AIoT Canada

Roundtable on National AIoT Strategy

May 5, 2022

Preliminaries

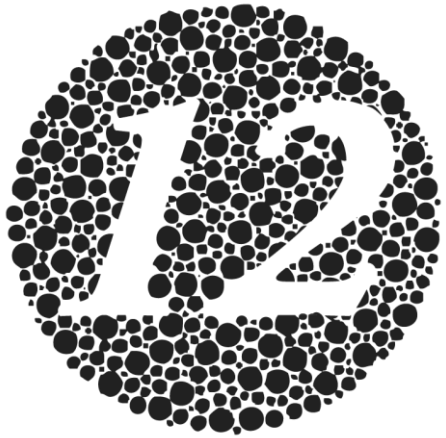
Orientation

COVID-19

Twitter: @aiotcanada #aiotcanada

TITLE SPONSOR

CORPORATE SPONSORS



DESIGN. BUILD. SECURE

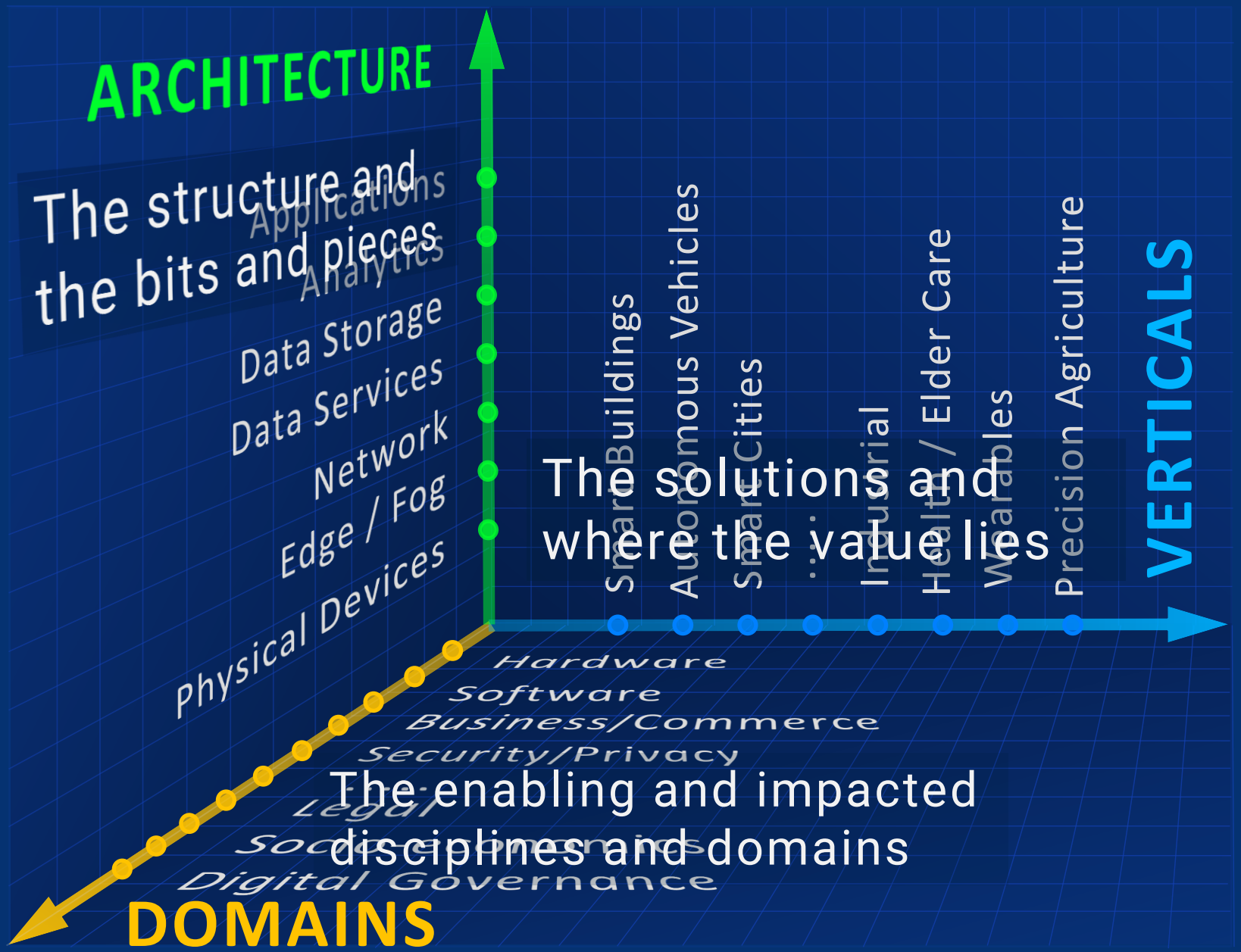
BLG

Borden Ladner Gervais

Why are we here?

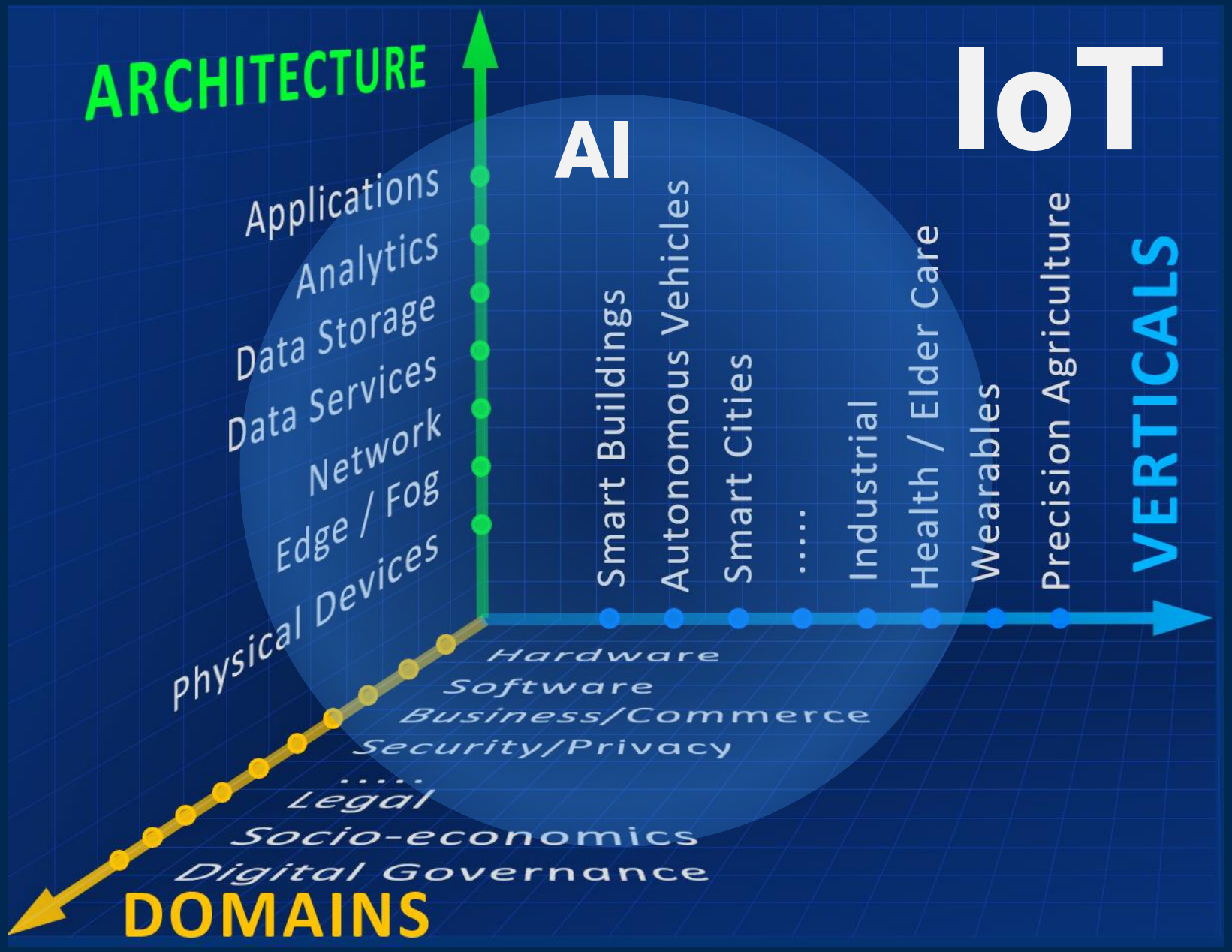
IoT Space

Think 3D



Think3D

IoT + AI = AIoT


ARCHITECTURE
Applications
Analytics
Data Storage
Data Services
Network
Edge / Fog
Physical Devices
AI
IoT
Smart Buildings
Autonomous Vehicles
Smart Cities
.....
Industrial
Health / Elder Care
Wearables
Precision Agriculture
VERTICALS
Hardware
Software
Business/Commerce
Security/Privacy
.....
Legal
Socio-economics
Digital Governance
DOMAINS

AIoT → Economic Value

How do we leverage AIoT
for national economic growth?

National AIoT Strategy

STRATEGY

Driven by:

- opportunities
- challenges

Resulting in:

- solutions

STRATEGY

Driven by:

- opportunities
- challenges

Resulting in:

- solutions

Roundtable Mission

Leverage the combined wisdom and experience of industry, government, and academic leaders to identify the needs and actions to be addressed by a national Canadian AIoT strategy, aiming to elevate Canada's economic growth and competitiveness through AIoT.

