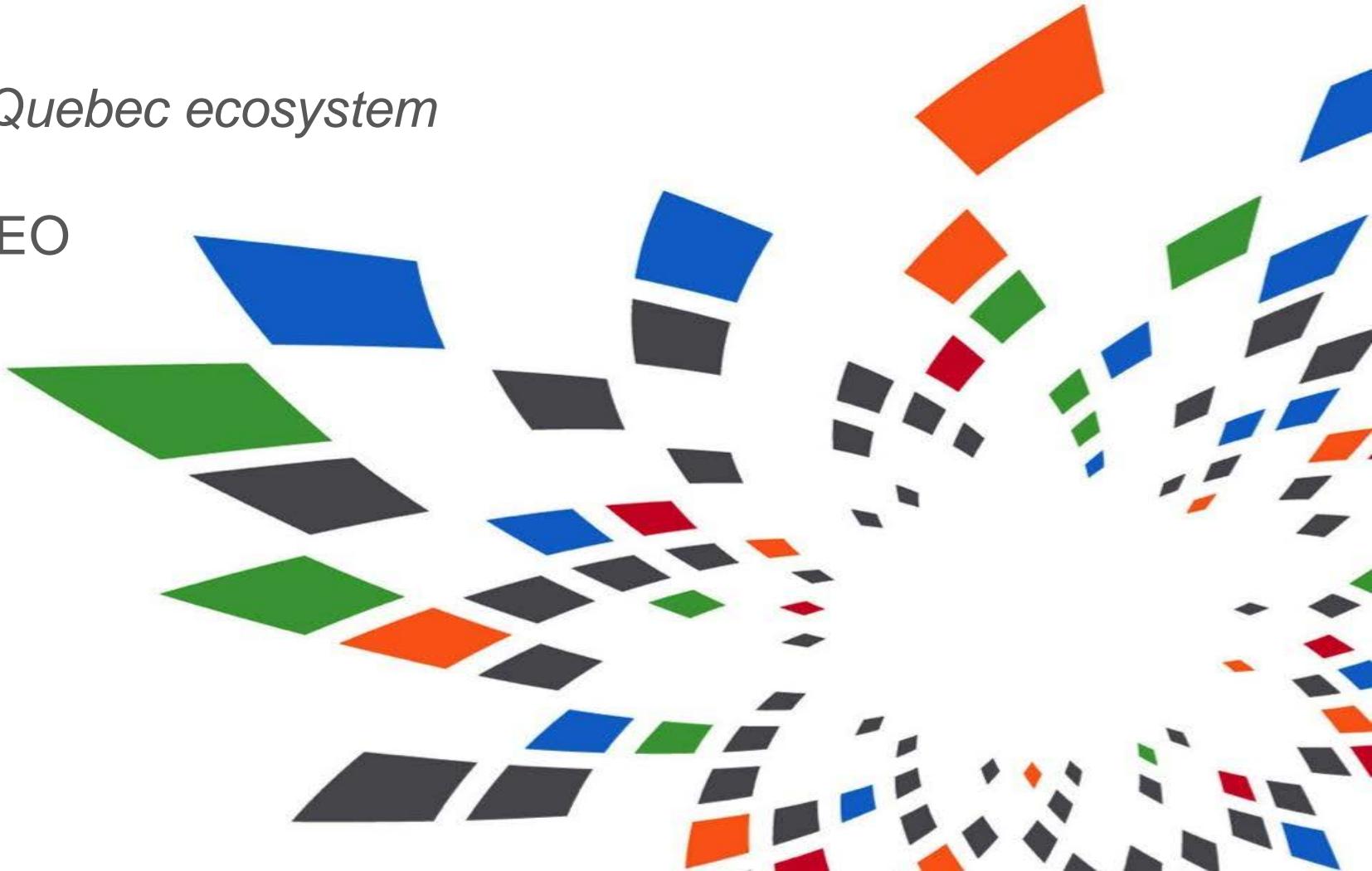


Institute for Data Valorization IVADO

IVADO and the Quebec ecosystem

Gilles Savard, CEO
IVADO



Outline

- Digital technologies, the creation of value and the value of data
- The AI ecosystem of Montréal

Beyond the words...



the fundamentals...

- **Computing power:** Moore's law + GPU
 - 2 x more powerful by 1,5 year at the same cost
 - 20 years : factor 10000 (100000 with GPU)
- **Telecommunication network:** exponential growth in network capacity (speed, bandwidth, storage, etc.)
- **Software engineering:** flexible programming, agile, embedded system

with now the data...

Digitization of the physical world into a virtual world

Usages

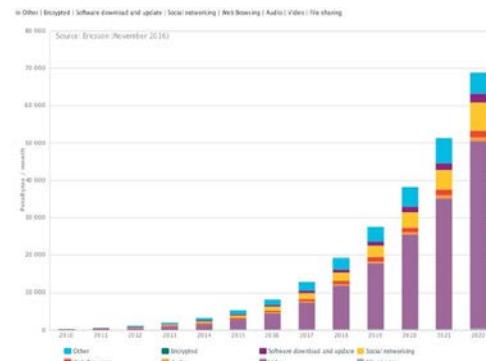
IDC: 4,4 to 180 zettabytes from 2013 to 2025

Multiples of bytes			V · T · E	
SI decimal prefixes		Binary usage	IEC binary prefixes	
Name (Symbol)	Value		Name (Symbol)	Value
kilobyte (kB)	10^3	2^{10}	kibibyte (KiB)	2^{10}
megabyte (MB)	10^6	2^{20}	mebibyte (MiB)	2^{20}
gigabyte (GB)	10^9	2^{30}	gibibyte (GiB)	2^{30}
terabyte (TB)	10^{12}	2^{40}	tebibyte (TiB)	2^{40}
petabyte (PB)	10^{15}	2^{50}	pebibyte (PiB)	2^{50}
exabyte (EB)	10^{18}	2^{60}	exbibyte (EiB)	2^{60}
zettabyte (ZB)	10^{21}	2^{70}	zebibyte (ZiB)	2^{70}
yottabyte (YB)	10^{24}	2^{80}	yobibyte (YiB)	2^{80}

