Towards an Inclusive Innovation: Strengthening the Talent Ecosystem

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AGENDA

Rethinking innovation
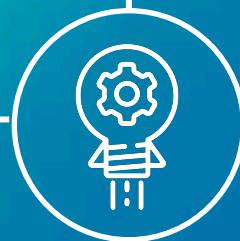
Innovation↔Diversity
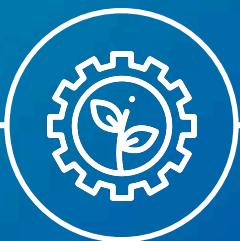
Conclusions

Jobs/Skills Gap

Building the Innovation Ecosystem

INNOVATION IS "DOING" DIFFERENTLY

✓ Doing differently
✓ New products and services
✓ New initiatives or organizations
✓ New processes

"Creativity is thinking up new things.
Innovation is doing new things."
-Theodore Levitt

# Disruptive and Exponential Technologies

AI and Machine Learning
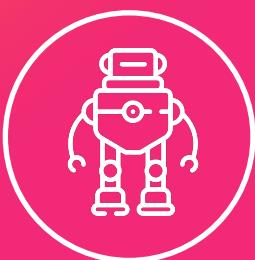
Robotics

Internet of Things (IOT)

Virtual and Augmented Reality
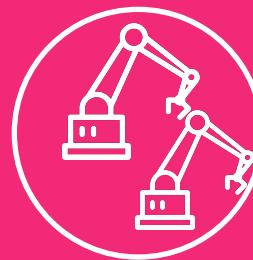
Digital Twin
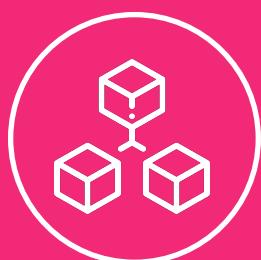
Blockchain and Distributed Logistics

Conversational Systems

Mesh Apps and Service Architecture

Digital Technology Platforms

Adaptive Security Architecture

Planning when you can't predict:
VUCA (Volatile, uncertain, complex and ambiguous)

50 billion
connected devices worldwide by 2020 (Cisco)

Uber
drones by 2020

90%
of cars online by 2020

$11 trillion
on IoT by 2025

Impacts on the workforce

- 42% of jobs will disappear by 2020 (Osbourne and Frey)

- AI: job automation (12%); enhancement (75%) creation (13%) (Frank et. al., 2017)

- Not just low skills: physicians, coders, journalists

- WEF reports almost 65 percent of the jobs elementary school students will be doing in the future do not even exist yet.

Innovation is not just about creating new technologies

💡 Without users and adoption there is no innovation

💡 Canadian consumers lead in mobile but companies lag

💡 **40%** of Ontario's SMEs do not have an internet presence

💡 **20%** of labour force is in the public sector

💡 **Its not just about STEM**

"Obstacles to the practical use of the computerized medical record exist, but we may expect these to vanish within a few years.." -Bradbury, 1990

"Canadian businesses are moving 'bad slow' in adopting digital technology
-Sam Sebastian, Google Canada

Innovation can transform public sector service delivery

The rise of the "Imagination Age"?
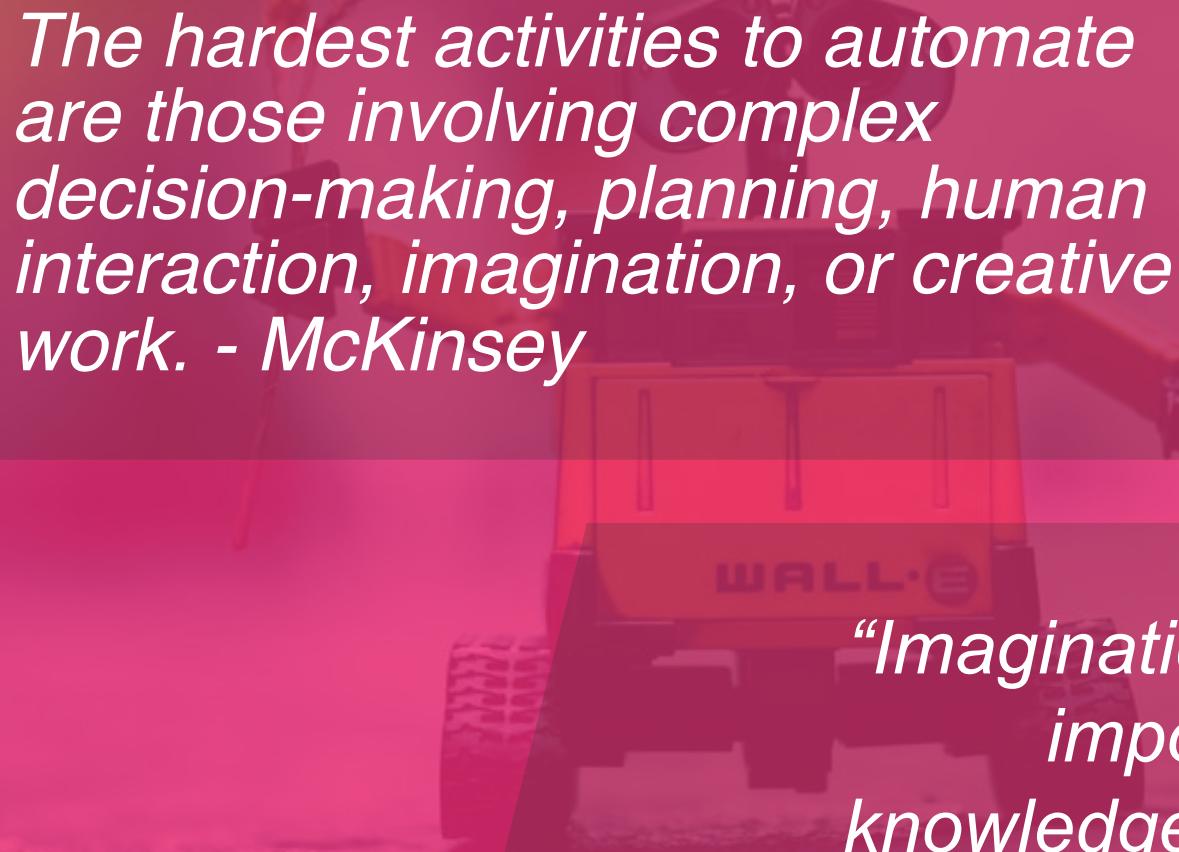
The hardest activities to automate are those involving complex decision-making, planning, human interaction, imagination, or creative work. - McKinsey