AGENDA

7:30	**Breakfast and networking**
8:00	Roundtable keynotes
9:00	Workshop No. 1: Opportunities and Challenges
9:55	Break and networking
10:15	Workshop No. 2: Solutions to Challenges
11:15	Open debate and consensus
11:50	Smart Connected Vehicle Innovation Center Showcase
12:10	Working Lunch • Keynote address • Consensus summary and concluding remarks
13:00	Formal end
13:00 (optional)	Smart Connected Vehicle Innovation Center Tour

AIoT CANADA

Welcome from uOttawa – Kanata-North

Guy Levesque

Associate VP, Innovation, Partnerships and Entrepreneurship, University of Ottawa


uOttawa
Kanata-Nord
Kanata North

Global challenges and opportunities for the Canadian AIoT industry

Michel Langelier

CEO, AIoT Canada

Global challenges and opportunities for the Canadian AIoT industry

Towards a national AIoT Strategy

May 5th 2022, Ottawa

What you will hear

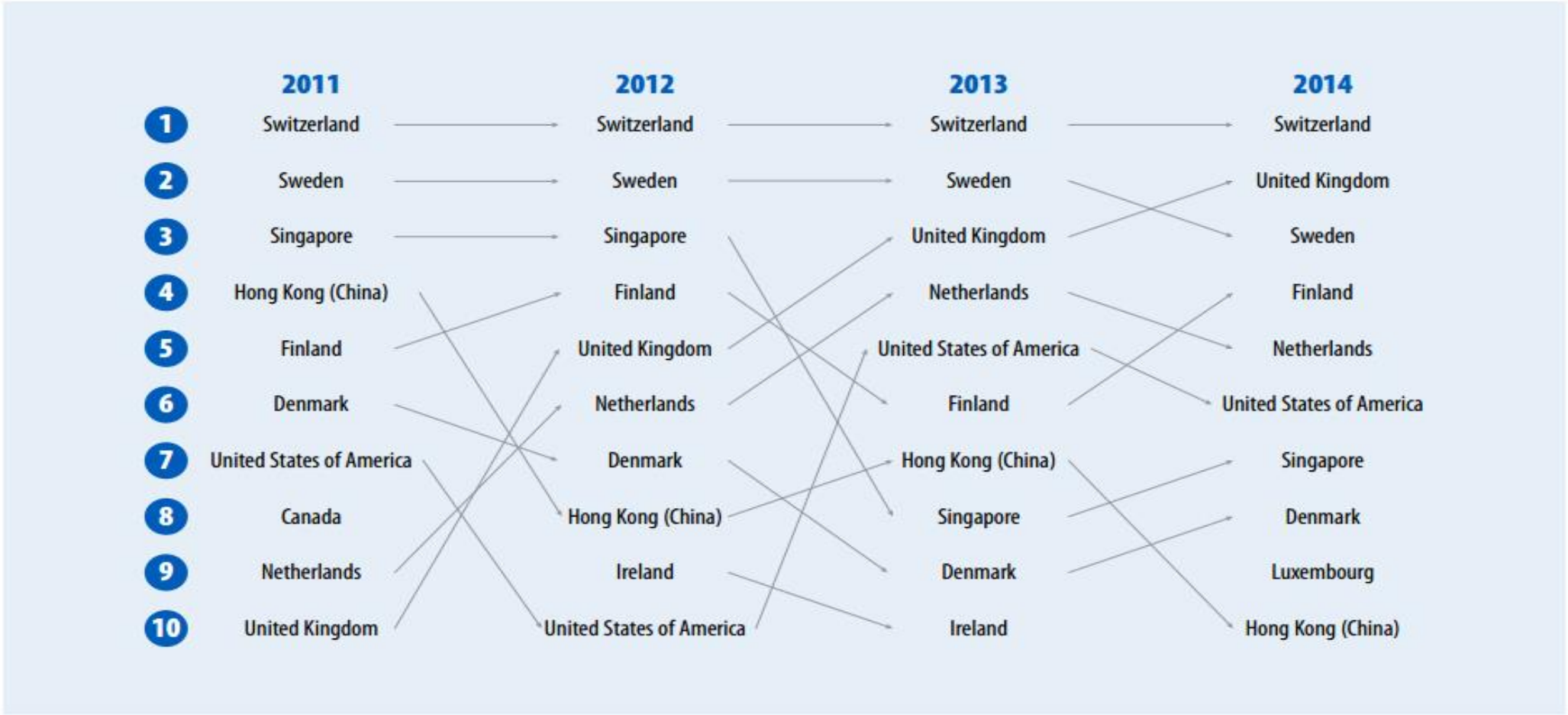
Needs for an innovation agenda aligned with the digital sector

An overview of the critical issues the AIoT Industry is facing

Facts & Key sectors' opportunities

- Innovation Agenda : Several roots for our existing challenges

Figure 2: Movement in the top 10 of the GII



Source: Global Innovation Index

COMPARING TWO WORLD LEADING INNOVATION NATIONS
GII – 2021 RANKING

● Strength ○ Weakness ◆ Income Strength ◇ Income Weakness

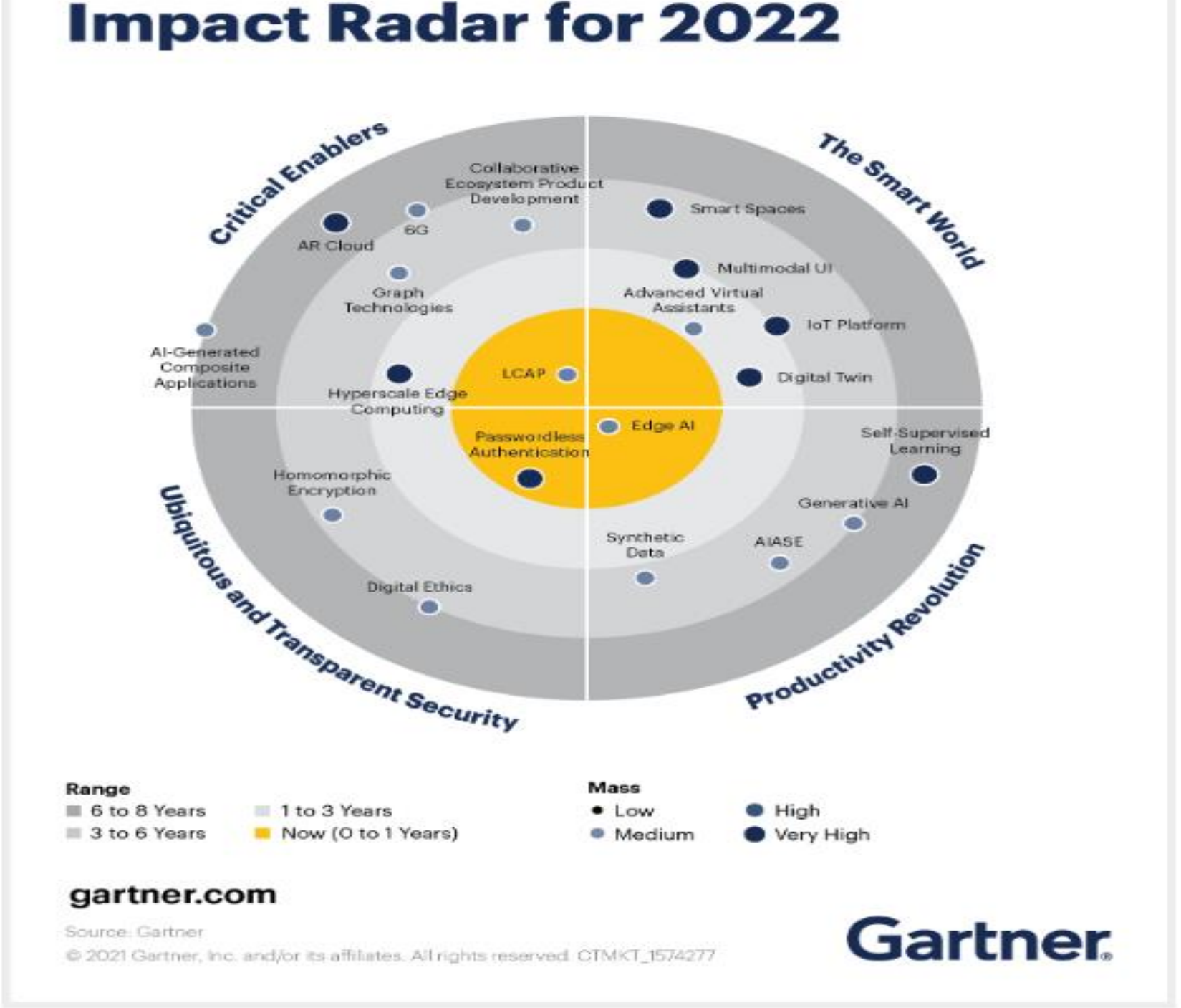
GLOBAL INNOVATION INDEX

The overall GII score is the simple average of the Innovation Input and Output Sub-Index scores.

