

**AI SINGAPORE**

## AI in the Insurance Industry

# Copyright

“The contents herein may not be used or reproduced partially or otherwise in any form or by any means without the express written permission of AI Singapore. AI Singapore is a national programme funded by the National Research Foundation and the programme office is hosted by the Office of the Deputy President (Research & Technology) of the National University of Singapore.”

# Disclaimer

The views expressed in this presentation are my own and do not represent the opinions of any organization whatsoever with which I have been, am now, or will be affiliated.

# About AI Singapore (AISG)

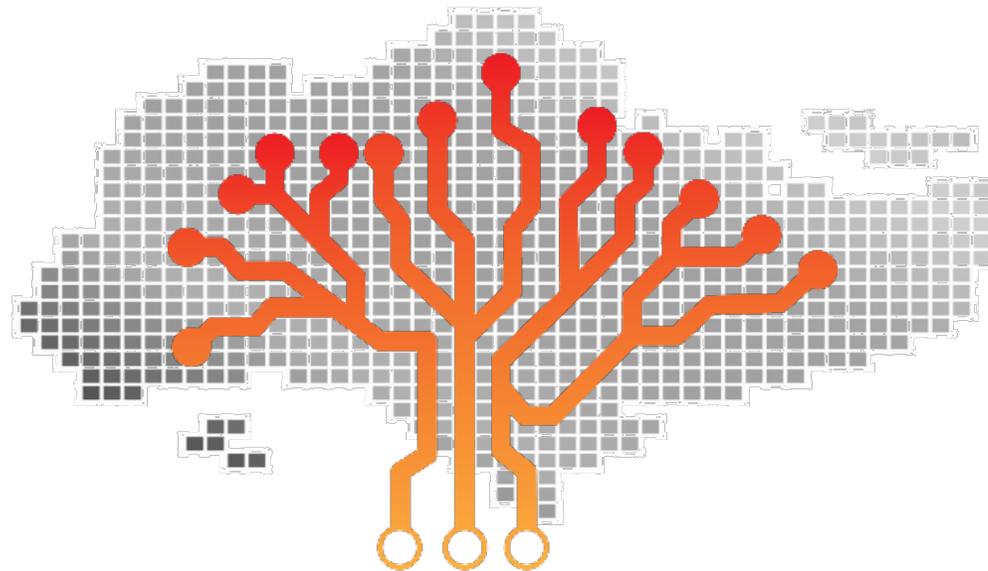
To anchor **deep national capabilities** in AI, thereby creating **social and economic impacts**, grow **local talent**, build an **AI ecosystem** and put Singapore on the world map

## Programme Coordinating Agencies

**NATIONAL RESEARCH FOUNDATION**  
PRIME MINISTER'S OFFICE  
SINGAPORE



SMART NATION  
&  
DIGITAL GOVERNMENT OFFICE



**AI SINGAPORE**

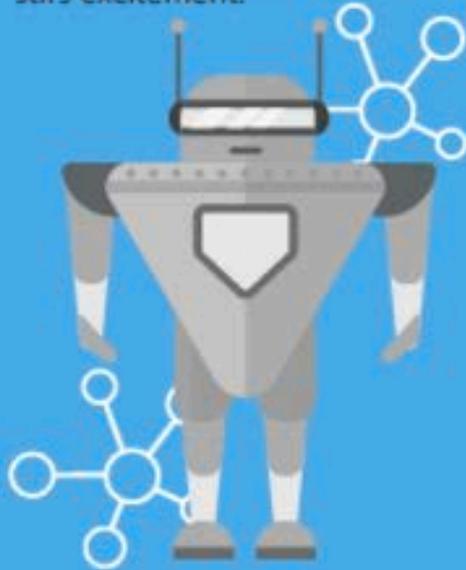
## Funded Universities & Research Institutions



**AI SINGAPORE**

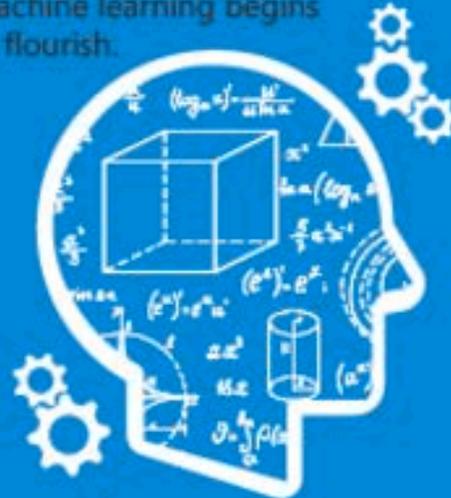
# ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



# MACHINE LEARNING

Machine learning begins to flourish.



# DEEP LEARNING

Deep learning breakthroughs drive AI boom.

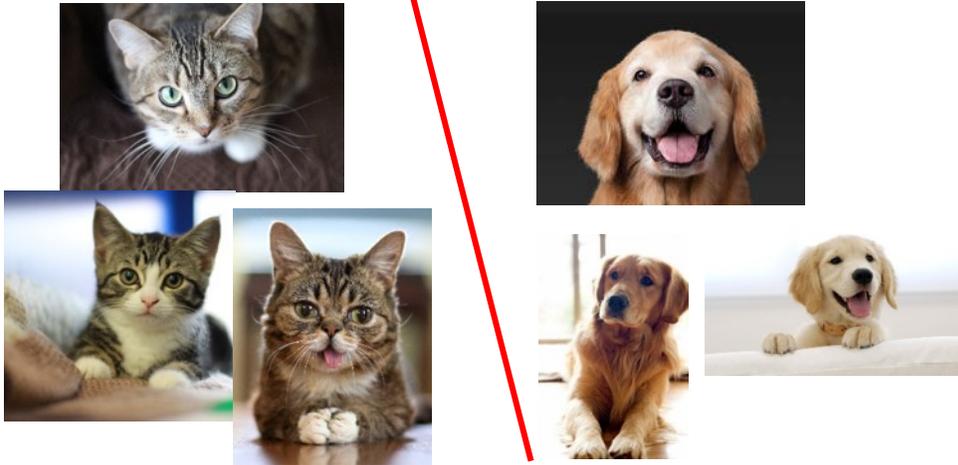


Since an early flush of optimism in the 1950's, smaller subsets of artificial intelligence - first machine learning, then deep learning, a subset of machine learning - have created ever larger disruptions.

