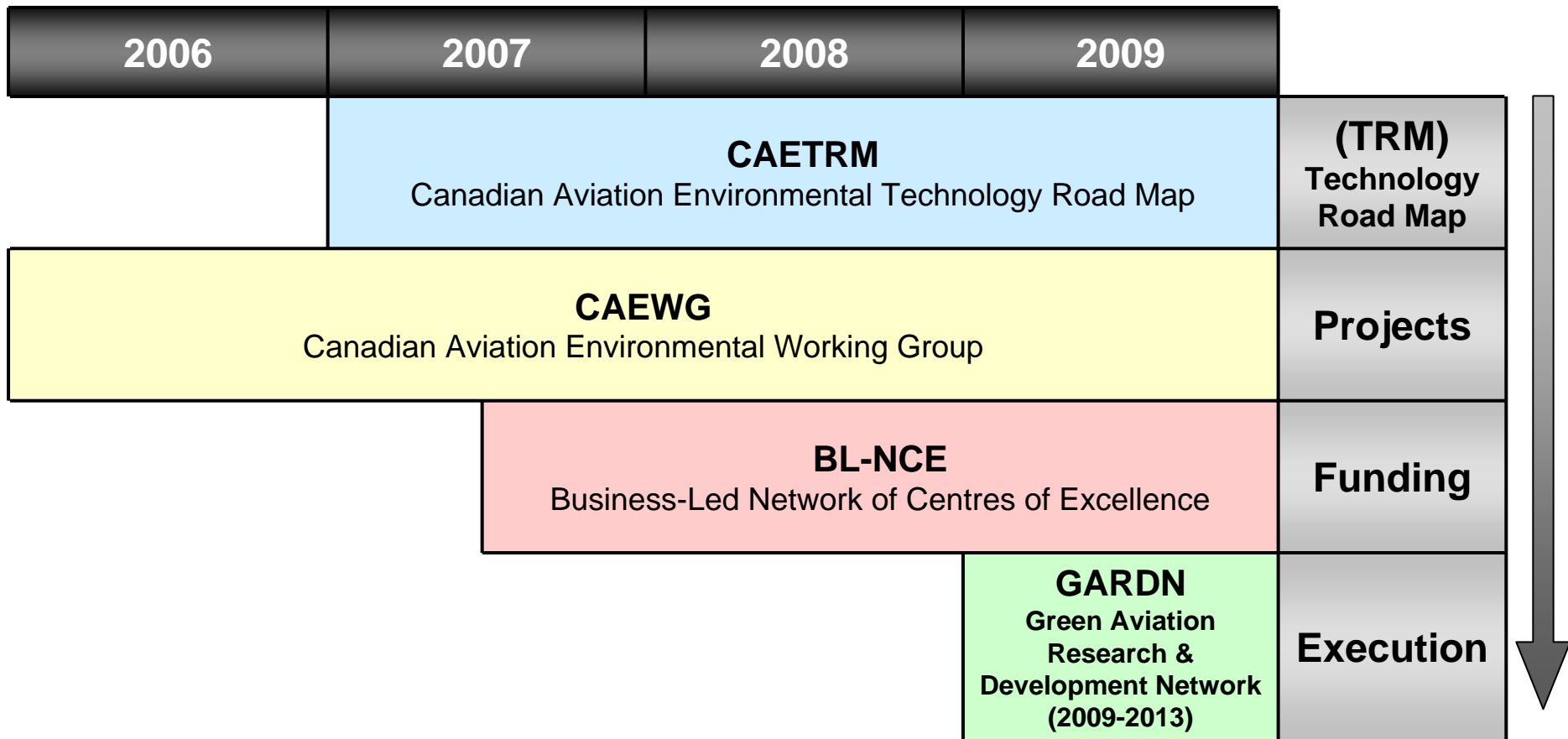




Green Aviation Research & Development Network

Fassi Kafyeke (Bombardier Aerospace)
Hany Moustapha (Pratt & Whitney Canada)
GARDN Executive Committee Members
May 2009