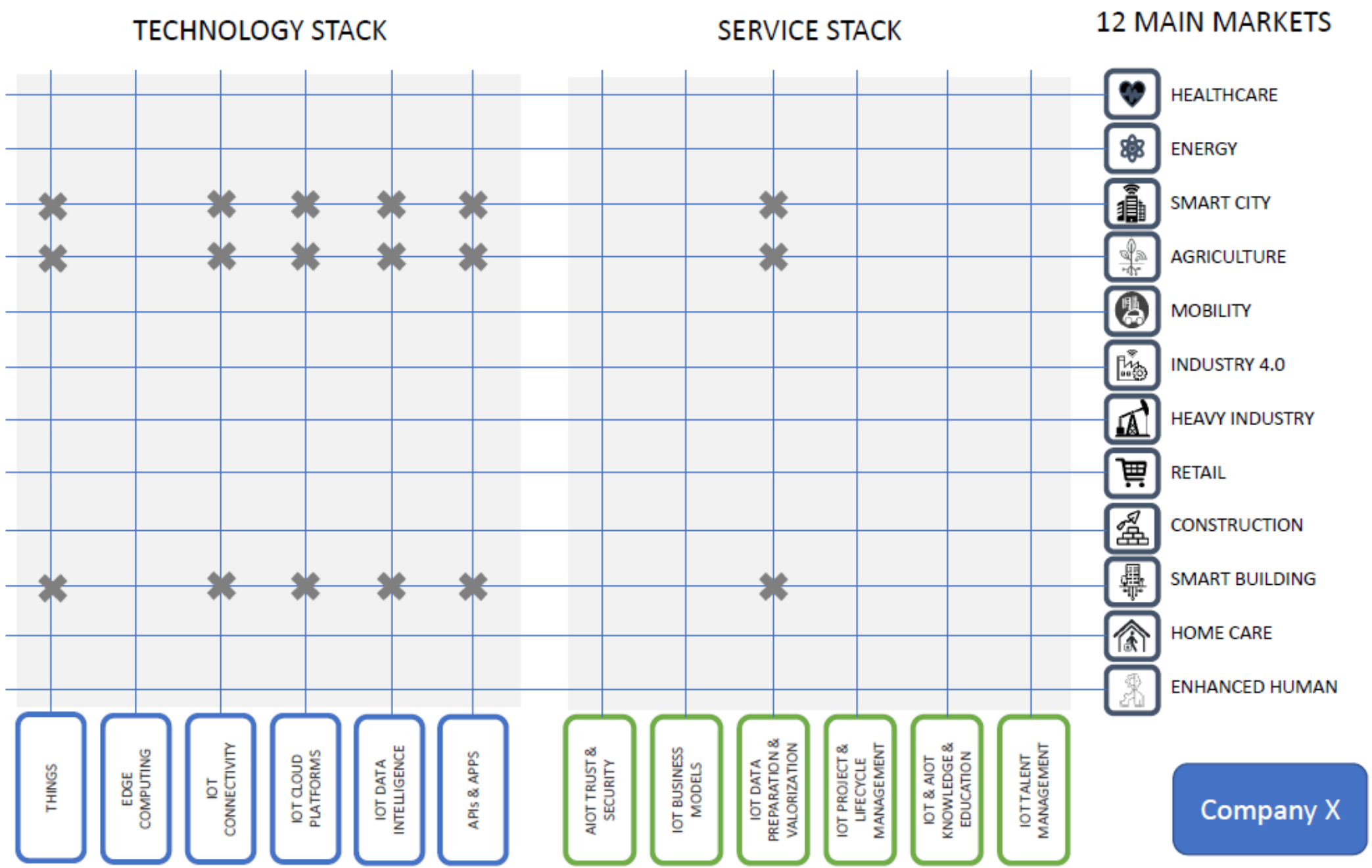
	Rank	Score		Rank	Score	
Overall	**2**	**63.1**	●◆	**16**	**53.1**	
Innovation Input Sub-index	2	69.6	●◆	8	66.2	●
Innovation Output Sub-index	2	56.6	●◆	23	40.1	

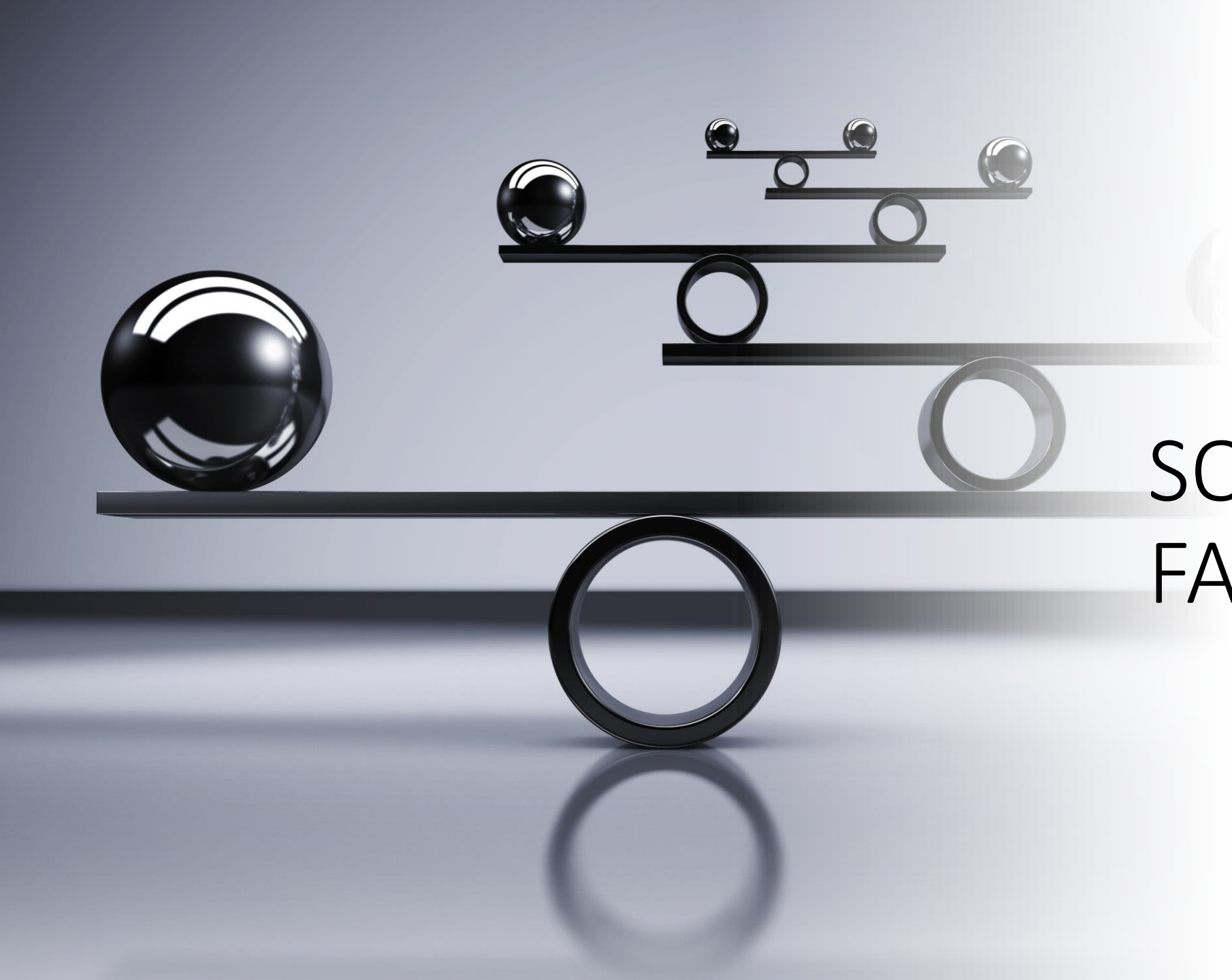
Digital drives the world economy in 2022