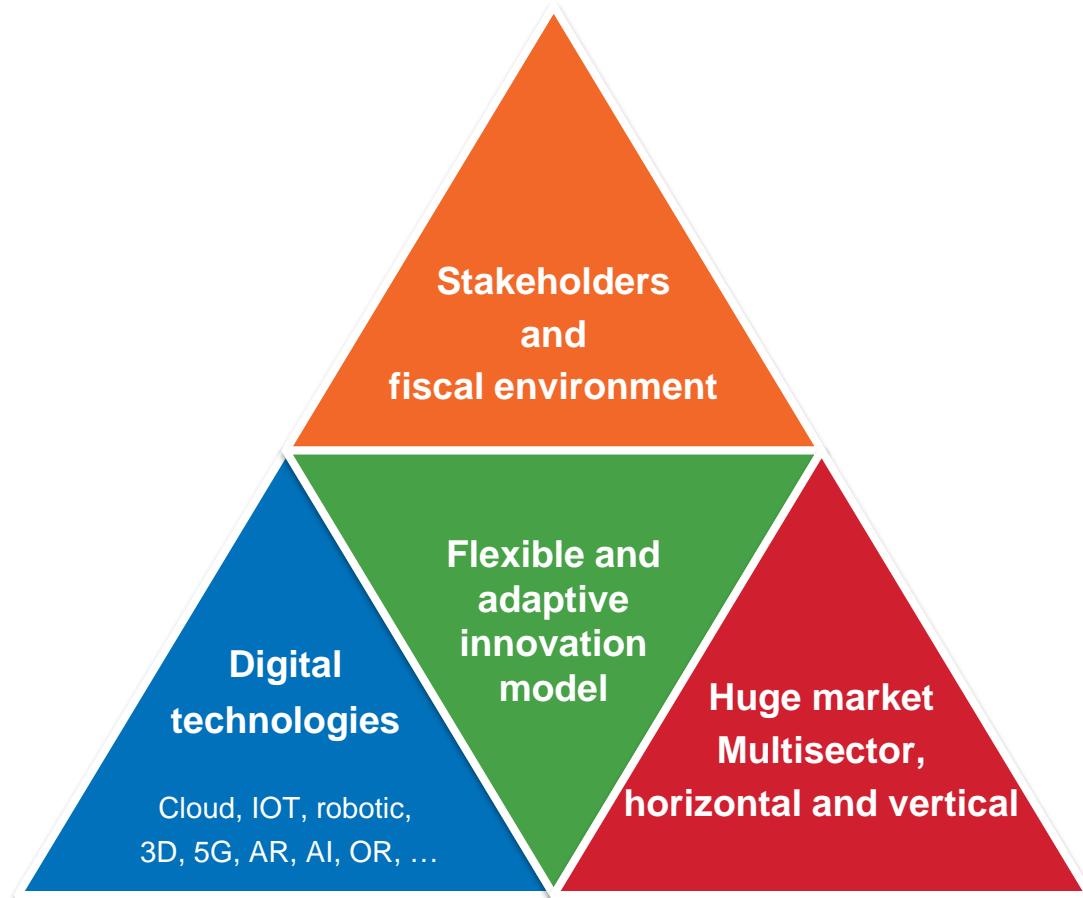
Internet of things (IOT)