GARDN Technology & Funding Road Map





GARDN Objectives

- Fostering the development of technologies that will reduce aircraft noise and emissions in the vicinity of airports
- Considering environmental impacts throughout the product life cycle
- Investing in the talents of our universities and encouraging creativity in the development of aviation environmental technologies
- Reducing the production of greenhouse gases by the aviation sector, and in so doing reducing the carbon footprint of the Canadian aviation sector

GARDN Eight Research Themes



Emissions

Noise



Icing

Aircraft
Operations

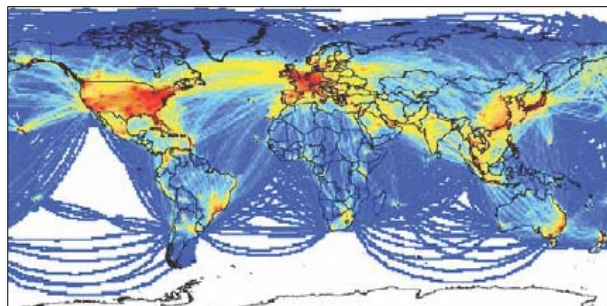
Performance

Alternative
Fuels

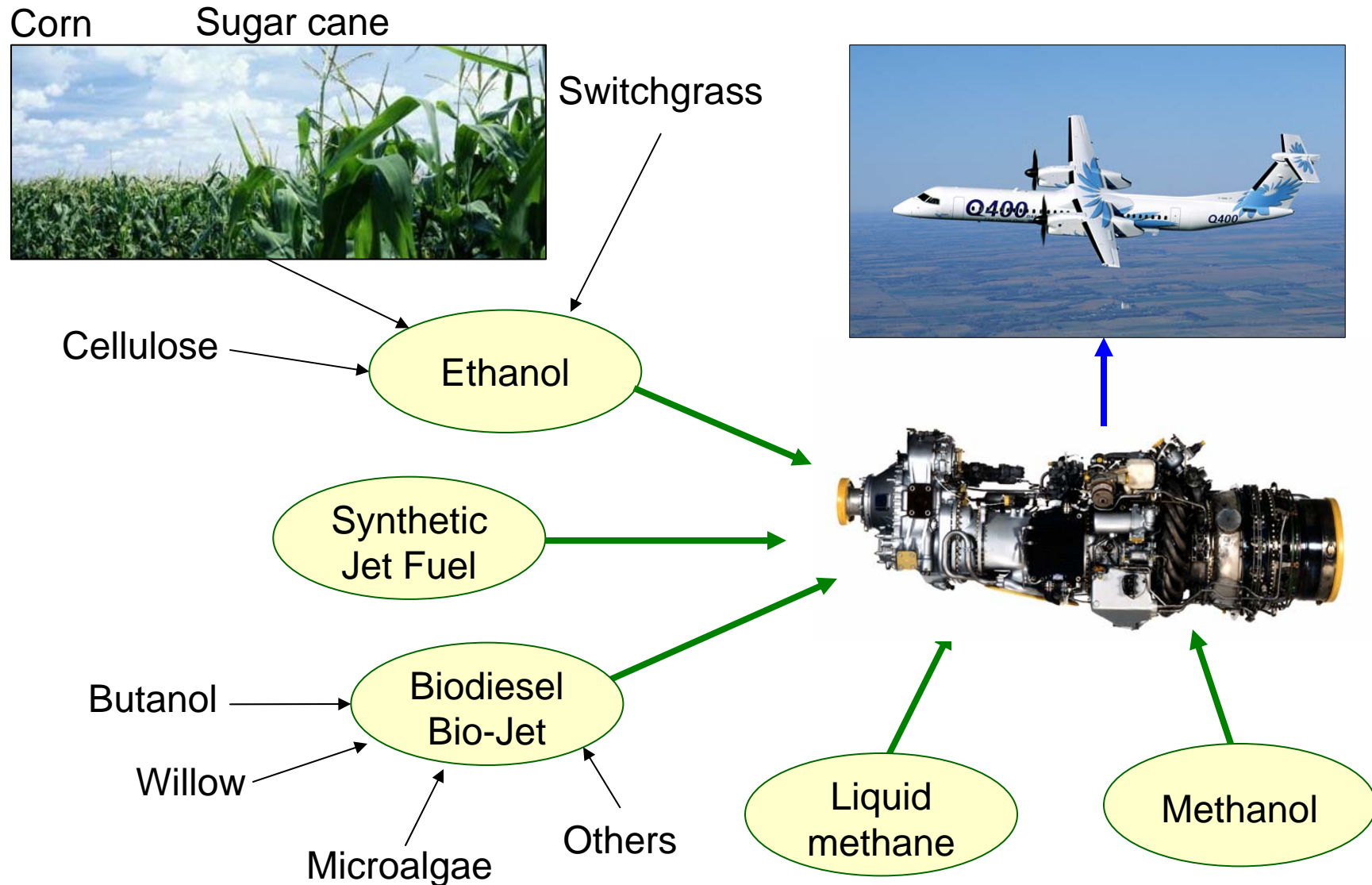
Product Life Cycle
