

CANADIAN COLLEGE RESEARCH & INNOVATION SUPPORT for COMMUNITY ECONOMIC DEVELOPMENT

Ray Hoemsen, P. Eng.

Executive Director, Research Partnerships & Innovation, Red River College
(Retired)

PRACTIONER Webinar

The role of research in addressing emerging trends, challenges and needs

University-Industry Interaction Online Conference

<https://www.university-industry.com/>



2020 06 09

© 2020



Red River College

- Manitoba's largest institute of applied learning
- Over 200 full- & part-time academic programs
 - Personal Development to Trades & Technologies to Degree Programs
- ~ 22,000 unique students
- Eight campuses across Manitoba
- Annual operating budget ~\$200M
- Annual research enterprise ~\$6M
- **Support the growth of enterprises and entrepreneurs** through research & innovation
 - Application of Knowledge – Focus is on the “How”, not the “Why”
 - Industry-friendly Intellectual Property approach – maximizes commercialization

Manitoba Environment (Context)

- 49th to 60th parallel
- ~650,000 km² (~≡ France)
- ~1.3M people (~55% in Winnipeg)
- Ocean access (summer)
- Winnipeg (capital)
- Net After-Tax Cost of Corporate R&D: 45¢ to 47¢ per \$1 of R&D
- Extreme humid continental climate
 - 306 days with measurable sunshine
 - 521.1 mm precipitation annually
 - 132 days of snow cover – 110.6 cm average snowfall
 - -47.8°C (1879) to 42.2°C (1937) = 90°C difference
 - Windchill (temperature + wind) record = -57.1 (1996)
 - Humidex record (temperature + humidity) = 48 (2007)

