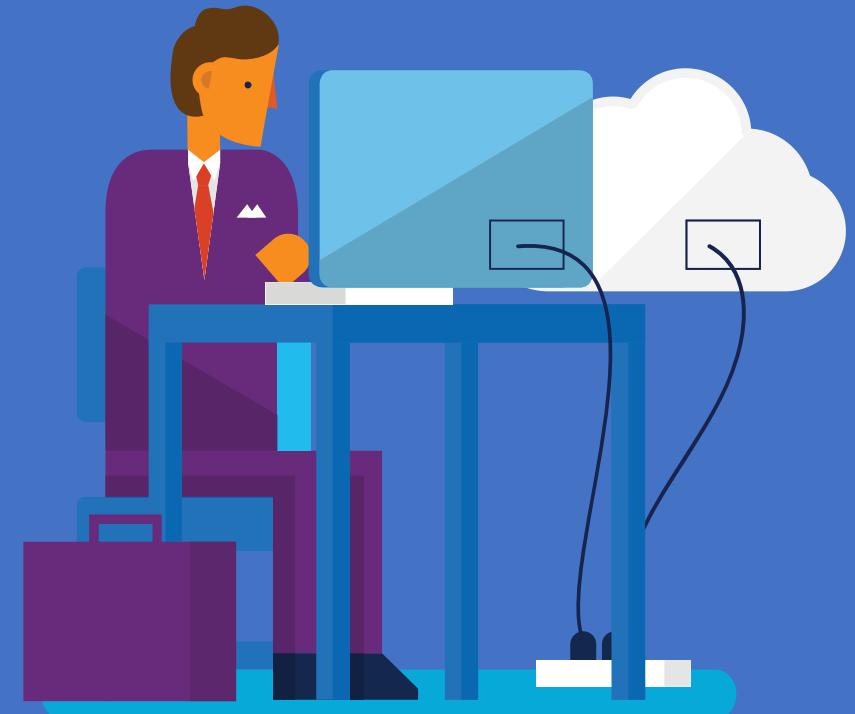


AI Hackathon Intro and Best Practices

Robin Lester





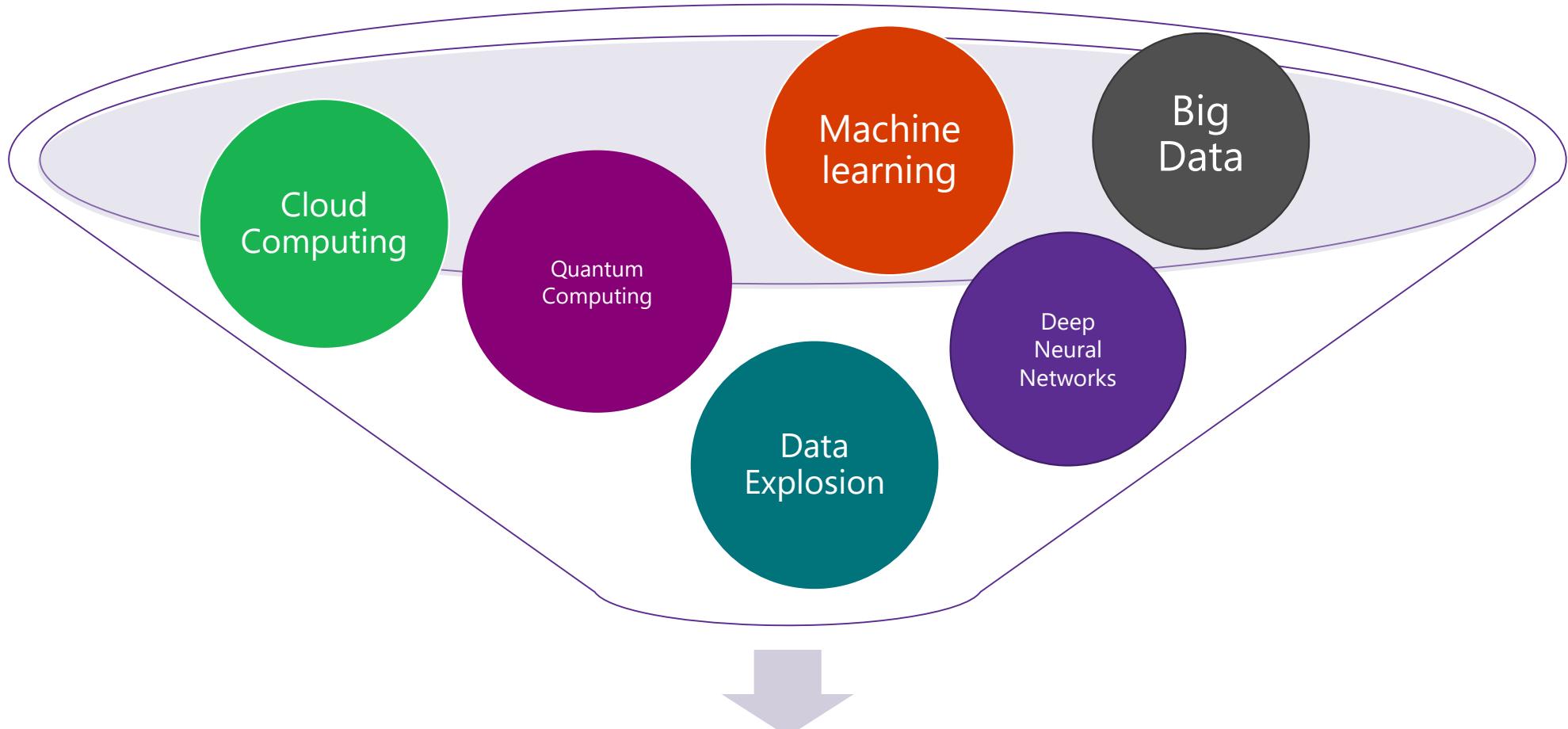
“Our goal is to **democratise AI** to empower every *person* and every *organisation* to achieve more.”

Satya Nadella

Every developer can be an **AI developer**, and every company can become an AI company

