



CONSEIL/FORMATION

EcoTech Quebec Artificial Intelligence 101

Presented by Johan Saba (j.saba@seedai.ca)

Business Translation



Business Translation

The Need for Domain Expertise

*"Many organizations **focus on the need for data scientists**, assuming their presence alone will enable an analytics transformation. But **another equally vital role** is that of **the business translator** who serves as the **link between analytical talent and practical applications to business questions**. In addition to being data savvy, business translators need to have deep organizational knowledge and industry or functional expertise."*

250K

Data scientists shortage

2M – 4M

Business translators
shortage

Source : McKinsey Global Institute, December 2016

Understanding before undertaking

Careful with « false good ideas »

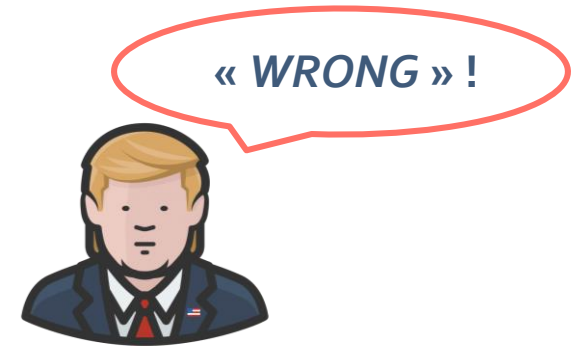
Exchange rates are made of **tabular data**, impacted by economical factors (GDP, interest rates, etc.). There is a **lot of historical data**, so I should be able to **easily predict the EUR/USD exchange rate** 12 or 24 months in advance !



Understanding before undertaking

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Exchange rates are made of **tabular data**, impacted by economical factors (GDP, interest rates, etc.). There is a **lot of historical data**, so I should be able to **easily predict the EUR/USD exchange rate** 12 or 24 months in advance !



The investment team did not understand the limitations of models and technical tools



The technical experts did not understand the factors impacting exchange rates

Out bet



Develop a **high level understanding of data science**, what is can and can't do, **for domain experts...**



...to enable them to **have better ideas** and find the relevant opportunities for value creation in their organization...



...before bringing a **technical expert** in to **evaluate the feasibility** of the suggested ideas and **help prioritize** them

Artificial Intelligence: A few definitions



Artificial Intelligence

A definition

Artificial intelligence refers to the set of techniques that enable the machine to simulate traits of human intelligence. This include planning, language comprehension, optimization, object/image/sound recognition and the capacity to learn.

Weak AI



Strong AI



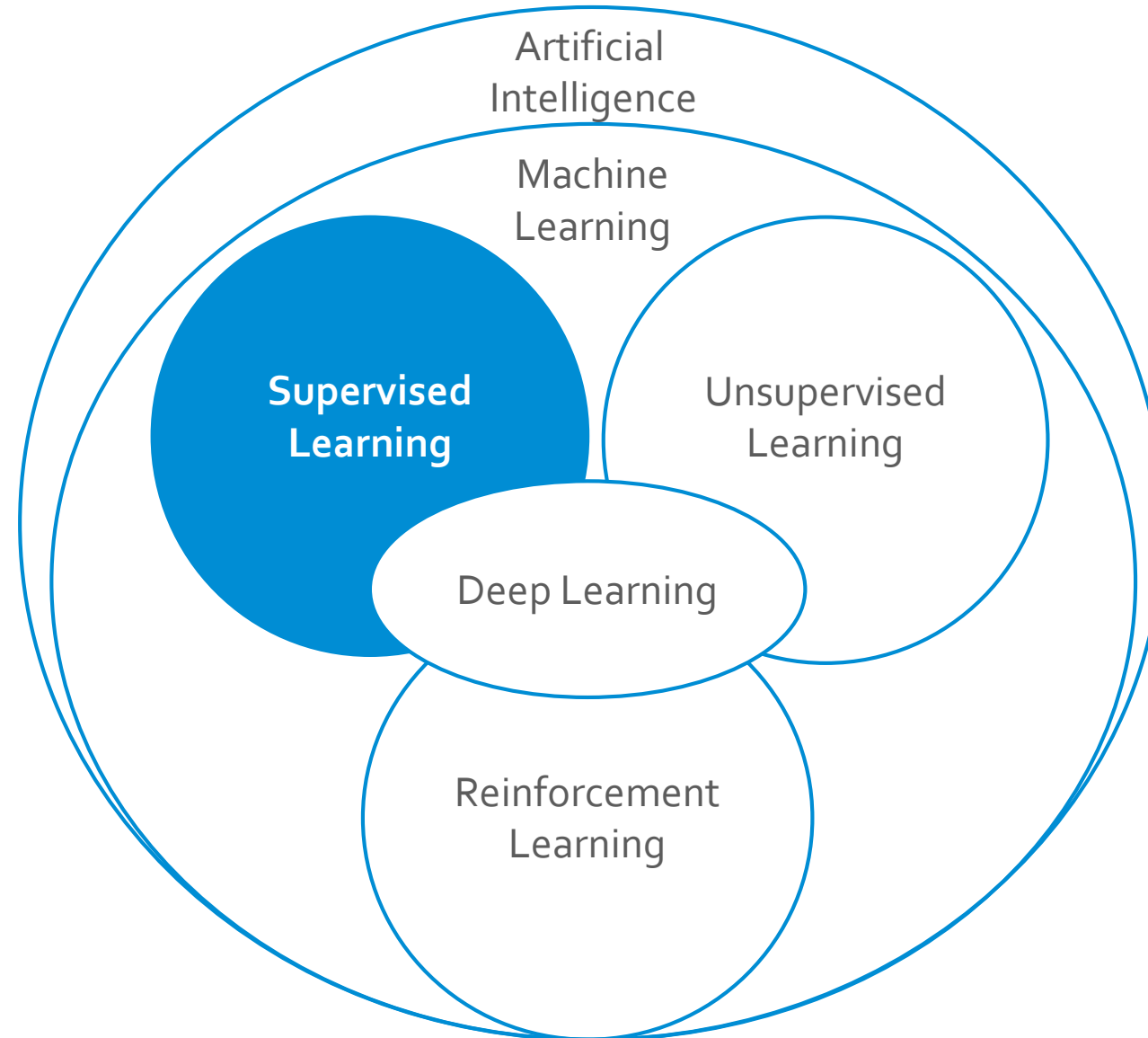
Machine Learning

A definition

« A computer program is said to **learn from experience** E with respect to some class of tasks T and performance measure P , if its **performance at tasks** in T , measure by P , **improves with experience** E »

- Tom Mitchell (1997)

Families of Machine Learning Algorithms



Supervised Learning Definition

Supervised learning refers to learning techniques that automatically produce rules based on a learning data set containing “examples”.