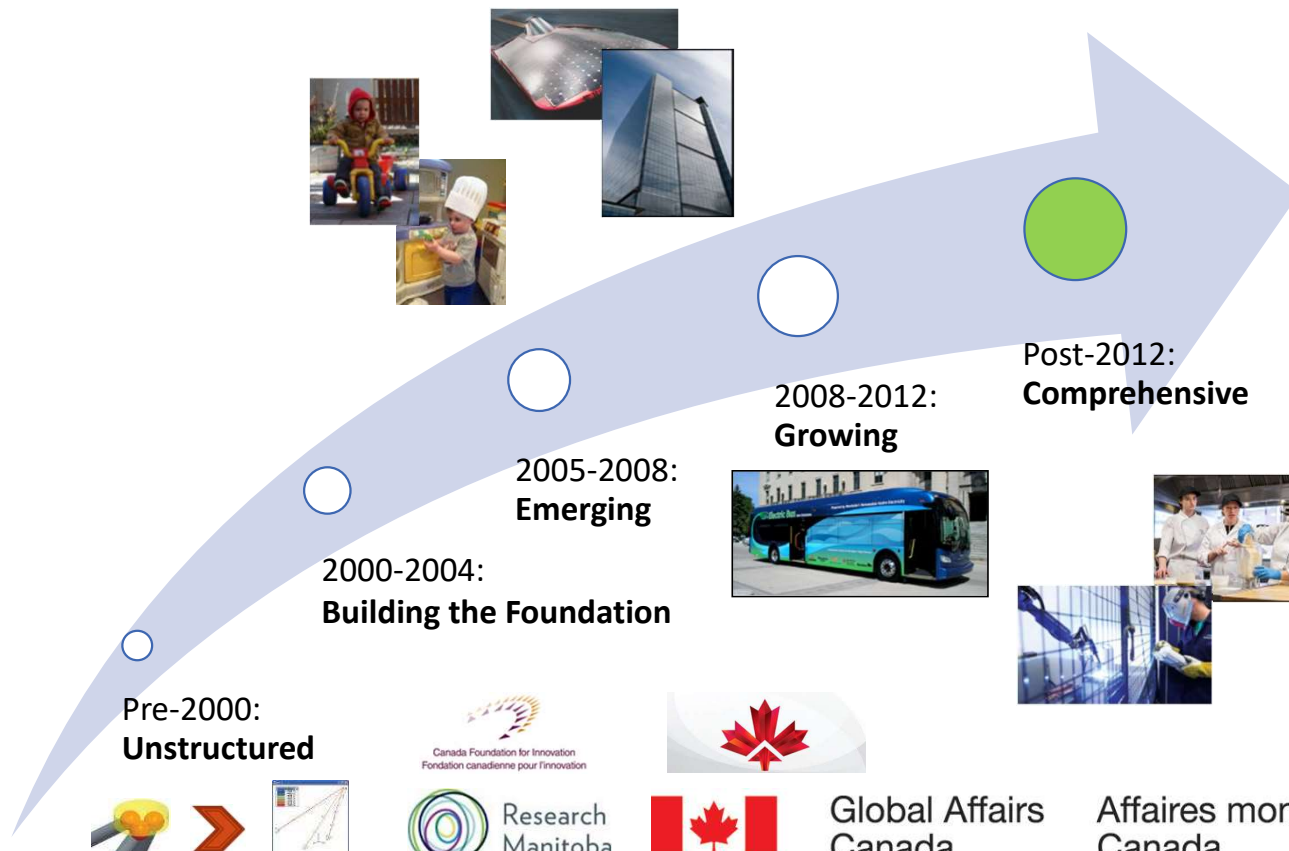


The Curiosity Mars rover, seen in this June 2014 photo from NASA, recently arrived at a spot dubbed 'Winnipeg' in a rocky area on Mars known as the Murray formation. (NASA/ JPL-Caltech/MSSS/AP)

Evolution of Canadian College Applied Research

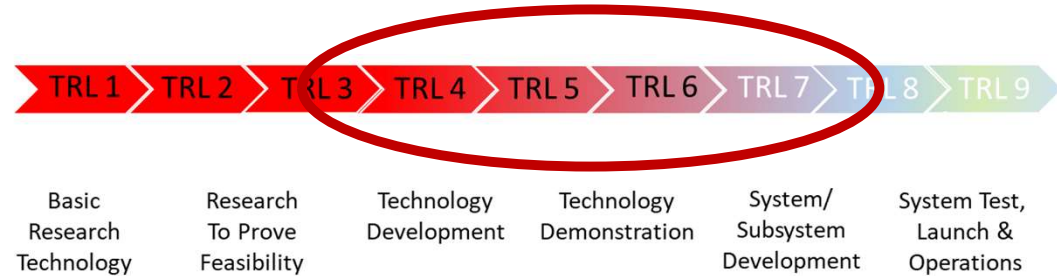
- 2000-2004: Key College, Association, Federal and Granting Council champions worked together to get College applied research on the agenda
 - to move forward from the “side of desk” approach & build capacity in the system
 - NSERC-eligibility most sought after – now 110 NSERC-eligible Colleges
 - Pilot (CCIP) evolved into the **Tri-Council’s CCI** program & then CCI program
 - CCIP funding envelope of ~\$3M (2004) grew to ~\$81M per annum (CCI)
- Since 2004: Other Federal Science-based Departments and Agencies
 - CFI (research infrastructure) created College envelope – CIIF – ~\$15M p.a.
 - National Research Council (NRC IRAP) worked with Colleges to better serve SMEs
 - Economic Development Agencies – typically involved on a regional project basis
 - SSHRC created social innovation (CCSIF) pilot – ~\$25M over three competitions
 - Other Government Departments (e.g. DND, NRCan, SDTC etc.) – project-basis
 - Mitacs (as of FY 18) pilot to include College students – ACCELERATE program
- As a result, Colleges now a key element in Canada’s innovation ecosystem

Evolution of Applied Research @ RRC



College-based Applied Research

- Technology integration
- Prototype development
- Testing and evaluation
- Demonstrations
- Business, market & technology intelligence
- Customized training
- Student engagement
- Access to specialized research & equipment
- Access to faculty & staff expertise
- Leverage of company partner contributions with funding agencies (including eligibility for SR&ED)