"Imagination is more important than knowledge." – Albert Einstein

# UNDERSTANDING THE SKILLS GAP

Demand

Supply

28.3% of SMEs and 30.9% of large employers report challenges recruiting

"By 2019 Canada will need to fill 182,000 tech jobs or lose economically". – ICTC, 2017

Underemployment of graduates and among some populations (racialized minorities/ immigrants, women (in some areas), people with disabilities, indigenous people)

Digital Skills Across the Sectors

Deep Technical and Content Creation

Knowledge, skills, and awareness needed to:
- Develop innovative ICT infrastructure, products, and services
- Grow the ICT industry
- Create digital media content advantage

Business/ Technology Skills

Knowledge, skills, and awareness needed use ICTs to:
- Build consumer and commercial markets for ICTs
- Private sector productivity and competitiveness
- Start up and build SMEs
- Capacity to innovate using digital technology

Basic Digital Literacy

Knowledge, skills, and awareness needed by all Canadians to:
- Participate in the digital economy
- Enhance personal opportunities and quality of life
- Use digital technologies to access products and services

K-12 and PS Education   Occupational Training   Self-Study/Social Interaction

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Soft Skills

- No agreement on definitions
- No agreement on measurement
- Essential skills such as communications, critical thinking etc. area if taught often lack connection to their practical application in the workplace (eg. writing long essays versus short reports; SPSS rather than .xls; content analysis research methods versus social media analytics)
- Graduates (and faculty) may have insufficient knowledge and experience to communicate the transferability of what they know
- Change in PSE is painful - develop employment driven co-curricular non credit opportunities adjacent to credit programs

Gaps in Employer and Graduate Perceptions

Student Perception

93% believe they are highly proficient in writing, 91% in oral communication

Employer Perception

39.4% believe recent graduates are highly proficient in writing, 47% in oral communication

University Grads: Earnings (2 yrs.)	2005 grad	2012 grad
Dentistry	**$103,750**	**$99,839**
Veterinary Medicine	$70,714	$77,001
Law	**$75,376**	**$73,470**
Medicine	**$68,333**	**$71,123**
Computer Science	**$56,828**	**$66,677**
Engineering	**$58,939**	**$65,265**
Nursing	**$58,927**	**$61,745**
Mathematics	$50,814	$56,776
Business & Commerce	**$52,383**	**$53,286**
Health Professions	**$51,410**	**$50,320**
Therapy & Rehabilitation	$50,313	$48,334
Other Arts & Science	$49,954	$46,322
Physical Sciences	$48,860	$45,107
Education	**$47,992**	**$43,787**
Social Sciences	**$43,996**	**$42,105**
Kinesiology/ Recreation/ Phys Ed.	$42,647	$39,681
Agriculture & Biology	$42,038	$39,391
Humanities	**$41,550**	**$38,399**
Journalism	**$40,870**	**$38,734**
Fine & Applied Arts	**$36,911**	**$34,695**
Average	**$49,669**	**$49,001**

Women in STEM (COU) (1985-2015) **its not just about the math or science**

Chart Title

Legend:
- U/G Engin. & Applied Sciences
- U/G Agricul. & Bio Sciences
- U/G Health Professions
- U/G Maths & Physical Sciences
- U/G Computer Science

Y-axis (Axis Title): 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%

X-axis: 1985-86, 1986-87, 1987-88, 1988-89, 1989-90, 1990-91, 1991-92, 1992-93, 1993-94, 1994-95, 1995-96, 1996-97, 1997-98, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05, 2005-06, 2006-07, 2007-08, 2008-09, 2009-10, 2010-11, 2011-12, 2012-13, 2013-14, 2014-15