	Nb.bed.	Area	Neigh.	.	.	Price
x_0	1	0	0	0	0	y_0 125000
x_1	1	100	1	.2	.5	y_1 150000
x_2	3	200	0	.1	.2	y_2 350000
x_3	1	150	1	.4	.1	y_3 275000
x_4	2	210	2	.5	1.1	y_4 225000

X
 Y

	Nb.bed.	Area	Neigh.	.	.	Price
x_0	1	0	0	0	0	y_0 ?
x_1	2	50	1	.3	.8	y_1 ?
x_2	1	100	1	.5	1.4	y_2 ?
x_3	4	170	0	.7	.4	y_3 ?
x_4	1	120	3	.9	.5	y_4 ?

X^{new}
 Y^{new}

Supervised Learning

Common use

Certain predictive models can also reveal precious information to better understand the impact of some explanatory variables on the variable to predict during a descriptive analysis.

Prediction



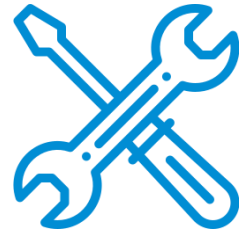
Inference



Supervised Machine Learning

Use-case examples

Predictive maintenance



Defect detection on production lines



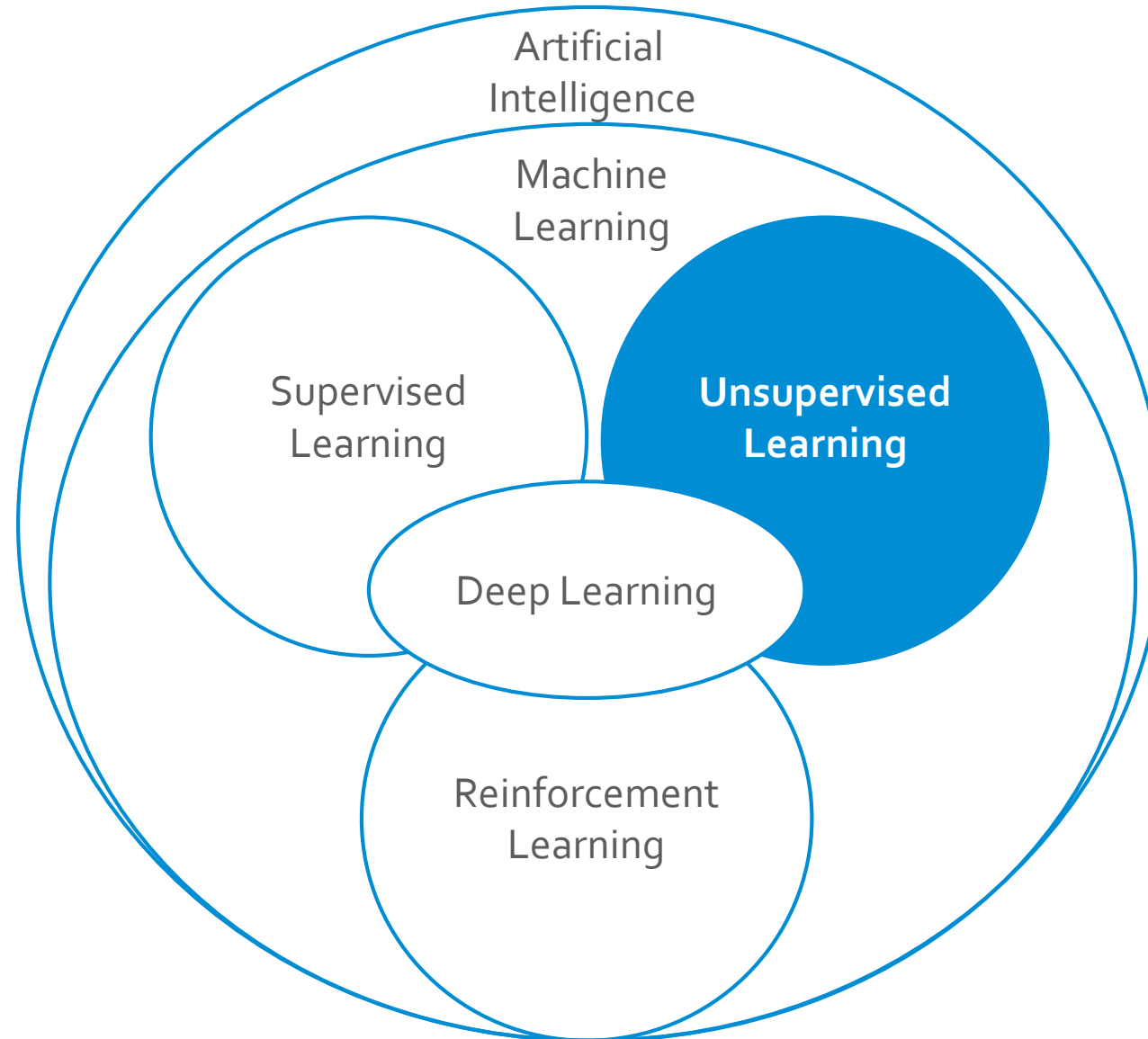
Prediction of supply and demand



Automatic document review
(e.g. emails, bills, etc.)

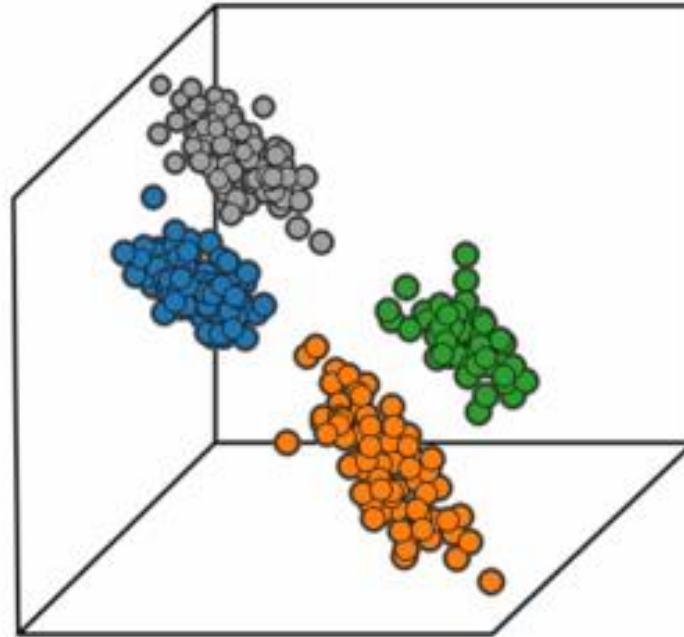


Families of Machine Learning Algorithms



Unsupervised Learning Definition

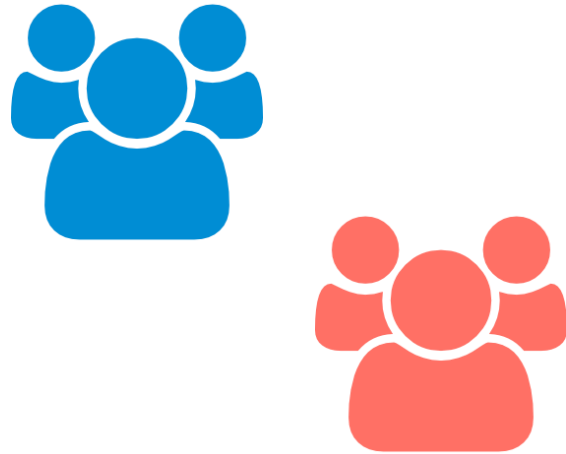
Consist in identifying and exploiting underlying structure in the data