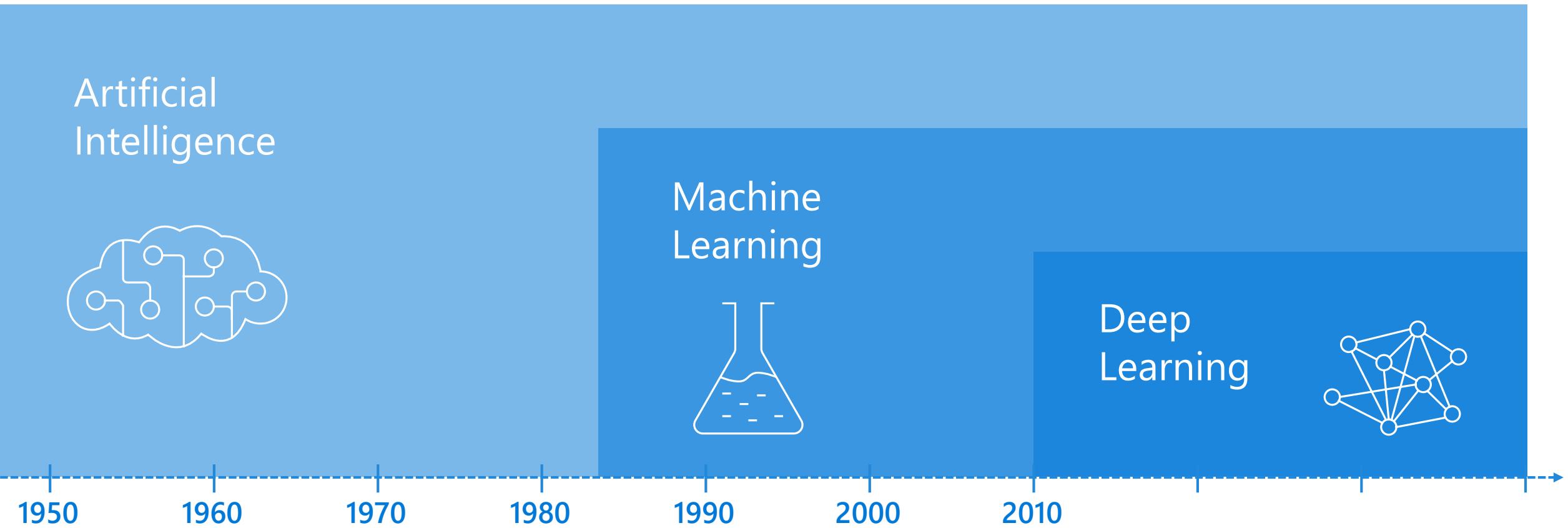
AI is the New Normal

The world is changing



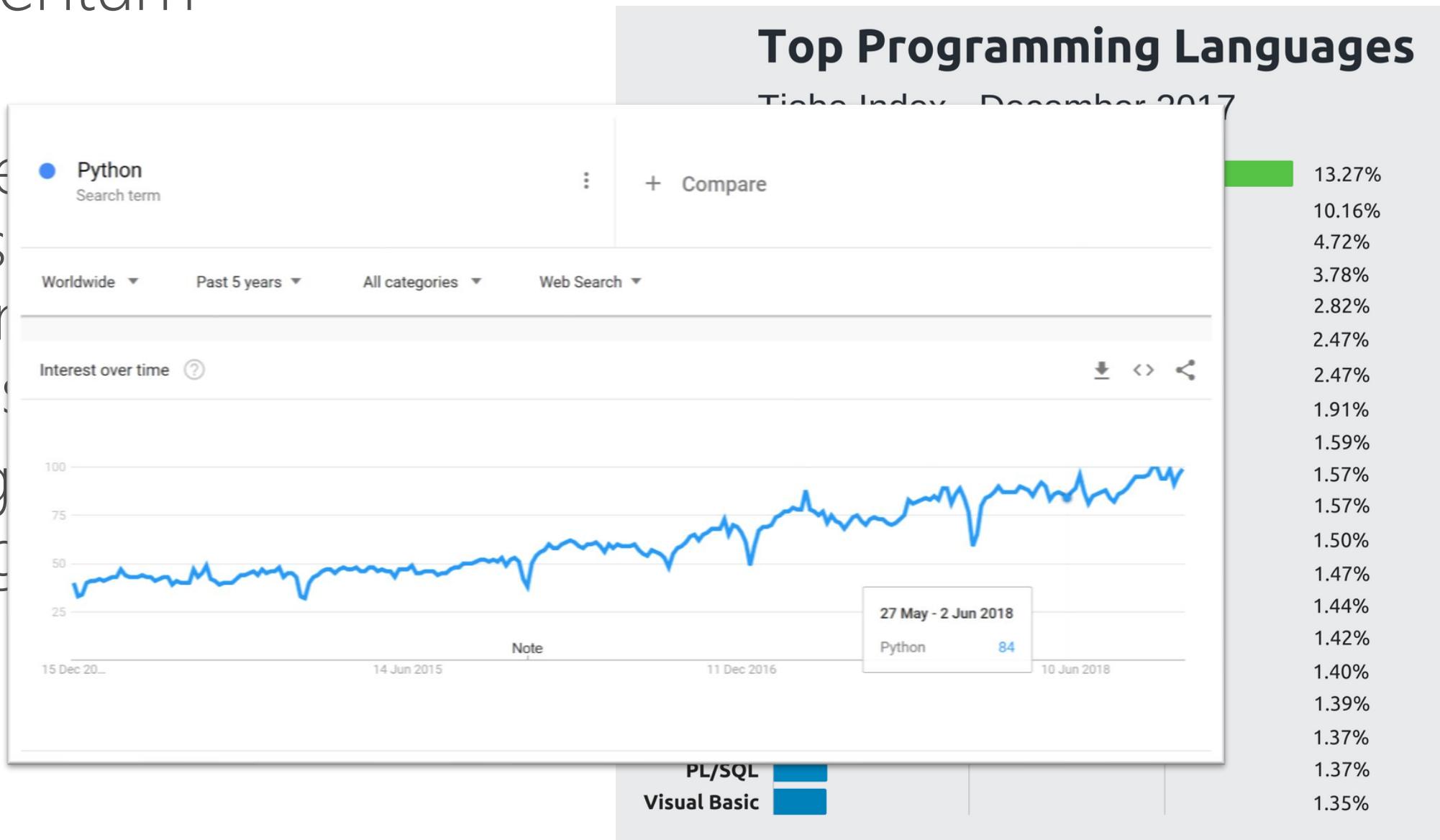
Science Fiction Becomes
Reality

AI, Machine Learning and Deep Learning

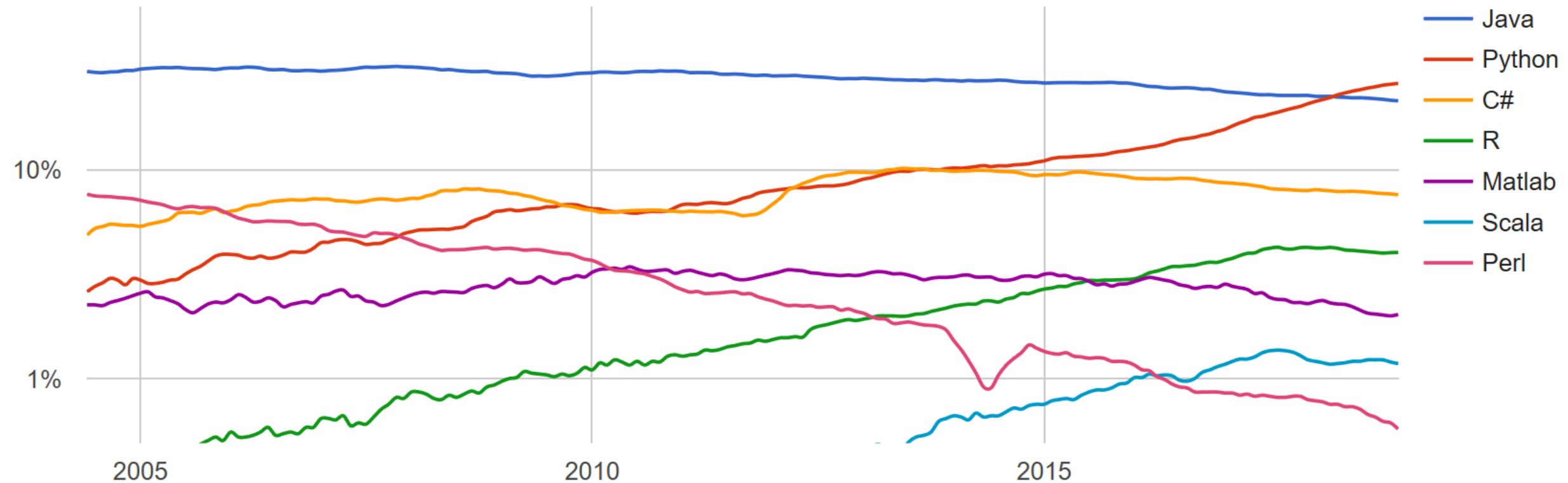


AI Momentum

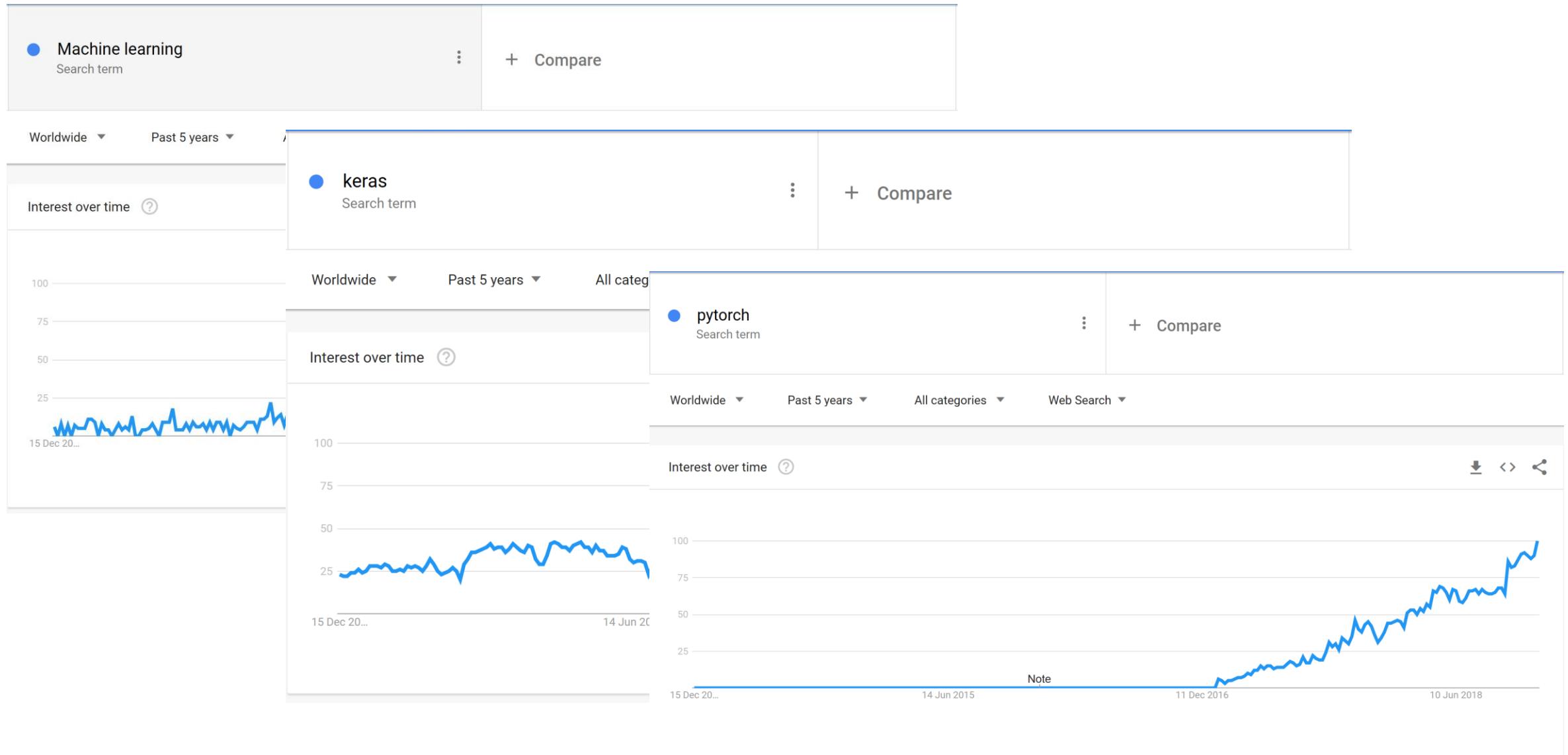
- Number of AI papers doubling every 18 months
- AI language gaining market share



PYPL PopularitY of Programming Language



AI momentum



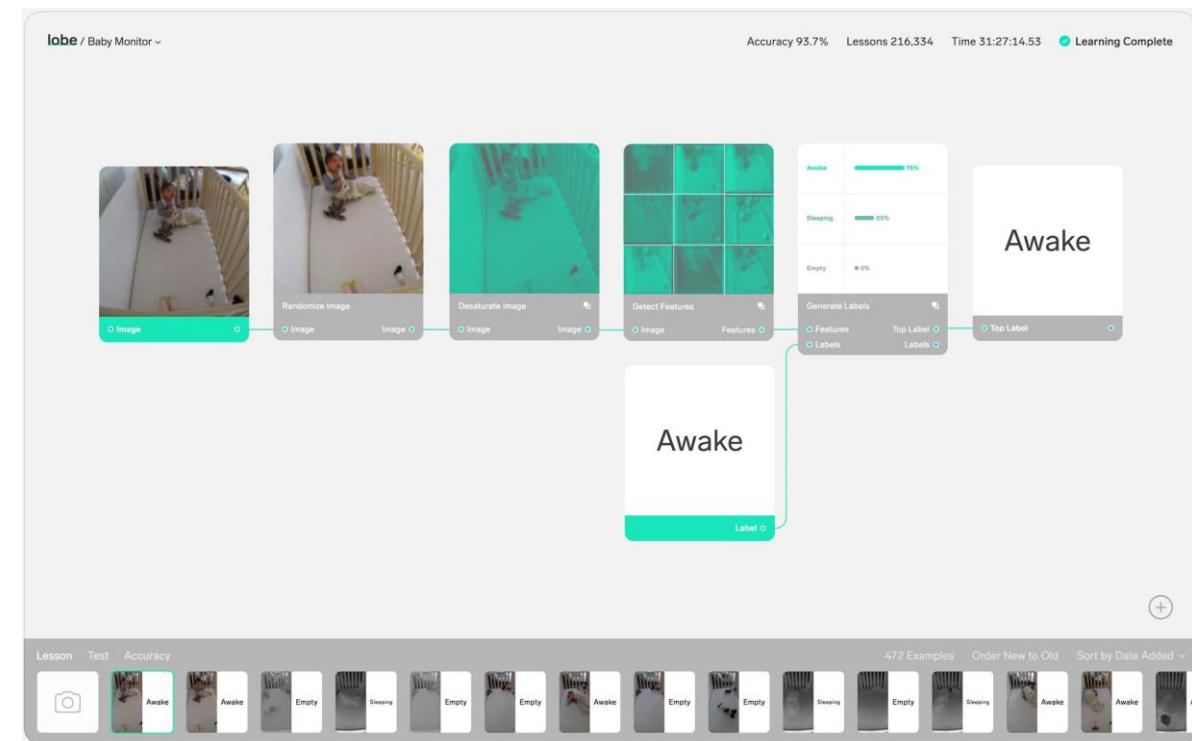
Trends in AI

Trends in AI Democratisation of AI

Making things easy

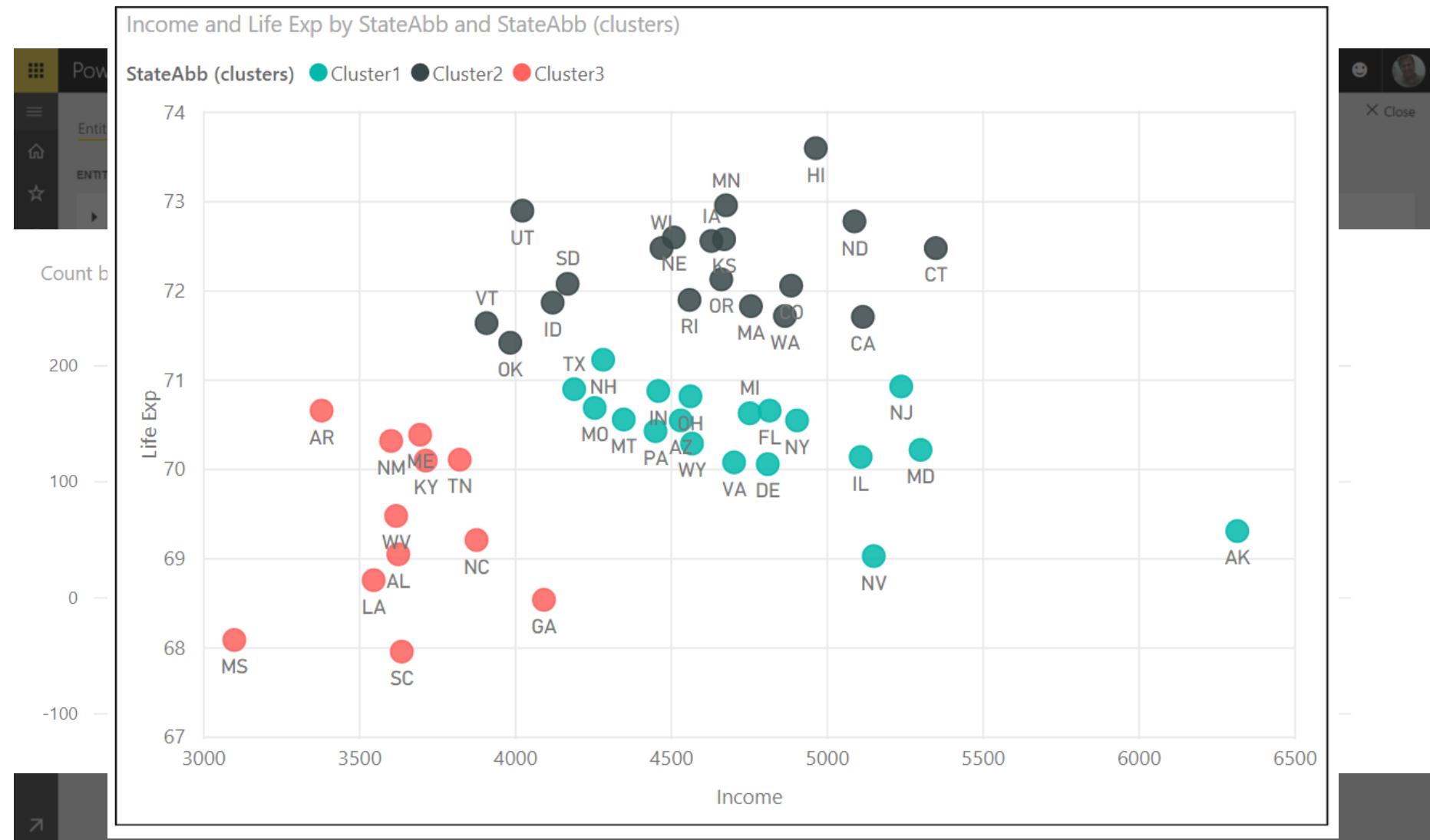
Making things accessible

- Azure Machine Learning Studio
- Lobe AI
- TensorFlow playground
- Keras
- Azure ML Python SDK
 - Hyperparameter tuning
 - AutoML



