

# MAKE AI WORK FOR YOUR BUSINESS

A GUIDE TO OVERCOMING  
**FIVE** OF THE MOST  
COMMON CHALLENGES TO  
**AI ADOPTION**

# BACKGROUND

First coined in 1956, the term artificial intelligence (AI) was used to develop key concepts surrounding “thinking machines”. Today, AI is defined as the ability for machines to perform cognitive functions associated with the human mind. Global technology leaders such as Google and Amazon are reshaping their operations across all functions, creating limitless boundaries to where AI can take businesses. Referred to some experts as “the new electricity”, it is becoming apparent that artificial intelligence is a transformational technology and as such to remain competitive, it is vital for businesses to adopt AI solutions.

The following list of information and resources will give your business a starting point from which to solve some of the most common challenges to AI adoption.

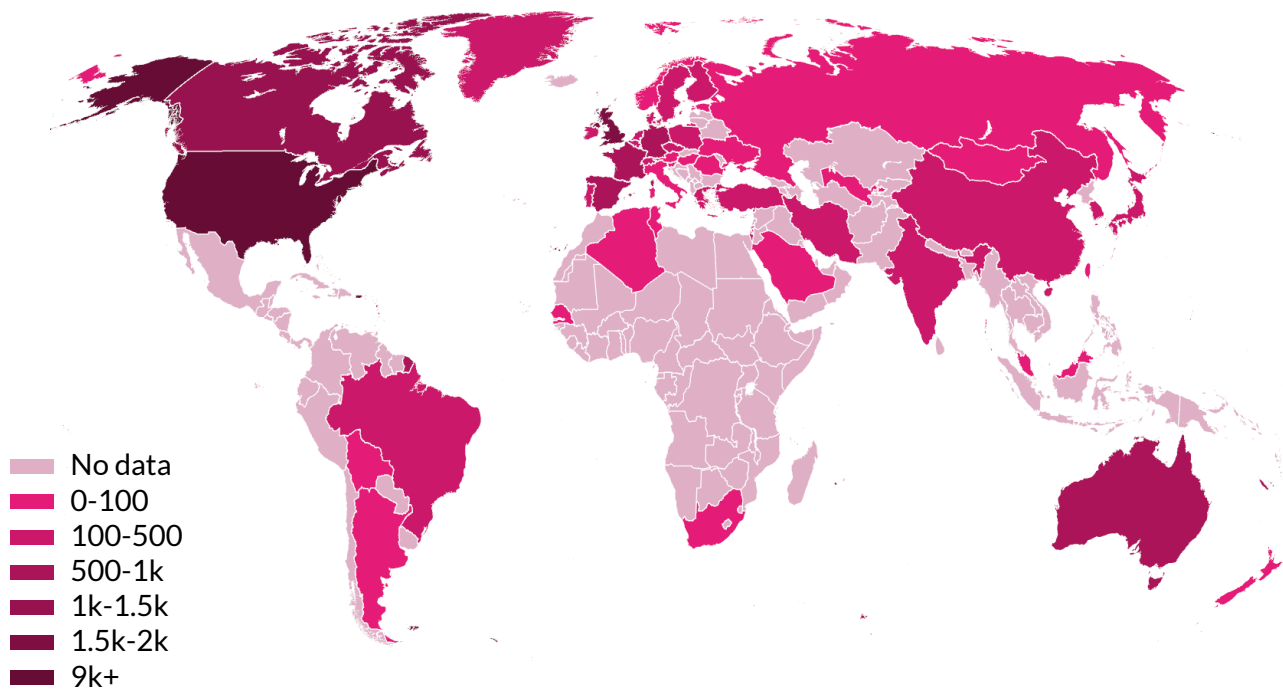


## 1. TALENT

The demand for AI talent has exploded over the last few years. Businesses looking to build their AI solutions require technically-adept teams of people with proficiency in understanding and applying machine and deep learning. This poses many challenges not only for businesses searching for the people to help them transform their business model, but also for the current workforce that needs to be reskilled in order to deploy it.

As a leader in the field for more than 30 years, Ontario is at the forefront of AI research and an international hub for the highly skilled talent that propels companies that use AI to augment human skills and knowledge. In fact, many of the world’s most prominent directors of AI research studied under Geoffrey Hinton at the University of Toronto, including those at Facebook, Google, Apple, OpenAI and Uber.

## Global distribution of AI talent



Data sourced from Global AI Talent Report 2018

### RESOURCES FOR RECRUITING AI TALENT

#### VECTOR INSTITUTE SCHOLARSHIPS IN AI:

The Vector Scholarships in Artificial Intelligence are merit-based awards that recognize top candidates pursuing AI-related studies in master's programs recognized by the Vector Institute for Artificial Intelligence or who are following an individualized study path that is demonstrably AI-focused in Ontario, Canada.

