

Collaborative Automotive Research and Education in Canada

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AUTO21 NCE





Core Auto Industry Objectives:

The future vehicle will have to:

- ✓ *be safe, reliable, affordable and fun to drive;*
- ✓ *use less energy and have a smaller carbon footprint;*
- ✓ *continue to meet stringent government regulatory standards;*
- ✓ *be manufactured on a competitive basis.*

These objectives will be challenging to achieve and can only be realized with advanced technology and the very best technical and managerial leaders.



Powertrain Systems Evolution

Key Issues:

- System & total cost
- Battery weight & durability
 - Plug-in hybrids & recharging infrastructure
 - ICE/FCV efficiency
- PEEM efficiency & cost
- Vehicle safety & dynamics
- Lightweight Materials

TODAY

Internal Combustion Engine

Otto (gasoline) or Diesel ICE
with automatic or manual transmission

Technology Disruption

NOW /
SOON

Hybrid Powertrains

ICE + Energy Storage & Electric
Drive & Control

Technology Disruption

FUTURE?

Fuel Cell Powertrains

+ Energy Storage & Electric Drive
and Control





Canada's Automotive Sector



Canada's Auto Industry Statistics

- *~ 12 light vehicle and several heavy vehicle assembly plants across Canada (incl. cars, trucks & buses > 10 OEM's)*
- *Approx. 400 parts supplier companies*
- *Output – approx. 1.5 - 2.8 million vehicles/year*
- *Approx. \$119 billion including parts & assembly*
- *Canadian employment is approx. 100,000 people + 300,000 indirect*
- *Canadian R&D investments approx. \$500M-\$1B/year*
- *Several large automotive R&D centres and many smaller ones are located in Canada.*



Collaborative Industry-Academic Research within the AUTO21 Network of Centres of Excellence

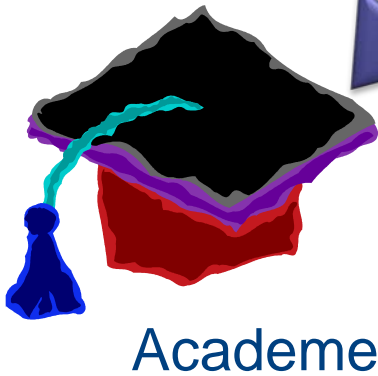
A proven partnership model that brings all of Canada's research universities together to carry-out industry-driven R&D.



AUTO21 NCE: A network of centres of excellence built on trust, confidentiality, accomplishment & strong partnerships