Trends in AI - Democratisation of AI – Making things easy

- Power BI
 - Clustering
 - Trend Lines
 - Auto ML
 - Quick Insights
 - Q and A

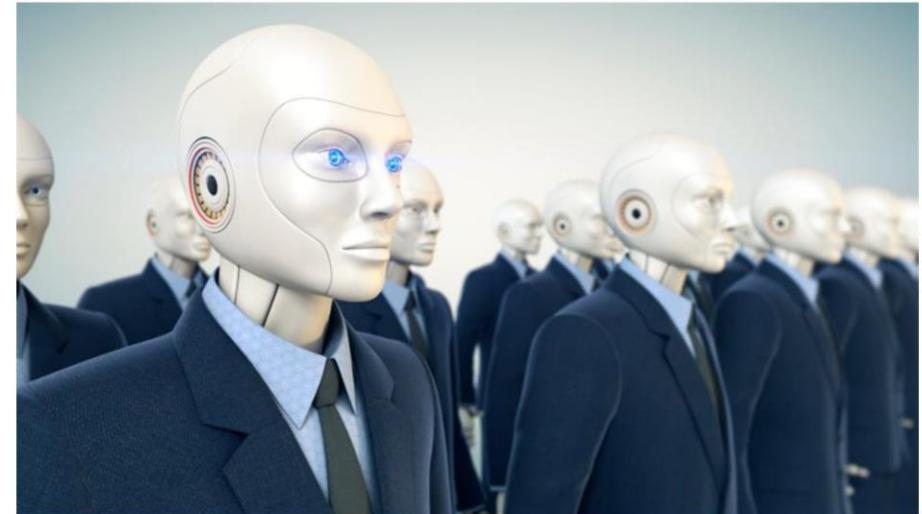


Trends in the media

- AI is often seen in the media with a negative slant looking at dystopias
- News and documentaries
 - Hypercapitalism
 - Jobs changing too quickly
 - Skills base can not keep up
 - Automation of firing processes
 - Invasion of privacy
 - Lack of fairness
 - Machines killing people

Man Fired From Job By Robot, Humans Unable to Intervene

By: Chris Gaetano
Published Date: Jun 21, 2018



In yet one more sign that robots are slowly but surely taking over the entire economy, a computer programmer was accidentally fired by an automated system, and when he pointed out the mistake to his fellow humans, they found they were unable to reverse the decision. The programmer reported the story on his personal blog.

11,615 views | Oct 28, 2018, 01:39pm

Driverless Cars Will Kill Cyclists, Warns Nature Magazine



Carlton Reid Contributor (i)

Transportation

I am Press Gazette's Transport Journalist of the Year, 2018



A member of the development team drives a Range Rover Sport Sports Utility Vehicle (SUV) hands-free during an autonomous driving demonstration by the UK Autodrive consortium on a public road in Coventry, U.K., on Monday, Oct. 8, 2018. Britain's post-Brexit industrial strategy has a heavy focus on technology, with artificial intelligence and autonomous vehicles being two areas at the heart of it. Photographer: Jason Alden/Bloomberg

Moral psychologist Azim Shariff believes that autonomous cars will be programmed to redistribute risk away from some people and towards



RED LIGHT ROADS Driverless cars will be used as 'pay-by-the-hour' mobile brothels, says academics

Futurists believe that cars will drive themselves without the need for human supervision from 2025, leaving passengers to get on with other things...

By Elisha Thakorlal, Digital Motors Editor

8th November 2018, 5:54 pm | Updated: 8th November 2018, 6:00 pm



1

COMMENTS

TRULY driverless cars may have a bigger impact than first imagined, as a new study claims that pay-by-the-hour hotels and brothels will be replaced by connected and autonomous vehicles (CAVs).

Hypercapitalism

Which specific types of tasks are going to be the most impacted by growing workplace



GROWTH RATE

+59% What about your job?

48%

% OF WORK IN 2018

% OF WORK IN 2022

1.8m

jobs are expected to be lost to AI by 2020, but...

2.3m

jobs will be created

74%

of consumers worldwide say they are ready to learn new skills/completely retrain to remain employable in the future

Roles like account workers become

Gartner 2017

Gartner 2017

PwC 2018



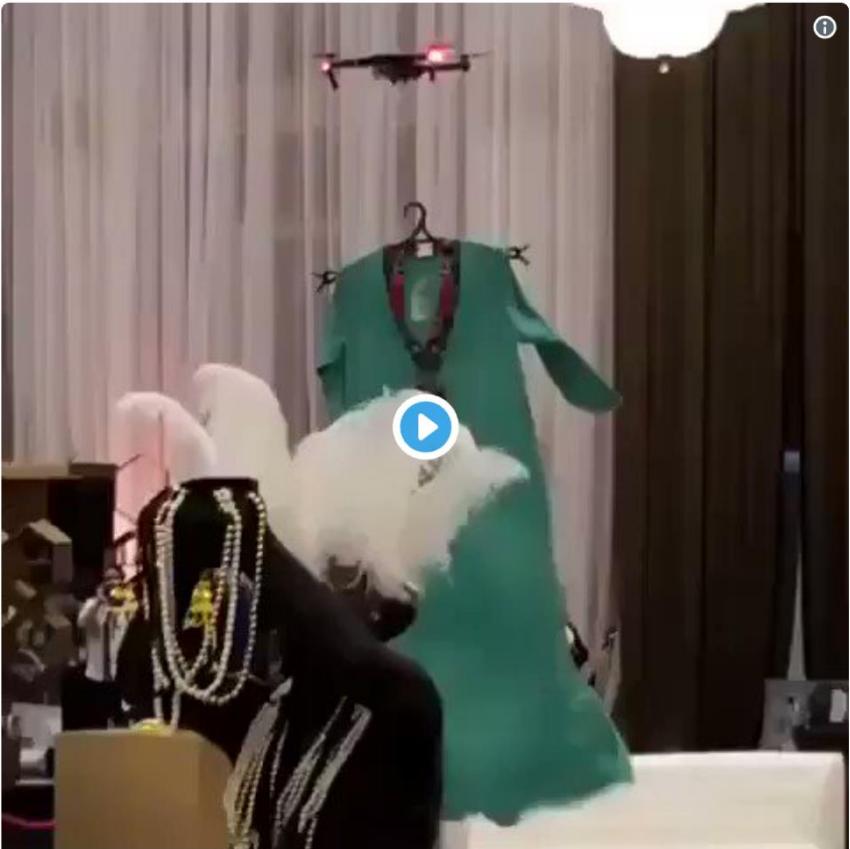
SOURCE: Future of Jobs Survey 2018, World Economic Forum, Statista

visualcapitalist.com



Impact on jobs?

"A fashion show in Saudi Arabia is like a ghost film," another said.



oNe واحد
@wa7d_riyadh



عرض أزياء في السعودية.. كانه فيلم أشباح

1,502 12:58 AM - Jun 7, 2018

633 people are talking about this

>

News

VIDEO: San Jose airport unveils robots to help passengers

By: Vince Cestone

Posted: Oct 25, 2016 05:02 PM PDT

Updated: Oct 25, 2016 05:02 PM PDT



What will AI mean
for jobs & the economy?



What jobs **can** AI replace?

Vision + Analysis + Decision making



RADIOLOGY



AUTO & TRUCK DRIVERS

Speech + Analysis + Decision making



CALL CENTERS



FAST FOOD ORDERS

Language



TRANSLATORS & INTERPRETERS

Learning



MACHINERY INSPECTION & REPAIR



PARALEGAL

Some jobs **can't**
be replaced by AI



NURSES



SOCIAL WORKERS



TEACHERS



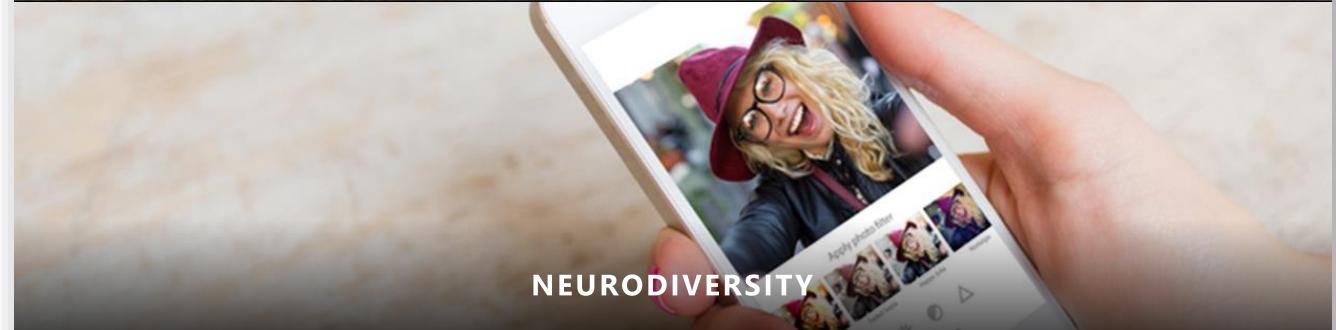
THERAPISTS

How can AI empower people?

Vision



Vision + Analysis



Speech + Language



Knowledge



What jobs will AI create?



Disciplines required to make AI work well



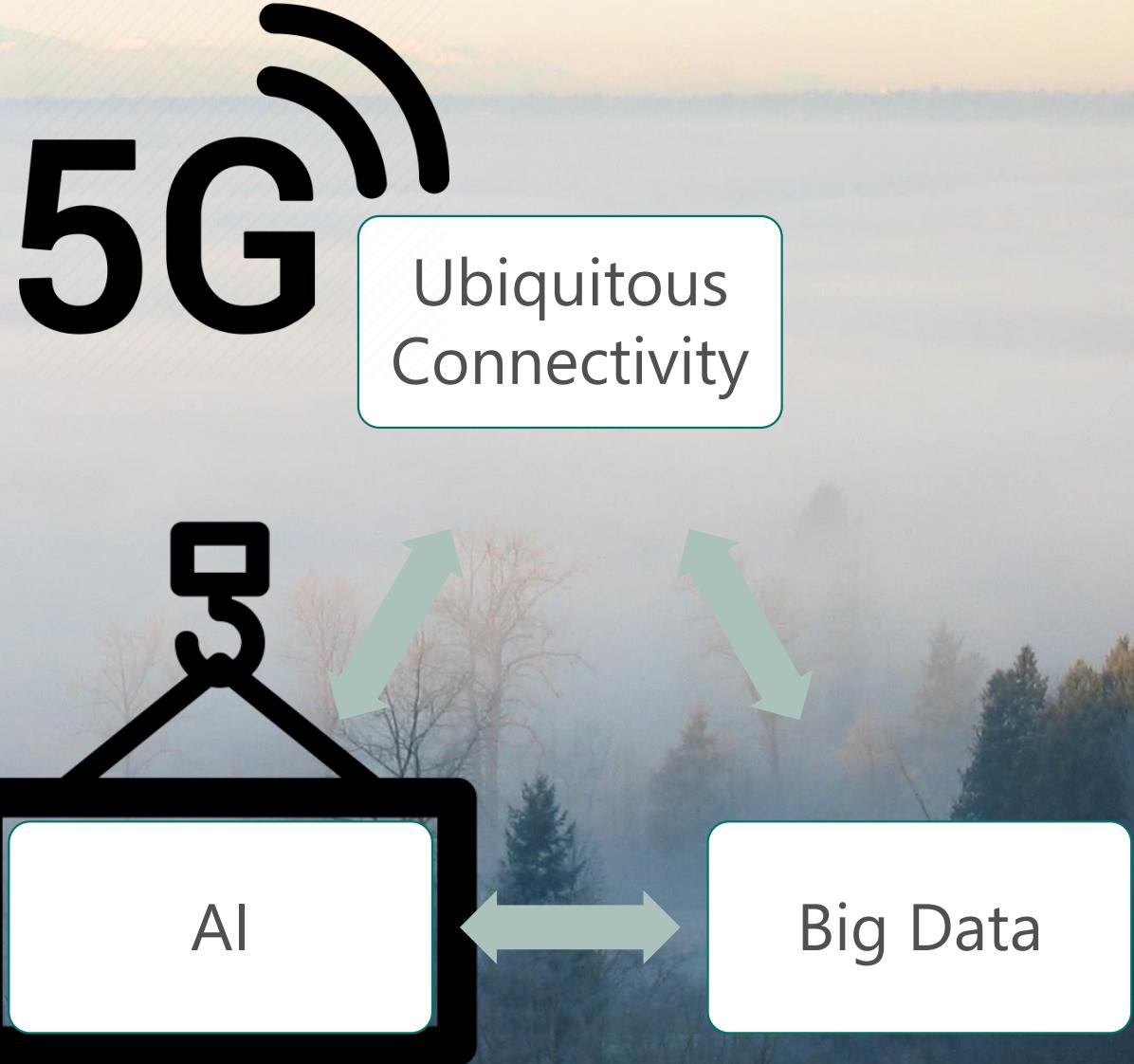
Disciplines that AI can make **more impactful**