Chart 2
Employment rate adjusted for age, by education level and by severity of disability, 2011

percentage

Level of education

☐ No disability   ■ Mild disability   ☐ Moderate disability   ■ Severe or very severe disability
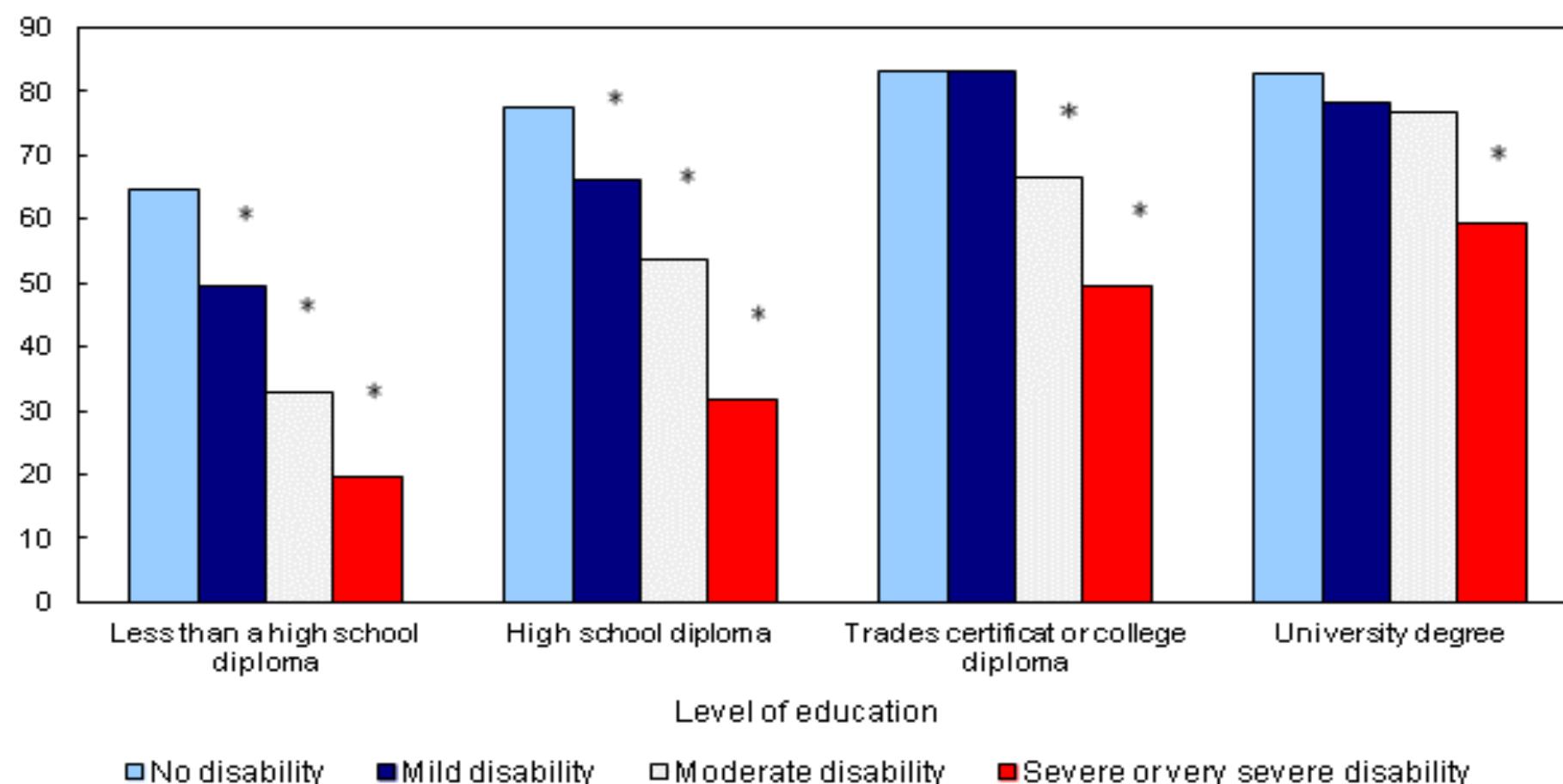
* significantly different from reference category (no disability) (p < 0.05)
Source: Statistics Canada, Canadian Survey on Disability, 2012.

What is not working?

- *Most clients do not find full-time employment in their chosen career." 38% of clients were employed full-time and 14% had found appropriate employment*
- *Less than half of the people who begin an apprenticeship program in Ontario complete it. (ON AG, 2016)*
- *The latest projections from the Canadian Occupational Projection System were based on data obtained from the 2011 LFS that was released in 2013. The most recent updates have been delayed …. the information used for the projections are five years out of date. (ON AG 2016)*
- *LINC had improved the language abilities of students in the areas of reading (by 0.88 benchmark) and writing (by 0.51 benchmark level) but not in listening and speaking beyond what they would have gained from living in Canada. (CIC, 2010)*

"We won't be fooled again": déjà vu?

"Our sustained growth and on-going success in a competitive global marketplace require large numbers of new Canadian graduates in computer science, electrical and computer engineering, physics, and mathematics."(Roth, 1998)

Access to Opportunities Program (ATOP) spent $150 million over three years into Ontario universities to address these skills

"Technological skills are not the only need. it [was] assumed that the industry's biggest problem was a lack of programmers [but] the real problem was finding sales and marketing people…."Marketers are harder to find than engineers." (CATA, 2001)

Where does the evidence lead

- Critical need for real time LMI
- Specific skills shortages in deep technology
- STEM is foundational but need to be augmented with arts and social sciences – management, design, policy etc.
- BIG differences between SCIENCE and ENGINEERING
- Not all ICT jobs are STEM – growing demand for hybrids
- Employer needs must be central but they do not always know what is coming and often hire in their own image
- Multiple pathways (eg. to ICT and entrepreneurship)
- We need a skills and training **system**
- Demand excellence **AND** relevance: no more ivory towers
- Leverage diversity: address barriers on both supply and demand side
- Responsiveness and flexibility: rapid response, short intensive programs