Canada
Public Sector

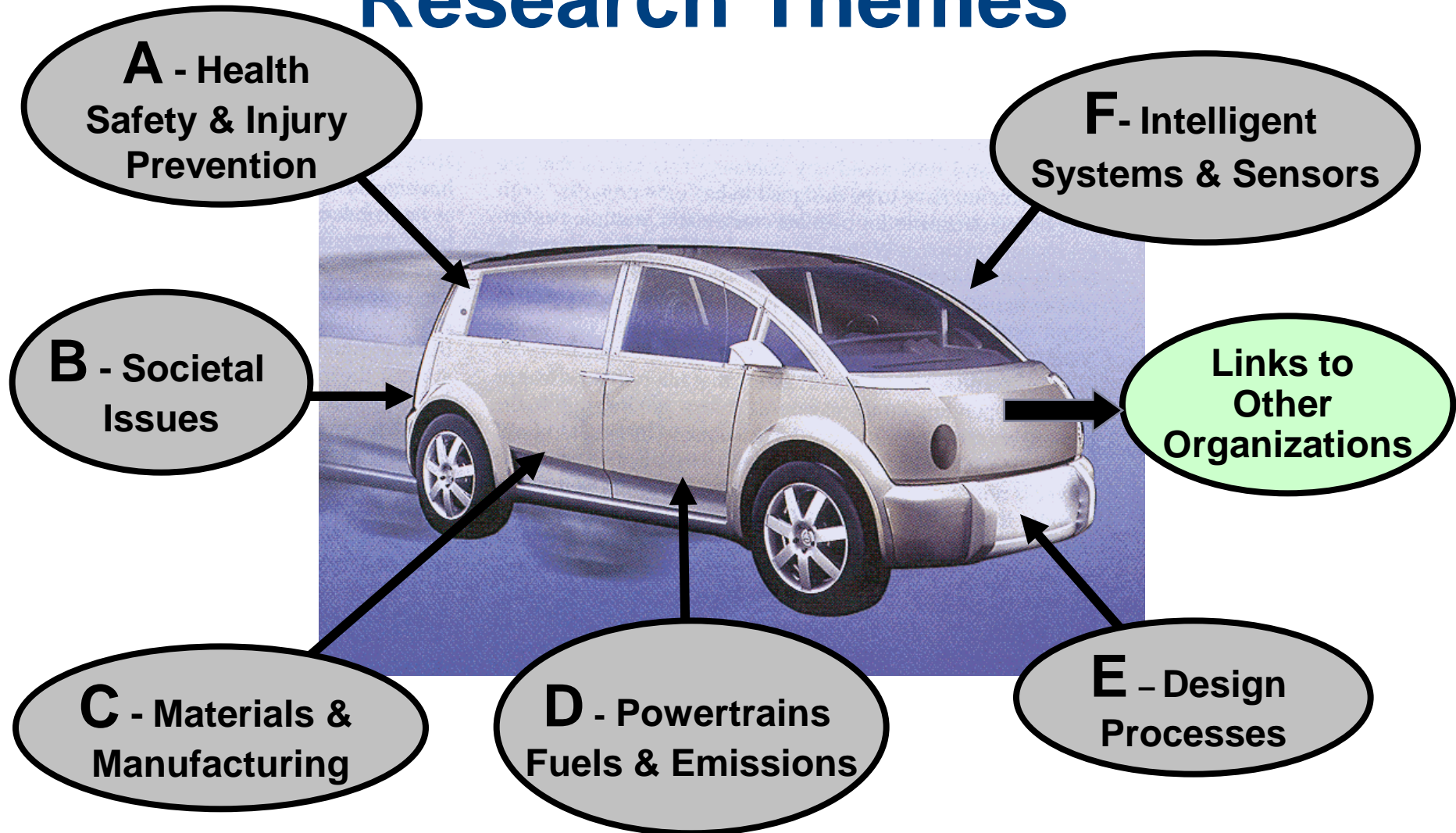


Industry Associations





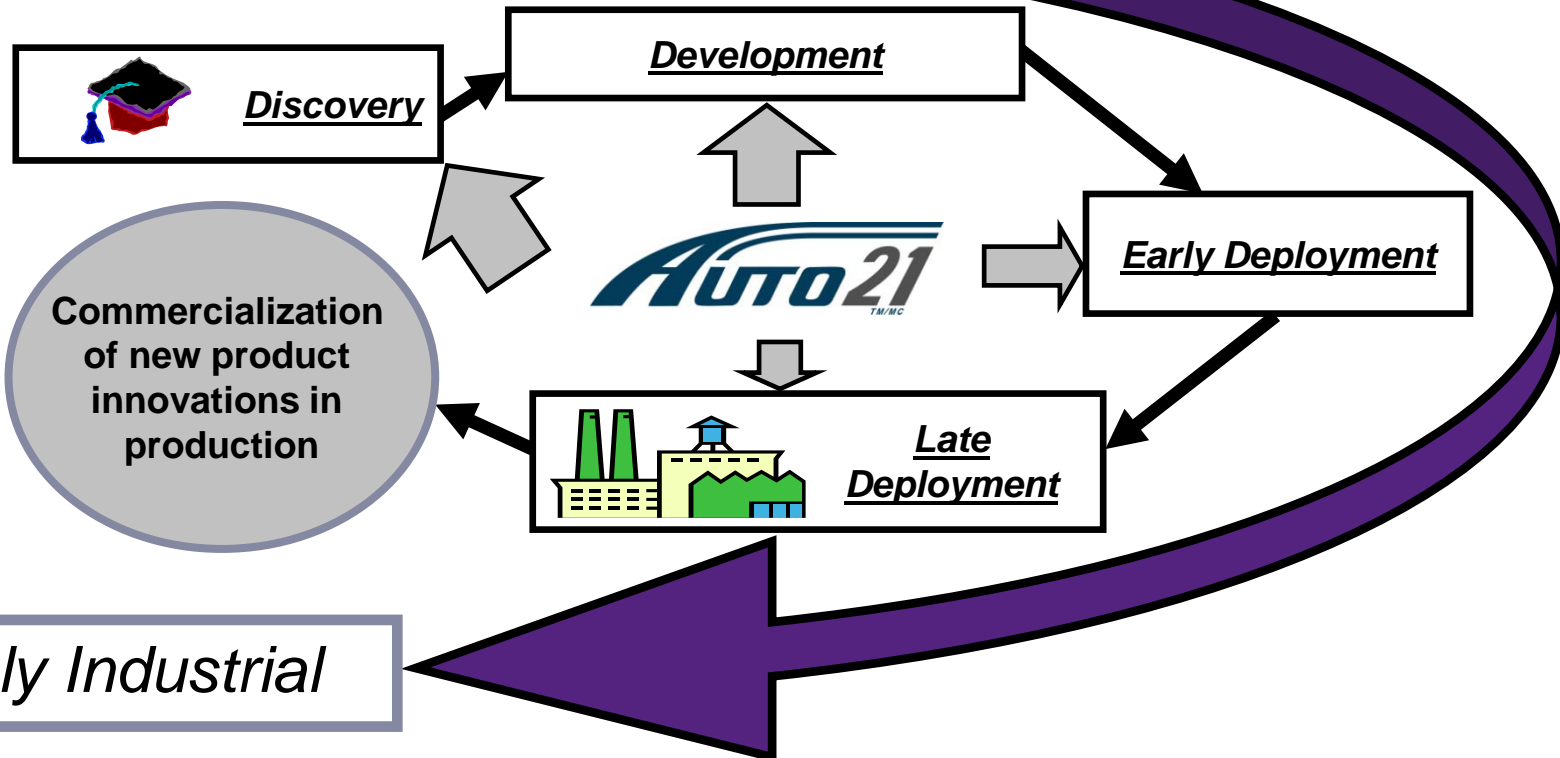
Research Themes





AUTO21 Research Portfolio - from the Lab to the Shop Floor

Mainly Institutional

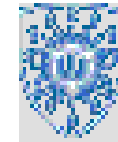




Member Institutions (currently 46)



Centre for Addiction and Mental Health
Centre de toxicomanie et de santé mentale





PARTNERSHIPS (approx. 120)



THE NEW
CHRYSLER



Environment
Canada

Environnement
Canada



ArcelorMittal



Natural Resources
Canada

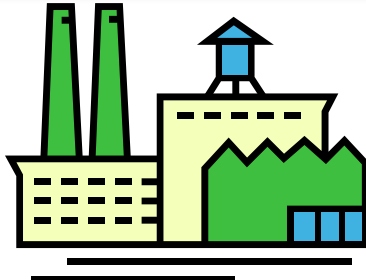