Recent Roadmap Highlights

Fog Computing

AI on the Edge



Azure Machine Learning service

Azure Machine Learning service is a cloud service that enables data scientists to quickly and easily build, train, and deploy machine learning models. **We're announcing new features in Azure Machine Learning service (in public preview):**

- **Automated machine learning:** Identify the best models faster with model selection and intelligent hyper-parameter tuning
- **Azure Machine Learning service Python SDK:** Integrate with your favorite Python development environment, including Visual Studio Code, Visual Studio, PyCharm, Azure Databricks notebooks, or Jupyter notebooks.
- **Distributed deep learning:** Build better models faster with massive, managed GPU clusters. Train models quickly with distributed deep learning, and deploy them on GPUs and FPGAs.
- **Model management:** Manage your Dockerized models using models and images registry, and integrate into your continuous integration (CI/CD) pipeline.
- **Hardware accelerated inferencing:** Access powerful FPGAs for high speed image classification and recognition scenarios. Supported models include ResNet 50, ResNet 152, VGG-16, SSD-VGG, and DenseNet-121 that can be trained using your data.

To learn more about Azure Machine Learning service, read the [Ignite Blog](#).

GA
Released @ Connect()
December 2018

Home / Services / Azure Machine Learning service

Azure Machine Learning service

Accelerate machine learning from the cloud to the edge

[Start free >](#)

Already an Azure subscriber? Sign in to get started >

Explore Azure Machine Learning service: [Pricing details](#) [Documentation](#) [Calculator](#) [Azure Machine Learning service overview](#)

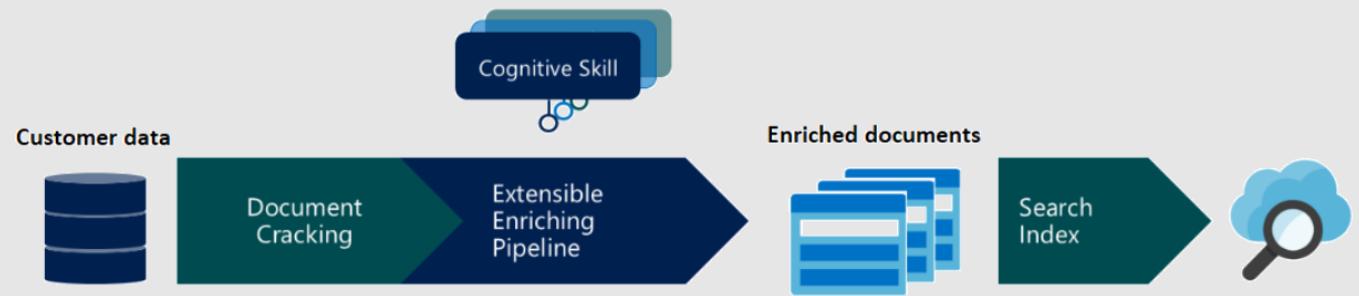
- ✓ Build and train machine learning models faster, and easily deploy to the cloud or the edge with Azure Machine Learning service.
- ✓ Use the latest open source technologies such as TensorFlow, PyTorch, or Jupyter.
- ✓ Experiment locally and then quickly scale up or out with large GPU-enabled clusters in the cloud.
- ✓ Speed up data science with automated machine learning and hyper-parameter tuning.
- ✓ Track your experiments, manage models, and easily deploy with integrated CI/CD tooling.

Cognitive Search

GA
ETA
Q2 2019

Cognitive Search is an enrichment pipeline that transforms raw, unstructured content into rich searchable content in an Azure Search index.

- Find structured information from unstructured data
- Powered by cognitive skills, such as natural language processing and computer vision capabilities
- Extracts structure and semantics from unstructured and non-textual data, and feeds it into a search index



[Learn more.](#)

SQL Database with Machine Learning services

Limited Public Preview
Released
November 2018

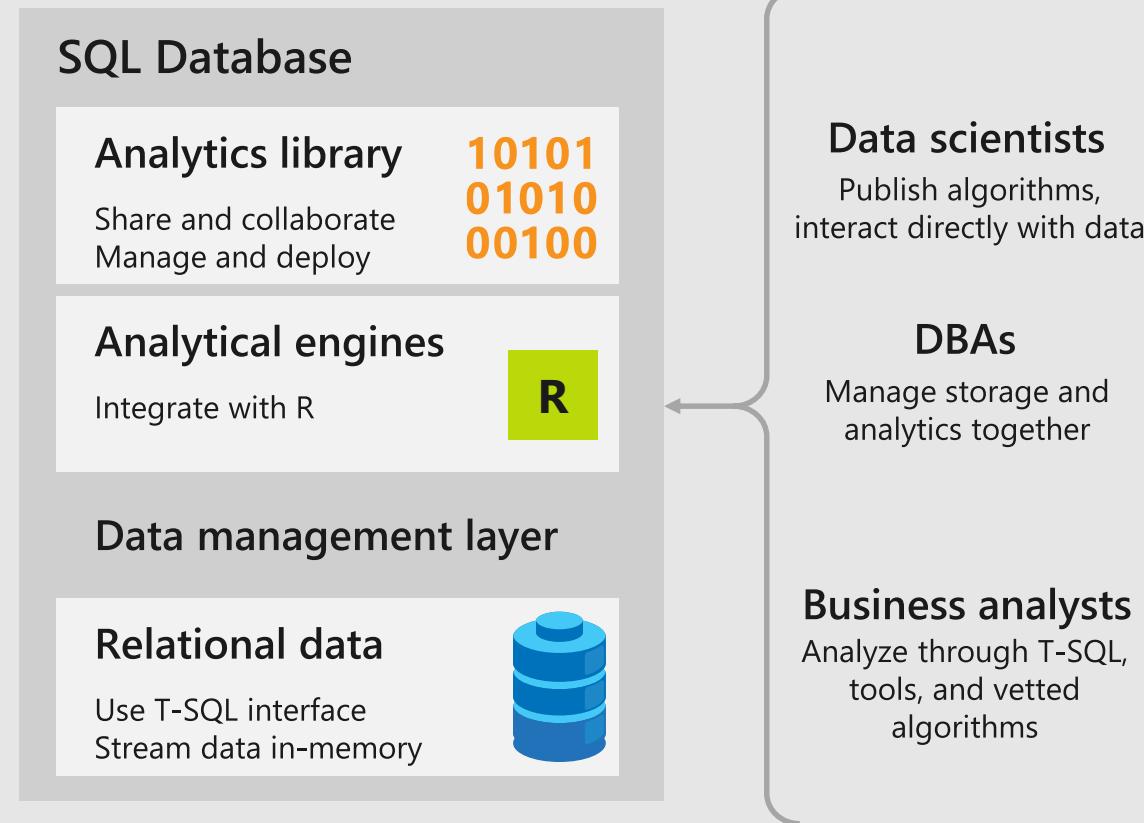
R integration enables end to end machine learning in Azure SQL Database – without moving data

Operationalize your machine learning scripts and models directly in a fully managed database in the cloud.

Expose predictions to any application using your database, easily and seamlessly.

Take advantage of predictions via simple stored procedures for apps connecting to SQL Database.

[Learn more.](#)



* GA, ETA Q2 CY2019

Demo - Cognitive with Containers

- Preview
 - Face API Container
 - Recognize Text Container
 - Text Analytics
 - Key Phrase Extraction
 - Language Detection
 - Sentiment Analysis

Resources

AI Solution Templates

SOLUTION

Loan Credit Risk with SQL Server

Using SQL Server 2016 with R Services, a lending institution can make use of predictive analytics to reduce number of loans they offer to those borrowers most likely to default, increasing the profitability of their loan ...

1.3K 343 24 days ago

Microsoft

SOLUTION

Personalized Offers

In today's highly competitive and connected environment, modern businesses can no longer survive with generic, static online content. Furthermore, marketing strategies using traditional tools are often expensive, ...

4.6K 399 3 months ago

Microsoft

SOLUTION

Campaign Optimization with SQL Server

This solution demonstrates how to build and deploy a machine learning model with SQL Server 2016 with R Services to recommend actions to maximize the purchase rate of leads targeted by a campaign.

8.1K 1.2K 2 hours ago

Microsoft

SOLUTION

Campaign Optimization with Azure HDInsight Spark Clust...

This solution demonstrates how to build and deploy a machine learning model with Microsoft R Server on Azure HDInsight Spark clusters to recommend actions to maximize the purchase rate of leads targeted by a...

1.2K 157 18 days ago

Microsoft

SOLUTION

Predicting Length of Stay in Hospitals

This solution enables a predictive model for Length of Stay for in-hospital admissions. Length of Stay (LOS) is defined in number of days from the initial admit date to the date that the patient is discharged from any ...

10K 1.2K 25 days ago

Microsoft

SOLUTION

Demand Forecasting and Price Optimization

Pricing is recognized as a pivotal determinant of success in many industries and can be one of the most challenging tasks. Companies often struggle with several aspects of the pricing process, including accurately fo...

4.4K 670 3 months ago

Microsoft

SOLUTION

Quality Assurance

Quality assurance systems allow businesses to prevent defects throughout their processes of delivering goods or services to customers. Building such a system that collects data and identifies potential problems alone...

1.9K 313 3 months ago

Microsoft

SOLUTION

Telemetry Analytics

Super computers have moved out of the lab and are now parked in our garage! These cutting-edge automobiles contain a myriad of sensors, giving them the ability to track and monitor millions of events every second

9.2K 1.4K 3 months ago

Microsoft

SOLUTION

Demand Forecasting

Accurately forecasting spikes in demand for products and services can give a company a competitive advantage. This solution focuses on demand forecasting within the energy sector

9.5K 1.6K 3 months ago

Microsoft

SOLUTION

Predictive Maintenance

This Predictive Maintenance solution monitors aircraft and predicts the remaining useful life of aircraft engine components