Image from <https://www.peter-doherty.com/posts/ai-and-its-cousins/>

# Machine Learning Crash Course

## Supervised learning

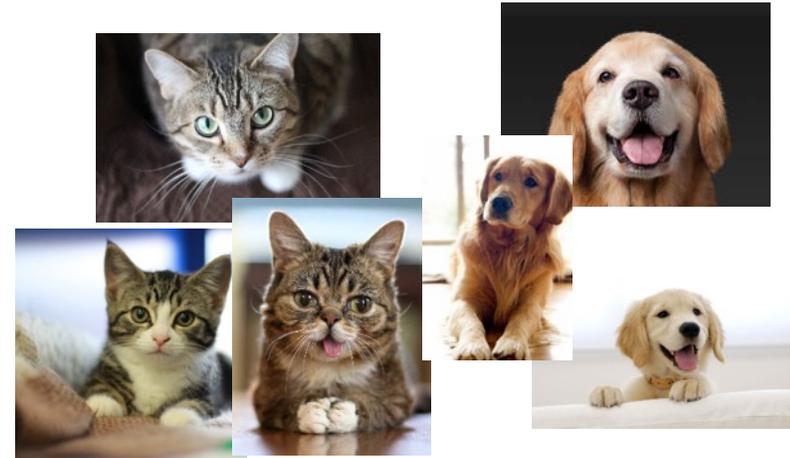


This looks like the dogs I saw before, it should be a dog too

It has different names in different contexts:

- predictive modelling
- pattern recognition
- ...

## Unsupervised learning



I can see there are two types of animals. But I don't know what they are. Can anybody tell me what they are?

# Example AI Use Cases in the Insurance Industry



## Product

Improving risk understanding & pricing:

- Better segmentation to identify new insurable risk
- Granular pricing



## Marketing

Improving consumer profiling:

- Propensity to buy models to help identify who are more likely to buy a product



## Underwriting

Selecting better risks:

- Predictive UW model to identify good risks
- Simplified underwriting can also help to increase sales



## Policy administration

Improving customer retention

- Proactively engage those who are more likely to lapse



## Claims

Lowering claims:

- Fraud detection model to spot fraudulent claims

## Sompo Holdings Asia wins AI Award for General Insurance

*The company received the award for its AI-powered fraudulent claims detection initiative for enhanced claims processes.*

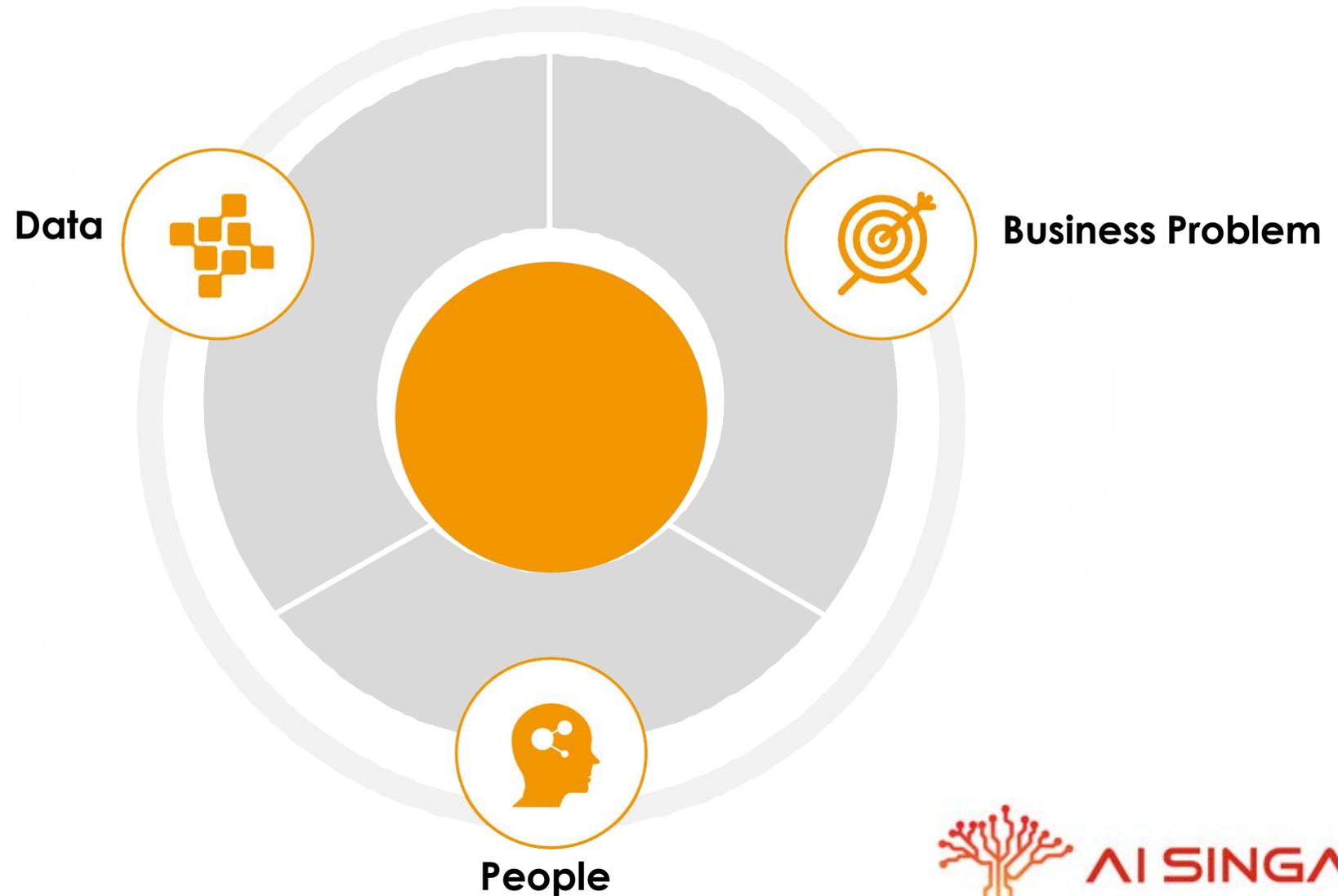
Sompo Holdings (Asia) Pte. Ltd. (Sompo Asia) received the AI Award for general insurance during *Singapore Business Review's* recently concluded Technology Excellence Awards.