Understanding the next decade

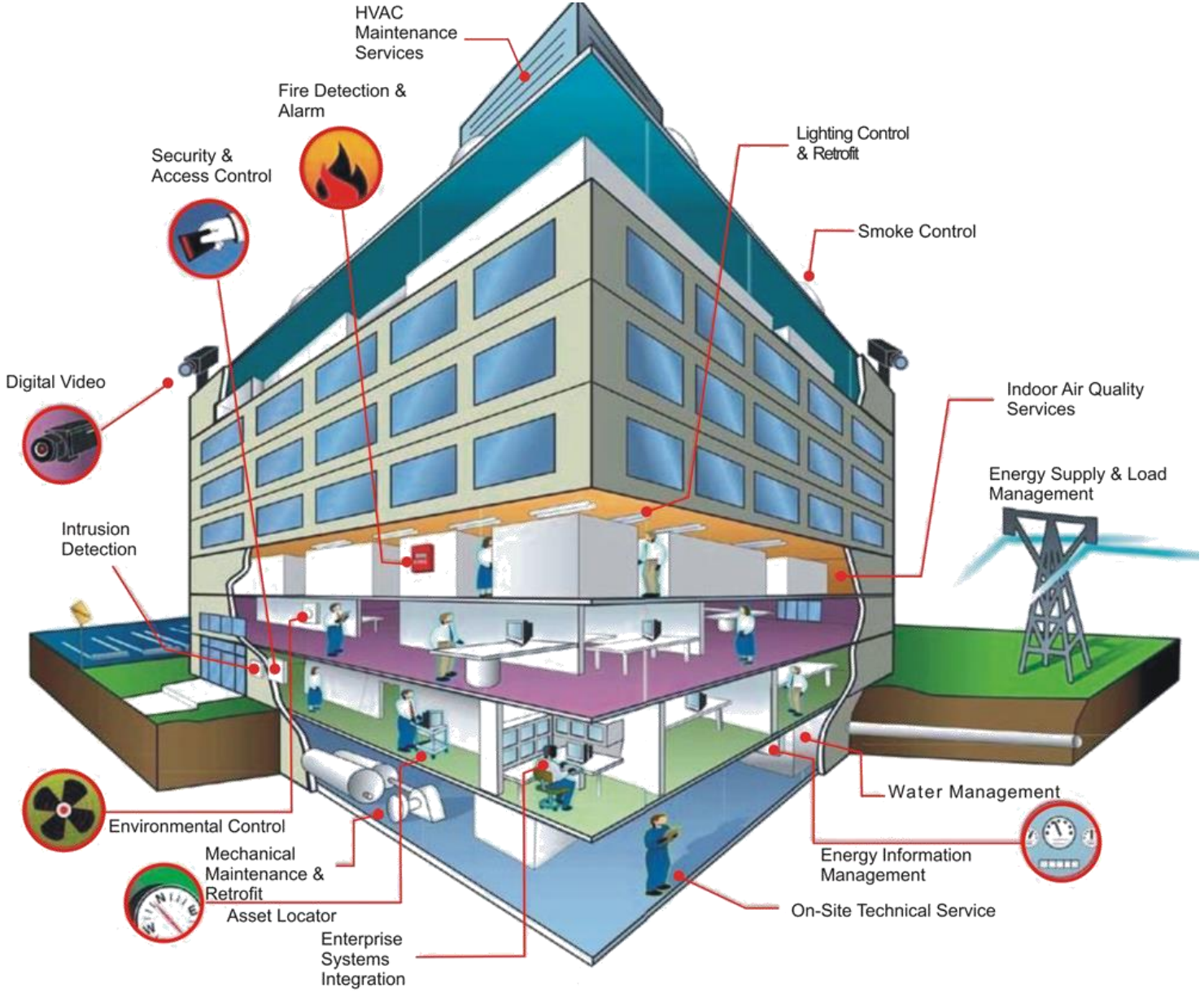


AIOT COMMUNITY MAPPING MODEL





SOME FACTS



Tech Sector - R&D Ratio: 42%

The Tech sector invests more than $8 billion every year in R&D

Source: ICT_Sector_Profile2020_eng.pdf

Canadian cities are becoming tech hubs

Technology jobs are a bigger share of the local work force in Ottawa than they are in Silicon Valley. And Toronto has more tech workers than there are in Seattle, the home of Amazon and Microsoft.

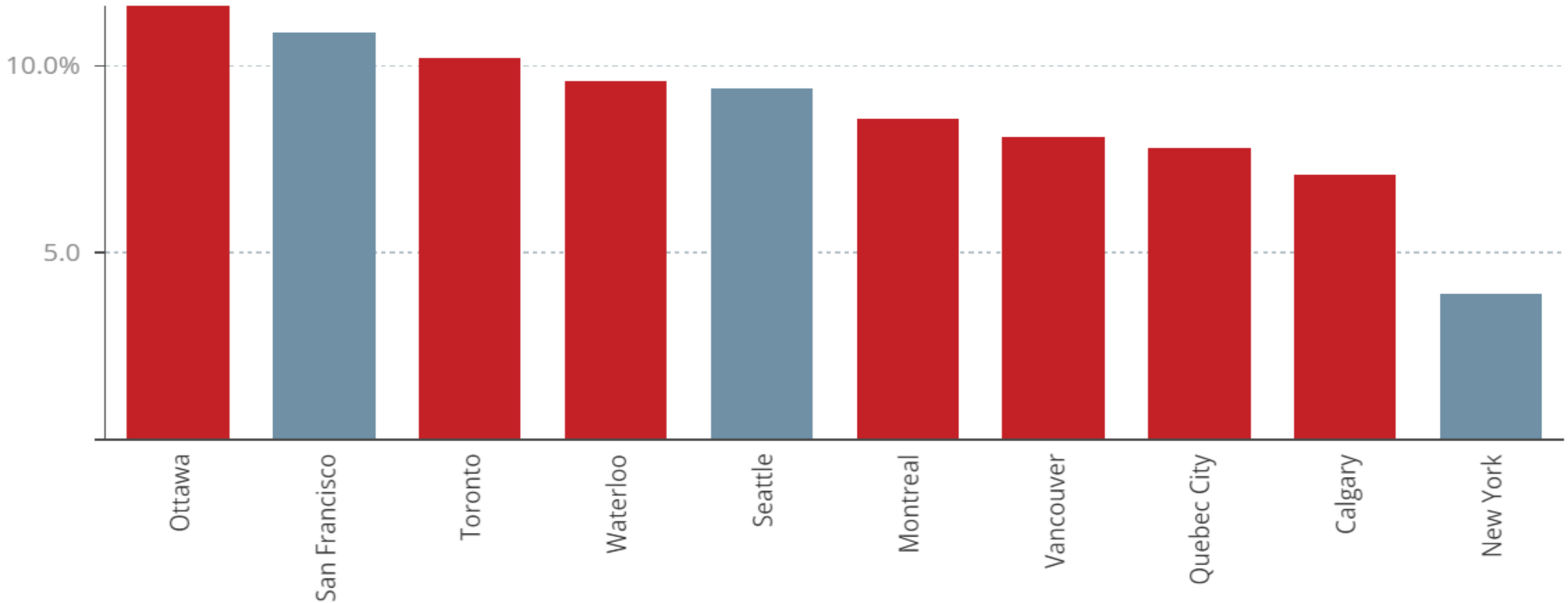


Chart: Pete Evans/CBC • Source: CBRE

CBC News

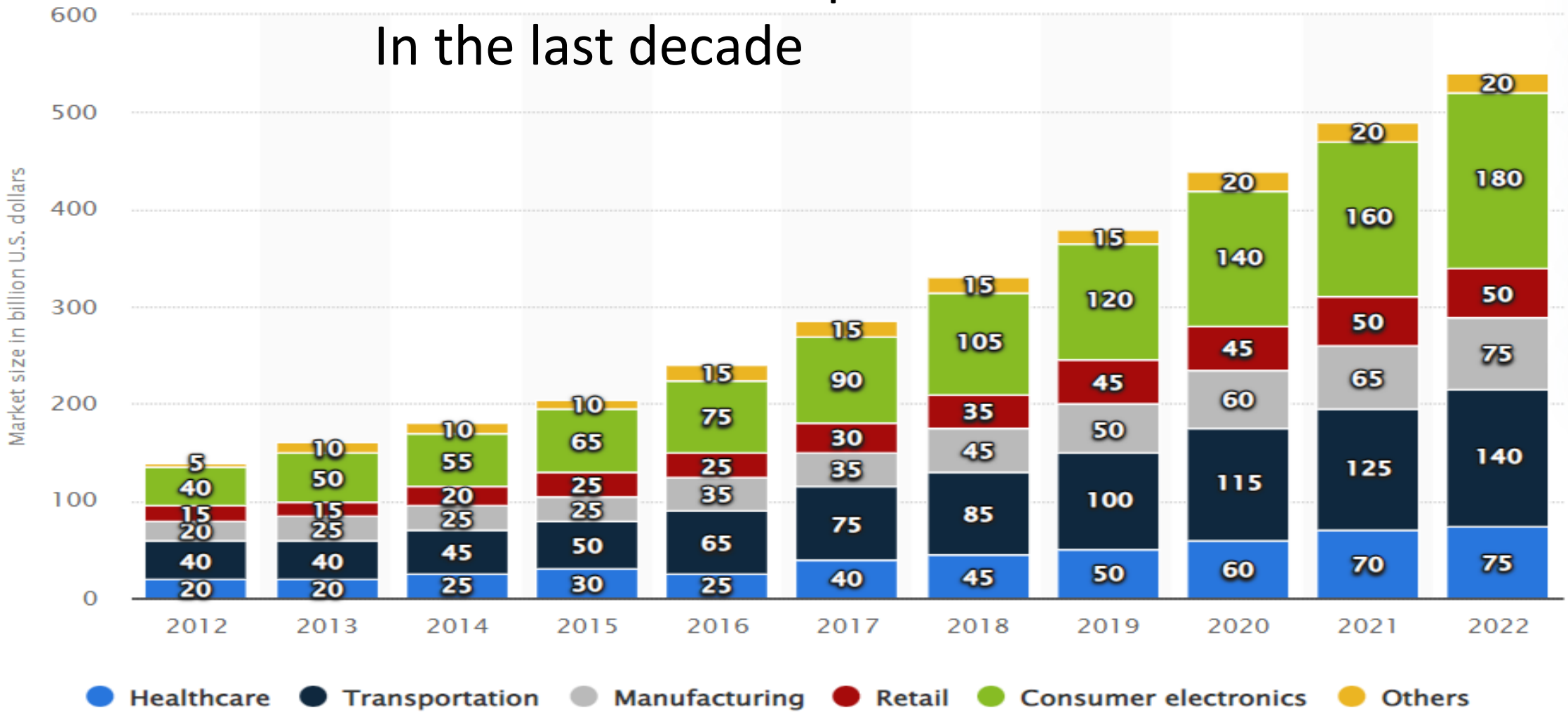
Tech Businesses Pay

40% Higher
Then Private Sector
Average Wages.