Management



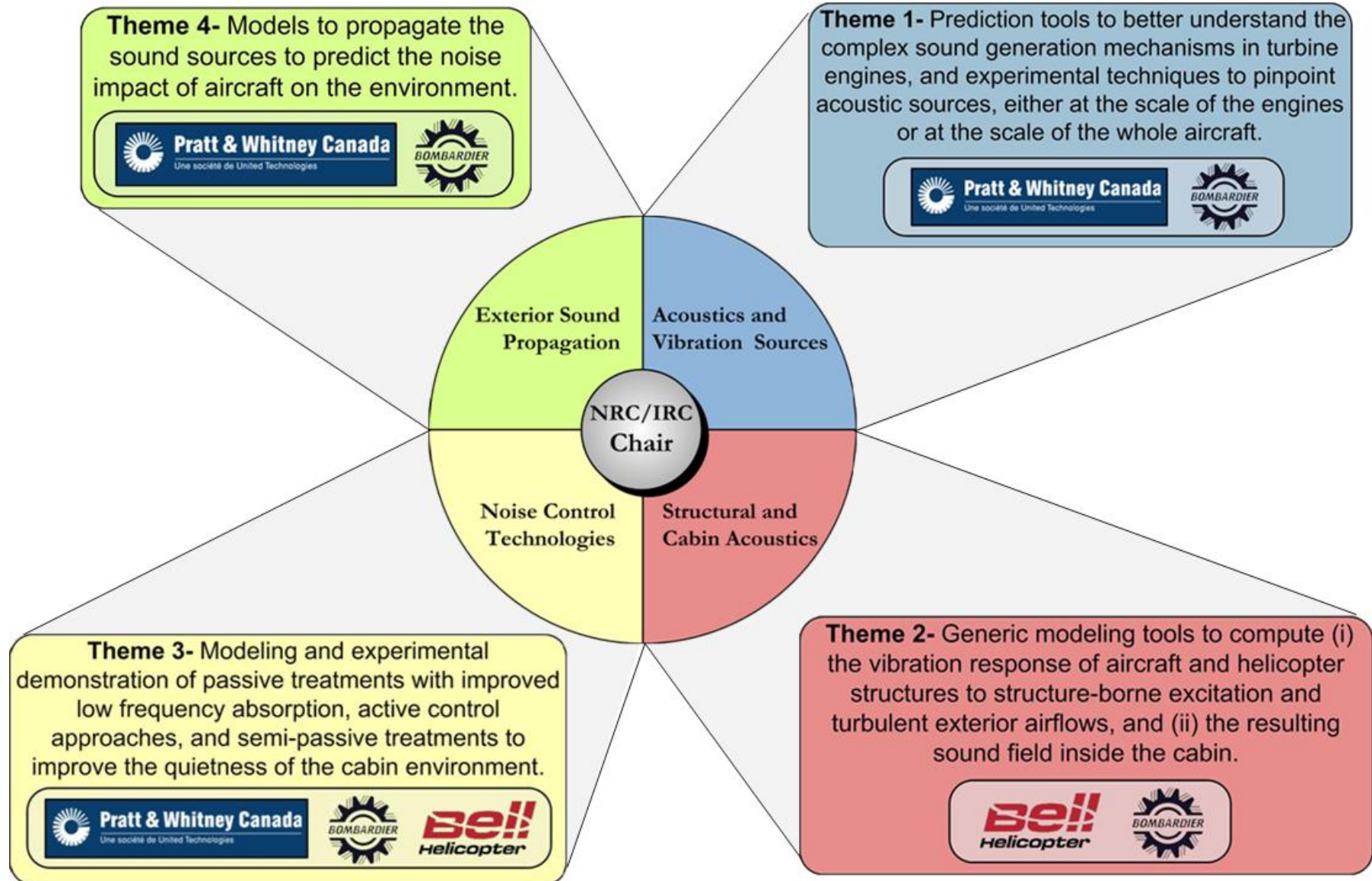
Materials &
Manufacturing
Processes



Alternate Fuel Technologies



Sherbrooke Univ. and P&WC-BA-Bell Acoustics NSERC Chair (2009-2013, \$3.3M)





GARDN Research Themes and First Round Nine Projects (\$23M)

Themes	P&WC					BA			CMC
	Project 1	Project 2	Project 3	Project 4	Project 5	Project 1	Project 2	Project 3	Project 1
Noise		X	X			X	X	X	
Emissions				X	X				
Materials & Manufacturing Processes	X								
Performance				X		X	X		
Icing									
Aircraft Operations									X
Alternative Fuels									
Product Lifecycle Management	X								

P&WC

- Project 1 (M. Bissinger) Life-cycle improvement - Materials of concern (Poly, Carleton, Integran, StandardAero)
- Project 2 (G. Girard) Forced mixer and nozzle noise reduction (McGill)
- Project 3 (S-A. Meslioui) Noise reduction for transonic fans
- Project 4 (F. Lefebvre) Engine core technologies to reduce emissions (Poly, Concordia, Waterloo, Ryerson, Calgary, Western Ontario, Ottawa, NRC, Exova, VacAero)
- Project 5 (Q-P. Zheng) Altitude emissions control for aviation (Toronto, Warsaw Polytechnic)

BA

- Project 1 (S. Banerjee) Environmentally-focused regional aircraft (UTIAS, P&WC)
- Project 2 (S. Banerjee) Environmentally-focused long-range business jet (UTIAS, P&WC)
- Project 3 (M. Huising) Airframe noise reduction (Waterloo, Messier-Dowty, Aercoustics)

CMC

- Project 1 (R. Hygate) Continuous descent arrivals research (ETS)