Sompo Asia has been a market leader in Asia's non-life insurance industry with over 70 years of trusted presence in the region outside Japan, providing solutions to ensure customers' security, health and wellbeing worldwide. It is part of the century old Sompo Holdings headquartered in Tokyo, Japan.

Collaborating with AI Singapore (AISG) under their flagship 100 Experiments Programme, the project is a result of the company's need to resolve the roadblocks it encountered when it came to fraudulent detection of travel and personal accident claims. Recognizing Sompo Insurance Singapore as a good talent resource for developing their AI team, Sompo Asia invited its subsidiary to join this project.



# It Is Not Just About Technology



# Is Actuary an Endangered Profession in the Age of Artificial Intelligence?

Published on July 22, 2017



**Mahesh Kashyap** | [Follow](#)

Leveraging AI for Financial In...



38



7



2



**AI SINGAPORE**

# A Comparison

## Actuarial Science

## AI



- The Law of Large Numbers is a key principle
- As the number of exposure units, or policyholders, increases, the probability is higher that the actual loss per exposure unit will equal the expected loss per exposure unit. The focus of actuarial modelling is how to set the right premium for a risk pool (a cohort of policies).

- A model is built to learn the pattern from historical data. And the model is applied in new data to predict the probability that certain event would happen on individuals.
- Focus on model's generalization capability



- Actuarial modelling combines data analysis and subject matter expertise
- Problems solved are almost always financial
- Risk-oriented

- Raw outcome is usually a probabilistic score.
- Involved in wide range of problems not just financial, e.g. optimizing customer experience
- Opportunity-focused



- A global explanation is important e.g. male is x% more likely to claim than female; GLM is widely used
- Less use of unsupervised learning approaches

- A wider selection of techniques are commonly used. Some are more complicated, e.g. random forest, neural network, and do not give coefficients as GLM does.
- Unsupervised learning is applied when no clear target variable is available



- Actuaries predominantly focus on attributes directly applicable to problem statement
- Reliant on data but has to fill in gaps with expert knowledge

- Usually looks at as many attributes as available
- Structured, unstructured, labelled, unlabelled

# More collaboration between Actuarial Practice and AI Should be Fostered and Promoted



CASUALTY ACTUARIAL SOCIETY

## 2020 HACHEMEISTER PRIZE ANNOUNCEMENT

05/19/2020 —

The 2020 **Hachemeister Prize** has been awarded to Ronald Richman for his paper, "**AI in Actuarial Science**," presented at the 2019 ASTIN Colloquium. The Charles A. Hachemeister Prize is awarded annually to ASTIN Bulletin or ASTIN or AFIR Colloquium paper(s) based on several criteria but with emphasis placed on the paper's impact for North American actuaries and its practicality of application.