# Evaluation, Coordination, Implementation & Scaling Challenges

*"While there is evidence of growing commitment to evaluation, most often "**promising practices**" are defined "as practices that are particularly effective in achieving their stated aims" with little reference to their long term impact or systems change"* (CISSA, 2012)

Satisfaction ≠ **Impact**

*"Agencies are often not aware of relevant projects beyond their boundaries. "The absence of a transfer mechanism acts as a significant brake on innovation at the industry level…..the sector already has an innovation engine in the form of individuals with skills and creativity; **what it lacks is a transmission for linking this creativity to a learning and dissemination strategy that would lead to enhanced sector-wide performance**"* (CISSA, 2012)

DIVERSITY/INCLUSION/INNOVATION

DIVERSITY/ INCLUSION	➡️	INNOVATION
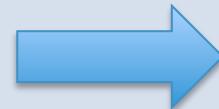
DIVERSITY/ INCLUSION	↔️	INNOVATION

Canadian global brand: Unprecedented opportunity for "brain gain"
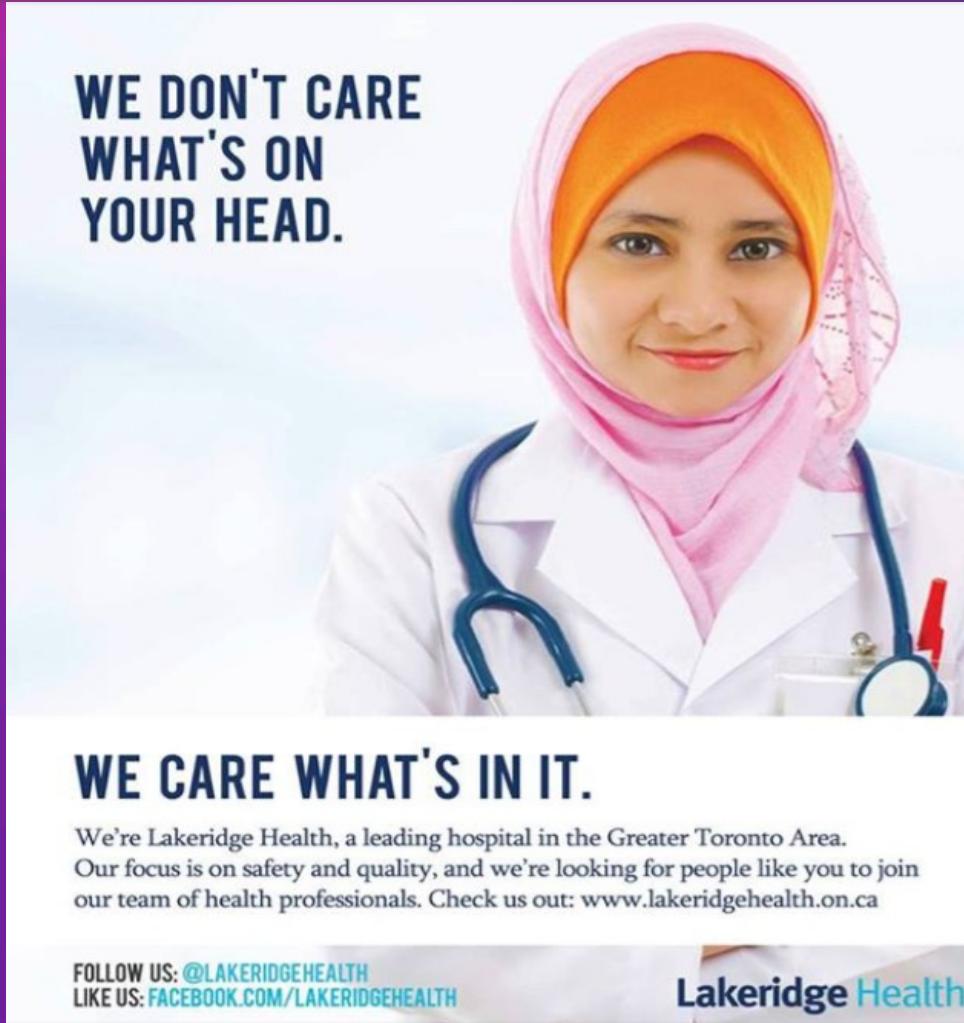
WE DON'T CARE WHAT'S ON YOUR HEAD.

WE CARE WHAT'S IN IT.