Source: CompTIA Cyberprovinces 2020 Report

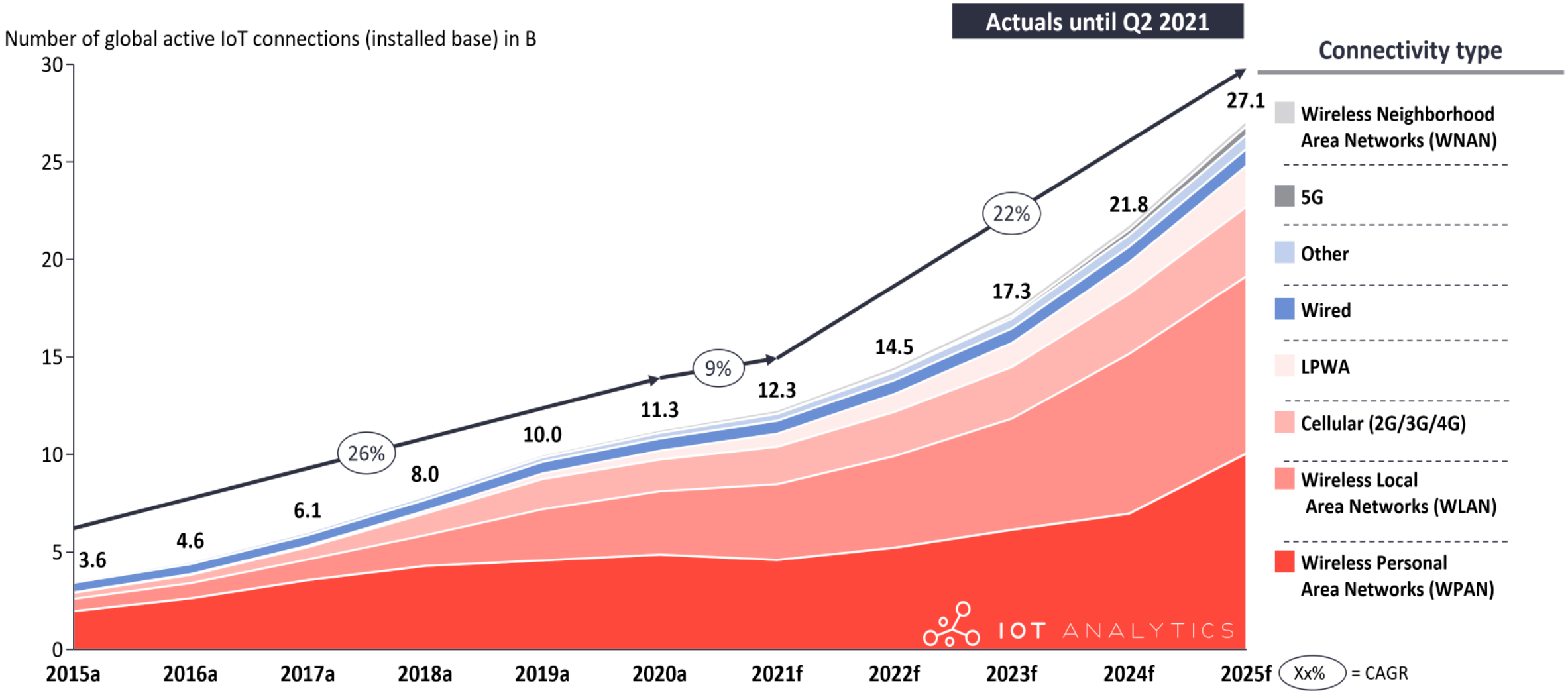
A decade of exponential growth

North America - IoT Adoption
In the last decade



-source Statista

Global IoT market forecast (in billion connected IoT devices)

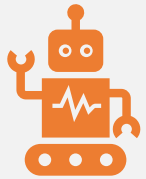


Key sectors/niches according to McKinsey

Global market: 5 -12.5T$ by 2030

- Transportation & Mobility
- Manufacturing/Heavy Industries
- Wearable Devices
- Smart Home
- Connected Health
- Energy
- Connected Territories
- Retail
- Construction Supply Chains
- Health Care Facilities
- Smart Agriculture

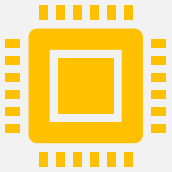
According to McKinsey



IoT decreases emergency response time by up to 40%.

There will be 76.3 million autonomous cars by 2023.

For a current fleet of over 1billion on the road.



Integration with existing technology (53%) and security (50%) are the top challenges for IoT integration.

1:7 1:5 ?

Canada's Digital Economy Employs Over 2 million Canadians

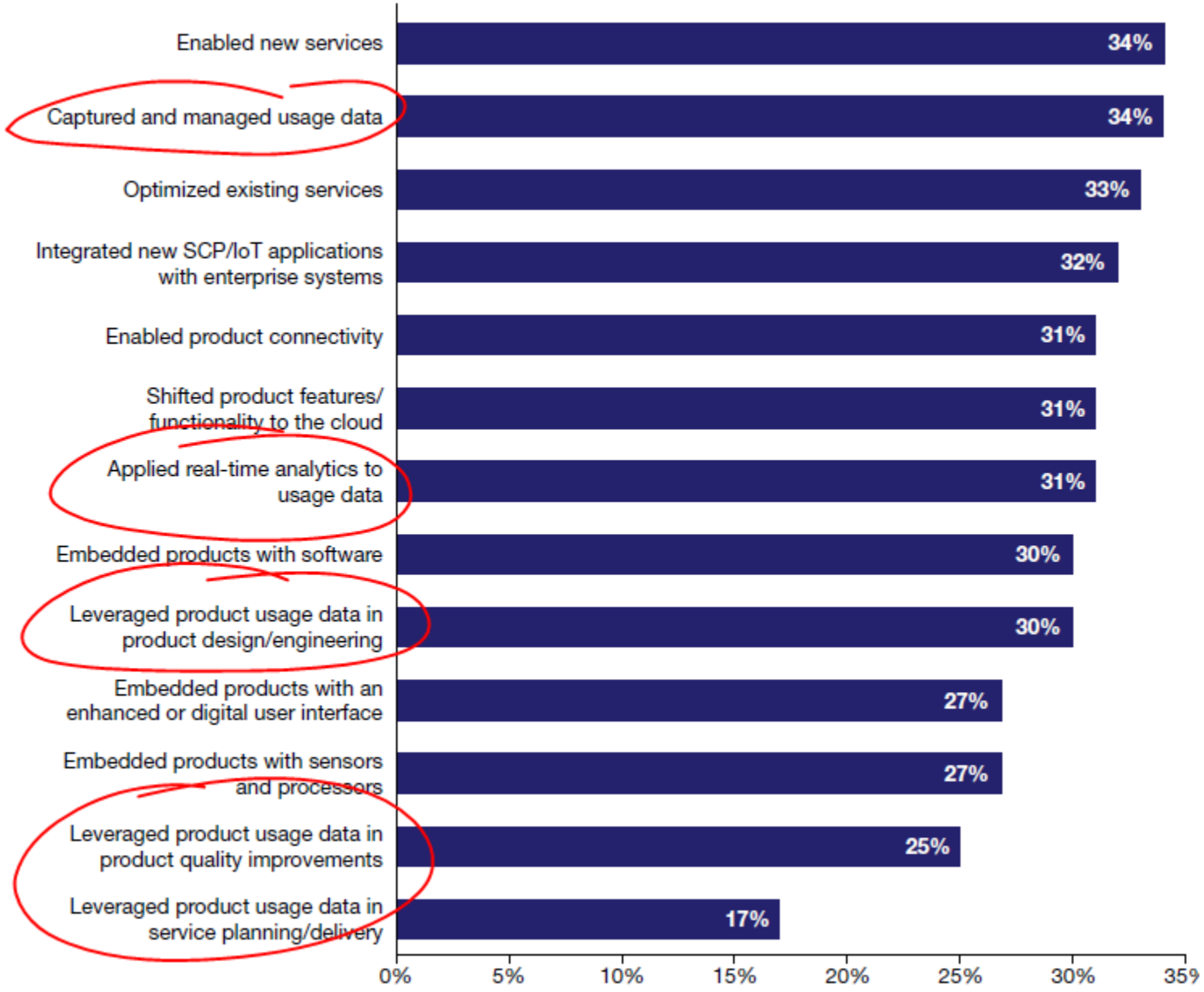
Source: digital-talent-outlook-for-2025.pdf (ictc-ctic.ca)

Industry Maturity level

Supply-chains are
about aligning, speeding
& optimizing end-to-end
supply and demand from
supplier to customer