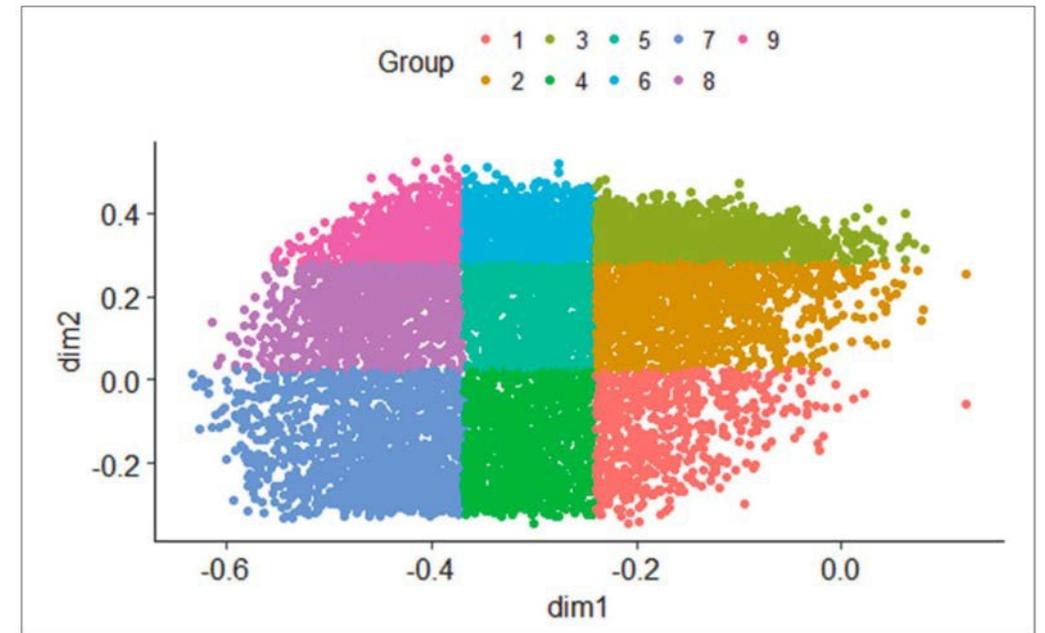
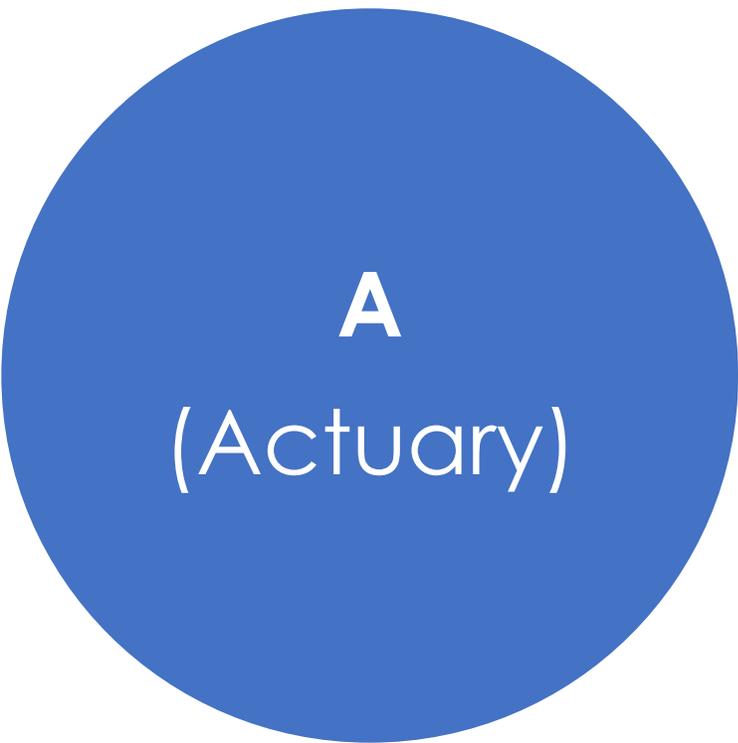
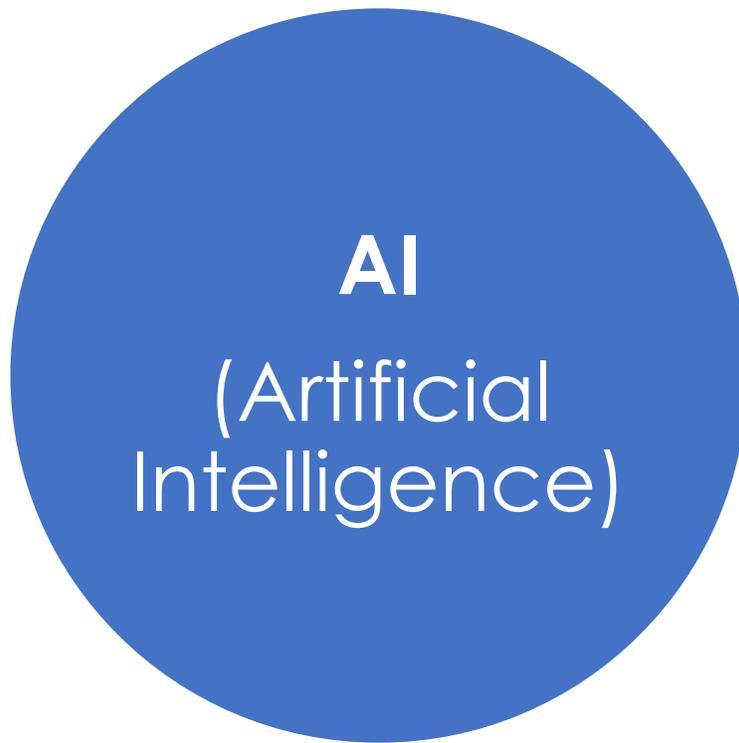


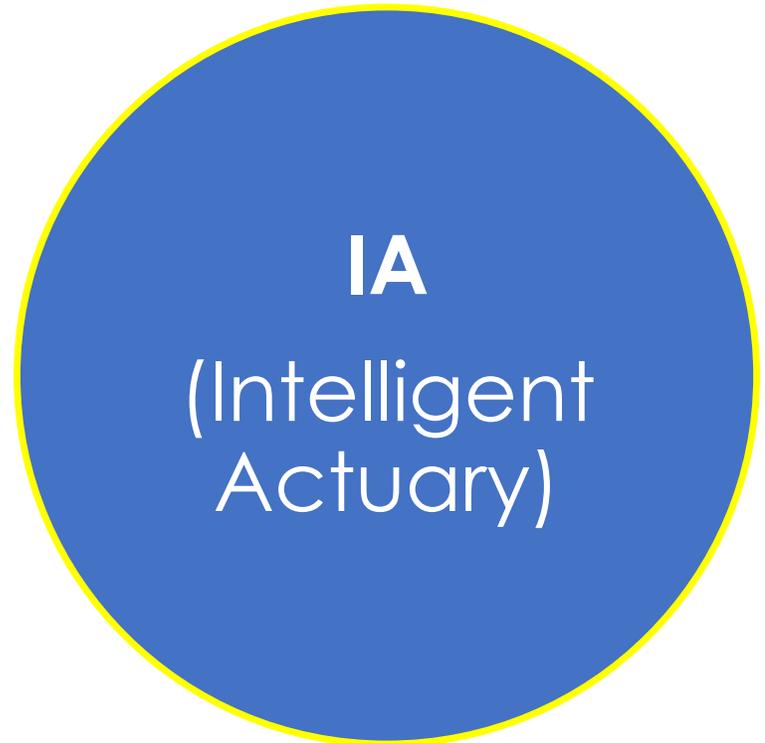
FIGURE 14 Heatmaps encoded using a convolutional autoencoder and grouped by quantile of the encoded distribution