Ressources naturelles
Canada



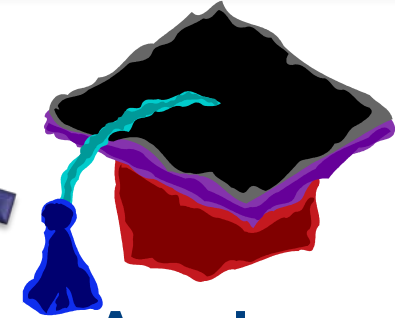


AUTO21 Supports Innovation in the Auto Industry

- *How does AUTO21 work?*
- *How do industry partners benefit?*
- *Who is eligible for funding*
- *What about intellectual property (IP)*
- *How long does a project take?*



Private Sector

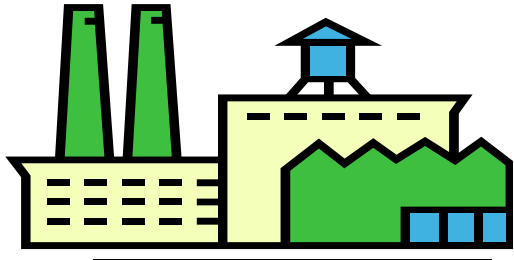


Academe

**AUTO21
Projects –
Working
Together**



**AUTO21 Collaborative
Project**

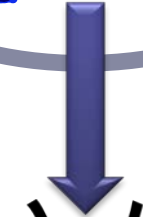
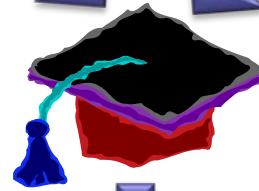
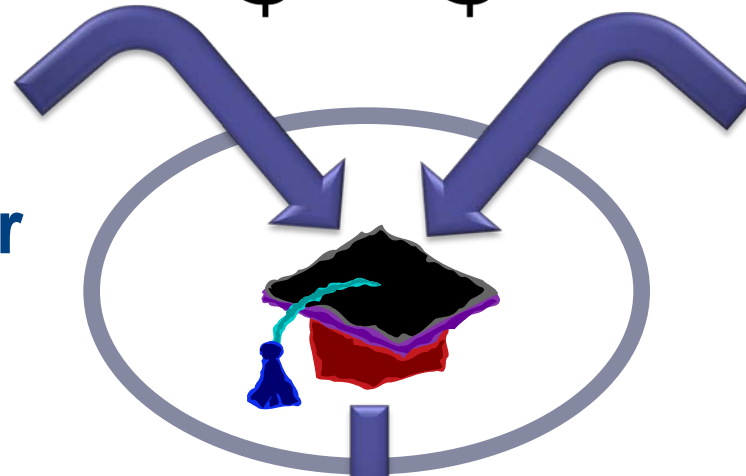