Unsupervised Learning

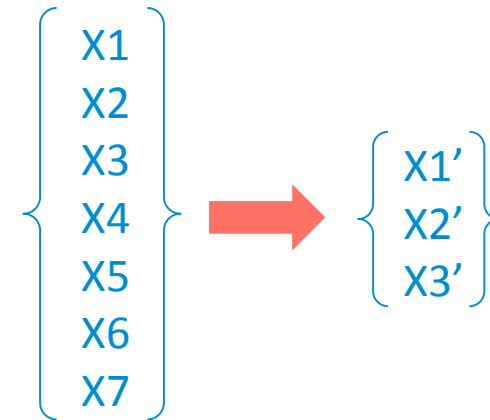
Common use

Clustering



Regrouping observations

Dimensionality Reduction

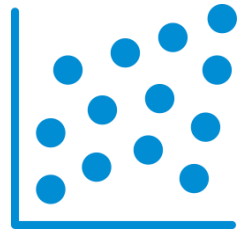


Regrouping variables

Unsupervised Machine Learning

Use-case examples

Clustering analysis
(products, clients, etc.)



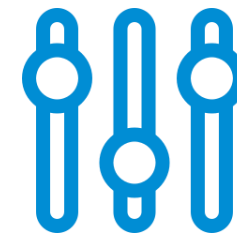
Anomaly detection



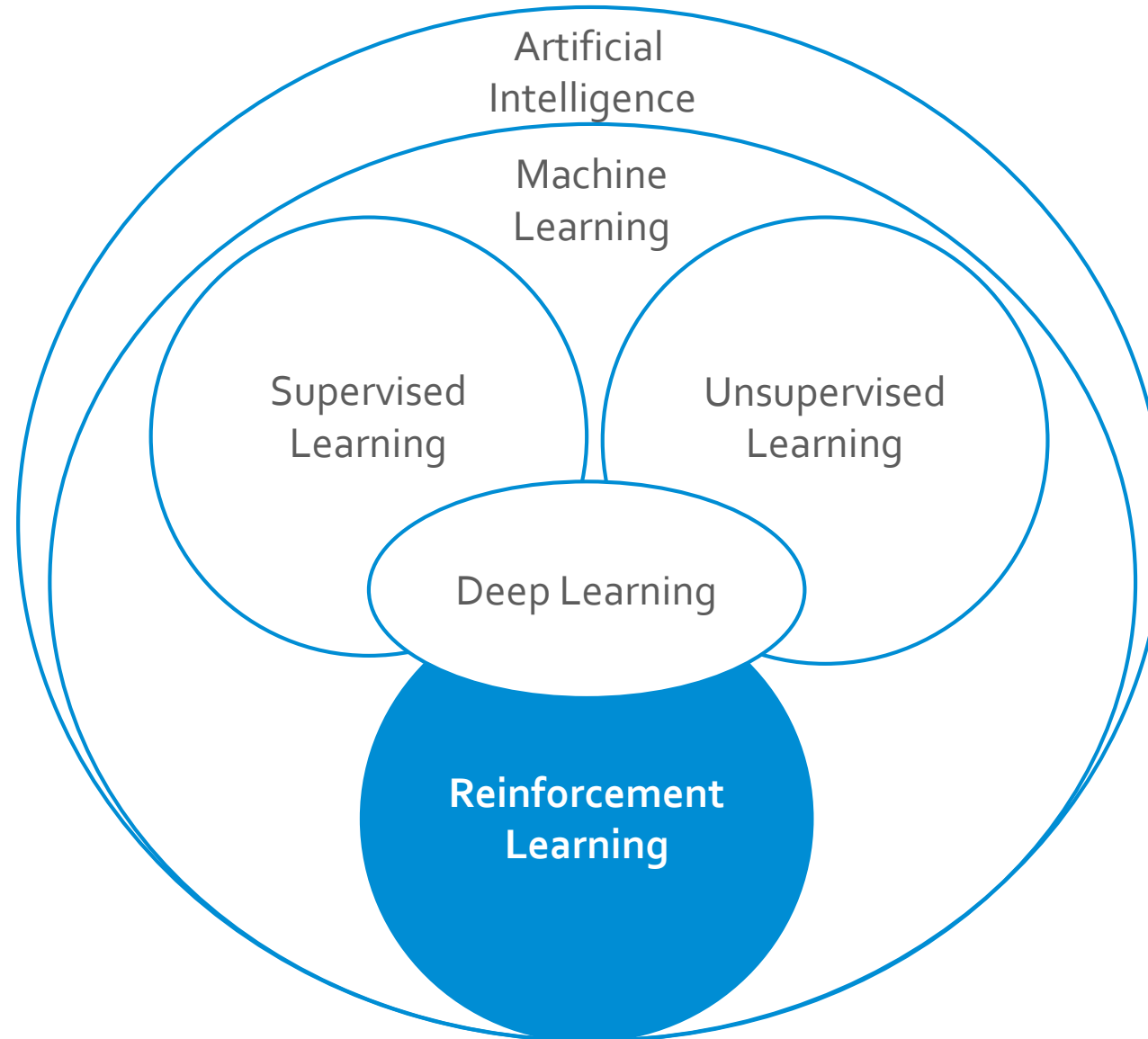
Data integrity tests



Identification of main factors affecting
production, demand, etc.