+



=



# THE DATA SCIENCE HIERARCHY OF NEEDS

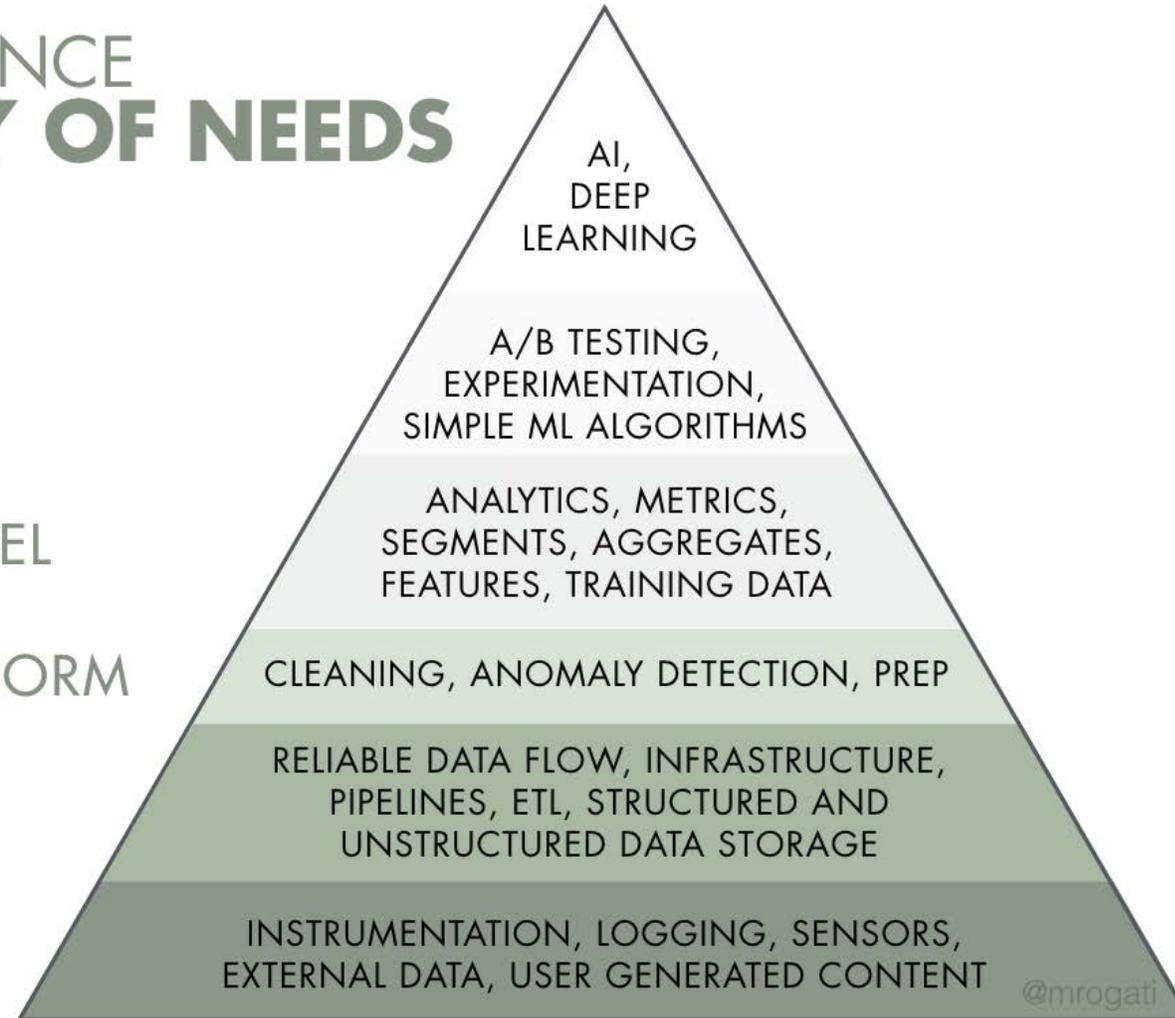
LEARN/OPTIMIZE

AGGREGATE/LABEL

EXPLORE/TRANSFORM

MOVE/STORE

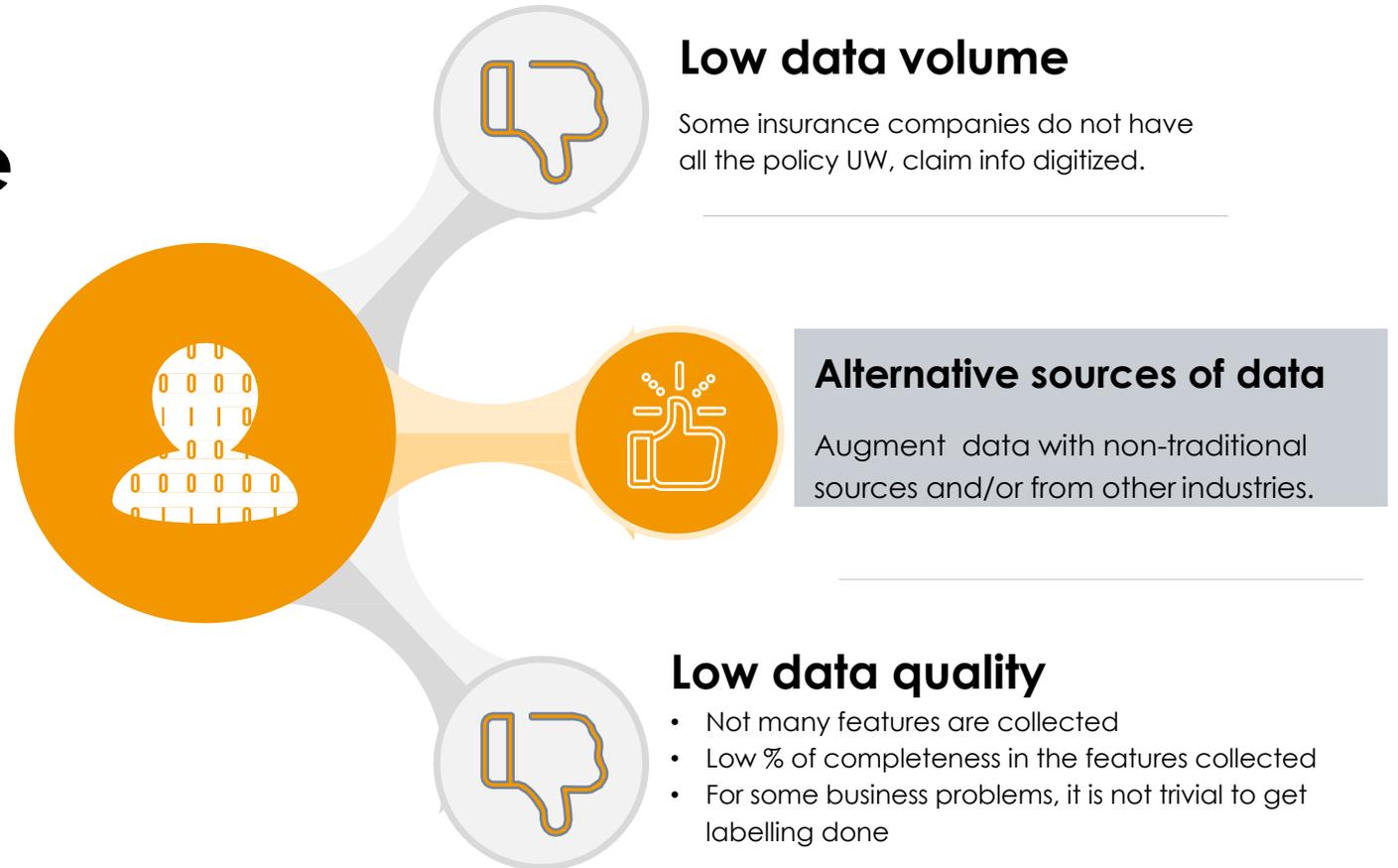