#### CANADA'S GLOBAL SKILLS STRATEGY

The Global Skills Strategy provides businesses in Canada with a faster way to bring in global talent in order to scale-up and grow—creating better jobs for more Canadians.

#### OINP ENTREPRENEUR STREAM

Under the Ontario Immigrant Nominee Program (OINP), entrepreneurs from outside of Canada looking to start a new business or buy an existing business in Ontario can be nominated for permanent residence.

#### NextED

NextED is offering a unique program for both executives and employees of large and medium-sized enterprises, called: AI Business Strategy & Application, which helps participants understand the implications of data and AI, as well as create strategy and technical insights to adopt AI into their businesses.

A sample of AI-related post-secondary education programs in Ontario

<b>University of Guelph</b>	Master of Science/Master of Applied Science (collaborative specialization in AI)
<b>Queen's University</b>	Master of Management in Artificial Intelligence (Smith School of Business)
<b>Ryerson University</b>	Master of Engineering (Electrical, Computer and Biomedical Engineering, AI)
<b>University of Ottawa</b>	Master of Computer Science (Applied AI) (French)
<b>University of Toronto</b>	Master of Management Analytics
<b>University of Waterloo</b>	Master of Mathematics (Computer Science) & Master of Mathematics (Statistics), Data Science Specializations
<b>Western University</b>	Master of Data Analytics (Artificial Intelligence)
<b>York University</b>	Master of Science (Computer Science, AI)

For more fulsome, up to date information, visit **Vector Institute's list of AI-related programs**.

## AI TALENT MEET-UPS

Hosting or attending informal meet-ups is a great way to complement your company's recruitment strategy. Here are two you might like to check out:

- **Toronto AI Tech Talks Group (AITTG)** is a public group that hosts events to bring you the latest practical technology on AI, machine learning, deep learning, data science and big data.
- Organized by Intergrate.ai, **AI in the 6ix** is a casual gathering to share code challenges, best practices, new libraries and practical tips across the Toronto tech community.



## 2. DATA

The fuel for AI is clean and precise data. There are several ways a business might go about collecting quality data or enhancing its current data with quality information. Any data that is collected needs to align with the company's specific needs. Programs in Ontario exist to help companies find public data sources or discover and unlock the value of their own data.

### THE COMMUNITECH DATA HUB

Communitech is building an ecosystem of companies that want to work with data and helping them to realize the insights they can unlock from various sources of data across many industries.

### MaRS DATA CATALYST

MaRS Data Catalyst is dedicated to opening up and sharing data with those who are best suited to use it to solve complex and important problems. Data Catalyst focuses on energy, healthcare, open data and the innovation economy.

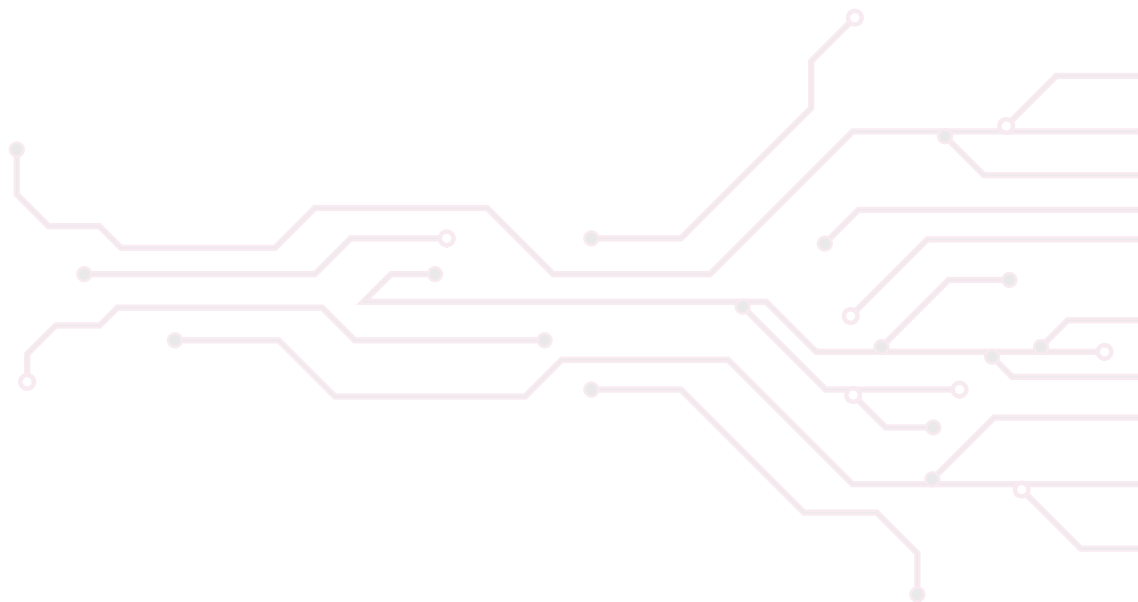
### ADDITIONAL RESOURCES FOR ACCESSING OPEN DATA

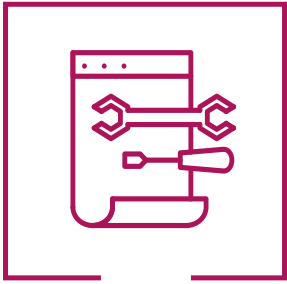
### ONTARIO OPEN DATA CATALOGUE

The Ontario government is opening up data from agricultural yields to transportation data. This list is constantly being updated.