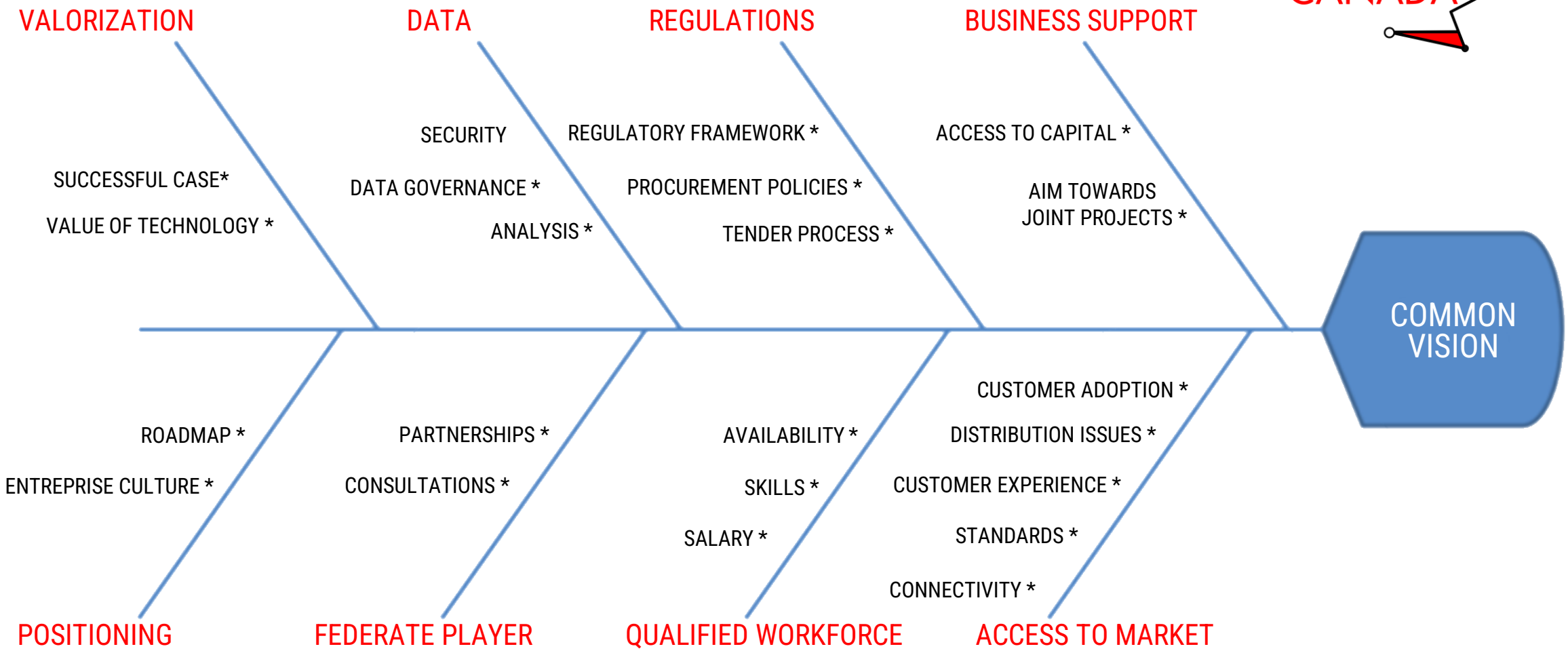
Machine Learning now
enables that optimization at the...
.micro-moment/
.micro-transaction/
.micro-place/
.micro-quantity level.

Fig. 3: Steps taken to transform products and services around the Internet of Things



Source: Smart, Connected Products Manufacturing's Next Transformation, Oxford Economics

INDUSTRY CHALLENGES : THE NEED FOR A SYSTEMIC VISION



Adoption challenges ahead for the AI

1. **Competing for the same pool of talents**
2. **Fit Options/Models**

1. **Social acceptance to AI**

Digital Trust Around the World

Researchers scored the performance of 42 global economies in four key metrics on a 0-to-100 scale (higher scores correspond to higher levels of trust). The top 10 scores for each category are highlighted.

HBR, February 25, 2021

	Attitudes How users feel about the digital trust environment	Behavior How engaged users are in the digital environment	Environment The mechanisms to build trust in the digital environment	Experience How users experience the digital trust environment
Argentina	49	47	33	31
Australia	40	51	59	55
Austria	57	34	67	51
Belgium	53	31	65	65
Brazil	29	65	30	29
Canada	47	52	62	57
China	61	100	18	64
Colombia	18	51	38	26
Denmark	69	46	73	62
Egypt	45	42	16	27
France	41	36	54	54
Germany	64	32	65	56
Hong Kong	35	76	55	69
India	24	55	37	38
Indonesia	76	54	31	31
Ireland	51	52	65	48
Israel	73	35	49	51
Italy	58	38	60	48
Japan	49	31	59	60
Malaysia	47	61	54	42

Conclusion

In a low-innovation environment, high standard of living equilibrium is unsustainable. Volatile resource prices, changing demographics, and increasing economic protectionism are exposing Canada's business innovation weaknesses and generating pressure to become more innovative in the coming years.

In a knowledge-based, globally competitive economy, Canadian businesses will need to make better use of the inputs and improve their ability to innovate to increase their domestic and global market shares.

ACCELERATE THE ADOPTION OF AIOT

Join us: connect.aiotcanada.ca – Your portal

michel@aiotcanada.ca

- Educate and promote the benefits of AIoT in our 12 markets
- Support the 12 markets to adopt AIoT solutions for their Digital Transformation
- Connecting the 12 markets to the AIoT industry for implementations and operation

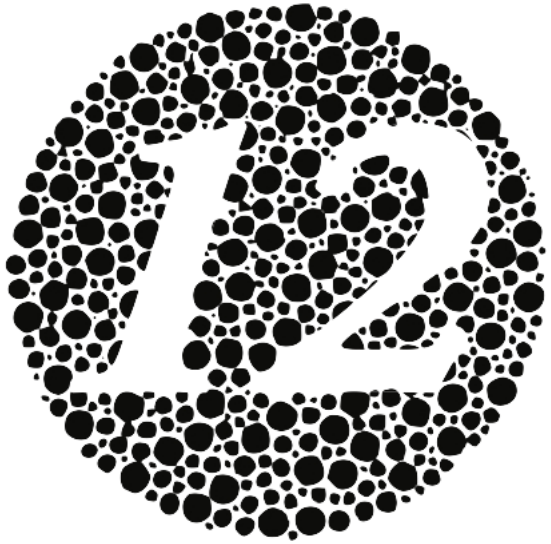
- Help the AIoT industry develop better products and solutions
- Help the AIoT industry develop its capabilities (partners, talents, $$)
- Help AIoT industry to implement shared AIoT resources and infrastructure

- Become the voice of the AIoT industry (territorial focal points)
- Promote the Canadian AIoT industry
- Addressing global AIoT sustainability challenges
- Influencing AIoT policies and best practices

Regulations, Cyber, AI, and IoT – Creating a Path Forward

Faud Khan

CEO, TwelveDot



DESIGN. BUILD. SECURE

AIOT

Round Table May 5, 2022

ABOUT TWELVEDOT

- Started in 2010, we are a boutique cyber consultancy focused on mobile, cloud, and IoT
- We currently do work in Canada, United States, Australia, Europe, and Africa
- We share our global expertise in cyber security to local markets
- We have developed several copy written methodologies for cyber evaluation based on our research under TwelveDot Labs – including universities, government, and partnerships
- We have deployed DNSSEC for .CA, security for a global pharma, help startups secure their solutions, and are editors of several ISO and IEC standards for IoT security and trustworthiness

COMPLEXITY OF THE LANDSCAPE

NIST
SP 800-30
Risk Management Guide for Information Technology Systems
SP 800-53
Security and Privacy Controls for Information Systems and Organizations

General IT Security
ISO/IEC 27000 series
Information Technology Security
ISO 15408
Common Criteria

Industrial Controls
IEC 62443 series
Industrial Automation and Control Systems Security

Vulnerability Disclosure
ISO/IEC 29147
Information technology -- Security techniques -- Vulnerability disclosure
ISO/IEC 30111
Information technology -- Security techniques -- Vulnerability handling processes

Privacy Focused
PIPEDA
Canadian Regulatory Framework for PII data
GDPR
European Data Privacy Framework that is to be used when hosting EU citizens data

IoT Device Regulations
UK Regulations
Code of Practice for Consumer IoT Security
Japan Regulations
IoT Security Safety Framework (IoT-SSF)
Singapore Regulations
Mandatory product assessment, evaluation, and product labeling for IoT products. TR-91
EU 303-645
IoT device baseline and assessment criteria.

Product Security
ANSI/CAN/CSA T200
CSA security maturity and assessment for organizations and products
ANSI/CAN/UL 2900-1
UL Standard for Safety Software Cybersecurity for Network-Connectable Products
ANSI/CAN/UL 2900-2-1
Software Cybersecurity for Network-Connectable Products, Part 2-1: Particular Requirements for Network Connectable Components of Healthcare and Wellness Systems