Ericsson: 30 G connected devices in 2022 *and even...*

Siemens: 200 G connected devices in 2025

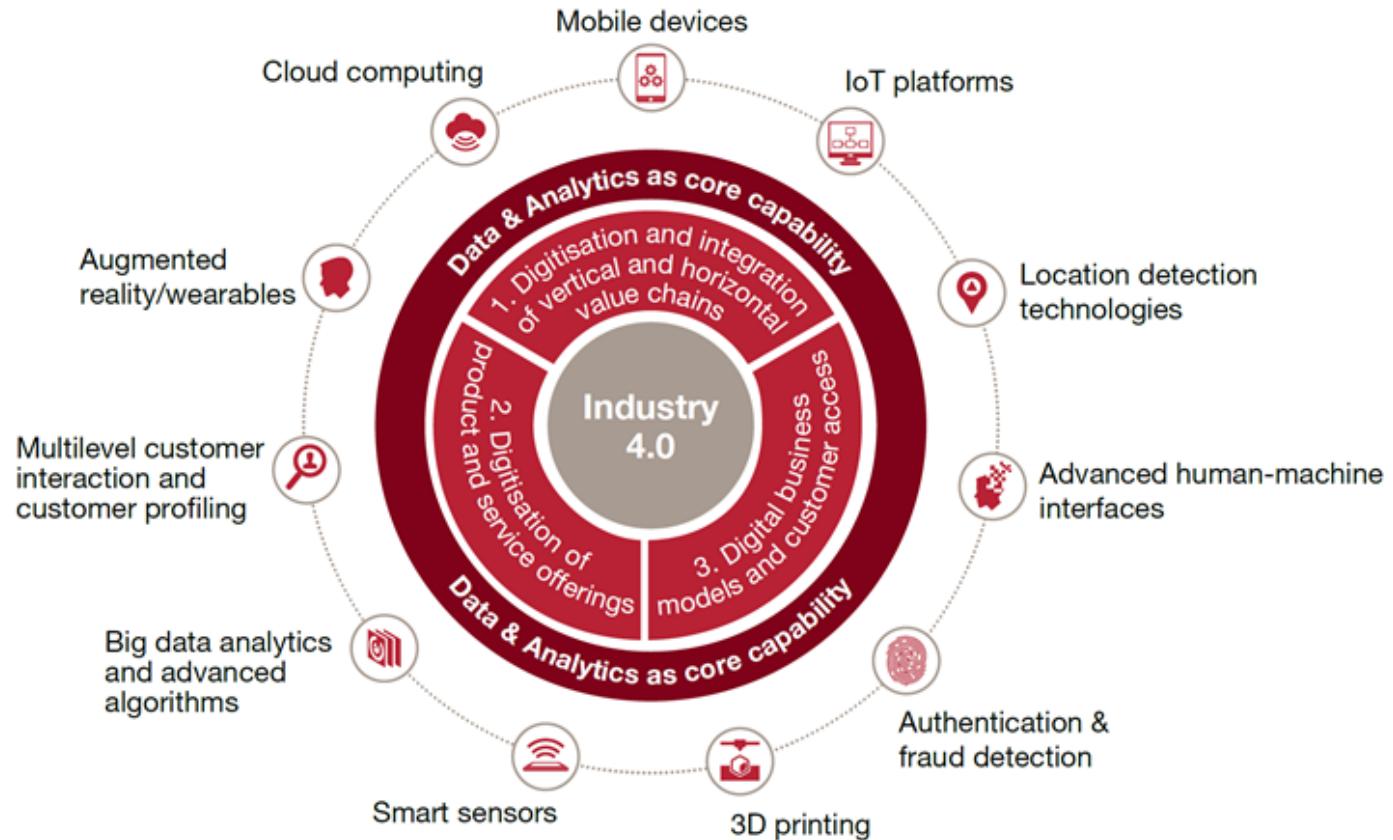


and an outstanding convergence of innovation pillars

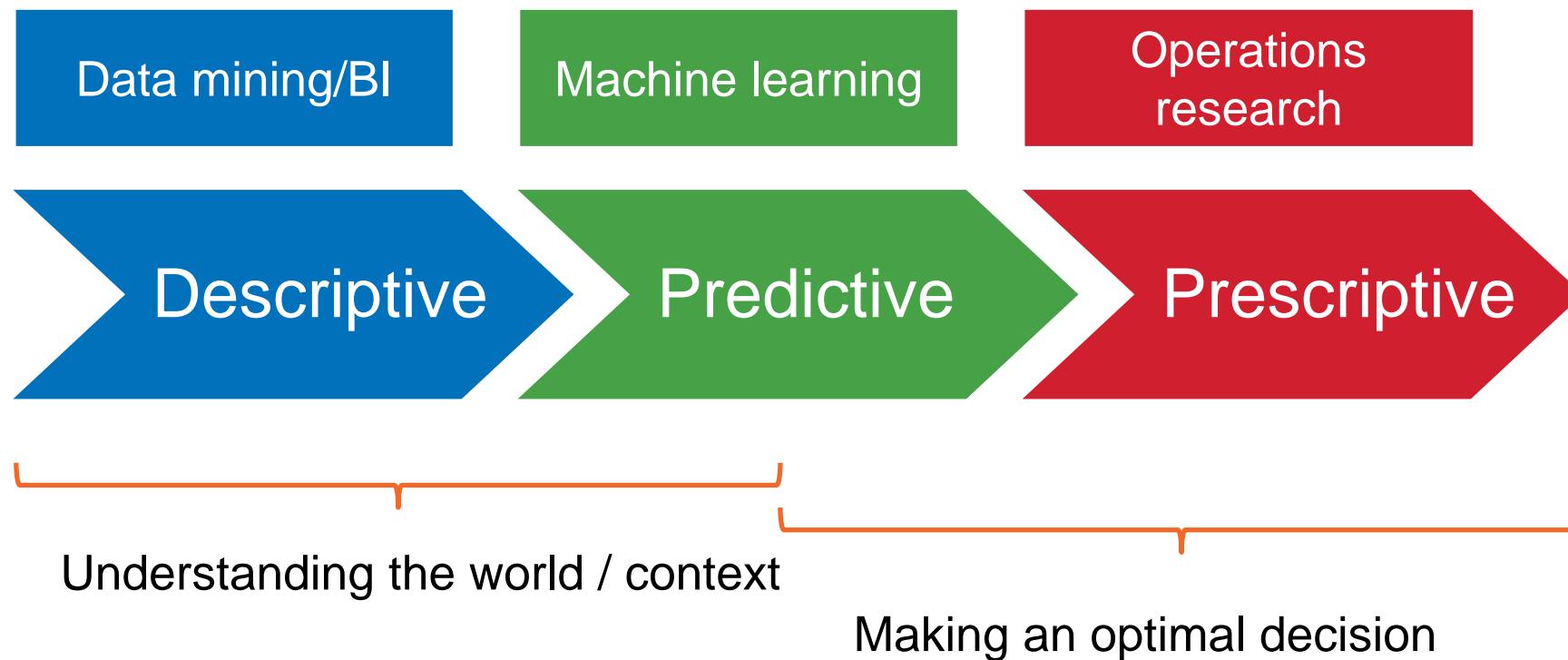


Industry 4.0 : creation of value

Industry 4.0 framework and contributing digital technologies



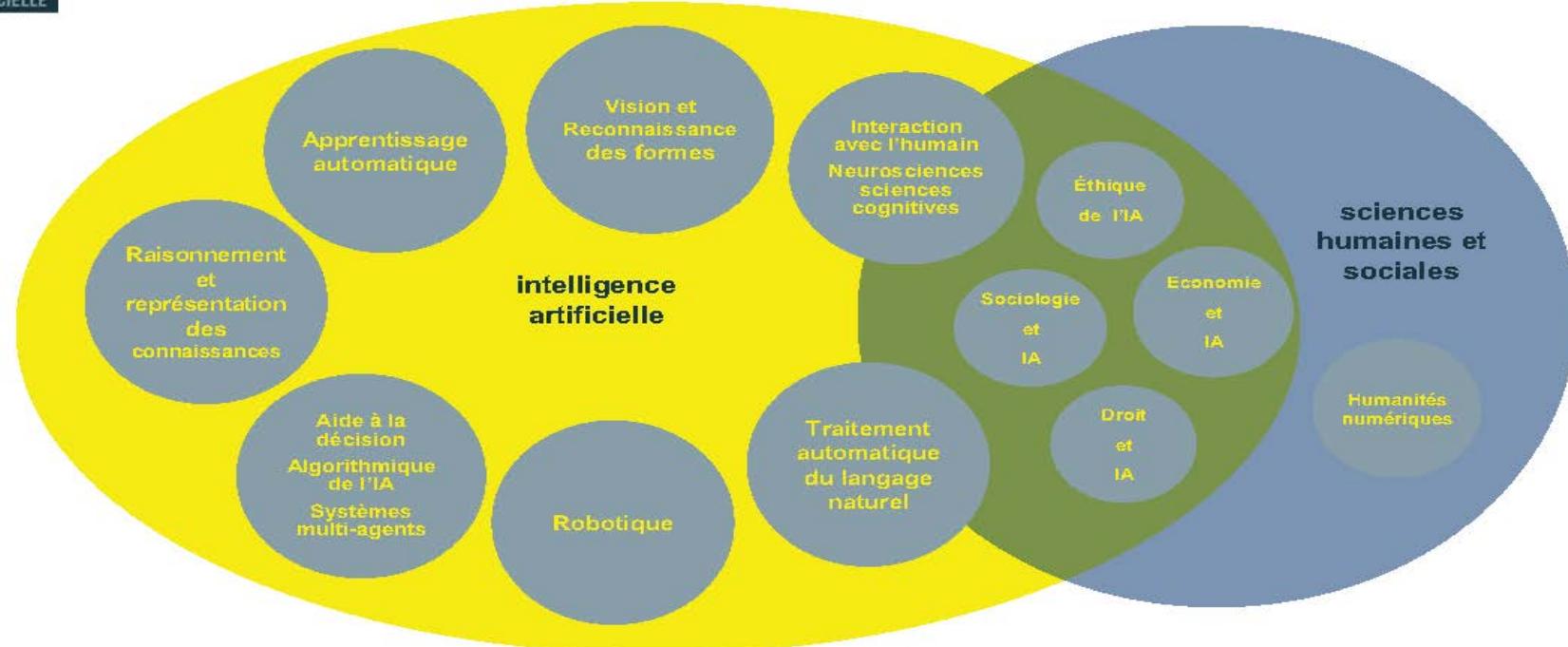
Data analytics: the true value of the data