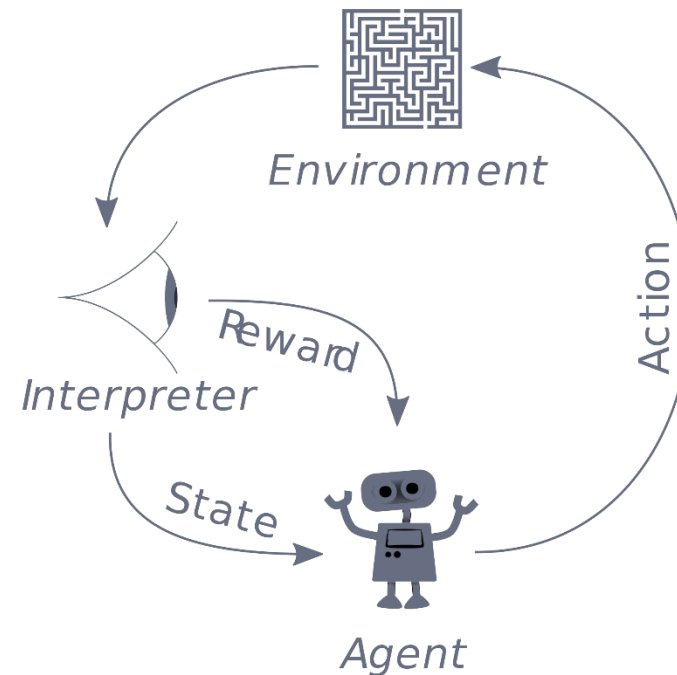


Families of Machine Learning Algorithms

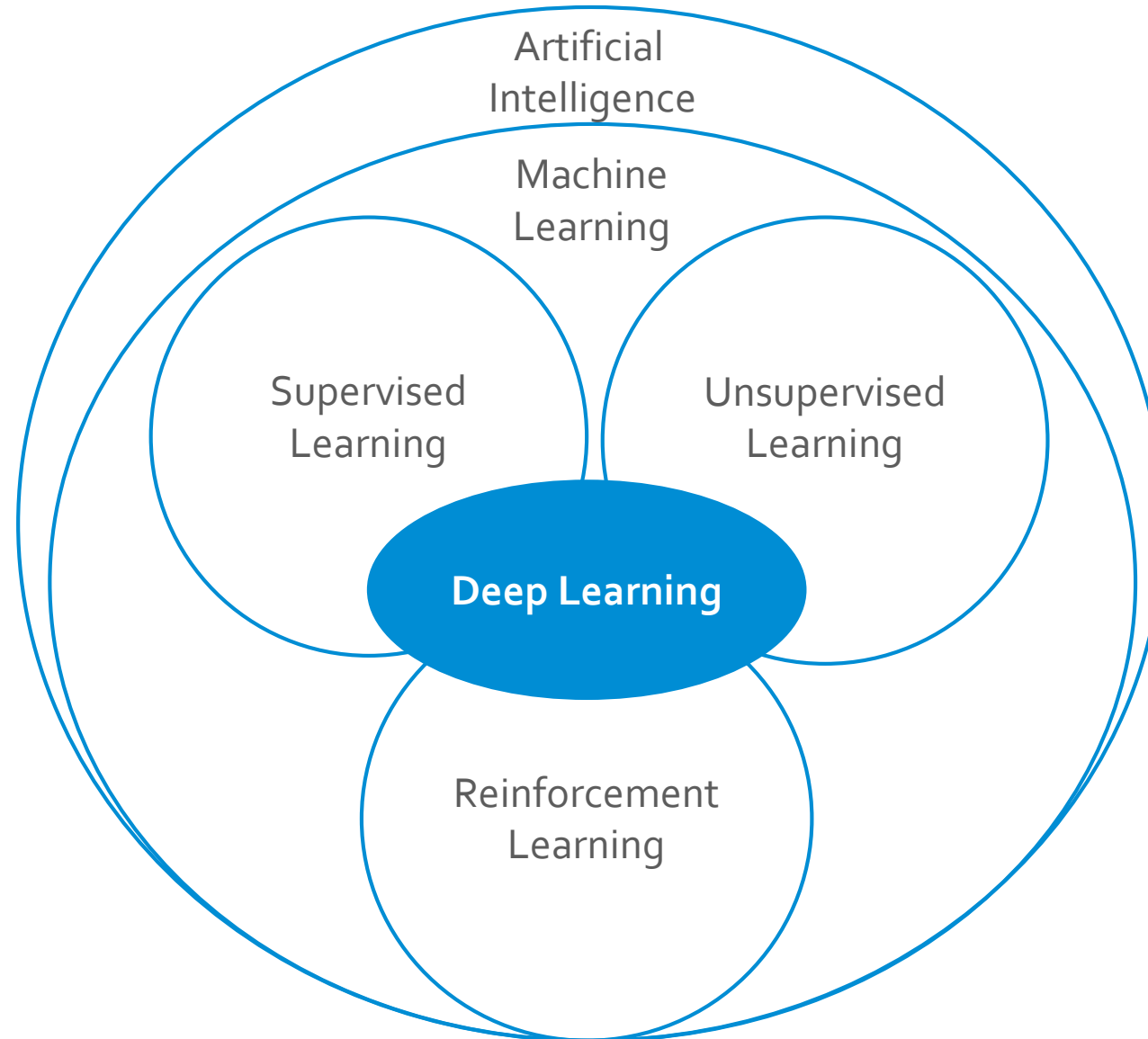


Reinforcement Learning Definition

Reinforcement learning consist in training an agent, through interactions with his environments and rewards, to behave optimally based on a given objective.



Families of Machine Learning Algorithms

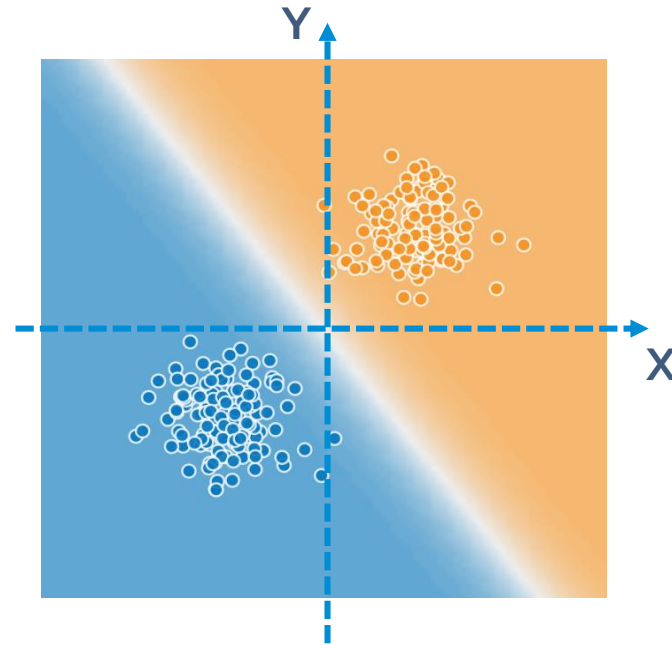


Deep Learning

Limitations of linear models

Data sets can **contain relationships that are more complex than linear ones** (ex: images, sound, text, etc.). « **Basic** » models are not able to find these **relationships** in the data.