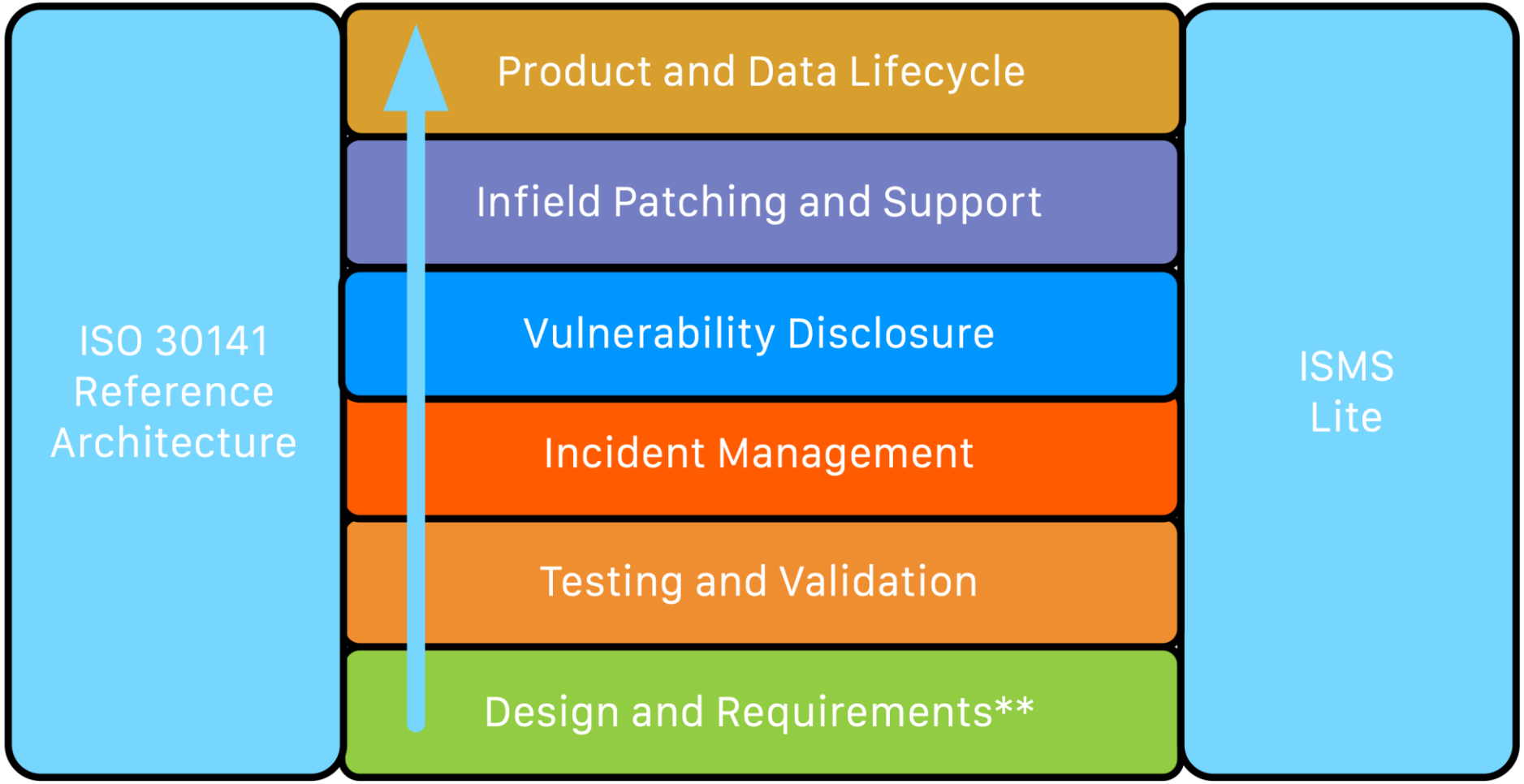
MAKING SENSE OF THE COMPLEXITY

- Security is not a technology it is about risk management
- #1 Organization
  - Need think “risk management” for all aspects of the business
  - Document your critical assets
- #2 Products/Solutions
  - Enhance your cyber skills in engineering/development teams
  - Formalize your development process
- Think strategic and plan for the business and products

PLANNING YOUR APPROACH

- Implement a Risk Management Framework
- Start with the Basics
  - Critical Assets
  - Tracking Risks
  - Training Staff
  - Testing and Validation
- Determine your plan for future growth the align to your risk framework
- Consider everything you do and potential risks
- Doing it up front will save costs later

IMPLEMENT A SDLC



SUMMARY

- Right now there is fragmentation in the marketplace
- Need to approach problem from both organization and product perspective
- Work towards SDLC & Risk Management Maturity
- Create a Road map to make targets achievable

DESIGN. BUILD. SECURE

security@twelvedot.com

@encrypto99

www.twelvedot.com

How data analytics and AI are multiplying the impact of IoT

Yvan Gauthier

Head of AI Accelerator Data Analytics Centre

NRC Digital Technologies

NRC·CNRC

NRC.CANADA.CA

How data analytics and AI are multiplying the impact of IoT

Yvan Gauthier
Head of AI Accelerator
Data Analytics Centre
NRC Digital Technologies

05 May 2022

What we do at NRC

Over 2,100 scientists, engineers, technicians & specialists in 22 locations across Canada

VANCOUVER, BC
- Batteries, fuel cells and industrial tribology

VICTORIA AND PENTICTON, BC
- Optical and radio telescopes
- Adaptive optics

EDMONTON, AB
- Nanotechnology, electron microscopy

SASKATOON, SK
- Plant biotechnologies and plant-growth facilities

MISSISSAUGA, ON
- Advanced materials for digital manufacturing, printed electronics, smart objects, devices, sensors

LONDON, ON
- Additive manufacturing, product development, laser consolidation, micro-machining

OTTAWA, ON
- Aerospace, vaccines, construction, quantum, photonics, machine vision, big data analytics, metrology, materials characterization and testing

SAGUENAY, QC
- Aluminium and multi-materials assembly
- Hybrid manufacturing (extrusions, forgings, castings)

MONTREAL/BOUCHERVILLE/ ROYALMOUNT, QC
- Intelligent machining, robotics
- Medical devices, advanced biologics analytics, biomanufacturing plant

HALIFAX, NS
- Photobioreactors, bioprocessing
- Natural product chemistry, bioactive characterization

CHARLOTTETOWN, PE
- Natural product and functional ingredient development

ST. JOHN'S, NL
- Ocean engineering
- Ice and vessel management

NRC Digital Technologies

Making digital technologies smarter and more intuitive by exploring innovative uses of data to solve real problems

100+

SPECIALISTS

30+

YEARS OF EXPERIENCE IN AI

Wide network of world-class experts from top universities and leading institutes

COLLABORATION CENTRES

Colocating researchers and equipment with university, industry, and other government organization partners to support research excellence in areas in which Canada can excel.

Examples of interest:

- NRC Waterloo Collaboration on AI, IoT, and Cybersecurity
- CIC-NRC Cybersecurity Collaboration Consortium: Fredericton

SUPPORT TO CANADA'S INNOVATION SUPERCLUSTERS

Examples of interest:

- AI for Logistics Program (support to Scale AI supercluster)
- Collaboration Program to support Digital Technology supercluster

CHALLENGE PROGRAMS

Partnering with private and public sector, academic and other research organizations to advance transformative, high-risk, high-reward research that address Canadian priorities.

Examples of interest:

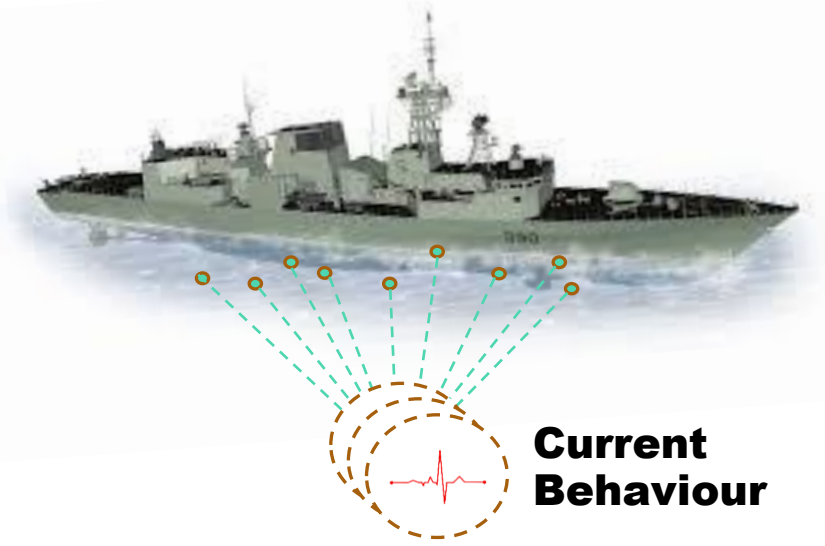
- High-throughput and Secure Networks
- Artificial Intelligence for Design
- Aging in Place
- Internet of Things: Quantum Sensors

How AI is multiplying the impact of IoT

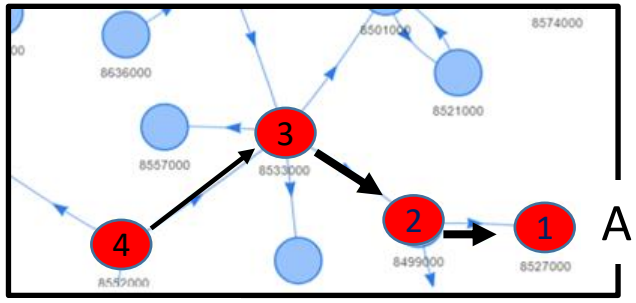
Some examples…

AI can make sense of large amounts of sensor data

- Navy Frigates have over 2,000 sensors reading equipment health data every half second
- AI can infer the causes and effects that occur between vessel components and trace any anomaly back to its root cause(s)
- Data can also be exploited for predictive maintenance