Managing





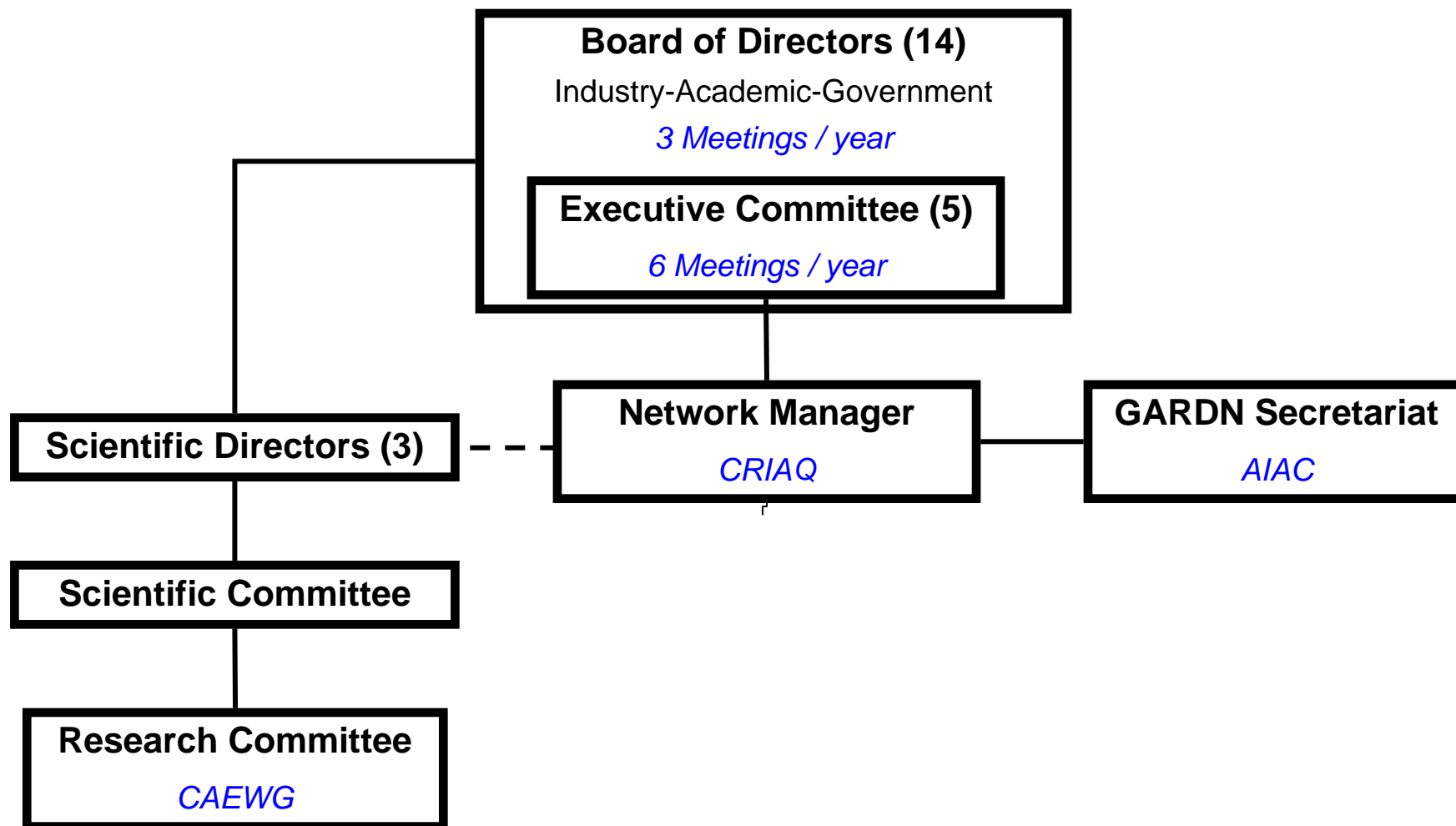
GARDN Management Structure

Guiding Principles

- Respecting NCE guidelines
- Benchmarking other NCE (e.g. AUTO21)
- Building on existing consortia know-how and strengths (CRIAQ, SDTC, ISTC, etc.)
- Using industry's best practices in technology management
- Adopting a lean structure
- Ensuring industry leadership
- Leveraging the know-how and networks of CRIAQ and AIAC



GARDN Management Structure



GARDN Key Performance Indicators (KPI)



Research Program

- Network researchers
- Number of projects
- Research budget
- TRL progression

Highly Qualified People (HQP)