Example: classification problem in a 2-dimensional space



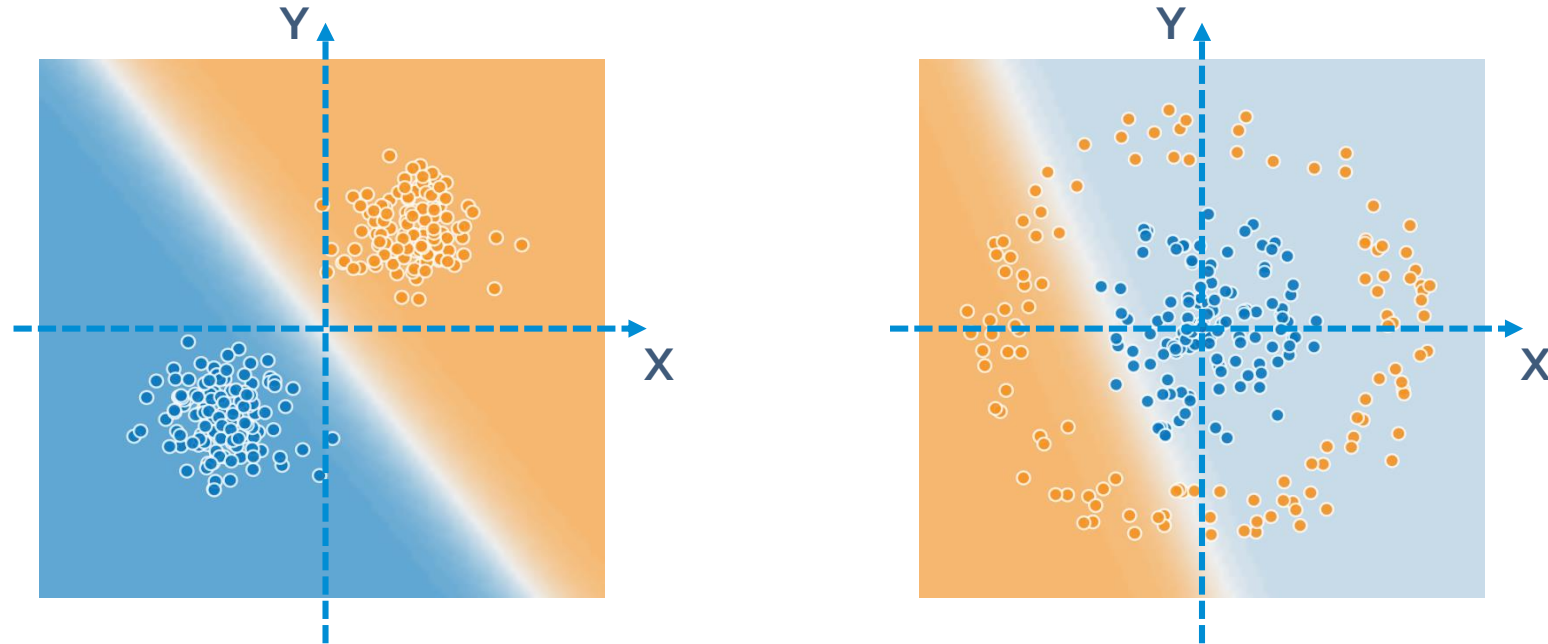
Tool used : Tensor Flow Playground

Deep Learning

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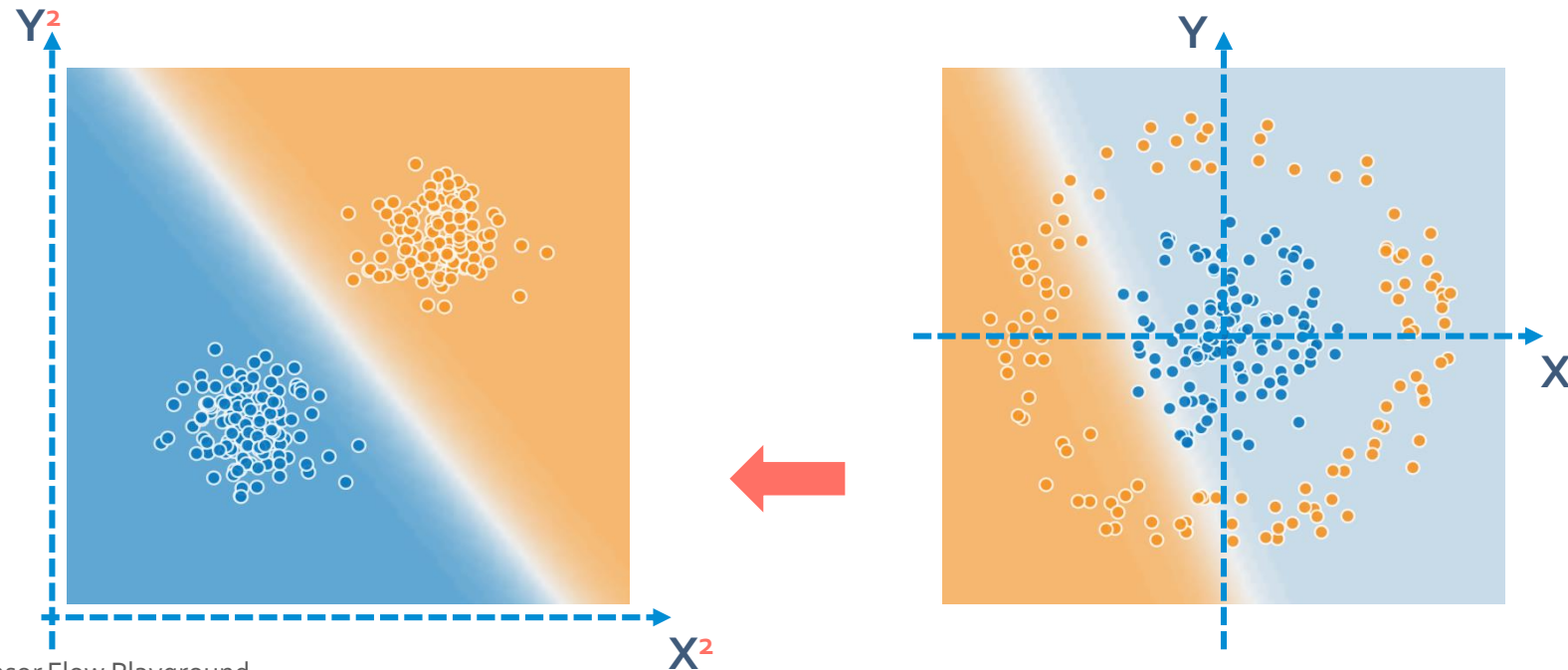
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Deep Learning