BI vs AI vs OR: extensive research topics



Plusieurs domaines de recherche & domaines connexes SHS



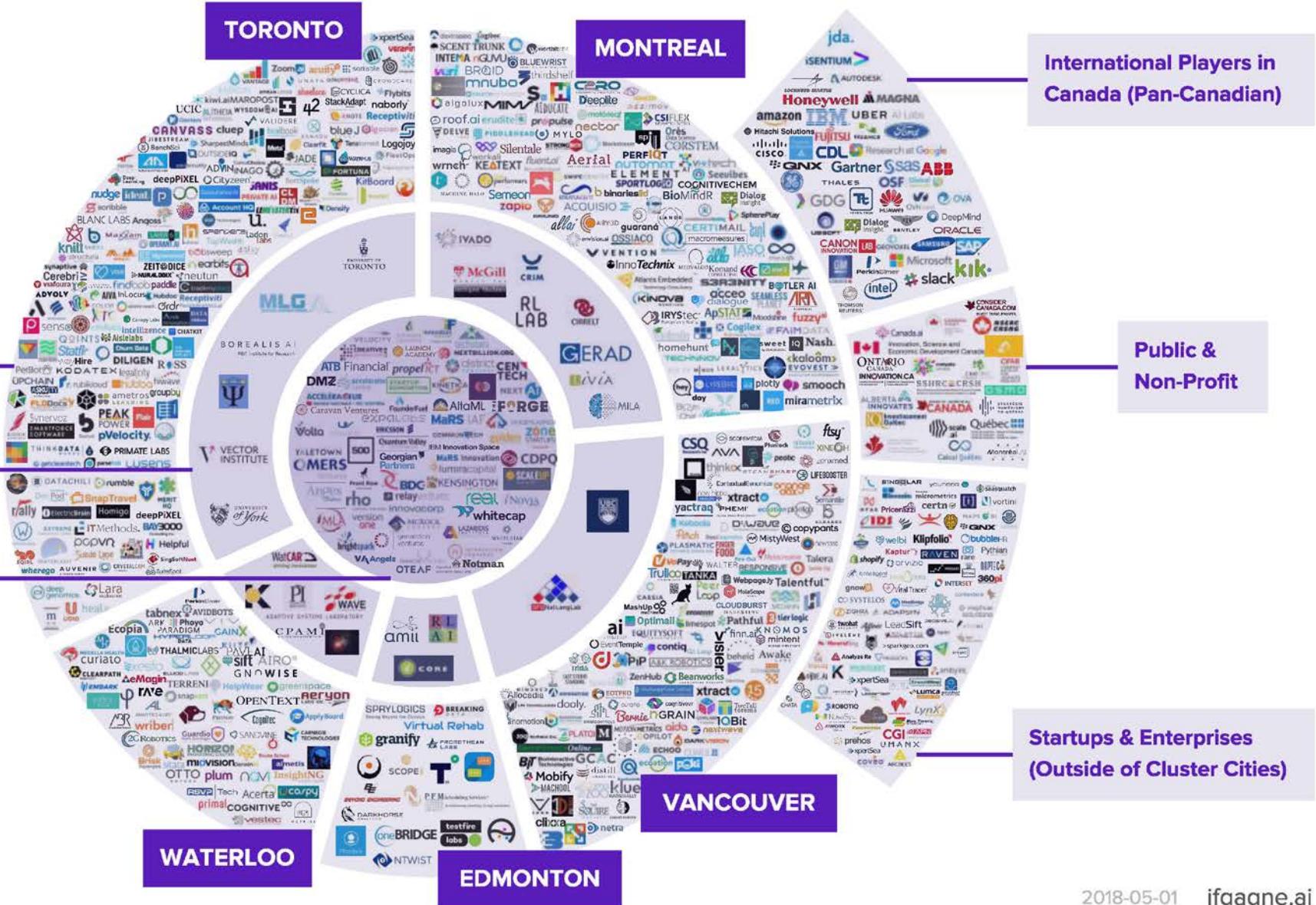
Canadian AI Ecosystem 2018

ELEMENT^{AI}

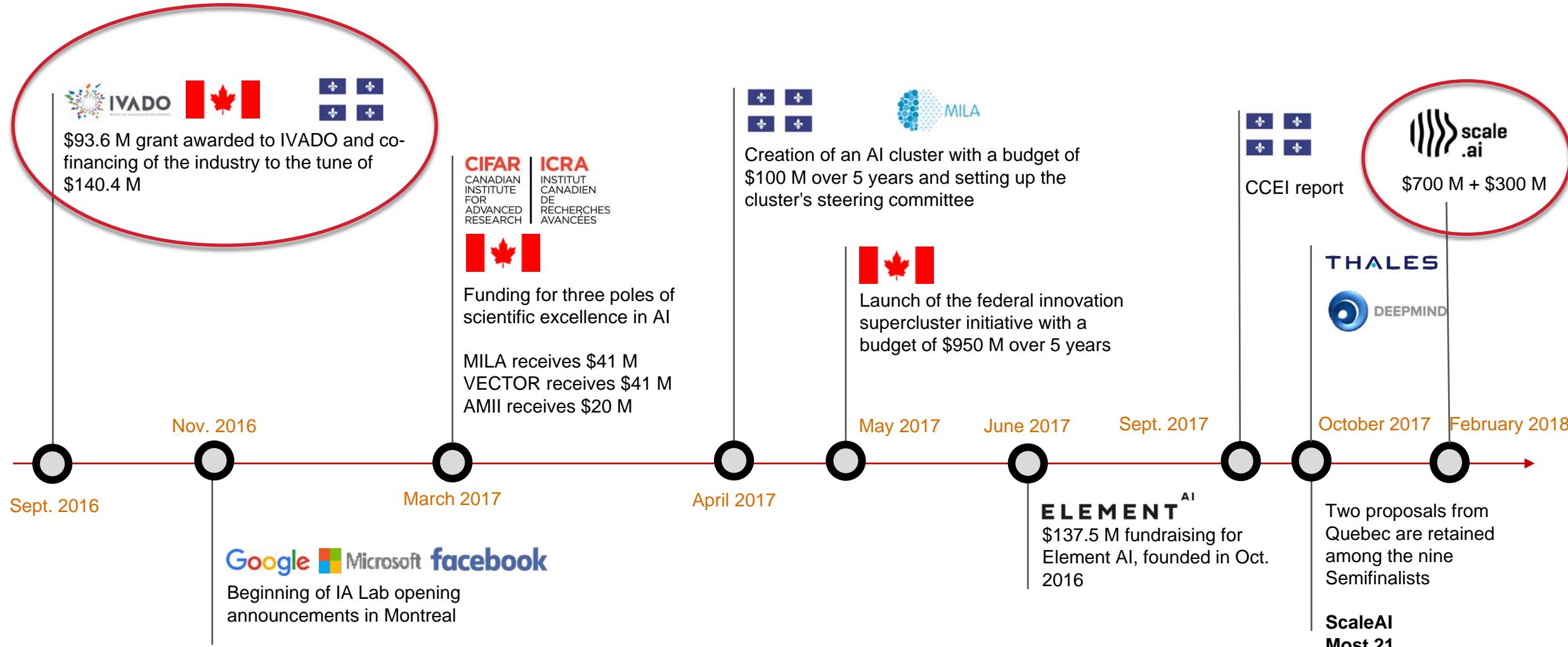
Startups & Enterprises