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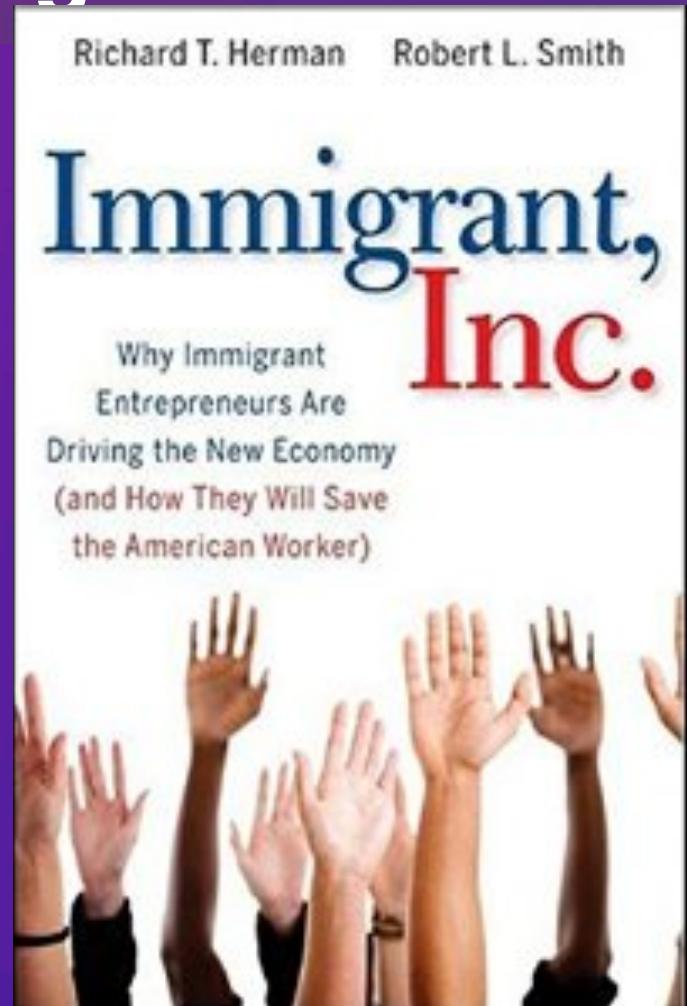
Richard T. Herman   Robert L. Smith

Immigrant, Inc.

Why Immigrant Entrepreneurs Are Driving the New Economy (and How They Will Save the American Worker)

Skills gap paradox: diverse groups face barriers

- Decline of women in CS and little progress in Eng Better represented in "hybrid" programs

- Applicants with "foreign sounding" last names are 30% less likely to be called for an interview.

- University grads with a severe disability have same employment outcomes as HS drop-outs.

- Socio-economic status can also present a big barrier including lack of social capital.

- Indigenous youth are fastest growing segment of the population; worst education and work outcomes

- Gender plus analysis of R&D, Innovation and Entrepreneurship ecosystems reveals huge gaps.

STEM is necessary but insufficient:

Alternative Narratives and Pathways: only 4 of these Tech CEOs have STEM backgrounds

BUILDING THE INNOVATION ECOSYSTEM
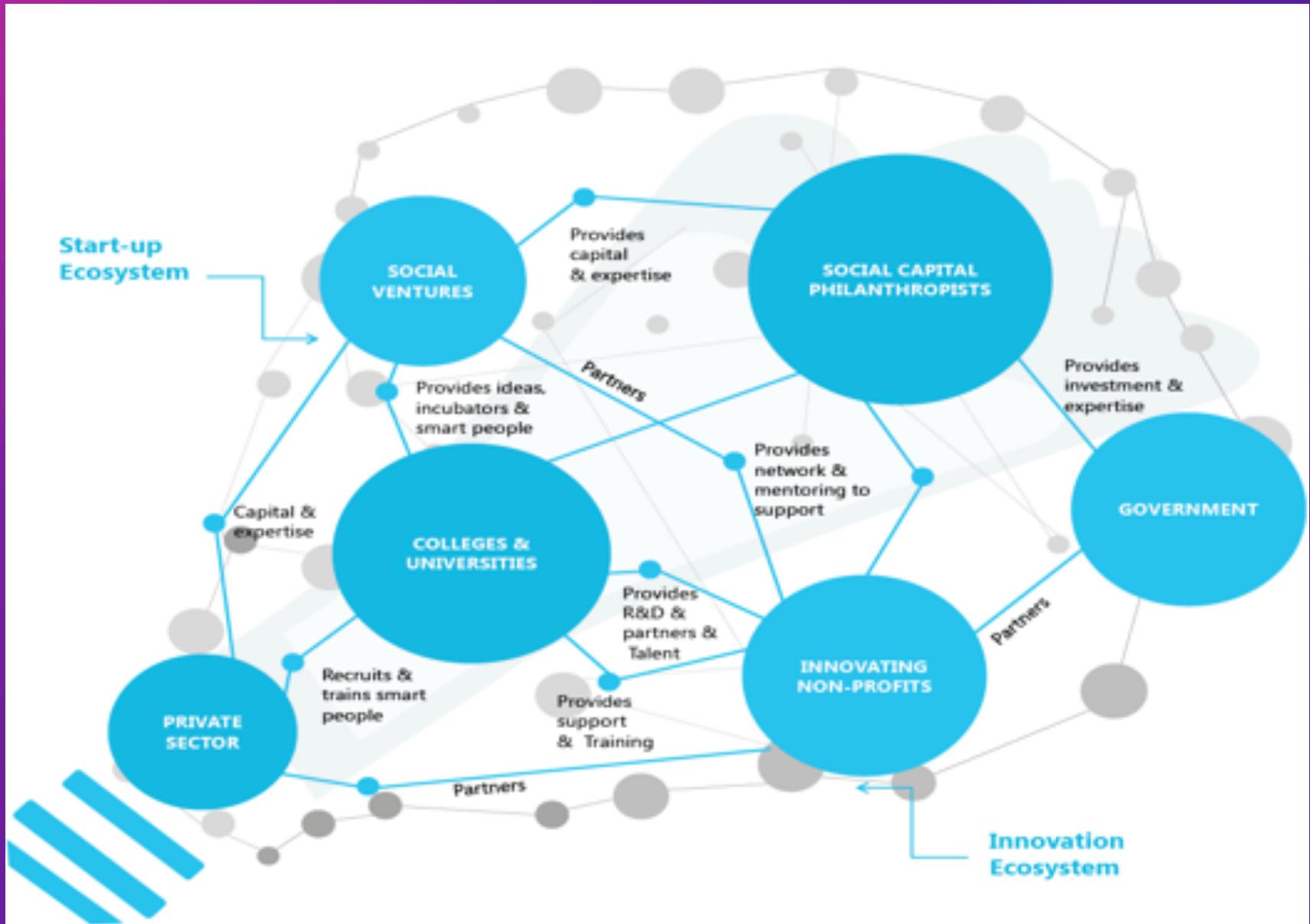
Eg. New tools and approaches