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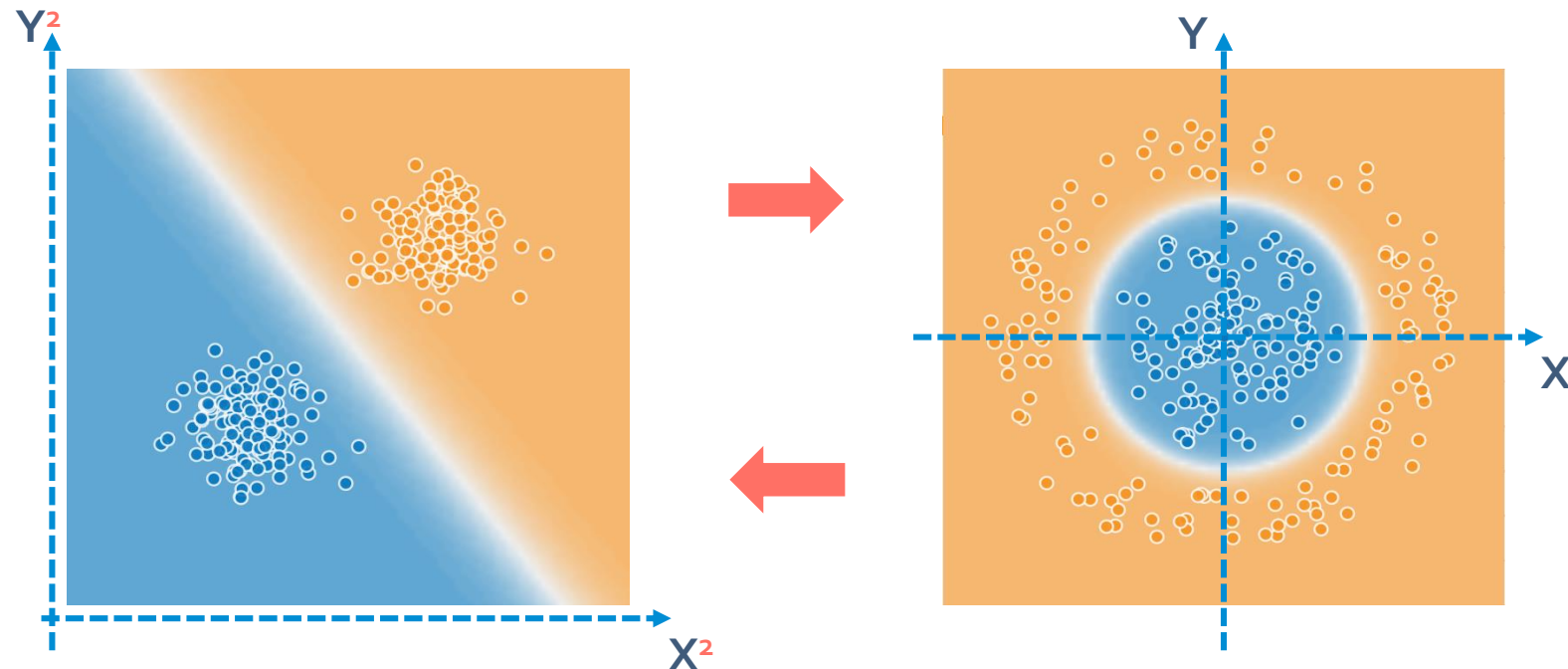
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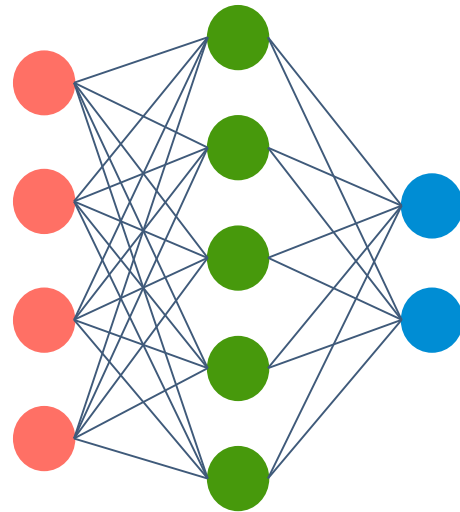
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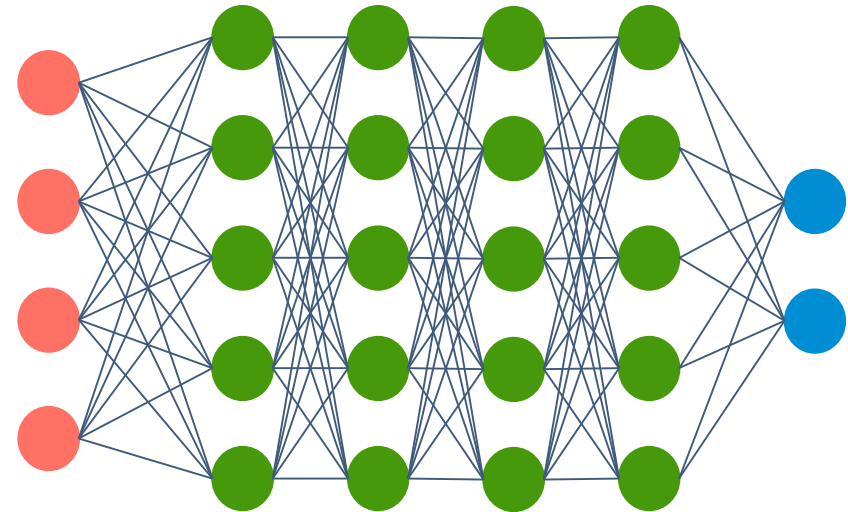
Deep Learning Definition

Deep learning refers to a set of method of automated learning that **attempt to model complex levels of abstractions** from the data using architectures based on **multiple linear transformation, creating non-linear ones.**