Research & Innovation Attributes

FACTOR	COLLEGE	UNIVERSITY
Nature	Applied	Discovery (basic)
Expectation (of government funders)	Increase productivity, competitiveness, jobs and exports	Create knowledge
Knowledge	Application	Advancement
Focus	How?	Why?
Term	Short	Medium-Long
Motivation	Client	Curiosity
Approach	Group	Principal Investigator
Driver	Market Pull	Technology Push
IP Ownership	Institution, freely shared	Creator or Shared
Mechanism	Sponsor Agreement	License or Spinoff
Technology	Diffusion	Commercialization
Impact	Economic Development	Benefit to Society

Community/Industry Engagement Process

- Initiated by faculty, staff, students or “industry”
- Research office screens for fit & scope
- Assemble the potential project team
- Mutually agree on need & statement-of-work (scope, deliverables, schedule)
- Estimate & agree upon cost & any funding needs
- Identify potential funding sources
 - NRC-IRAP, NSERC, SSHRC, SR&ED etc.
 - **Ideal cycle – NRC-IRAP (CTO) | NSERC CCI (e.g. Engage) | NRC-IRAP | SR&ED Eligibility**
- Address IP, confidentiality, publication etc. up front
- Research office handles administration, faculty/staff/students do the work with industry support & engagement

Intellectual Property Management Statement

Under RRC's Intellectual Property Policy (A10), RRC has mandatory institutional ownership of "IP" (to enable maximum clarity in a licensing situation), including any IP which is created by students employed on the project.

The policy is flexible enough to accommodate transfer of ownership, in the event the private-sector partners require ownership.

RRC's normal practice is to grant private-sector partners commercial rights, while RRC retains rights for further research and education.

As a result, there have never been any IP-related problems between RRC and industry since this practice was instituted in 2004.

Industry finds RRC to be very "IP friendly" and agreements on specific projects are normally negotiated and signed rapidly.

RRC Research Focus, Sectors & Technology Access Centres

- **Primary research focus areas**

- Advanced Design & Manufacturing
- Clean Technology
- Digital Technology
- Health, Nutrition & Social Sciences

- **Technology Access Centres (to support regional technology & knowledge clusters)**

- Building Efficiency Technology Access Centre
- Prairie Research Kitchen
- Technology Access Centre for Aerospace & Manufacturing

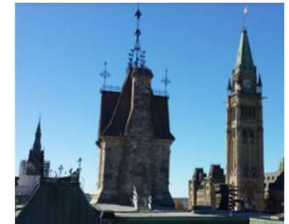
- **Sectors supported, such as**

- Advanced Manufacturing
- Aerospace
- Business
- Construction
- Culinary Arts
- Health & Community Services
- Heavy Vehicles (On- and Off- Highway)
- Information & Communications Technology
- Transportation
- Value-Added Agriculture

Research Partnerships & Innovation: Quick Facts



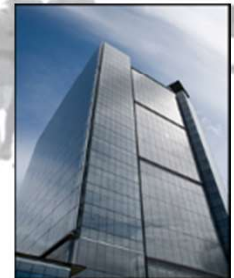
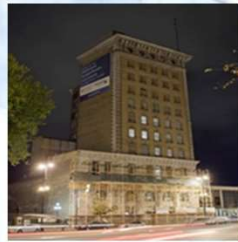
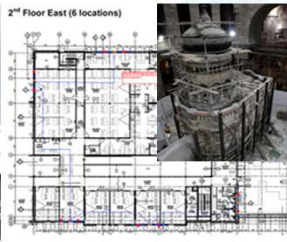
- **CORE** Activities
 - **C**ontracts, Grant & Intellectual Property Management
 - **O**utreach
 - **R**esearch & Partnership Development
 - **E**ngagement
- Four core RPI staff positions, plus ~45+/- project-based research-related employees
- Six Research Centres, three Technology Access Centres, two Research Chairs & five Research Professionals
- ~\$40M+ in operating support (including \$750,000 p.a. in base funding) since 2003/04 FY
 - Steady growth in research investment: ~\$6M p.a
 - 550 research partnerships
- ~\$85M invested/awarded for research infrastructure
 - Utilized for **more than research**: i.e. for **education & training** - **1,800+ students** | **170 faculty** | **~ 60 courses**
- Commercial rights freely granted for economic development benefit: **IP is NOT an impediment!**
- **INNOVATION IMPACTS ROI™**