Academic Labs

Incubators, Accelerators & VC (Pan-Canadian)



Overview of recent developments in AI in Montréal: > \$2 G



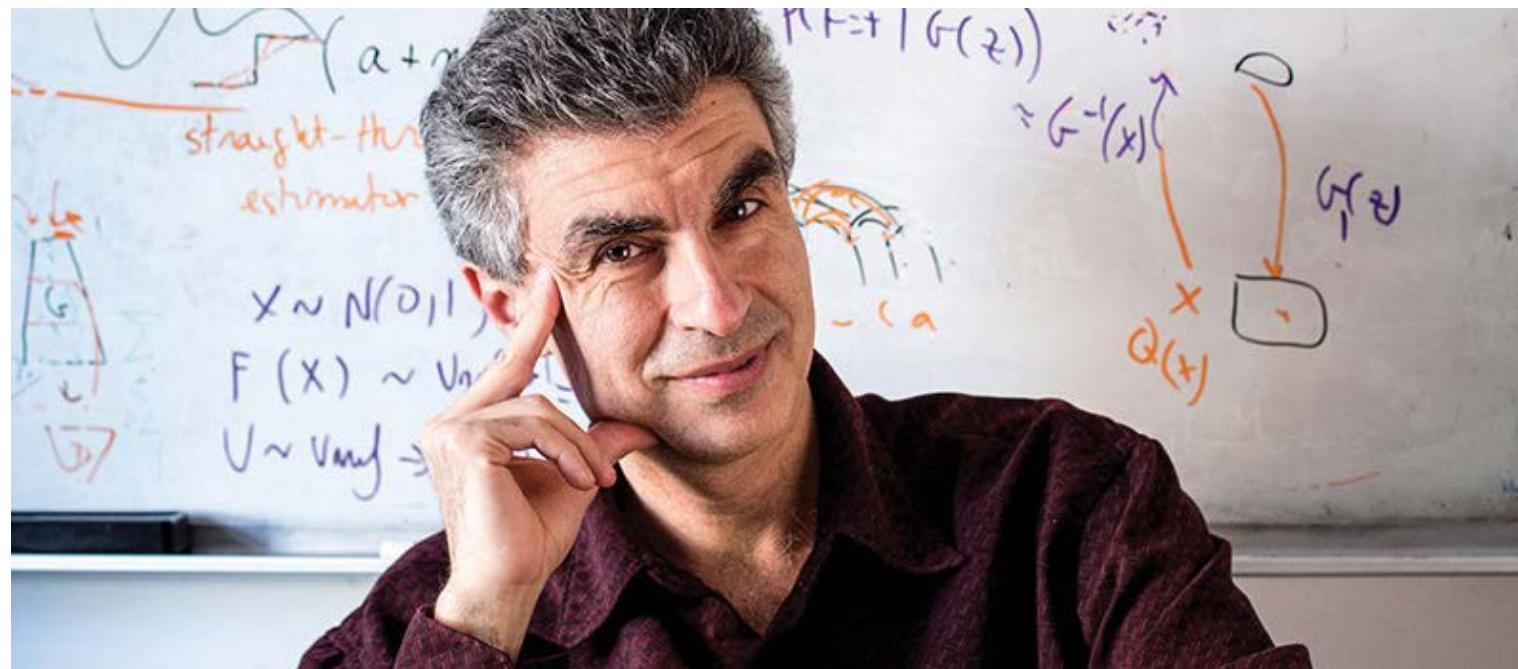
Montreal: A Unique Synergy Between Deep Learning and Operations Research