The challenge: Linking innovative initiatives to systems change

The Dynamics of Transformative Social Innovation
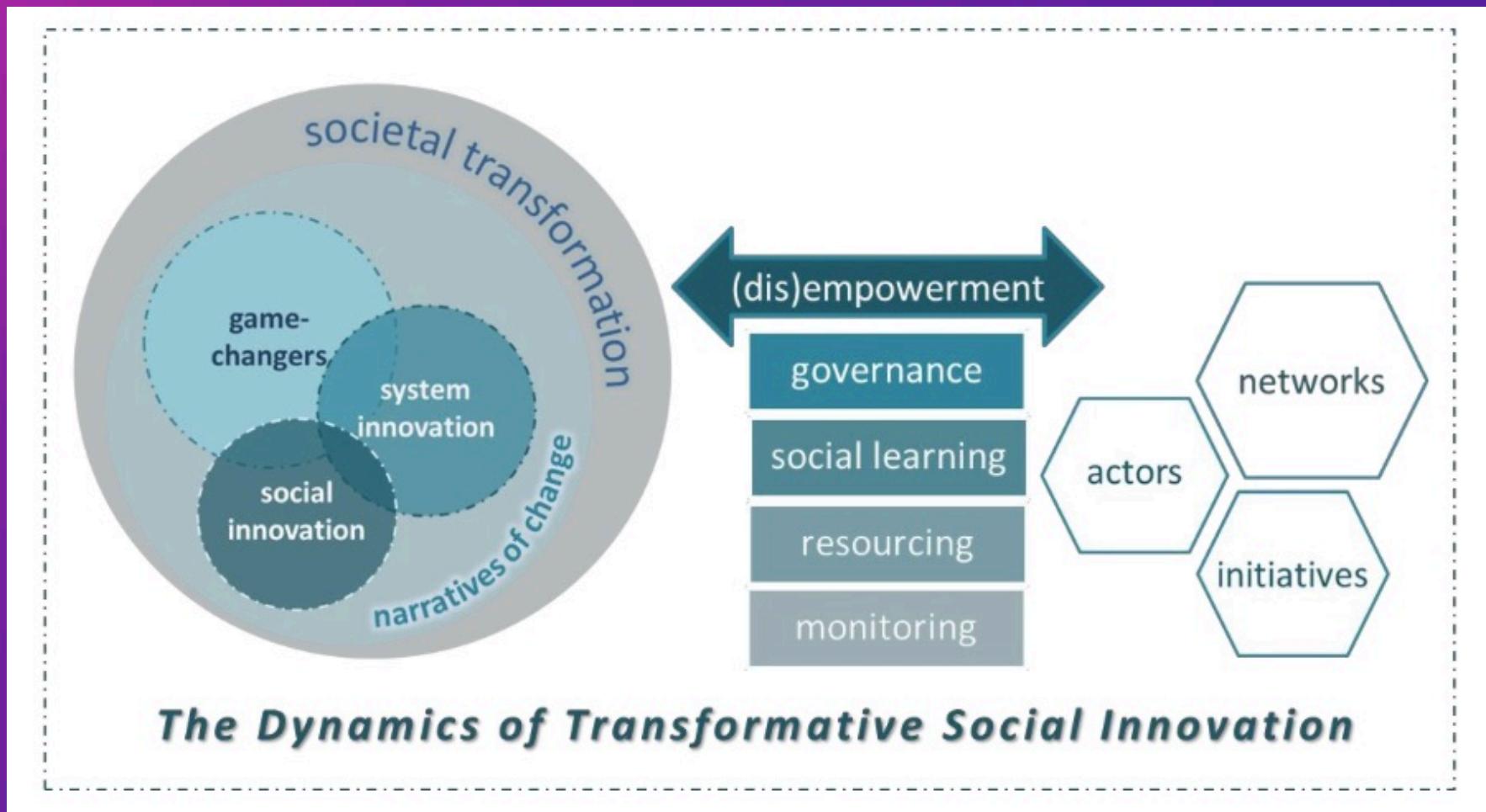
Eg. Coordinated Ecosystem of Platforms Supporting the Innovation Economy
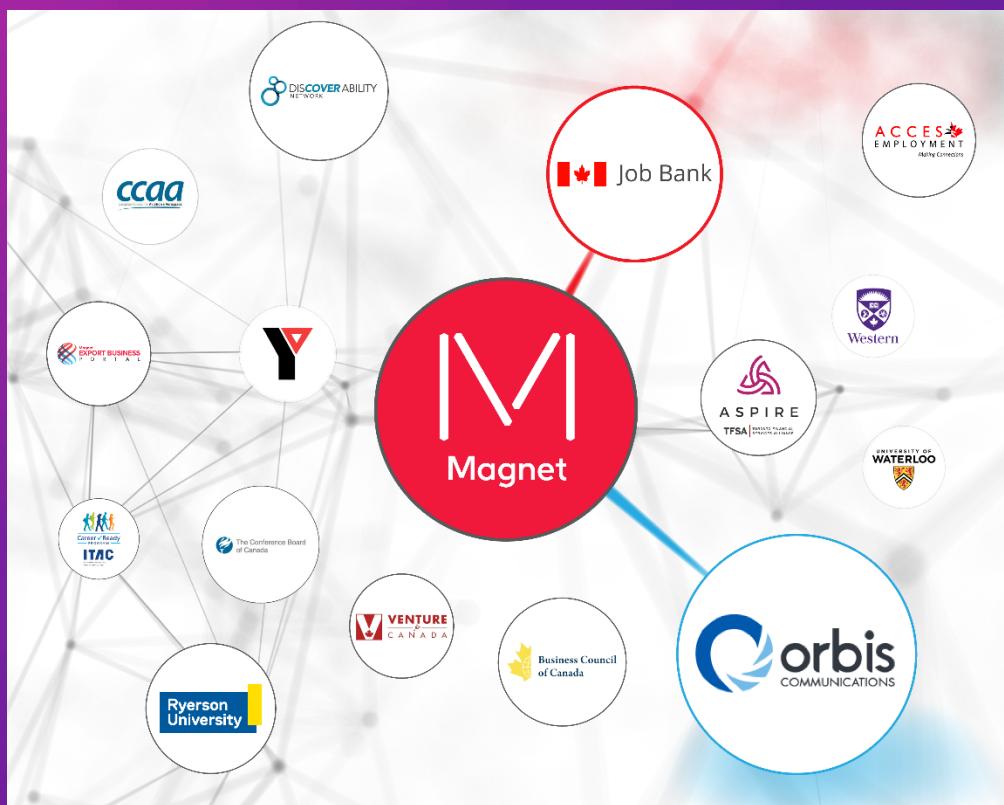
Magnet and ORBIS