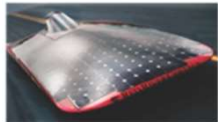
Innovation, Science and Economic Development Canada



Applied Research @ Red River College



Vehicle Technology Research: Projects



2005
Hybrid Hydrogen
Internal Combustion
Engine (HHICE)
Transit Bus Cold-
Weather Evaluation

2005 & 2008
Red River College
Raycer Solar Car



2006
Hydrogen Fuel Cell
Transit Bus
Demonstration

2007 & 2010
Reduced Emission
Diesel Engine
Integration: MCI
D4500 & J4500
Coach Prototypes



2008-11
Plug-In Hybrid
Vehicle Conversion/
Cold-Weather
Testing &
Demonstration

2011
Electric Vehicle
Technology &
Education
Centre



2011-14
Battery Electric
Transit Bus
Project



2012
Vehicle
Technology &
Energy Centre -
NSERC
Innovation
Enhancement
Grant (5-Year)
Research
Program



2012-14
BEV Mitsubishi
iMiEV Manitoba
Demonstration &
Testing



2013
PHEV Chevrolet
Volt & BEV
Nissan Leaf
Commercial EV
Demonstration &
Testing



2015
RRC L3 Rapid
Charger –
Manitoba's First
Level 3 Charger



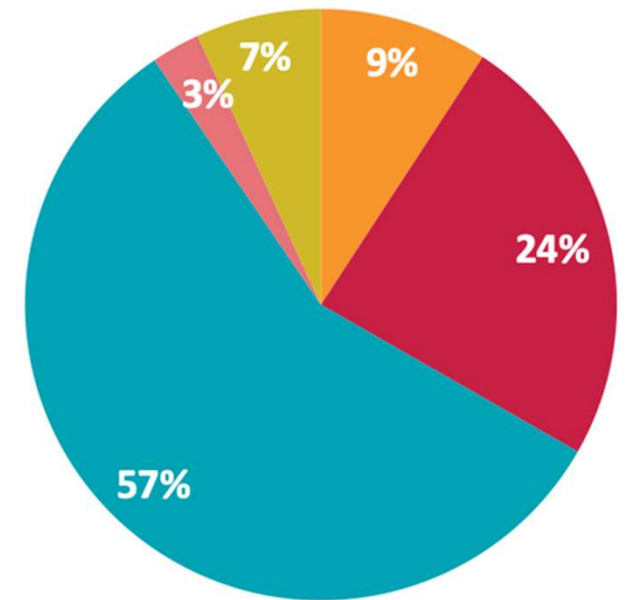
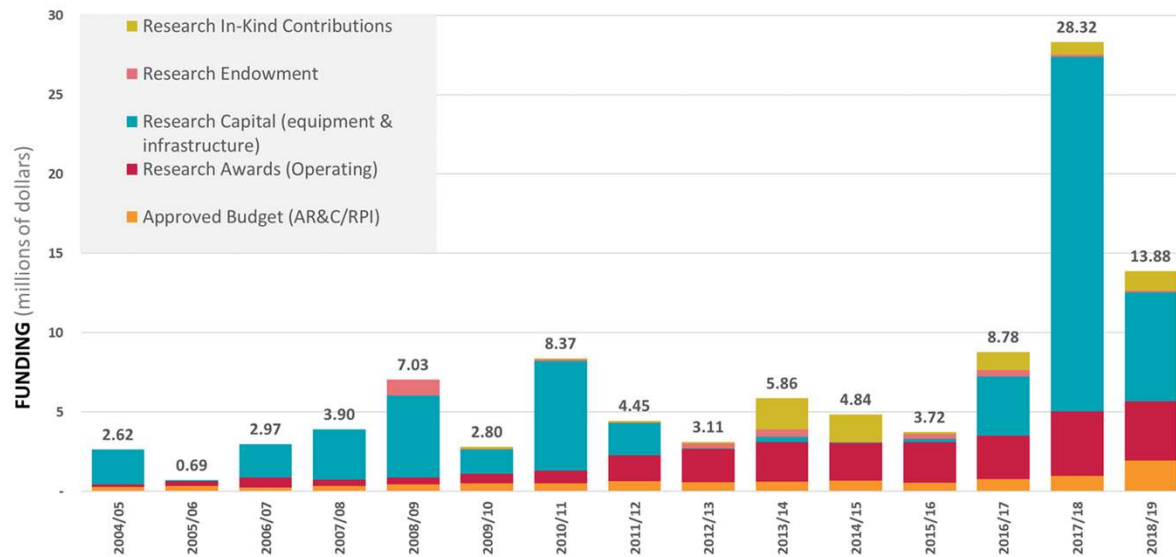
2018:
Shell Eco-Marathon
SpaRRcky - RRC BEV