- Montreal is a worldwide leader in both deep learning and operations research (OR)
- Campus Montreal pioneered the deep learning revolution
- Largest worldwide academic center for deep learning;
- #1 in publications on deep learning according to Semantic Scholar
- Strongest operations research cluster in the world (#1 in research impact)
- Only Canadian Excellence Research Chair in applied mathematics and computer science to Prof. Andrea Lodi
- IVADO has established research partnership innovation and commercialization channels with more than 70 partners
- Attraction of best PhD students in the world: 90% of applicants to MILA and 60% in OR are international students coming from renowned schools
- Thriving Montreal entrepreneurial ecosystem in AI/OR



Yoshua Bengio as Scientific Program Leader

- Member of pioneering trio who invented deep learning
- Only one of the trio to stay in academia despite pull from industry
- Among the most cited computer scientists in Canada:
 - h-index=84
 - 42,000 citations
- Canada Research Chair since 2000
- NSERC Chair 2005-2015
- Head of the Montreal Institute of Learning Algorithms
- Program Co-director and Senior Fellow, CIFAR
- One of only four Canadians invited to last Bilderberg meeting, a select forum of world leaders discussing megatrends and major issues facing the world, to address the economic and political impact of AI



Operations research: Taking optimal decisions in a complex context

Canada Excellence Research Chair in Data Science for Real-Time Decision-Making at Polytechnique Montréal, **Dr. Andrea Lodi** holds Canada's main chair in Operations Research.



Jean-François Cordeau, holder of Canada Research Chair in Logistics and Transportation was appointed to the College of New Scholars, Artists and Scientists of the Royal Society of Canada.



Pr François Soumis, IVADO's general director received the Prix Lionel-Boulet—one of the highest awards handed out to researchers by the government of Québec—in recognition of his career, research results, leadership in scientific development and contribution to economic growth in Québec.



IVADO in a few figures ...

70+

Industrial partners
and international
partners

1000

Scientists in data science, artificial intelligence
and operations research

234M\$

9

Research centers and academic departments

- GERAD
- CIRRELT
- MILA
- DIRO de l'Université de Montréal,
- Département de mathématiques et de génie industriel de Polytechnique Montréal,
- Département de sciences de la décision de HEC Montreal,
- Tech3Lab,
- Centre de recherches mathématiques (CRM)
- Chaire d'excellence en recherche du Canada sur la science des données pour la prise de décision en temps réel.

Global budget IVADO :

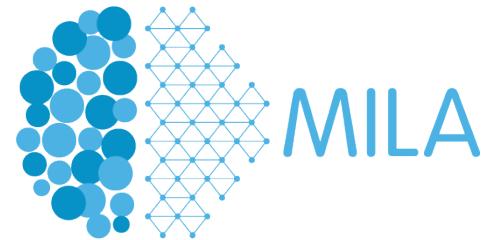
110,4 M\$ (industrial partners)

+ 93,6 M\$ (CFREF Canada)

+ 30,1 M\$ (HEC Montréal, Polytechnique Montréal et l'Université de Montréal).