Shallow Neural Network



Deep Neural Network



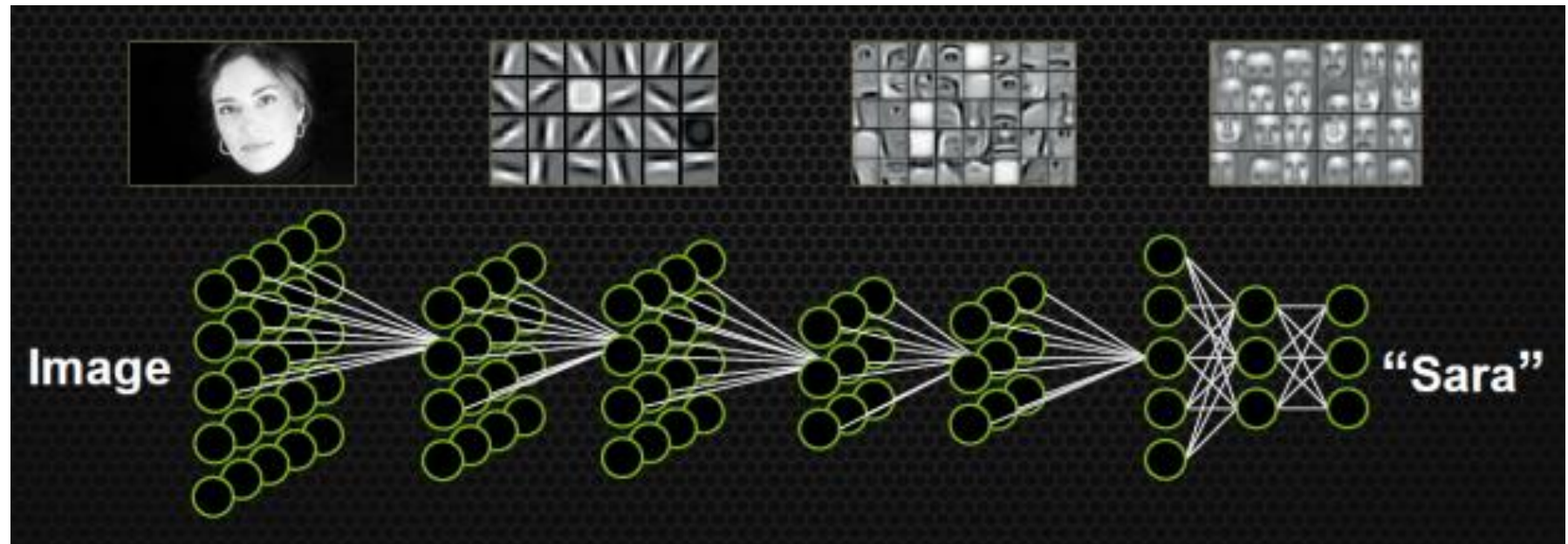
● Input Neuron

● Hidden Layer

● Output Neuron

Supervised Deep Learning Example – Face recognition

Using a convolutional neural network for face recognition. The model learns to recognize lines, face features and then faces.



Source : NVIDIA

Methodology for AI transformation: Case study at the CHUM



Methodology for the AI Transformation of Organization

Case study: Centre Hospitalier de l'Université de Montréal



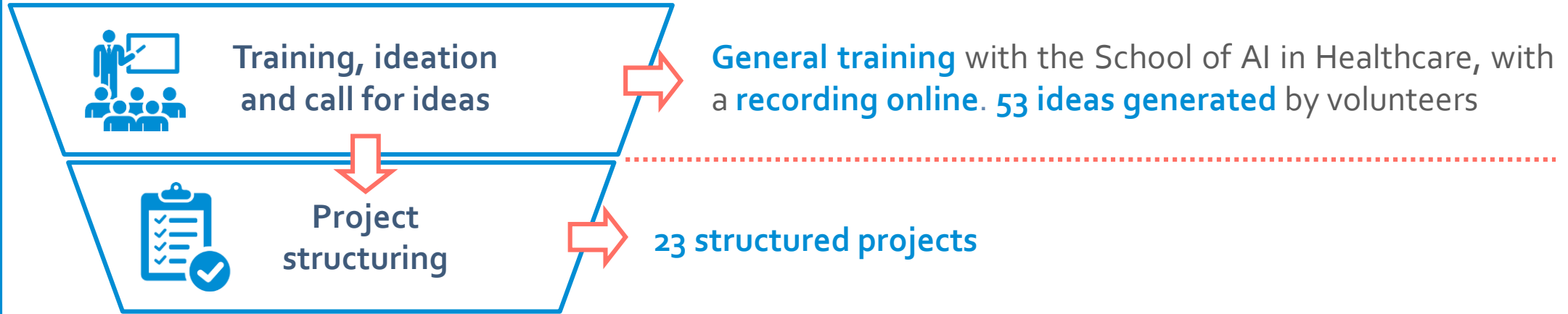
Training, ideation
and call for ideas



General training with the School of AI in Healthcare, with a **recording online**. **53 ideas generated** by volunteers