MotiveLab™ – Drive-
in Extreme
Temperature
Climatic Chamber



Research Enterprise: Funding & Leverage/ROI

Cumulative Funding (2004 to 2019) \$101,000,000



INNOVATION IMPACTS ROI™ (FY19-20)

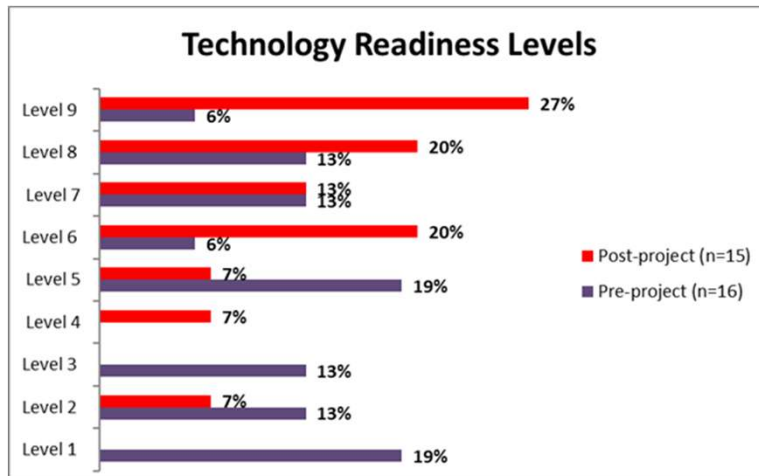
- **Instructors: 130**
- **Media mentions (proxy for reputation): ~173**
- **Partnerships: 204**
- **Anecdotes & activities (success stories, etc.): 94**
- **Curriculum: 22**
- **Transactions (research volume in \$s): ~\$10,000,000**
- **Students: 684 (including those engaged in Capstone Projects)**

- **Revenue (sales, exports, etc.)**
- **Opportunities (employment)**
- **Innovation (products, processes & services)**