- Number of students and universities
- Number of theses (MS, Ph.D.), etc

Knowledge and Technology Transfer

- Patent applications / Granted patents
- TRL-6 achievements
- Technical reports

Partnerships, Networking & International Relationships

- Number of partners (national & international)
- SMEs outreach

Governing & Managing

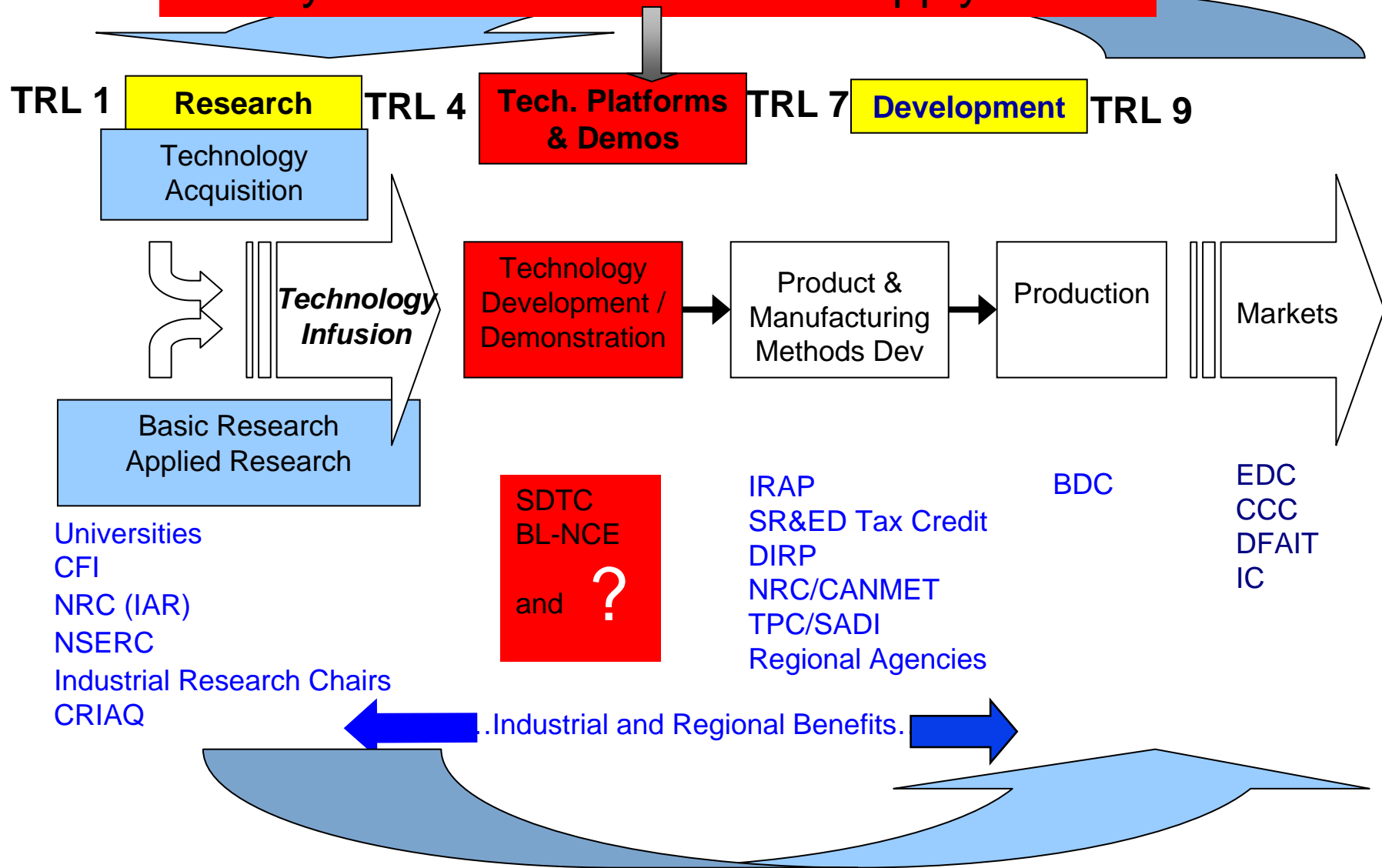
- Achievements vs objectives
- Administration budget percentage