- 110 Implementations in Post Secondary Institutions Across Canada (e.g Waterloo, Dalhousie, George Brown College)
- Over 1 million Post Secondary Students
- Student Records validated by Post Secondary institutions
- Canada Job Bank Integration
- Focus persons with barriers to employment (indigenous, Disability and newcomer)
- Over 60,000 Employers
- Real Time LMI

Barriers to change

- Structures
- Autonomy of institutions and individuals
- Infrastructure and legacy systems
- Incentives and reward systems
- Limited competition and pay for performance
- Support systems – labour intensity
- Lack of horizontal and vertical coordination in government
- CULTURE
- There are lots of great ideas. **The gap is execution**, delivery and accountability.

University Culture: town vs gown

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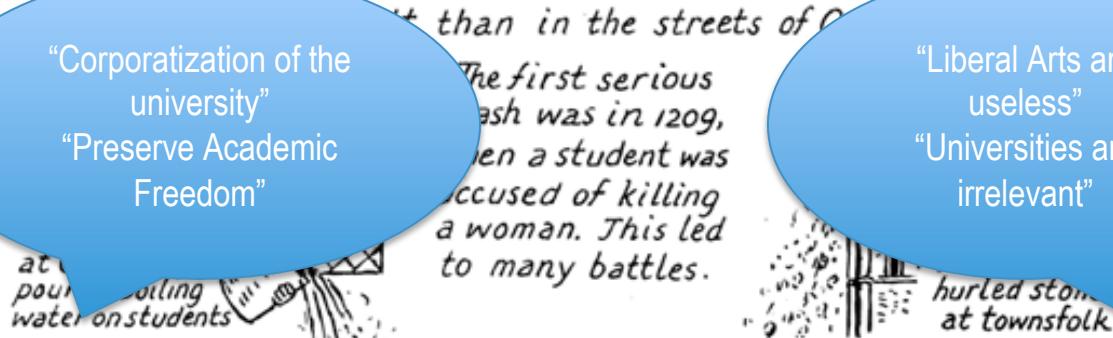
Culture eats strategy

| ENTREPRENEUR		MANAGER
Start with perception of an opportunity	←→	Start with resources in hand (budget)
Bias toward action	←→	Bias toward analysis
Make adjustment as they go	←→	Formal structure
Build teams and informal networks	←→	Work independently and autonomously
Focus on impact	←→	Focus on traditional metrics