11K 2.1K 3 months ago

Microsoft

Deploy to Azure

Use the following pre-built template to deploy this architecture to Azure

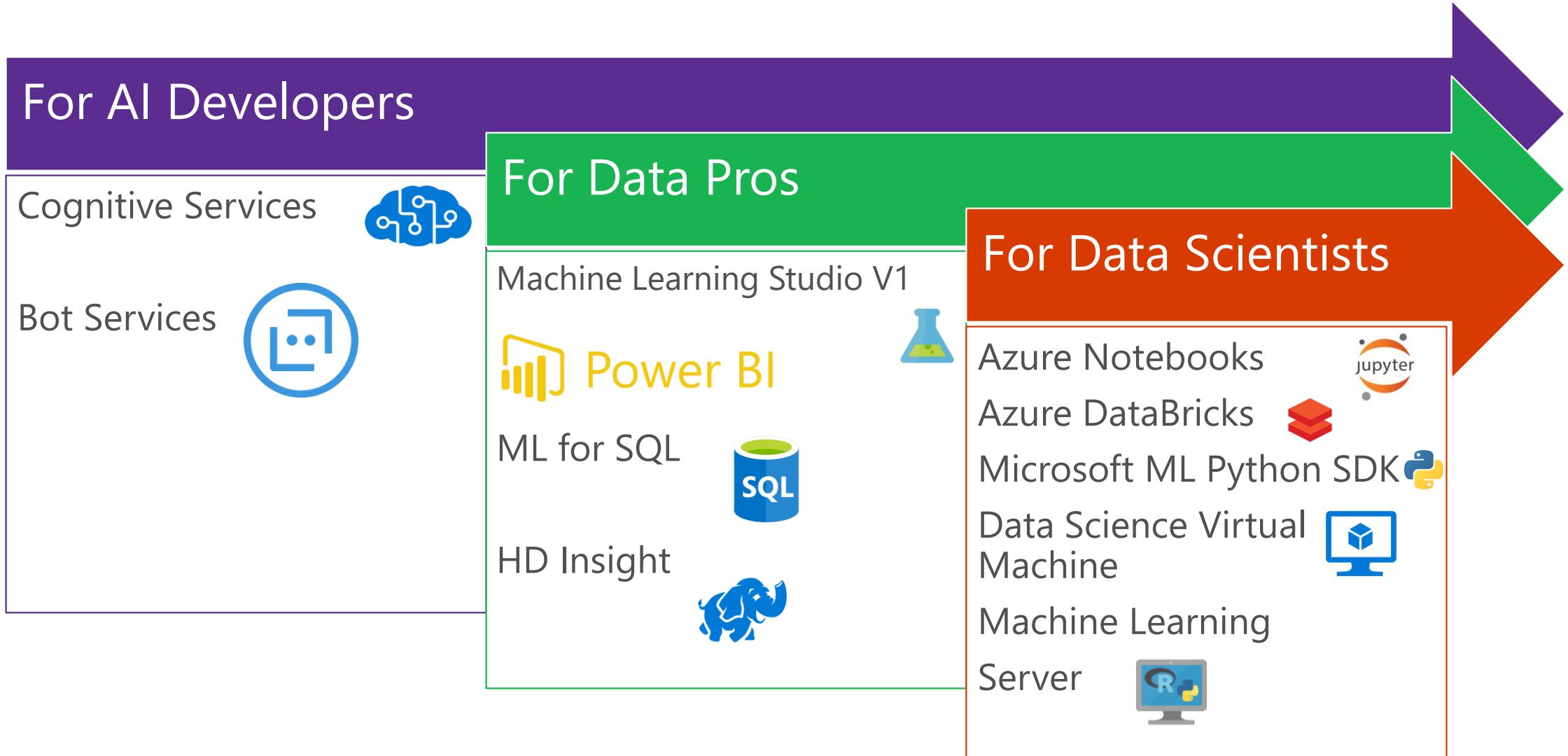
Deploy to Azure



Architectural Resources

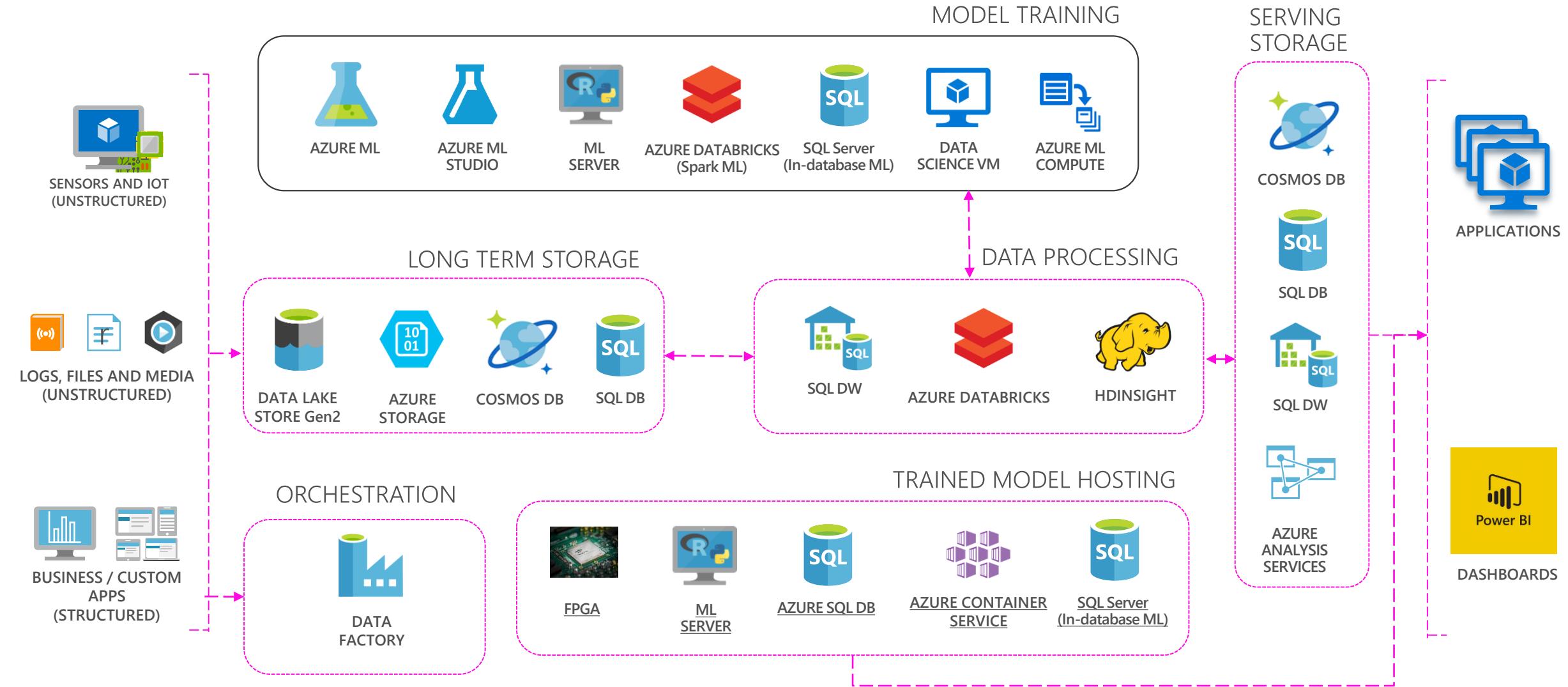
- Latest Updates
- <https://azureheatmap.azurewebsites.net/>
- Docs and Relationships
- <https://nnmer.github.io/azure-services-map/dist/>

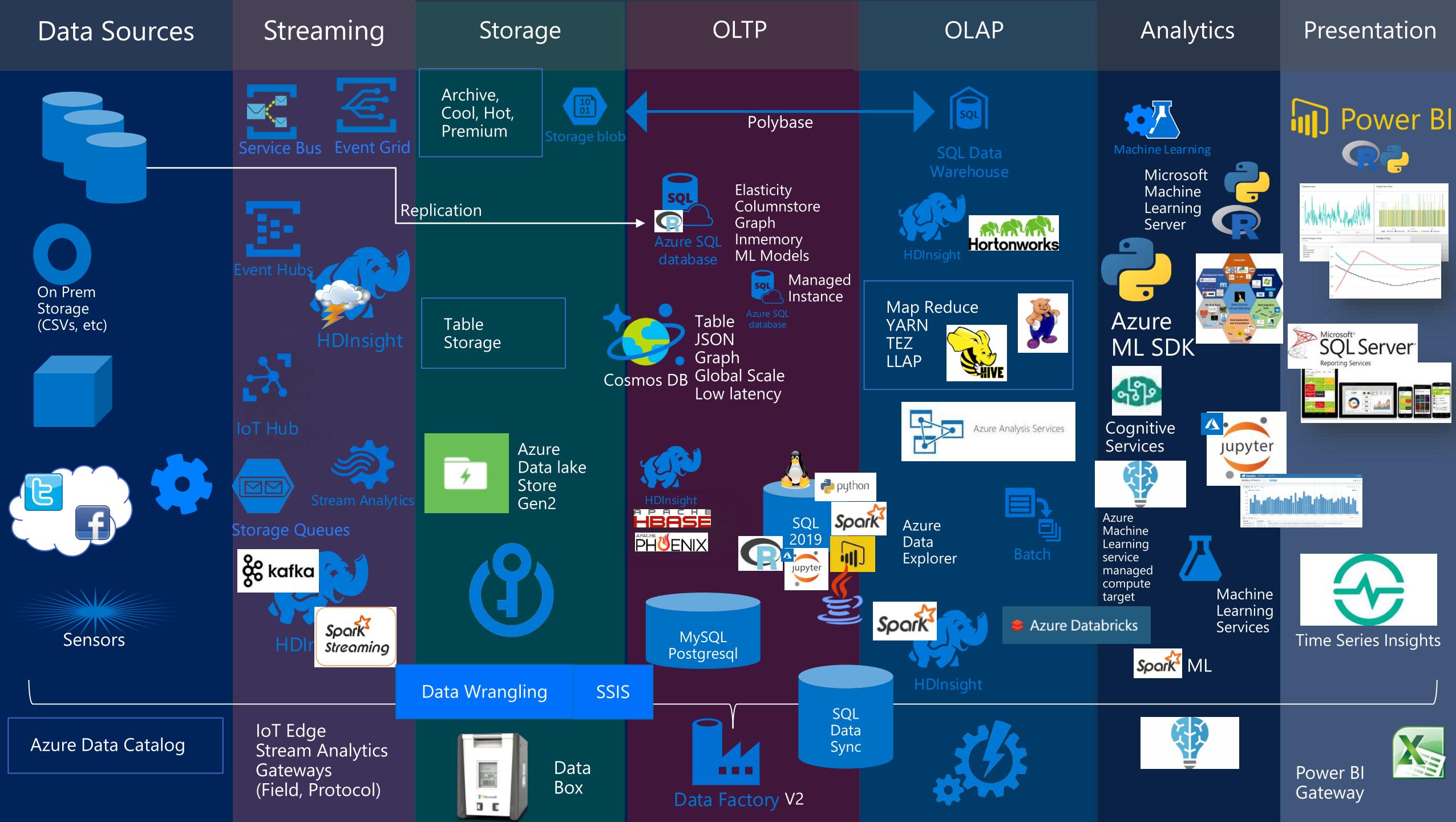
Breakdown of Toolings



ADVANCED ANALYTICS PATTERN IN AZURE

Performing data collection/understanding, modeling and deployment





Before you hack please
consider these common
learnings



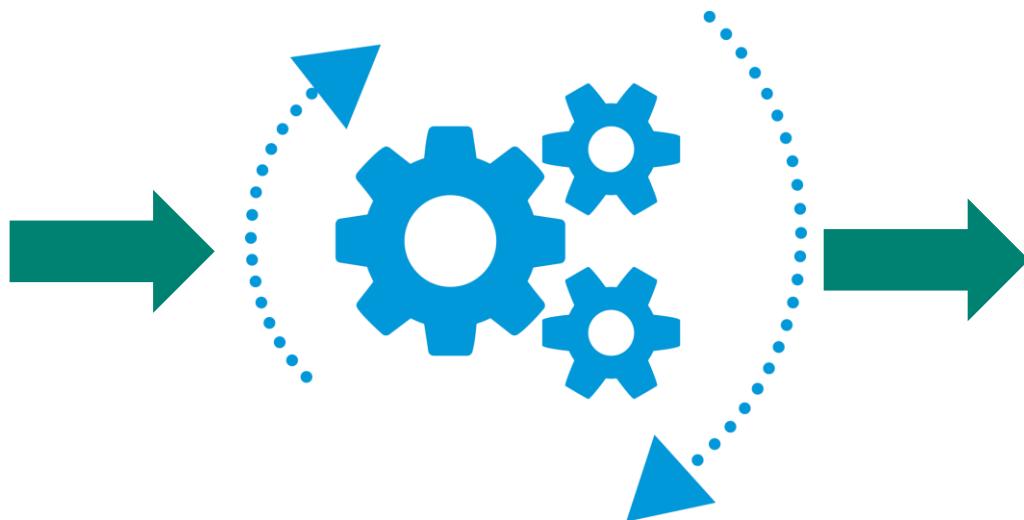
We forgot to bring the data!