Growing



Lack of Tech. Demos and Funding for TRL 4 to 7

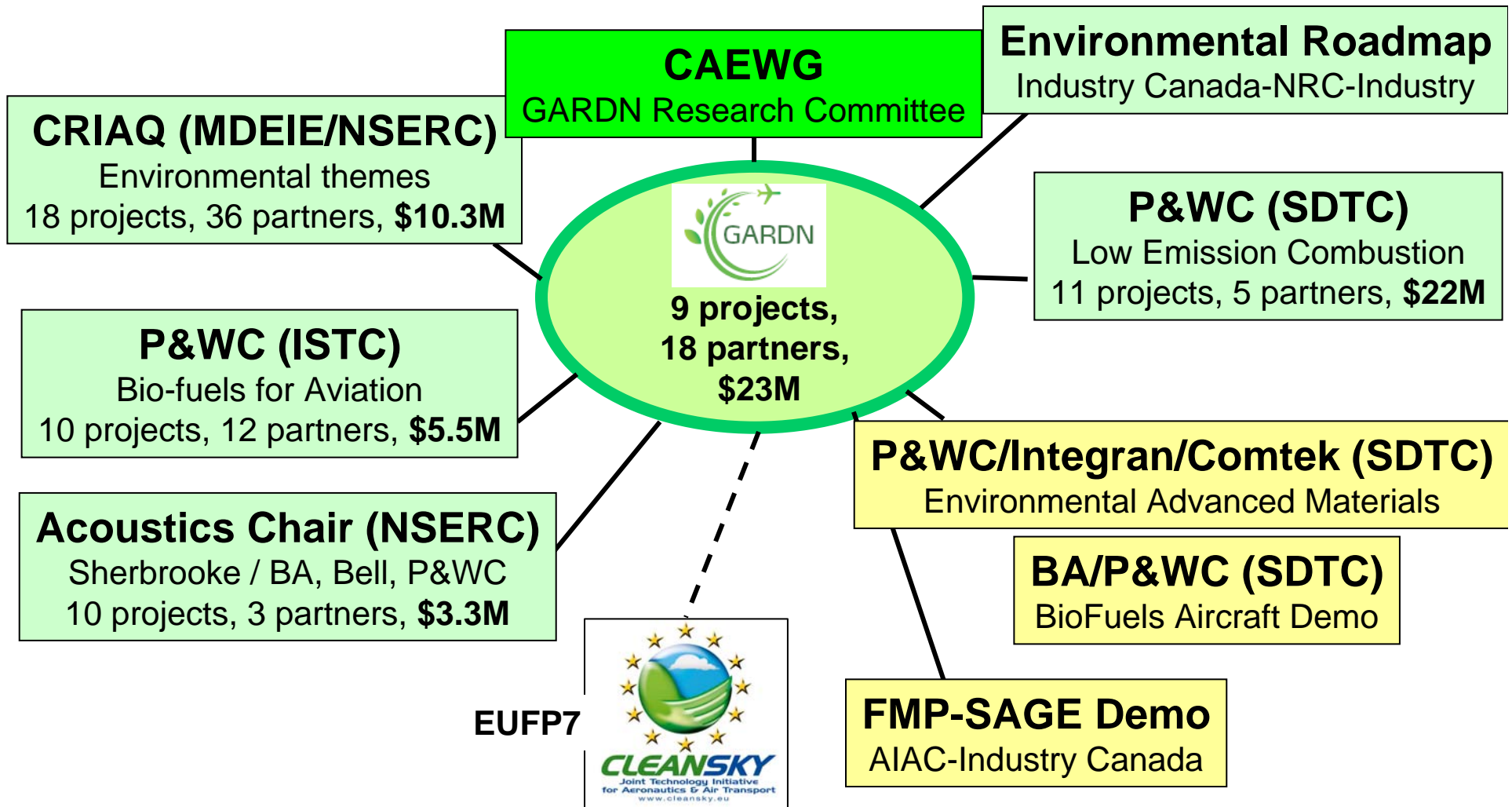
“Valley of Death in Innovation Supply Chain”



GARDN Strategic Plan: Linking to Canadian and International Aerospace Environmental Initiatives



Canadian Aerospace Environmental Collaborative Projects - Total Budget \$70M (0.35% of Sales)



1.7 Billion Euro (1.8% of Sales)