Detected Anomaly and Root Cause



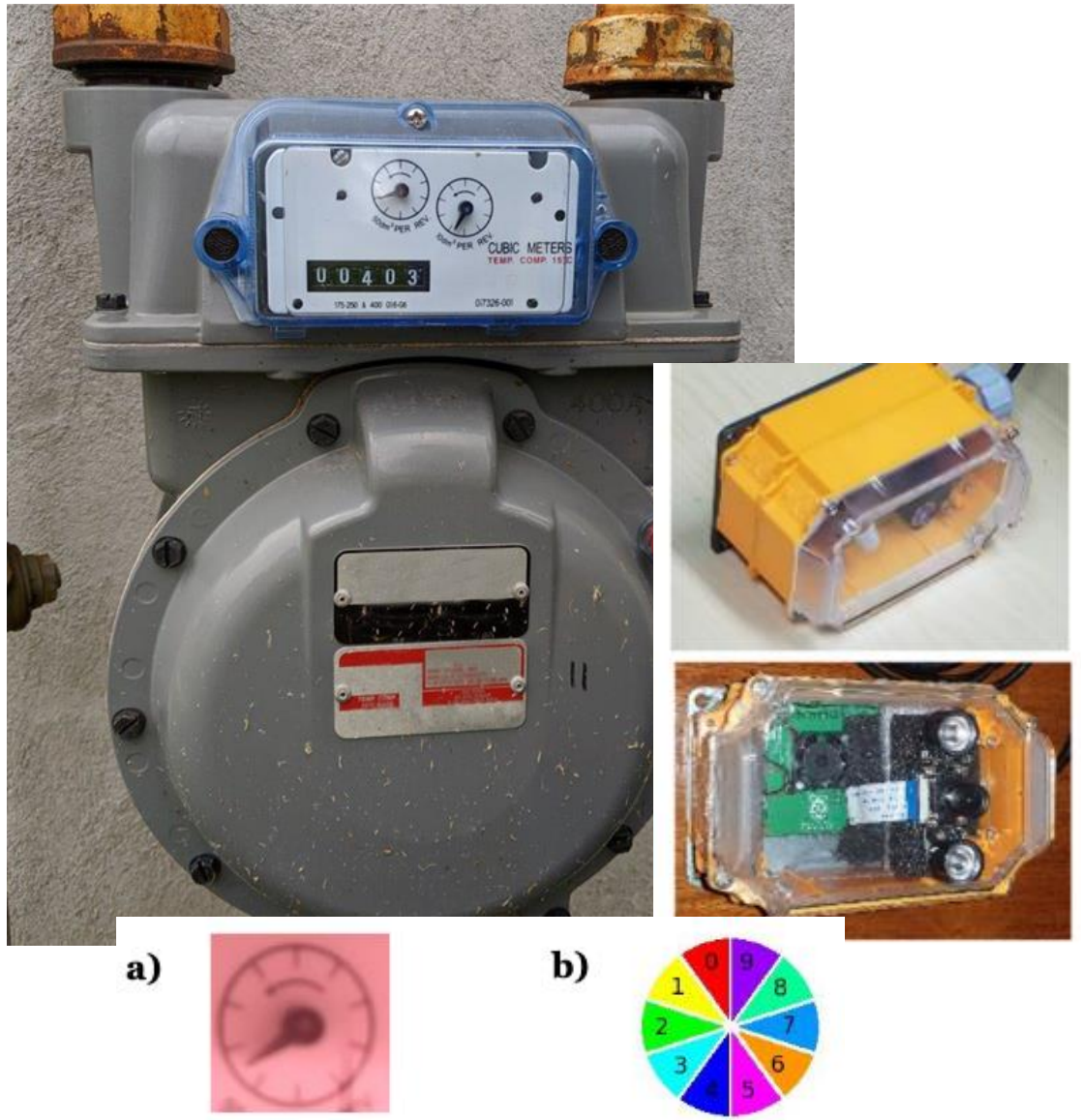
AI can process data locally and in real time

- Edge analytics reduces challenges in connectivity, latency, and energy consumption
- Also reduces privacy and security risks from centralization in cloud
- **Example:** IoT-enabled biosensors that can independently process environmental data and activate a real-time notification system

https://nrc.canada.ca/en/stories/laboratories-canada-supports-nrc-solution-real-time-environmental-monitoring

AI can teach old equipment new tricks

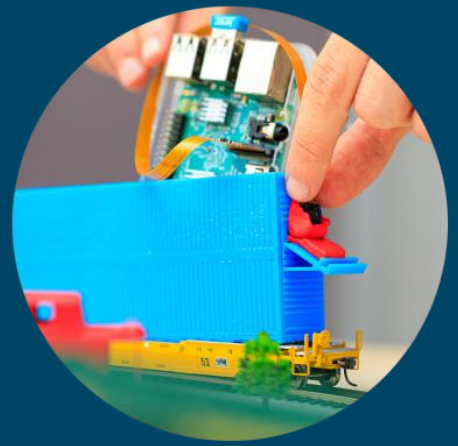
- Some analog equipment is prohibitively expensive to replace
- AI coupled with machine vision can automate labor-intensive (and error-prone) meter reading tasks
- NRC-GAMMA: Novel Large Gas Meter Image Dataset https://arxiv.org/abs/2111.06827



But launching into AI can be hard!

- **Starting small** helps to define requirements (for data, IT, talent, processes, governance, etc.)
- The first rule of machine learning is... do not start with machine learning!
- **Simpler approaches more likely to succeed** initially

Data Analytics Centre



Brings together experts in AI, analytics and IoT to help private and public-sector organizations to extract the most value from their data

NRC AI Accelerator

Delivers ***impactful***, ***innovative***, *and* ***responsible AI solutions and advice*** *supporting the* ***Government of Canada's*** *digital transformation*


Our AIoT journey is just beginning!

MERCI!
THANK YOU!

Yvan Gauthier • Head, AI Accelerator
yvan.gauthier@nrc-cnrc.gc.ca • @ygauthie

OUR COLLABORATORS

IoT North Conference – November 15-16

Presenting Sponsor

TELUS Business

Association Partners

Alberta IoT

AIoT CANADA

https://iotnorthconference.ca

Roundtable on National AIoT Strategy

IoT North Raison D'être

Canada's Internet of Things Conversation

Cross-pollination and mutual awareness across full IoT Space

Support growth of IoT/AI ecosystem **by AIoT Canada**

ThingkFest

ThingsHappen

iotNorth

Training: Digital Literacy through Internet of Things and Design Thinking

http://praxiem.com/digital-literacy-through-thingking

Workshops Overview and Instructions

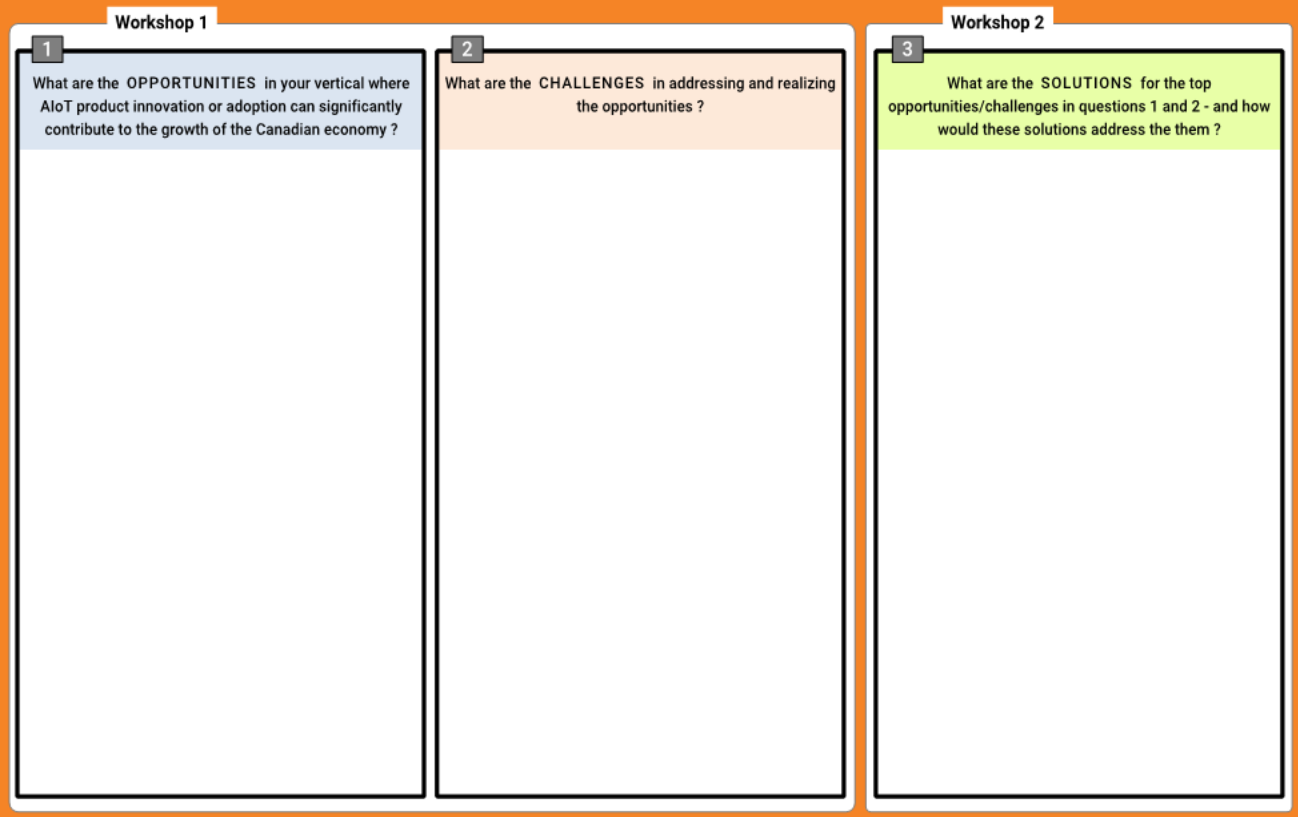
Nilufer Erdebil

CEO, Spring2 Innovation

WORKSHOPS

Tasks – Part 1

1. Consider and align on question meaning as a group
2. Individually write down your ideas and answers.
3. Share and discuss the qualities of individual responses, and any new ideas within group
4. Come to a consensus on the top answers to the question as follows:
   - Question 1: Top 3 Opportunities
   - Question 2: Top 3 Challenges
   - Question 3: Top 5 Solutions



SPRING2 innovation

AIoT CANADA

WORKSHOPS

Tasks – Part 1

5. Write down the top answers on the giant the wall stickie
6. Pick a group member to present the summary

OPPORTUNITIES

Answer 1
- sub-points
- ...

Answer 2
- sub-points
- ...

Answer 3
- sub-points
- ...

SPRING2 innovation

WORKSHOP 1

It’s time to work!