Insufficient Data

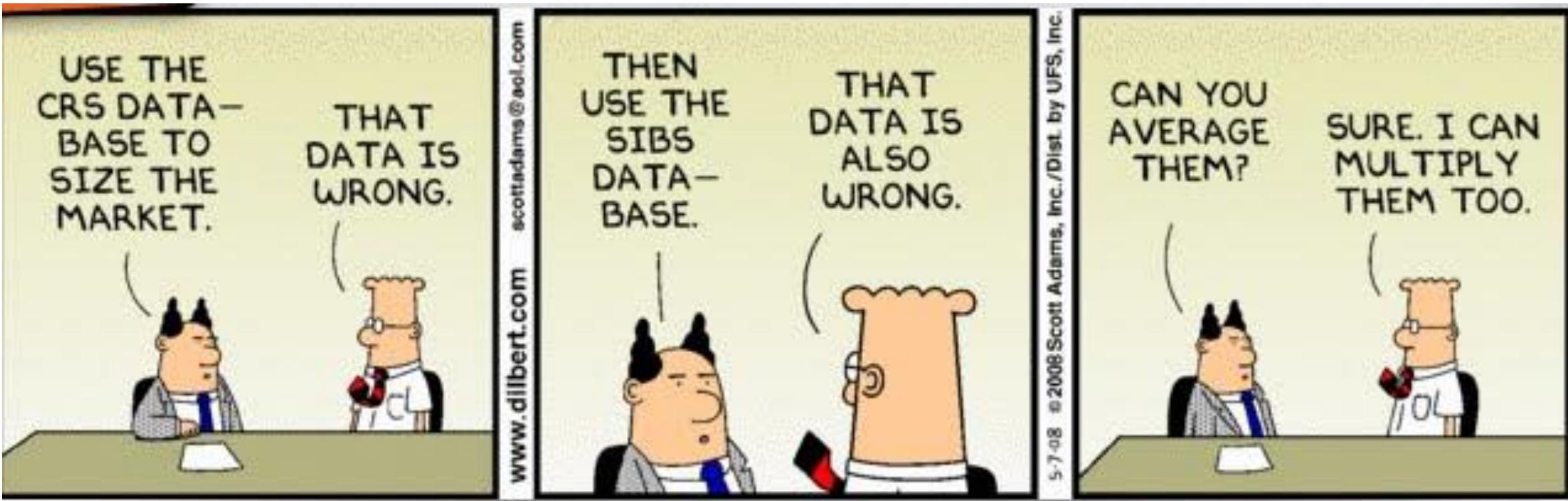
- Solutions = Virtual training simulations
 - Construct Images
 - Construct 3D physics models or use existing game engines

Common Learnings



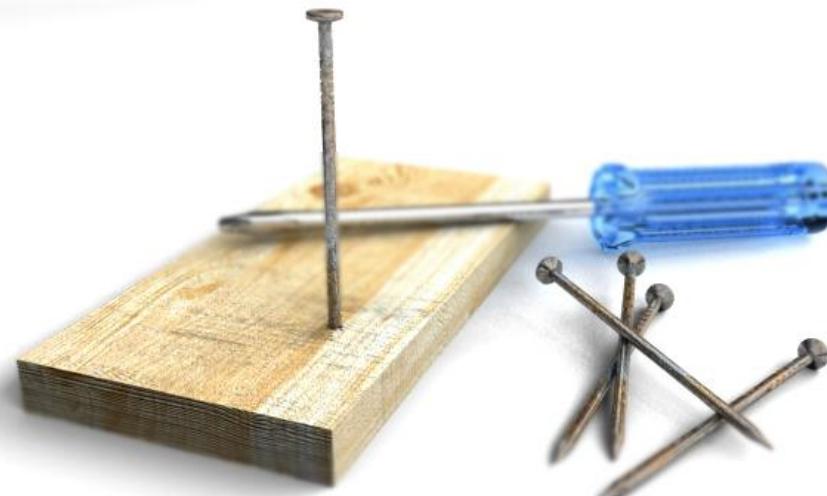
Common Learnings

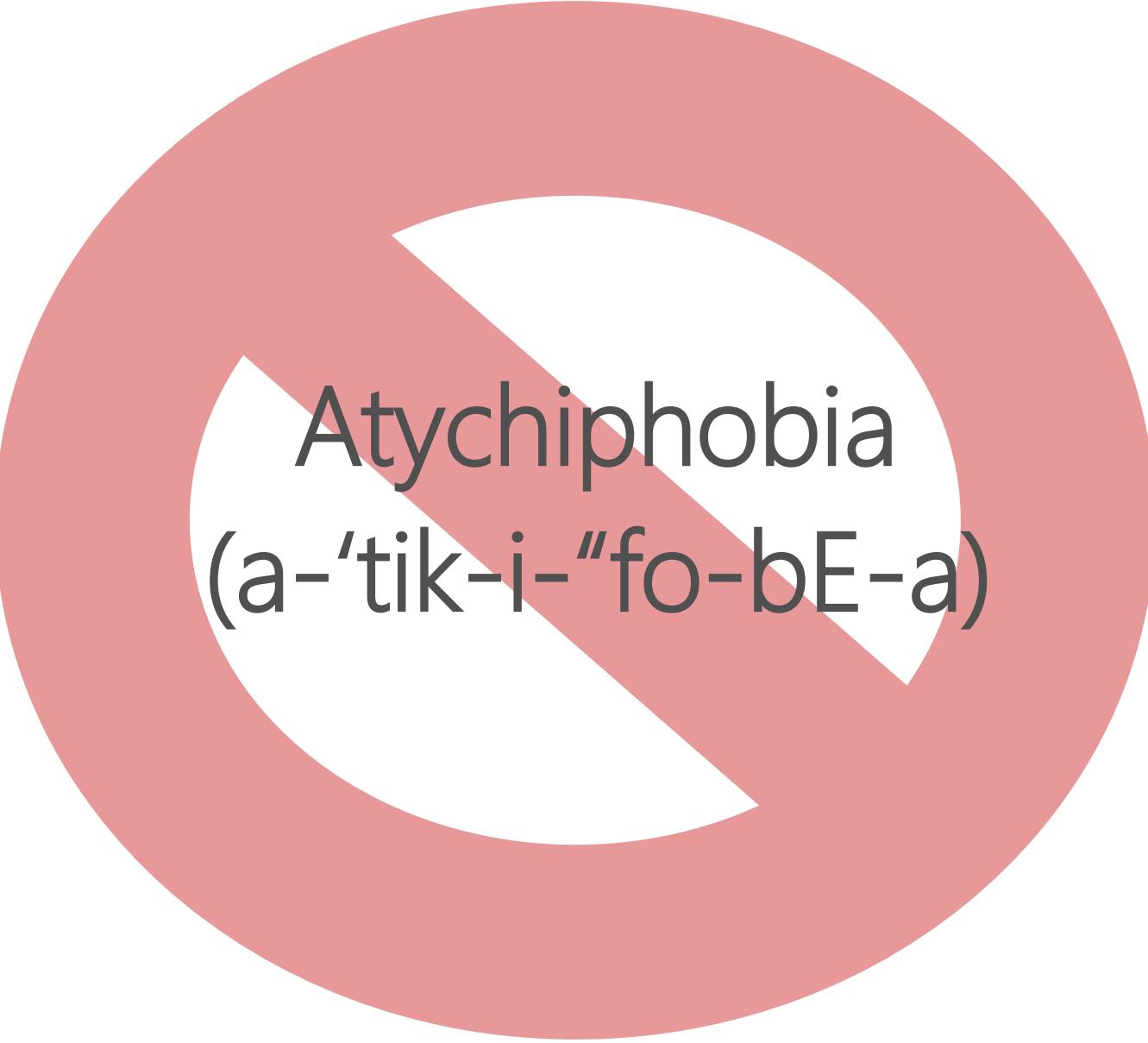
- 'All this data for me'
 - Unmanaged expectations
 - Data Quality and selecting the right data



Common Learnings

Find the right tools





Atychiphobia
(a-'tik-i-''fo-bE-a)

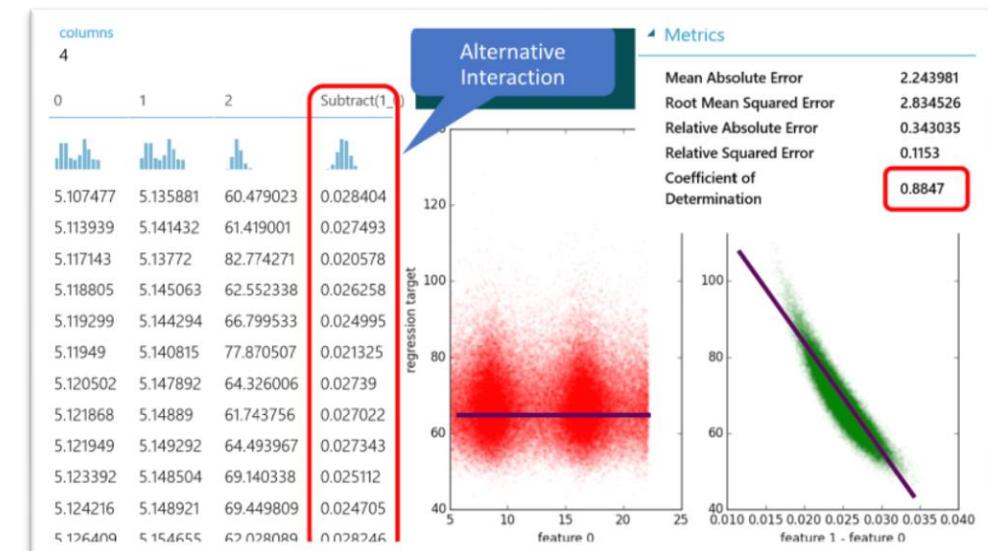
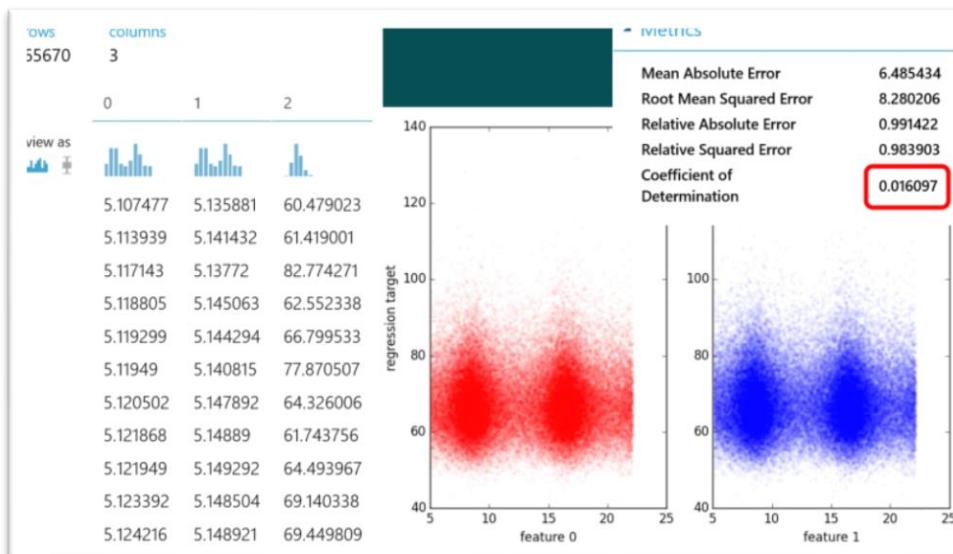
Common Learnings

- Nothing is impossible?
- False
 - Lots of things are not possible – try and then fail fast