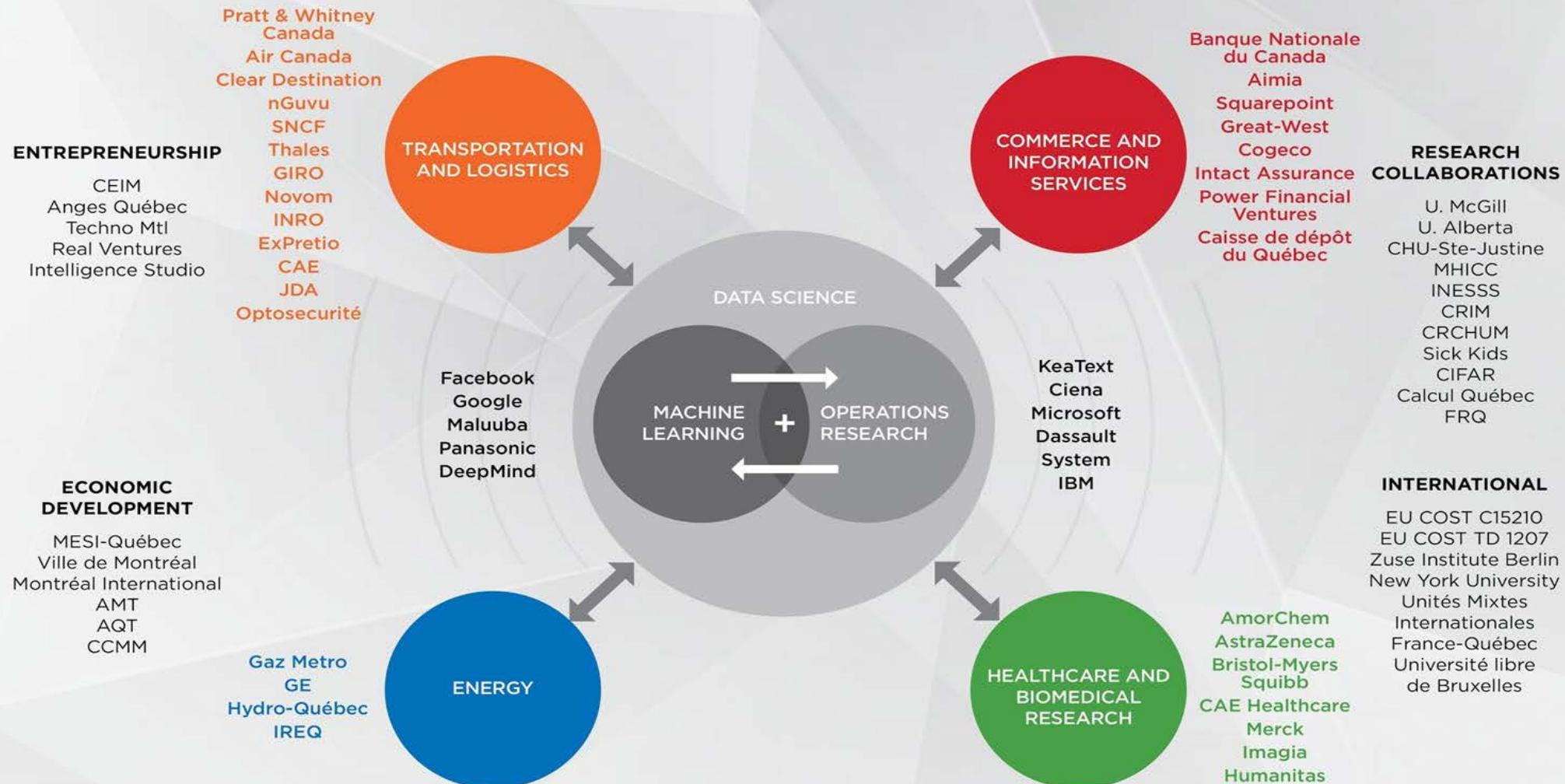
IVADO: world-class research centers



and more than 20 research chairs

IVADO Fundamental Data Science – Applied

With a strong innovation ecosystem
of more than 70 partners



SCALE AI

AI-Powered Supply Chain Supercluster

ISI: Federal government program aimed at building effective ecosystems for sustained value creation

Ecosystem build-up approach



THE INDUSTRIAL CONSORTIUM FOR SUPPLY CHAINS POWERED BY AI



Technological foundation: AI techniques, from ML to operational research

- Integration and reinforcement of other technologies: IoT, Blockchain, robotics ...

Functional foundation: industrial applications on the supply chain, ideal function

- Data generation, use of data, transverse to industrial sectors, goes beyond silos of value chains, link with exports, leverage on growth ...

Roadmap of innovation shared by industrial and academic partners

- Adapt, adopt and transfer point-to-point AI solutions
- Build and industrialize the foundations of the technological ecosystem
- Generalize the integration of AI in the running of companies

Strong anchorage in Quebec and Ontario

- Industrial jewels: CN, CGI, Aldo, Agropur, Couche-Tard, SNC, Bell ...
- "Great Future": Optel, Coveo, Ssense, Ray-Mont ...
- Ecosystem of initiation and growth: start-ups, CDL, Next AI, Real Ventures, Desjardins, Solidarity Fund, iNovia ...
- IVADO and Waterloo Leadership plus an Extended Academic Network

118 members to date incl. ~80 industrial partners



SCALE AI's strategy

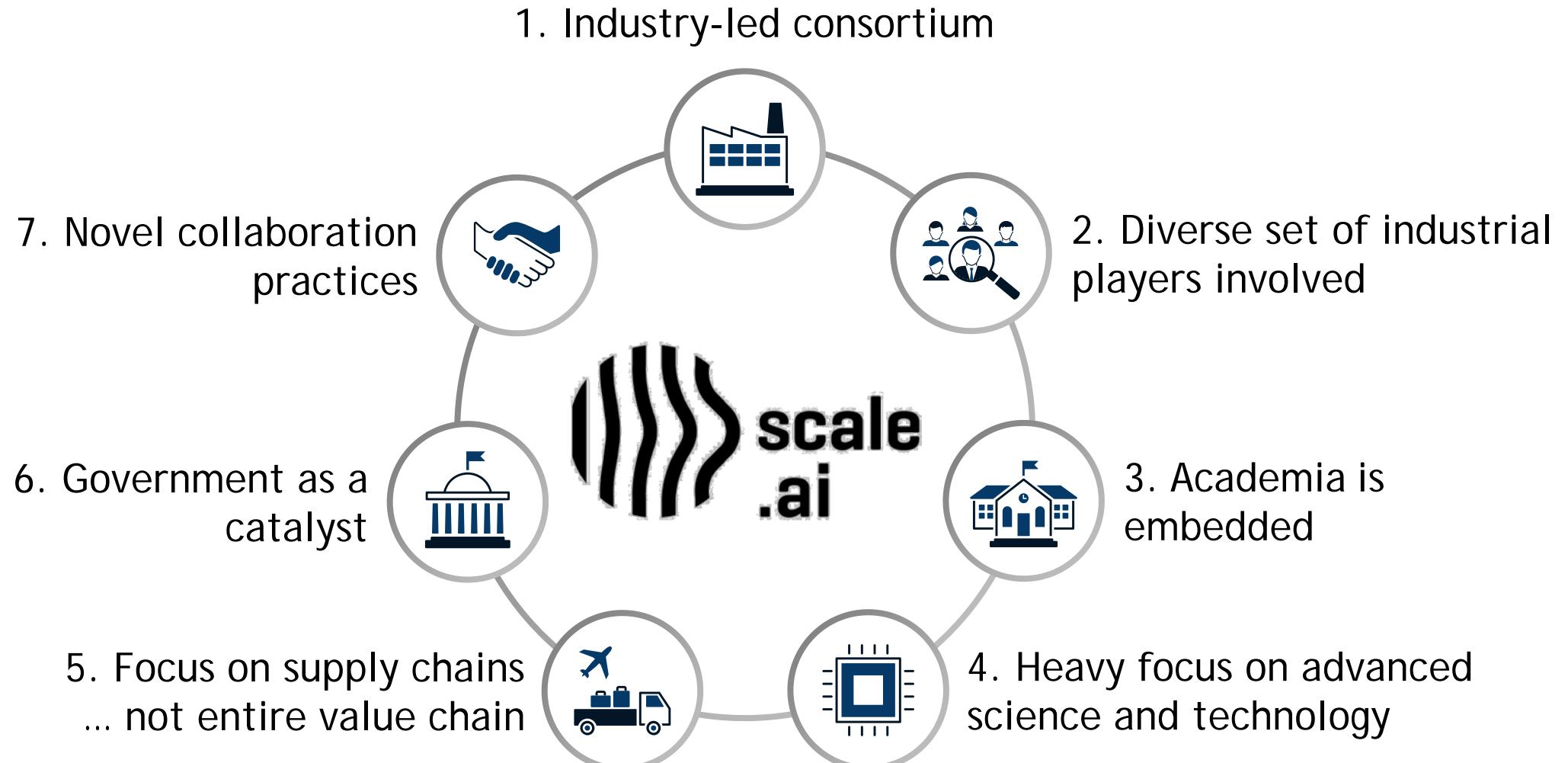
**Bring our successes in AI
from the lab to the field**