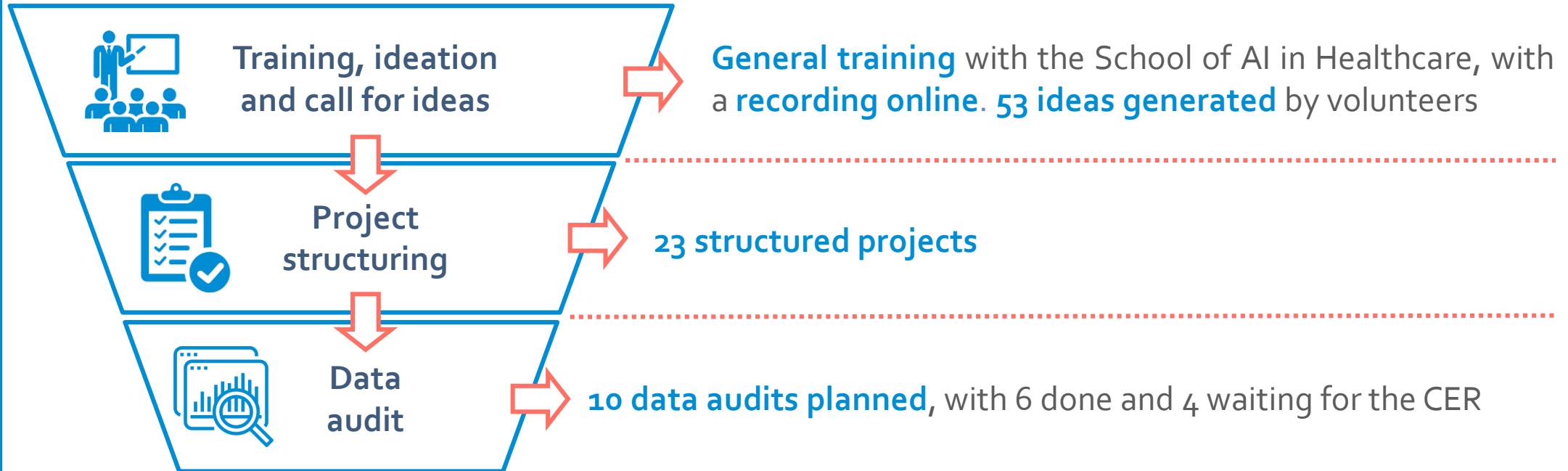
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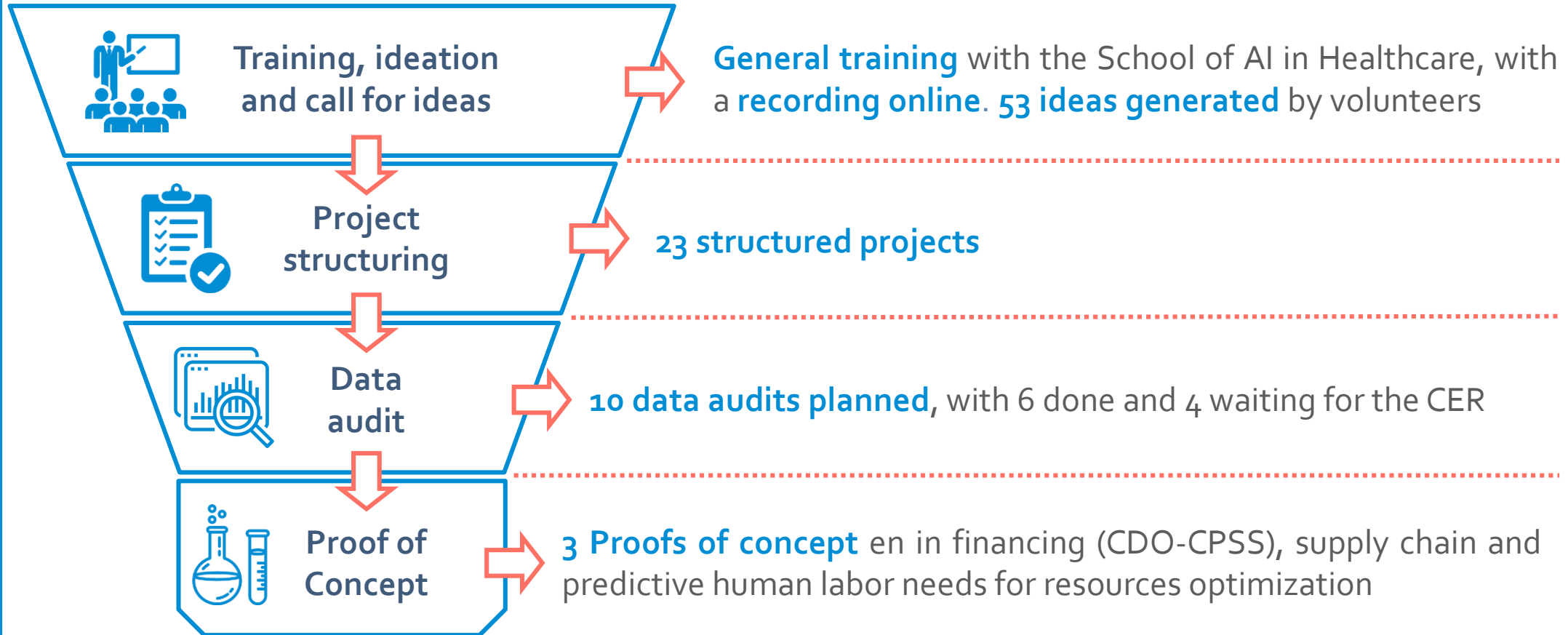
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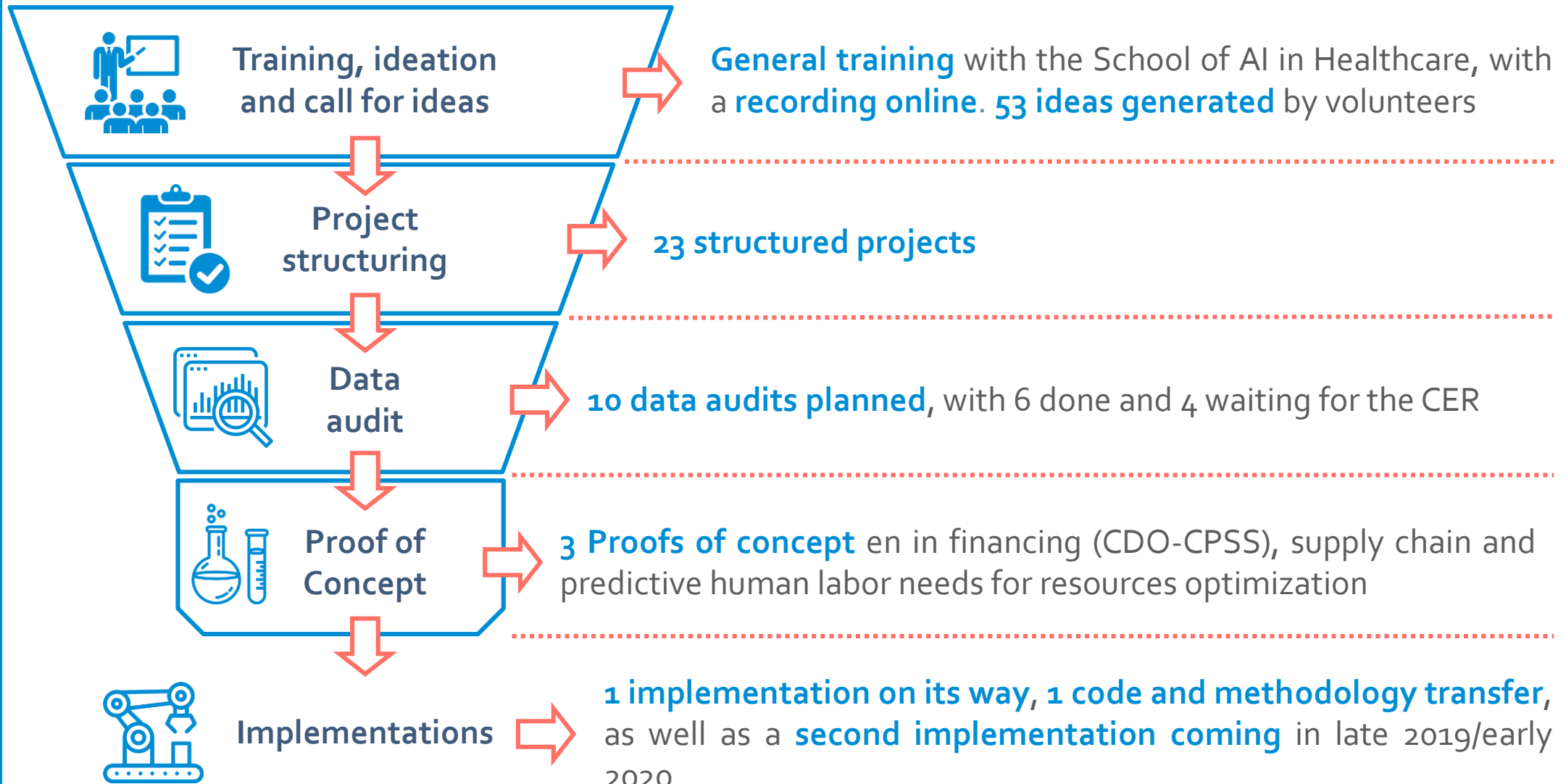
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Thank you!
Any questions?