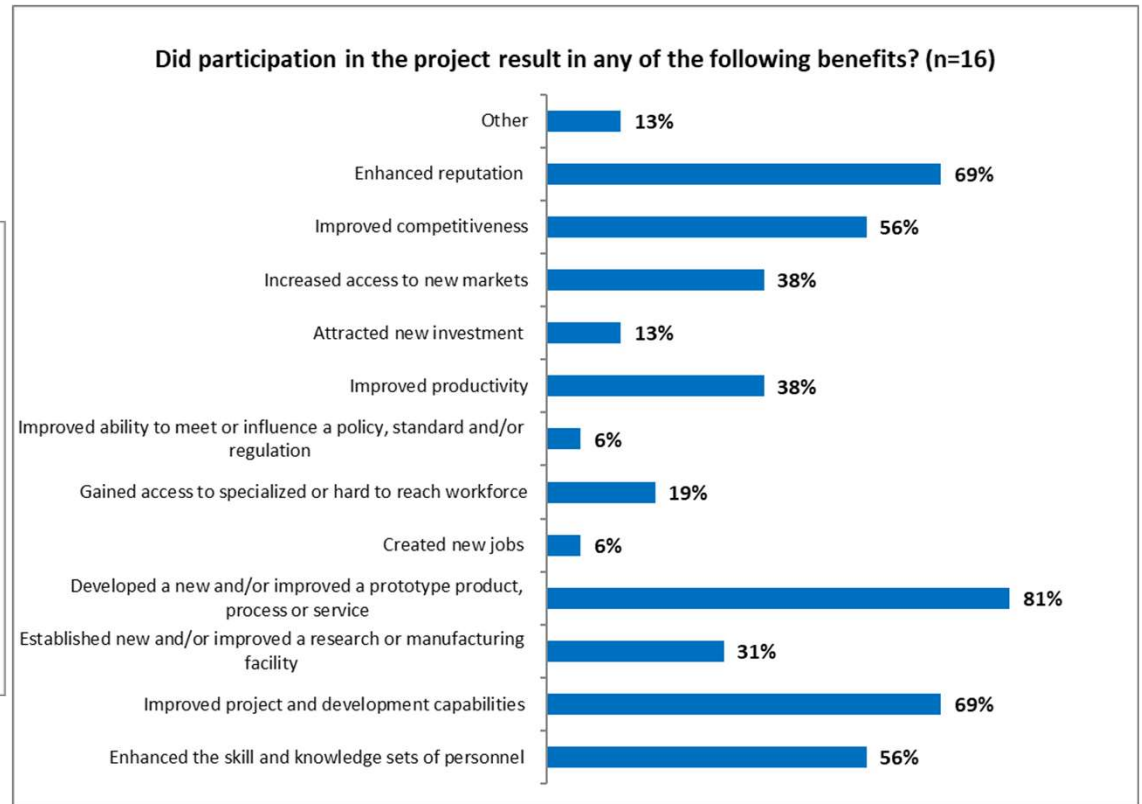
NSERC* Independent Survey of Research Clients

* Natural Sciences and Engineering Research Council of Canada

- Technology Readiness Levels are a measure of the maturity of a technology, where TRL 9 is the most mature



<https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html>



Recognition: Applied Research & Innovation



Canadian
Manufacturers &
Exporters



IEEE



MANITOBA
CHAMBERS OF
COMMERCE



NSERC
CRSNG



ALL STAR | APPLIED RESEARCH | INNOVATION | LEADERSHIP

LONG-TERM ACHIEVEMENT | PARTNERSHIP | PUBLIC ENGAGEMENT & ADVOCACY

RESEARCH | SPIRIT | SUSTAINABILITY | SYNERGY | STUDENT COMPETITIONS

Canadian College (Applied) Research Takeaways

- Group (versus Principal Investigator) approach – faculty, students & staff
- Focus is on solving a problem or addressing a community need – generally responding to a Market Pull (versus a Technology Push)
 - Technology Readiness Levels 4 to 7 – proof of concept to technology demonstration
- Short- to medium-term time frame to carry out the research
- Industry-friendly Intellectual Property protocol which grants business & industry partners royalty-free commercial rights, while the college retains rights for further research & education purposes
 - Research partners have the right to review publications, prior to release
 - Students have the right to identify their participation in applied research on their resumes
- Applied research & innovation supports community economic development
- All these factors contribute to greater engagement with Industry

Thank You!

Ray Hoemsen, M.Sc., FEC, P. Eng.

Executive Director,
Research Partnerships & Innovation
Red River College
(Retired – May 2020)

Winnipeg, MB CANADA

Mobile: 1.204.799.6987

E-mail: RayHoemsen@gmail.com

Web: rrc.ca/research
Blog: blogs.rrc.ca/ar
Twitter: @RRCResearch