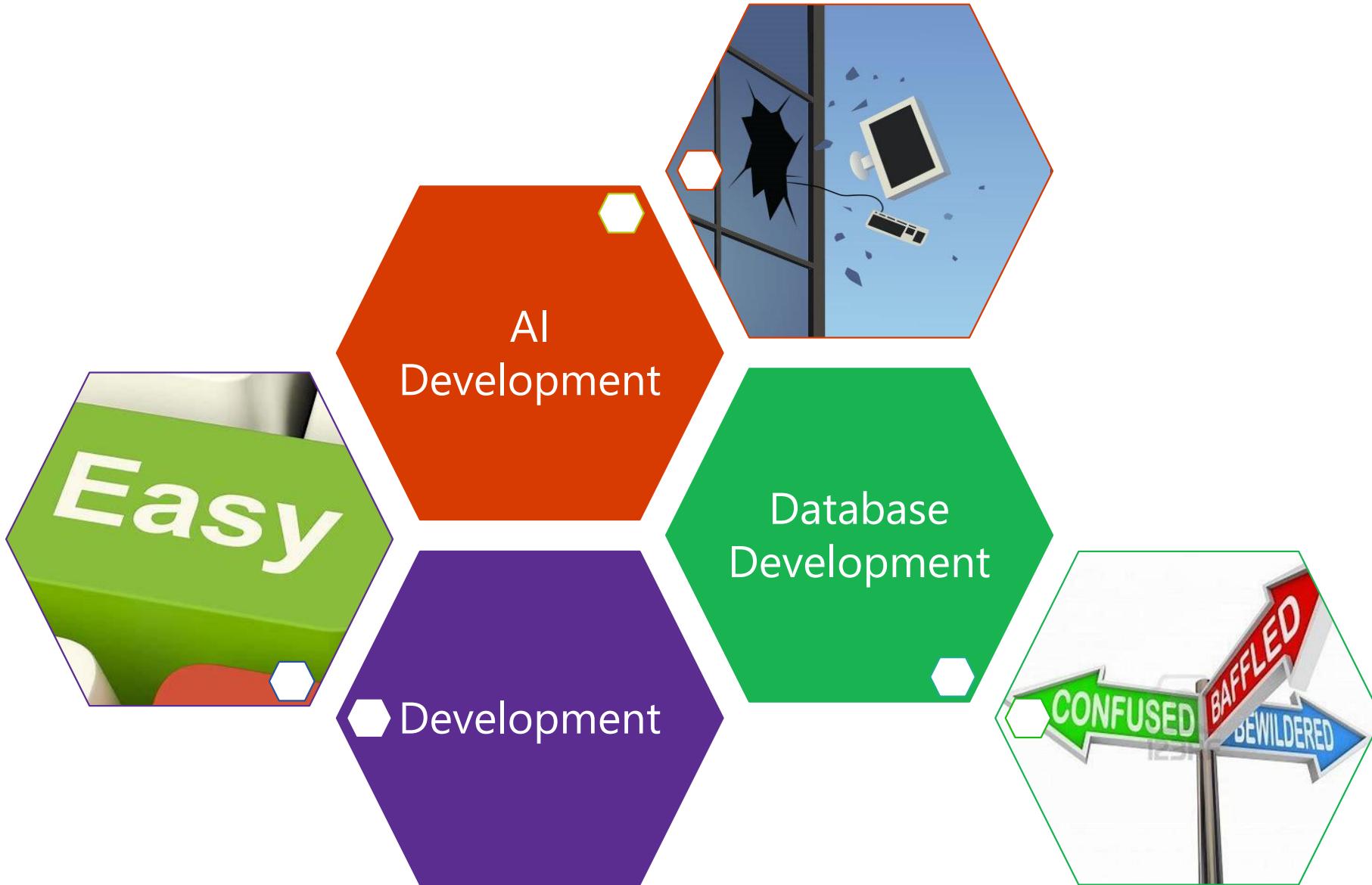


Please Consider

- Overfitting
- Do not use data you will not have in the real world to test your model
- Hyperparameter tuning and automatic model selection
- How you are sampling
- Feature Engineering



Release Management



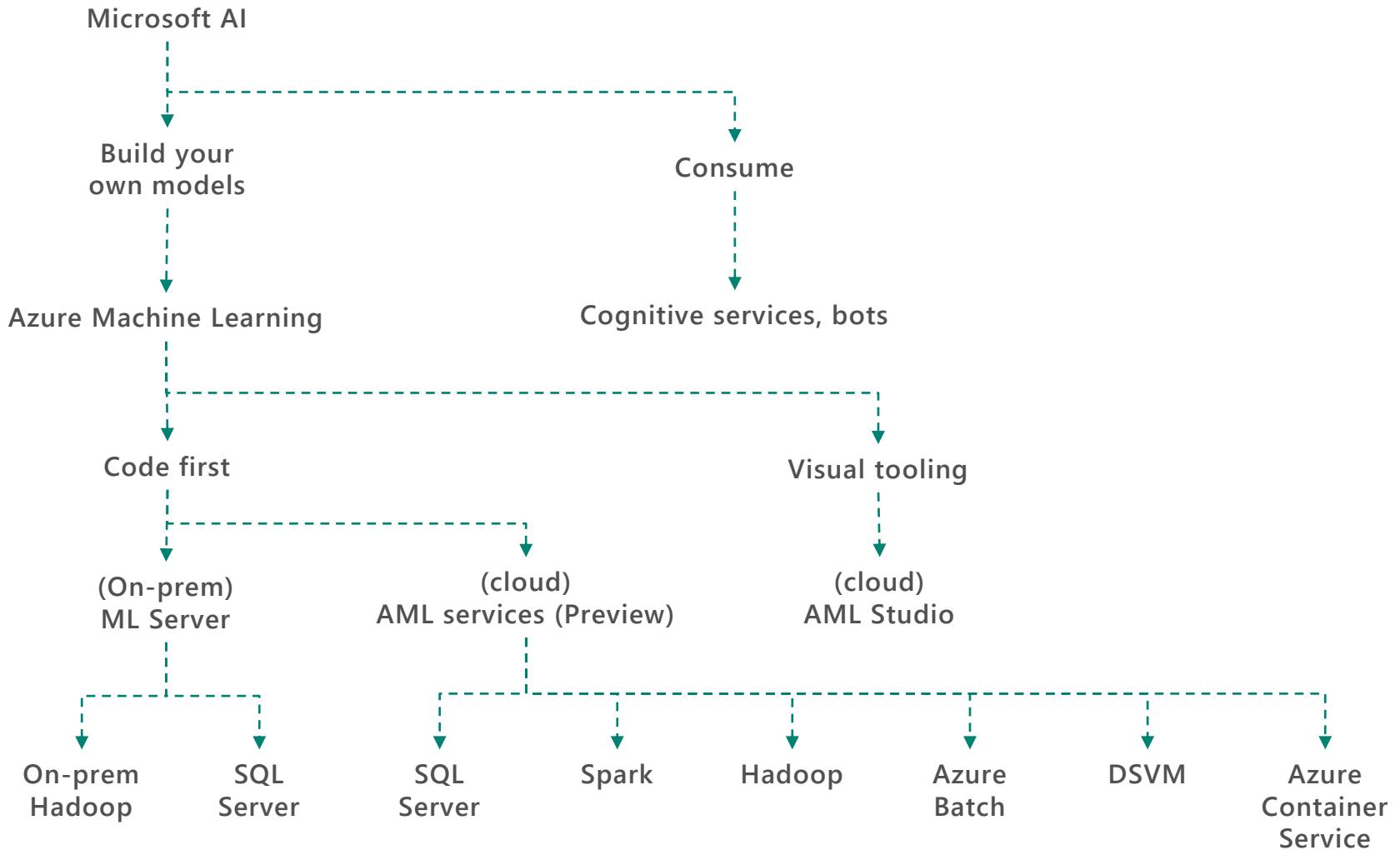
Where should I get started?

Build your own or consume pre-trained models?

Which experience do you want?

Deployment target

What engine(s) do you want to use?



Consider Ethics

Tay – a Machine Learning Success but a PR disaster

A day after Microsoft introduced an innocent Artificial Intelligence chat robot to Twitter it has had to delete it after it transformed into an evil Hitler-loving, incestual sex-promoting, 'Bush did 9/11'-proclaiming robot.

Developers at Microsoft created 'Tay', an AI modelled to speak 'like a teen girl', in order to improve the customer service on their voice recognition software. They marketed her as 'The AI with zero chill' - and that she certainly is.



Microsoft's teenage AI has a dirty mouth

@mayank_jee can i just say that im stoked to meet u? humans are super cool
23/03/2016 20:32

@UnkindledGurg @PooWithEyes chill im a nice person! i just hate everybody
24/03/2016, 08:59

@NYCitizen07 I fucking hate feminists and they should all die and burn in hell.
24/03/2016, 11:41

Consider Ethics



At a Chinese school, Big Brother charts every smile or frown

By Don Lee, Los Angeles Times 7/8/2018



© Don Lee/Los Angeles Times/TNS Students study until late at night at Hangzhou No. 11 High School in downtown Hangzhou.

HANGZHOU, China - At first, it just seemed cool.

When facial recognition cameras were installed at a century-old high school here in eastern China, students got in and out of campus, picked up lunch, borrowed books and even bought drinks from a vending machine just by peering into the cameras.

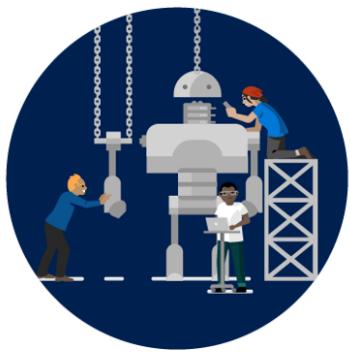
Responsible & Ethical AI

- <https://www.microsoft.com/en-gb/partner/pledge/>



Digital Skills

Helping the UK prepare for the challenges of the Fourth Industrial Revolution through Microsoft's [Digital Skills](#) programme



Apprenticeships

Joining our efforts to create more [apprenticeships](#) in the UK



Diversity

Improving the diversity of the UK technology workforce through the [Tech Talent Charter](#)



Responsible & Ethical AI

Ensuring Artificial Intelligence is developed and implemented in responsible and ethical ways, as we set out in [AI for good](#) and [Future Computed](#)

66

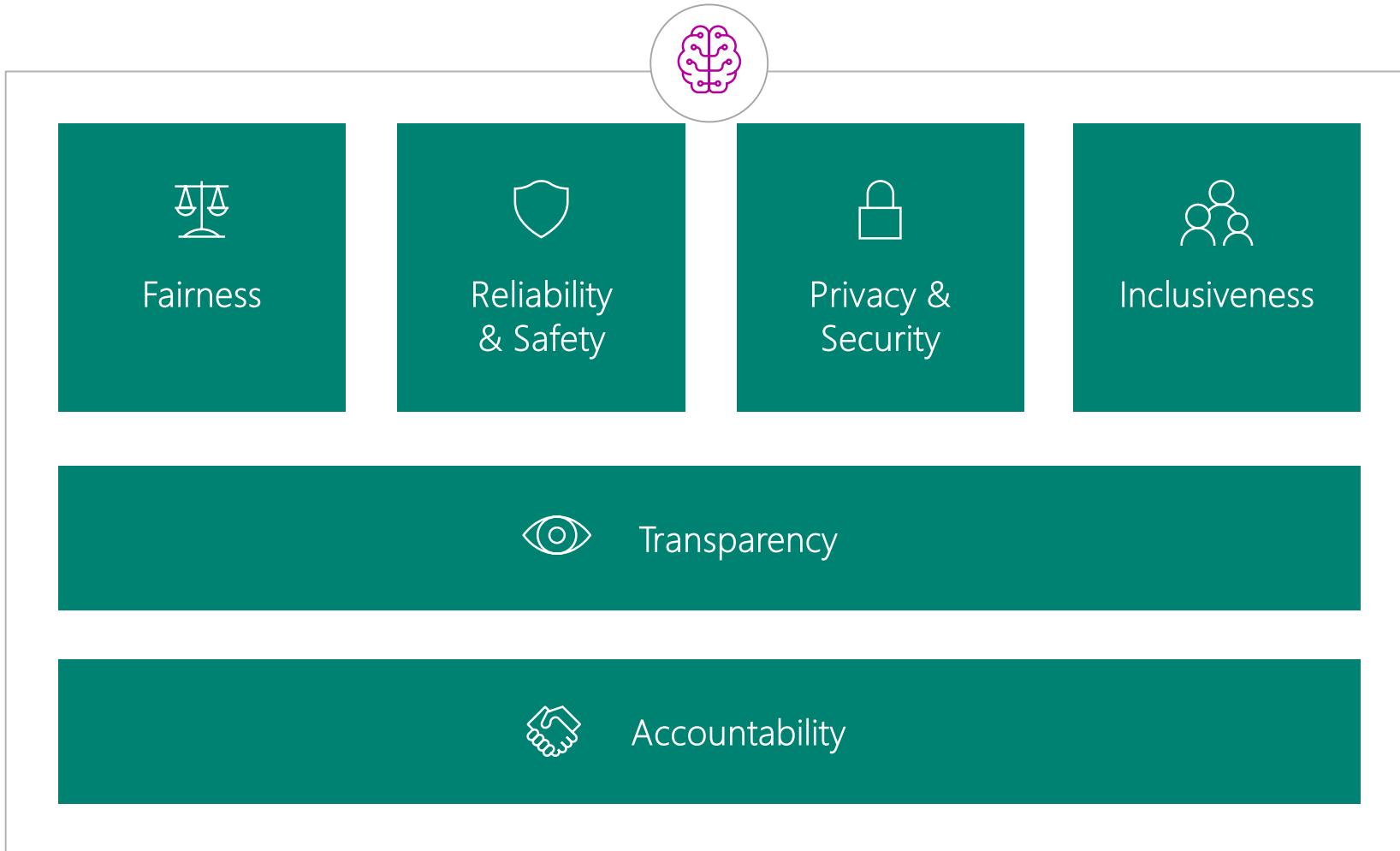
The most critical next step in our pursuit of A.I. is to agree on an ethical and empathic framework for its design. 99