Private Sector

\$ \$



Public Sector



Access to Research Equipment

Leveraging of R&D Funds

Professors

Students
(future employees)



The Rules.....

- ✓ ***AUTO21 funds can only flow to an eligible university, college or teaching hospital in Canada;***
- ✓ ***There is no funding formula – but proposals are evaluated on the basis of their value to Canada’s auto industry as well as on their quality and innovation;***
- ✓ ***The evaluation process is highly competitive and industrial support is a key factor in project ratings;***
- ✓ ***AUTO21 does not own IP – the industry partners negotiate with the researchers and/or their institutions;***
- ✓ ***Project are usually 2 years in duration but may be longer or they could be shorter feasibility studies.***



Example projects.....

- ✓ **aluminium & magnesium technologies making stronger yet lighter parts at lower cost;**
- ✓ **new powder metallurgy compounds forming a key part of a leading company's portfolio;**
- ✓ **next generation high strength formable steels;**
- ✓ **advanced metal forming analysis and technologies;**
- ✓ **class-a surfaces on polymer composite components;**
- ✓ **advanced welding technologies;**
- ✓ **bio-materials development (*which is now in production*);**



Example projects.....

- ✓ **50%+ drop in car thefts in a major city credited to AUTO21 research working with the Winnipeg Police Service and the RCMP;**
- ✓ **fuel cell & hydrogen research;**
- ✓ **NVH & acoustics developments (stay tuned on this one);**
- ✓ **telematics work including a new MEMS-based 77 GHz tri-mode radar for vehicle safety;**
- ✓ **national program on child car seat safety;**
- ✓ **electric vehicle work on advanced motors, batteries, support equipment and smart-grid infrastructure;**



Measuring Performance

(NOT easy – but essential both for taxpayer accountability & to ensure industry credibility)



AUTO21 Effects Measurement Framework

– 3 metrics to address 3 audiences

**Academe /
Researchers**

ACTIVITIES: statistics reported in academic CV's including numbers of papers, book chapters, conference presentations, citations, funding from external partners etc.

**Industry
Partners**

OUTCOMES: direct results of the research such as patents, changes in methods or procedures, policies or educational curricula, HQP available for employment as a result of the Network's activities.

**The
Public**

IMPACTS: the effect on the final product or public policy as a result of the research – i.e. the product innovations and/or the effects on quality of life resulting from the research that are visible to the public.

AUTO21 project teams report regularly results to its own industrial sponsors and produces a final report in the format shown above.



Metric	2001	2010	Growth
Annual NCE Grant	\$5.778M	\$5.8M	0.38%
Industry Partner Support	\$3.03M	\$6.27M	107%
	Total = \$44.0M (> 60% cash)		
Total Investment	Federal + Industry = \$101.9M (2001-2011)		
Researchers	193	196	-
Students (HQP)	163	430	163%
Research Institutions	27	46	67%
Projects	28	39	39%
Research Partners*	87	121	38%

***AUTO21 presently has 83 industry partners + 38 in the public & NGO sectors. The number of active partners varies as older projects wind-down and new ones commence during the funding cycle.**



COMMERCIALIZATION OUTPUTS & RESULTS

Patents Filed and / or Granted

58

**Licenses & Copyrights Granted or
Under Negotiation with Industry**

63

Non-Disclosure Agreements Signed

29+

Academic Publications

5000+

Highly Qualified Personal Trained *(to Spring 2010)*

> 1235

Non-Grant Support of AUTO21 Programs & Activities

\$4.2M+

AUTO21
TM/MC



AUTO21 Administrative Centre

University of Windsor
thinking forward

Canada's Automotive University

University of Windsor
Centre for Automotive Research
and Education (*est. 1999*)

754 California Ave.

Windsor, Ontario N9B 3P4

(519) 253-3000 ext. 4130

www.auto21.ca





**Developing the best people and
the best technology for the future of
the automotive industry**



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**Networks of Centres
of Excellence**

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