### OPEN DATA EXCHANGE

The Open Data Exchange allows you to search open data that is relevant to Canadians, learn how to work with datasets and see what people have done with open data across the country.





### 3. INFRASTRUCTURE & TOOLS

Digital investments and strategy are key ingredients to succeeding with AI. AI technology requires mass amounts of data and a robust IT infrastructure. Cloud computing, mobile, web, big data and advanced analytics are all aspects that make the entry into AI easier. Businesses that have a weaker digital foundation will need to increase their digital transformation efforts.

#### LIST OF AI TOOLS:

##### 1. TENSORFLOW

TensorFlow is one of the most well-maintained and extensively used open source machine learning frameworks. Created by Google, TensorFlow is now widely used by several companies, including Dropbox, eBay, Intel, Twitter and Uber.

##### 2. MICROSOFT COGNITIVE TOOLKIT

Microsoft Cognitive Toolkit (previously referred to as CNTK) is an AI solution that trains deep learning algorithms to function like the human brain.

##### 3. CAFFE

Caffe (Convolutional Architecture for Fast Feature Embedding) is a machine learning framework that focuses on expressiveness, speed and modularity.

##### 4. THEANO

Theano is an open source Python library that helps simplify the process of defining, optimizing and assessing mathematical expressions to easily fashion various machine learning models.

##### 5. KERAS

Keras is an open source software library created to simplify the creation of deep learning models and is written in Python, allowing it to be deployed on top of other AI technologies such as TensorFlow, Microsoft Cognitive Toolkit (CNTK) and Theano.

##### 6. ACCORD.NET

Accord.NET is a production-grade scientific computing platform. Due to its extensive range of libraries, it allows users to build various applications in artificial neural networks, statistical data processing, image processing and many others.



## 4. TRUST

Ethics surrounding AI is a fairly new concept and one of the greatest challenges a business will face when applying it. Accountability, privacy and transparency are key principles to ethical AI. Ryerson University and Deloitte's **Privacy by Design** framework can help your business apply AI in an unbiased, ethical fashion.

*"At Microsoft, our goal is that AI systems amplify human ingenuity. Ethical decision making frameworks help ensure we are building AI systems based on a set of shared values and principles, and we are excited that companies like integrate.ai are helping drive clarity for business leaders as they consider development and deployment of AI systems."*

**ANDREE GAGNON**, Assistant General Counsel,  
Microsoft Canada

### PRIVACY BY DESIGN

Privacy by Design is an internationally recognized framework based on the premise that privacy should be proactively embedded into the design, operation and management of IT systems, networked infrastructure and business practices.

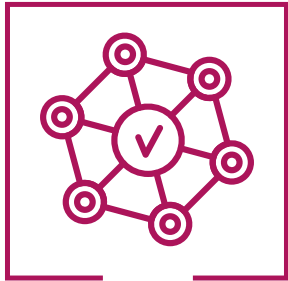
The Office of the Privacy Commissioner of Canada has developed a number of resources to help businesses better understand their obligations under the **Personal Information Protection and Electronic Documents Act (PIPEDA)**, and how the Act applies in certain situations and to specific issues.

### RESPONSIBLE AI IN CONSUMER ENTERPRISE

Integrate.ai's software platform helps traditional consumer businesses ignite growth and out-innovate competitors. Customers tap into a vast network of signals and insights about consumer behaviour that make smarter AI systems, all the while preserving privacy, security and trust.

**ADDITIONAL  
RESOURCES**  
to help businesses  
better understand  
their obligations under  
PIPEDA

**OFFICE OF  
THE PRIVACY  
COMMISSIONER –  
business advisors**



## 5. RELATIONSHIPS

In addition to being North America’s second largest IT cluster, Ontario offers a collaborative environment unique to small, open and connected economies like Canada’s. Businesses come here for Ontario’s strengths in research, and its rich diversity lends well to those who build products to scale in international markets.

Here are some of the AI-focused incubators and accelerators, academic programs and major investors that are a part of Ontario’s world-renowned AI innovation ecosystem.

### Ontario’s AI Innovation Ecosystem



#### LEARN MORE ABOUT ESTABLISHING AN AI R&D HUB IN ONTARIO:

InvestInOntario.com | Info@InvestInOntario.com | @InvestOntario  
 1-416-313-3469 or 1-800-819-8701 (North America)

All figures are in Canadian dollars unless otherwise noted. This information is accurate at the time of printing.