Strategic "Doing"
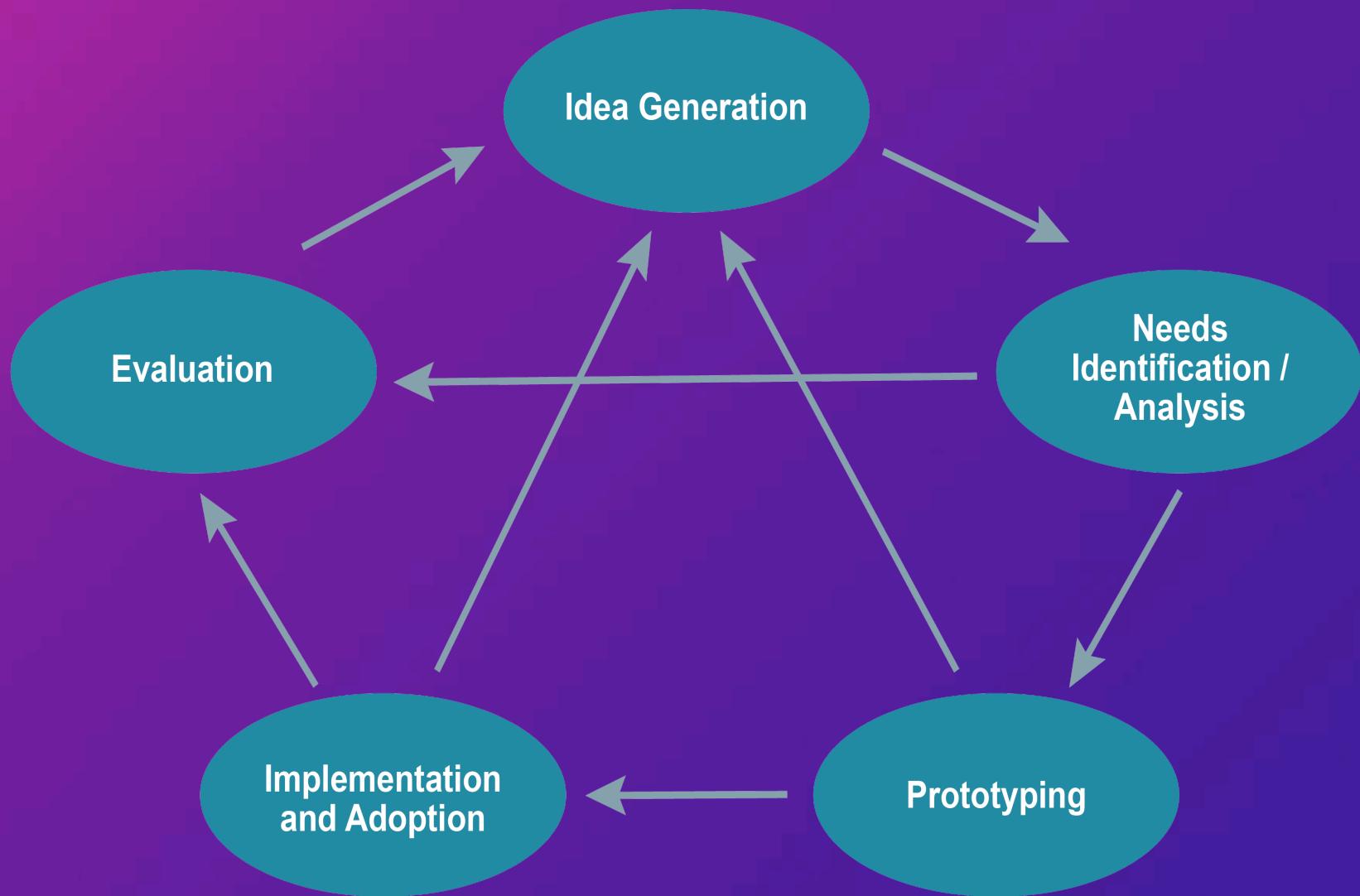
Robust change models and Evaluation eg. Ecological Model of Factors Impacting Representation in STEM

Societal /Macro

Stereotypes of STEM fields, People

Gender and Racial Stereotypes, Roles

Law and Policy

Education Ministries

Institutional /Meso

PSE Institutions

Cultural Norms

Curricula and Pedagogy

Media Representation

Employers

Organizational Recruitment & Retention Strategies

Individual Organizations like CLC

Organizational /Meso

Regulatory & Credential Recognition Bodies

Elementary & High School Boards

Role Models

Guidance Counsellors

Receptiveness to Innovation

Parental and Family Policies

Parents

Learners

Individual /Micro

Teachers

(Cukier et al., 2017)

CONCLUSIONS

- Its not about technology; its about adoption
- Institutions and incumbents invested in the status quo will not drive innovation: Develop a "coalition of the willing"
- Do not reinvent the wheel -
- Look at the evidence not the rhetoric: where are the jobs?
- Make it easy – support systems/intermediaries
- Incentives to act as a talent SYSTEM across silos
- Talent Concierge. Research and Best Practice Curation. Leverage technology to drive change.
- Increased accountabilities - Using funding to drive change
- Culture: overcoming inertia and embracing innovation
- Assess and evaluate what works and what does not work
- Learn from successes and failures: Iterate
- Reduce fragmentation and improve sharing (horizontal and vertical)

Wendy Cukier

▷Coauthor of the best seller Innovation Nation: Canadian Leadership from Java to Jurassic Park, Wendy Cukier, a professor in the Ted Rogers School of Management, is an expert in disruptive technologies and the drivers and barriers to their adoption. She is also the founder of the Diversity Institute and leads the International Innovation and Inclusion Network. where she has focused on inclusive innovation as a unique model for Canada. As Vice President of Research and Innovation, she created a number of innovative partnerships to advance research and innovation including the Incubate. Innovate. Network of Canada _ I-INC. Under her leadership research funding nearly doubled and the innovation ecosystem was enhanced. Her research has been supported by private sector, community and government agencies including the **Social Sciences and Humanities Research Council.**

thank you

International Innovation & Inclusion Network

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