**Empower Canada as a global hub
for intelligent supply chains**



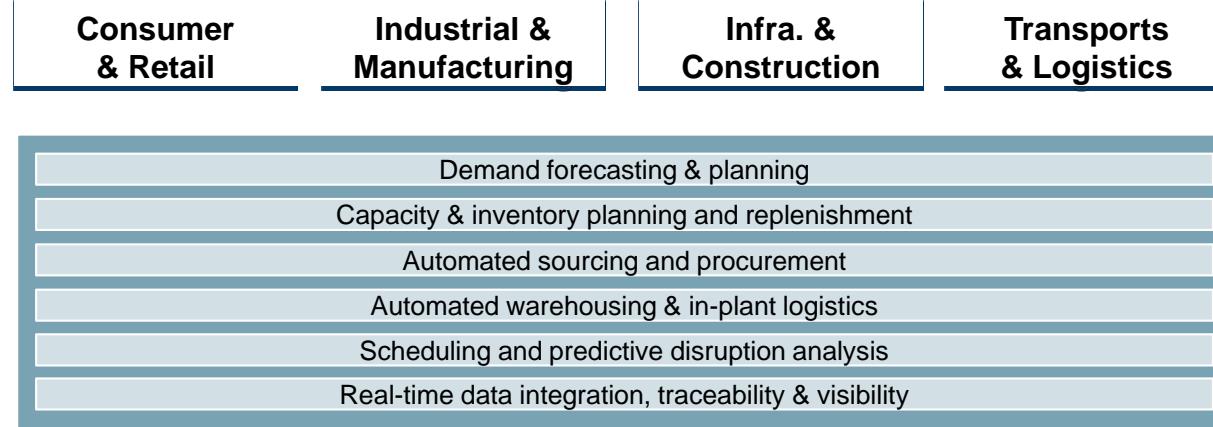
- Bring players together: multinationals, SMEs, academia
- Implement novel IP and data sharing platforms
- Grow the world's best applied AI services providers
- Deliver competitive advantage across industrial sectors
- Better position Canada as a trading nation
- Boost the talent pool of today and tomorrow

7 key elements that make SCALE AI innovative



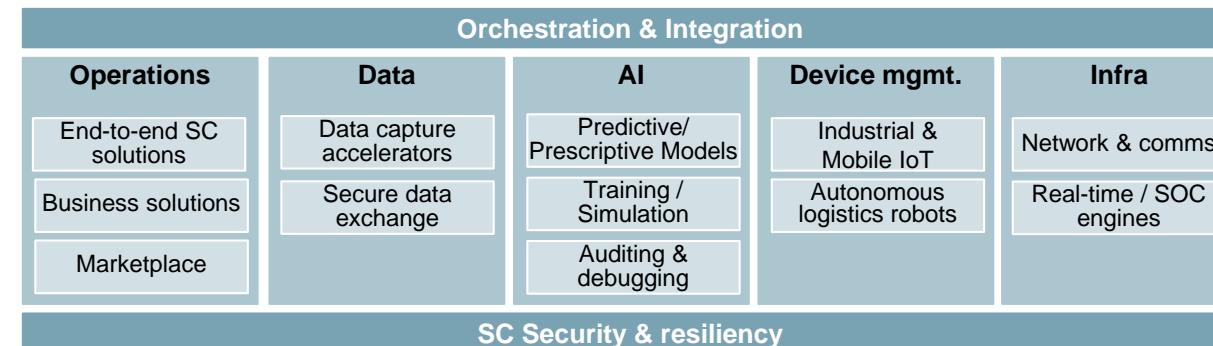
Technology roadmap: Two key axes

1 Drive adoption of AI-powered solutions to supply chains needs



Extract, generalize, standardize

2 Develop foundational intelligent supply chains building blocks



Generally Available Market Solutions

- Generalized and adapted to enable portability across segments

- Compatible building blocks to enable integration and maximize synergies

Conclusion

Beyond the hype of AI and even if we are far away from the *strong AI*...

our society will go inevitably toward the ***intelligent digital mesh¹***
the entwining of people, devices, content and services

Thus, and back to the ultimate goal of creation of values, the ecosystem will need resources from many other organizations not named in this short presentation as: CNRC, CQDM, CRIM, CRIQ, CEFARIO, ADRIQ,...

Something
BIG
is happening in
Montreal

COME AND SEE
OUR NEW DIGS
AT ivado.ca

Montréal,
MÉGA
branchée

VENEZ NOUS VOIR
À ivado.ca



HEC Montréal
Polytechnique Montréal
Université de Montréal