COLLECT



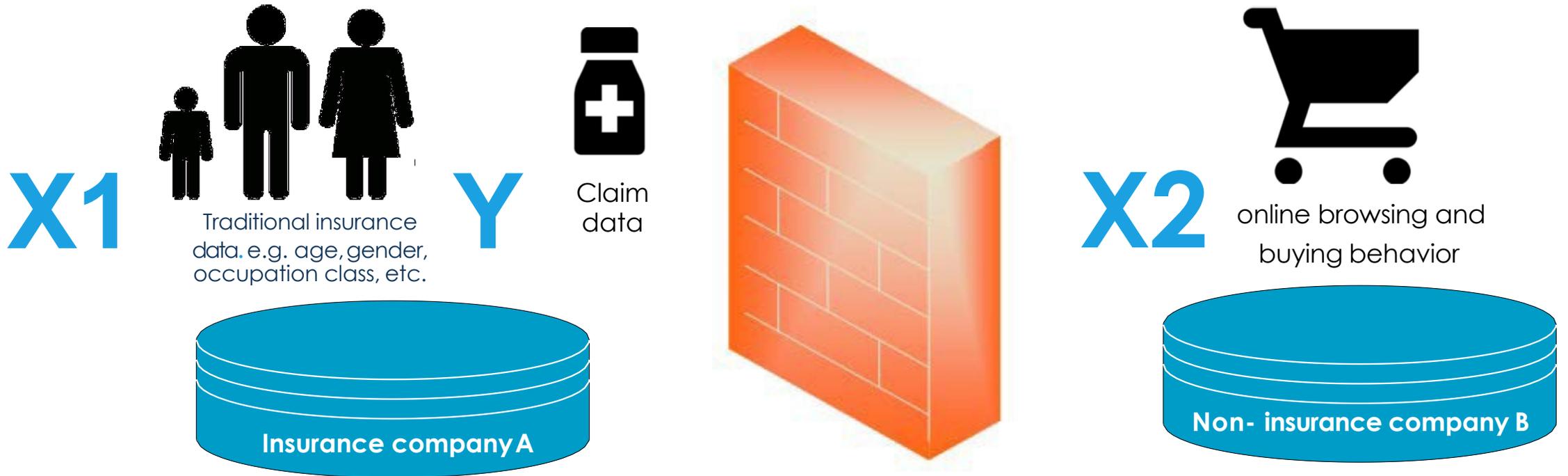
# Most LoBs in the Insurance Industry are low-frequency by nature

Typically, insurance companies have two touch points with their customers:

- when a customer buy or renew a policy, or
- when a customer claims



# Example: Alternative Sources of Data



# On the other hand, Privacy!

## PERSONAL DATA PROTECTION ACT (PDPA)



### Personal data

is defined as information which identifies a person directly or indirectly



### Benefit of PDPA

is protection of consumer rights by supervision of service providers



May 27, 2019

### PHASE 1

PDPA board and office established under Digital Economy and Society Ministry; 12 laws issued within 180 days\*

May 28, 2020

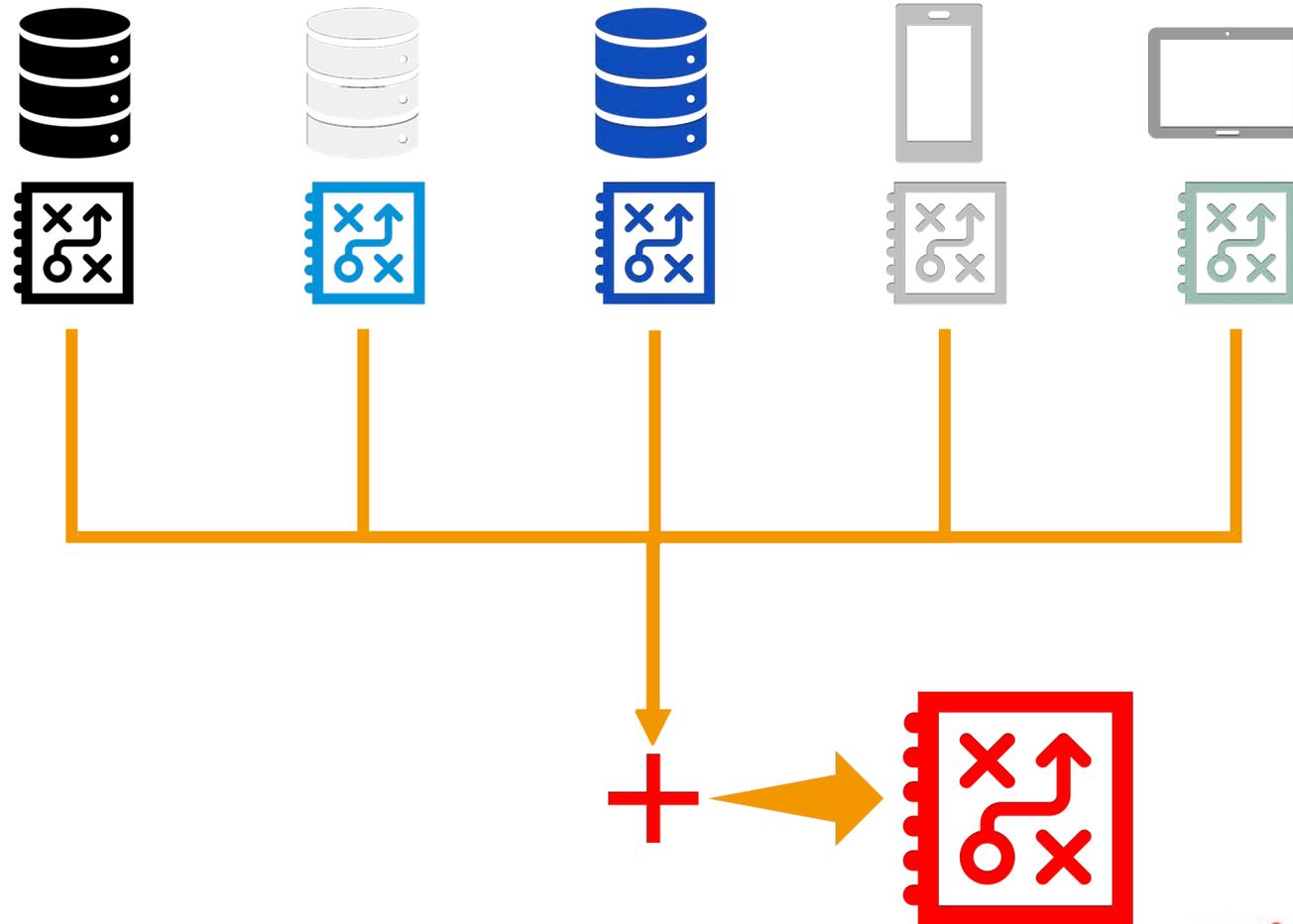
### PHASE 2

29 laws issued, such as protection of personal data, use and disclosure of personal data, complaint and dispute resolution, civil responsibility, penalties.

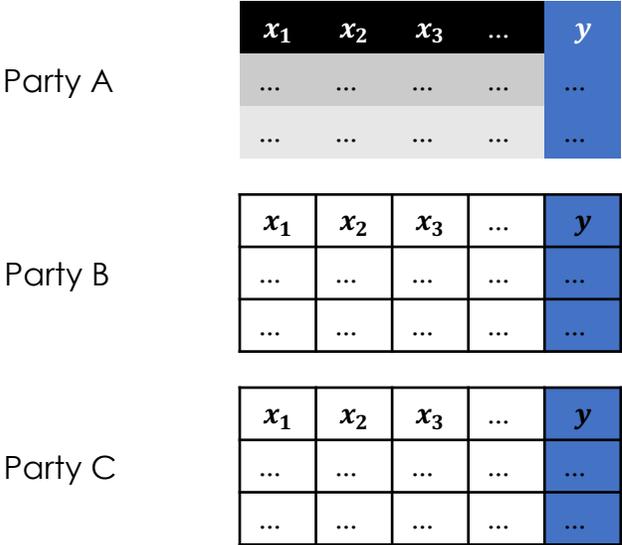
\*One-year grace period for enterprises applies until May 28, 2020