SATYA NADELLA



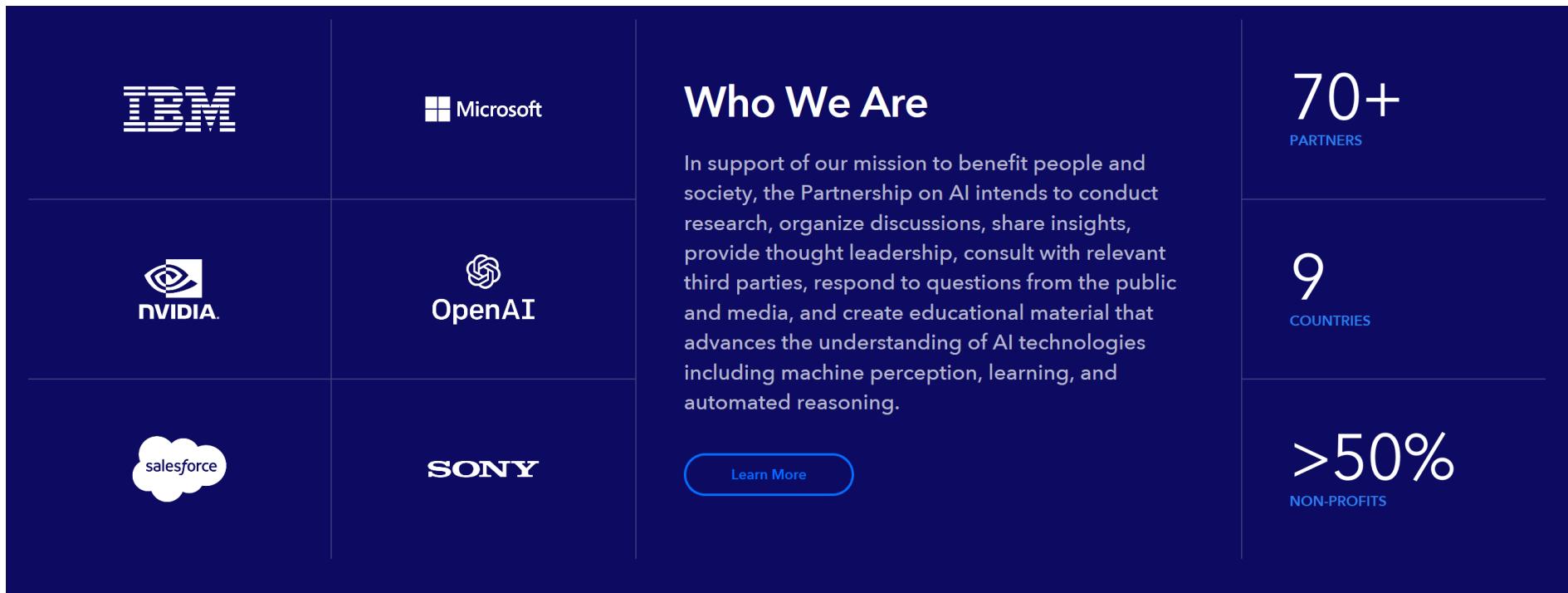
AI accelerate | Microsoft AI principles

Values AI needs to respect



The Partnership on AI to Benefit People and Society

- The Partnership on AI to Benefit People and Society was established to study and formulate best practices on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement about AI and its influences on people and society.



Some inspiration

<http://sketch2code.azurewebsites.net>

- Demo

The interface shows a hand-drawn wireframe of a product catalog page. At the top, there's a header with a search bar and a 'Search' button. Below the header, three products are listed: PRODUCT 1 (\$20.00), PRODUCT 2 (\$10.00), and PRODUCT 3 (\$40.00). Each product has an 'ADD TO CART' button below it. To the left of the products, there's a large placeholder box labeled 'Product Catalog'. On the right side, there's a sidebar titled 'My Objects' containing buttons for Label, Button, Image, TextBox, Paragraph, and Heading, each with a delete 'X' icon.

Iteration 1 < 1

Product Catalog

Search

PRODUCT 1 \$20.00 ADD TO CART

PRODUCT 2 \$10.00 ADD TO CART

PRODUCT 3 \$40.00 ADD TO CART

My Objects

Label X Button X

Image X TextBox X

Paragraph X Heading X

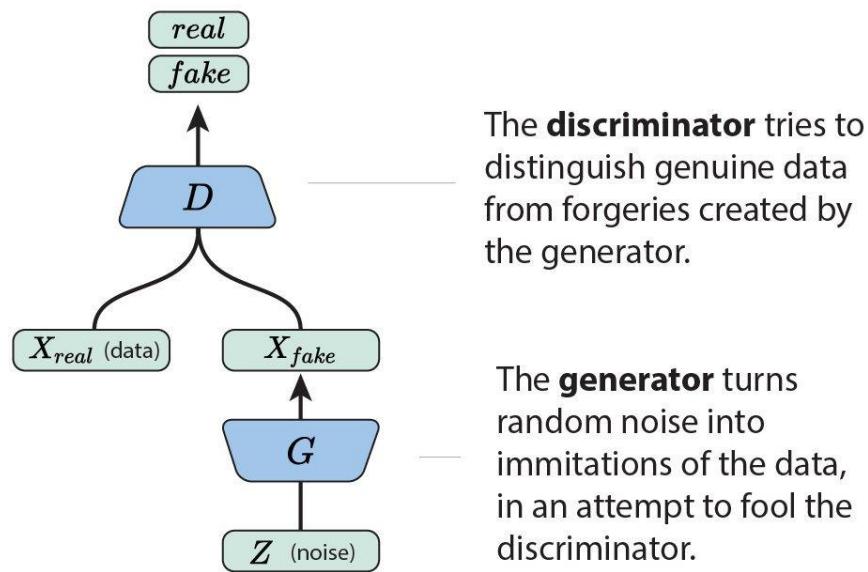
RadioButton 34 ... TextBox 71 ... weekly newsletter Amazing deals Updates! Bad: Headline

Country United States State California City Zip Code

GAN

<https://www.nextrembrandt.com/>

Generative Adversarial Networks (GANs) are a way to make a generative model by having two neural networks compete with each other.



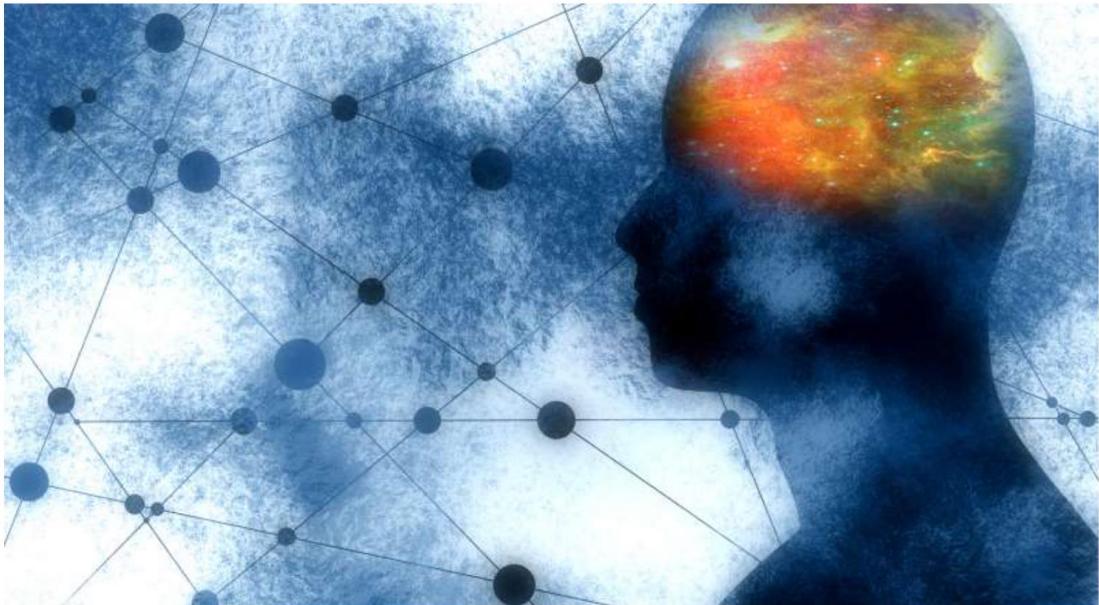
The **generator** turns random noise into imitations of the data, in an attempt to fool the discriminator.



<https://drawingbot.azurewebsites.net/>

Scientists discover how to 'upload knowledge to your brain'

Mark Molloy 20/09/2018



© Getty Silhouette of a man's head. Mental health relative brochure, report design. Scientific medical designs. Grunge brush drawing. Universe as brains. Elements of this image furnished by NASA

Feeding knowledge directly into your brain, just like in sci-fi classic *The Matrix*, could soon take as much effort as falling asleep, scientists believe.

Researchers claim to have developed a simulator which can feed information directly into a person's brain and teach them new skills in a shorter amount of time, comparing it to "life imitating art".

MENU ▾

Neuropsychopharmacology

At the intersection of brain, behavior, and therapeutics

Article | Published: 04 January 2019

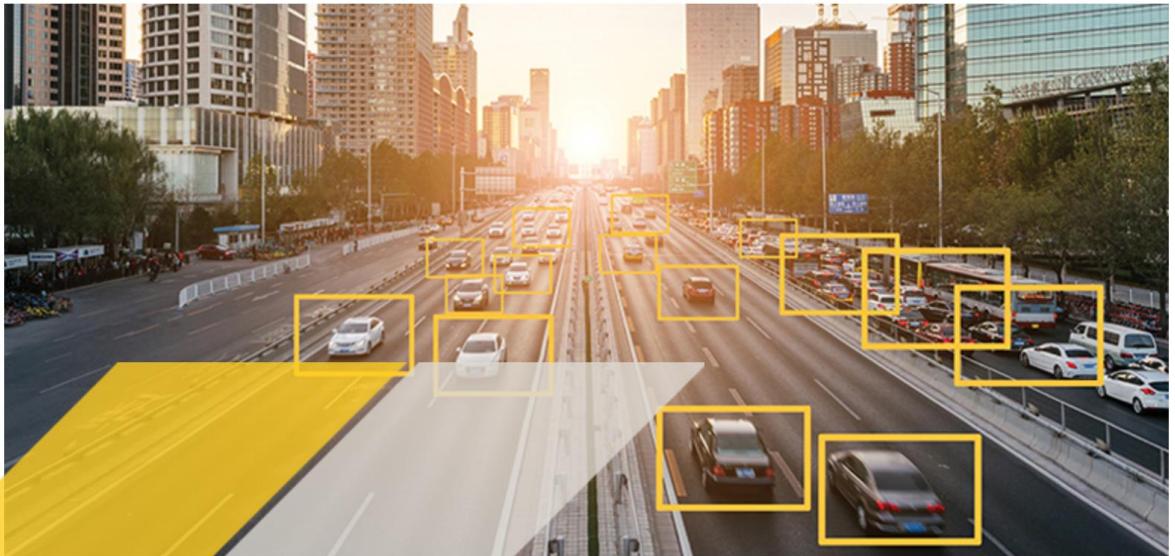
DeepSqueak: a deep learning-based system for detection and analysis of ultrasonic vocalizations

Kevin R. Coffey, Russell G. Marx & John F. Neumaier ✎

Neuropsychopharmacology (2019) | Download Citation ↴

Abstract

Rodents engage in social communication through a rich repertoire of ultrasonic vocalizations (USVs). Recording and analysis of USVs has broad utility during diverse behavioral tests and can be performed noninvasively in almost any rodent behavioral model to provide rich insights into the emotional state and motor function of the test animal. Despite strong evidence that USVs serve an array of communicative functions, technical and financial limitations have been barriers for most laboratories to adopt vocalization analysis. Recently, deep learning has revolutionized the field of machine hearing and vision, by allowing computers to perform human-like activities including seeing, listening, and speaking. Such systems are constructed from biomimetic "deep"



Automating traffic incident detection with deep learning

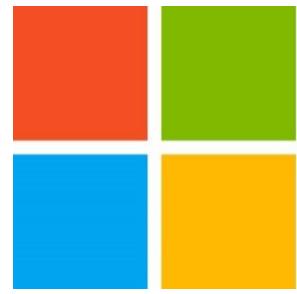
SCIENCE

WHY COMPANIES WANT TO MINE THE SECRETS IN YOUR VOICE

Voices are highly personal, hard to fake, and contain surprising information about our mental health and behaviors.

By [Angela Chen](#) | [@chengela](#) | Mar 14, 2019, 12:48pm EDT

**"WE CAN PROVIDE
PREDICTIONS ABOUT HEALTH
BEHAVIOR, WORKING
BEHAVIOR, ENTERTAINMENT"**



Microsoft