# Federated Learning - Share Models instead of Raw Data

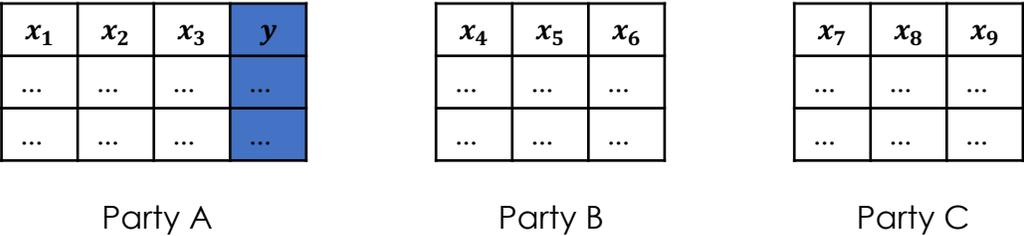


# Two Main categories of Federated Learning



**Horizontal FL** for homogenous data across different parties.  
**Potential use cases:**

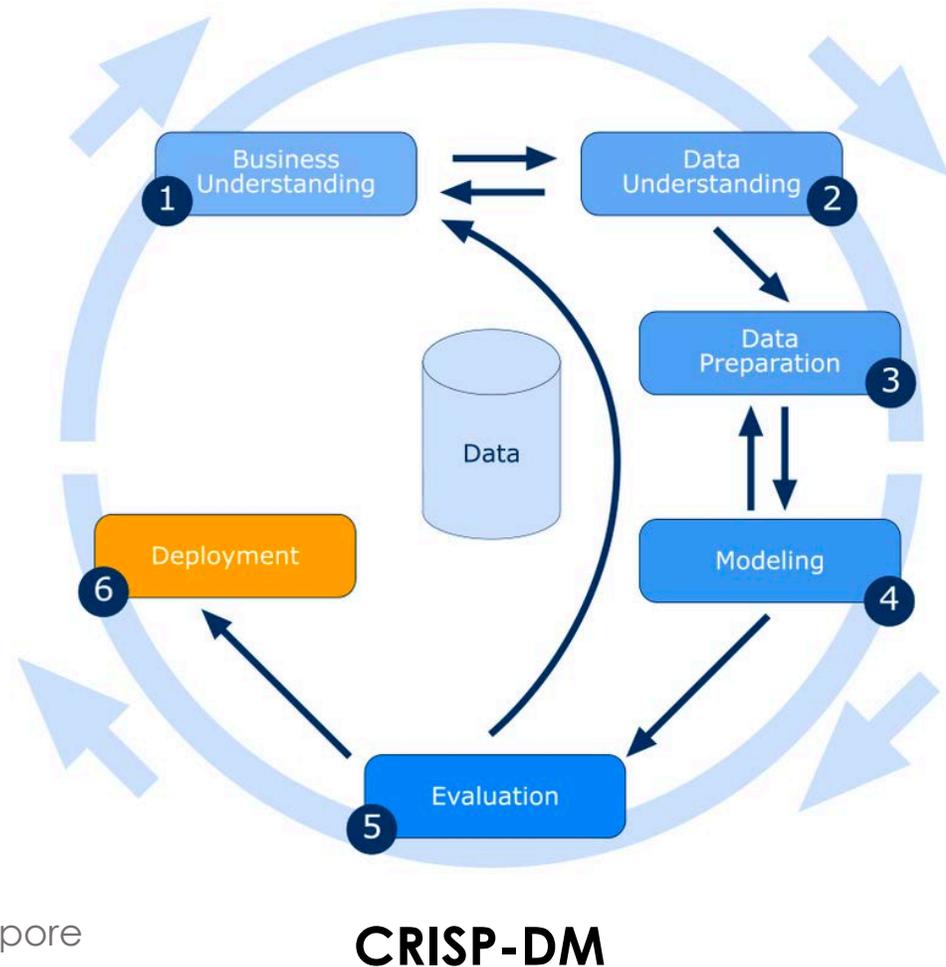
- ML with data across different jurisdictions within on MNC
- CV with feeds from massive surveillance camera network



**Vertical FL** for heterogenous data across different locations  
**Potential use cases:**

- Collaborative ML with data from different organizations, e.g. insurance with e-commerce / telco

# Business Problem Will Guide All Other Activities



## Common pitfalls

- This is the data we have. Now please **make AI happen**
- AI = BI
- AI is magic, it can help us in solving every and any problem:



Predict whether a life assured is going to claim because of cancer in future



Predict whether a life assured is going to claim in future



**AI SINGAPORE**

# AI Adoption Journey



**Educate**

AI4E™ / AI4I



**Explore**

AI Clinic



**Discover**

AI Discovery



**Prepare**

Data Readiness



AI Project



Enterprise

- Knowledge
- General Public
- What is AI
- Online/ Lecture

- Theme/Domain Specific
- Share use cases
- Generate Ideas
- 5 to 10 companies
- Face to Face
- 2 hours +

- Consulting
- Single company under NDA
- Explore biz issues
- Prelim data assessment
- Recommend actions
- ½ FTF + pre/post 2 to 3 days

- Data labeling
- Data transformation
- Data cleansing
- Data workflow preparation



We are here to support you.  
Scan this to contact us



**AI SINGAPORE**

# Key Takeaways



01. AI has a role to play in multiple areas in the insurance industry

---

02. AI and Actuarial Science should work hand in hand

---

03. People and Data are important assets for successful AI adoption and applications



Thank you

[www.aisingapore.org](http://www.aisingapore.org)