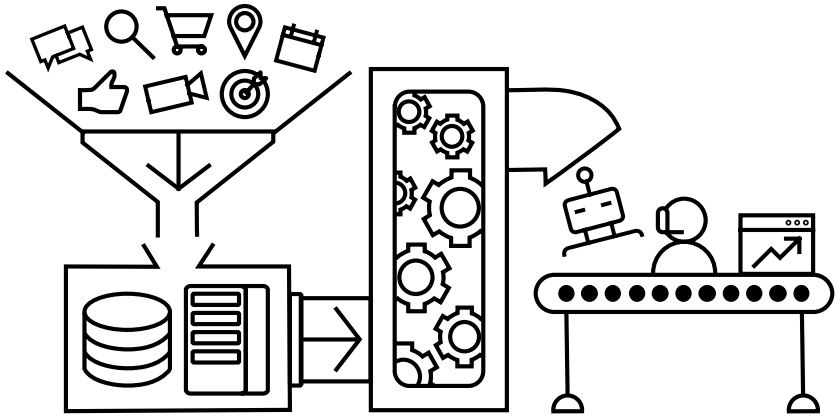
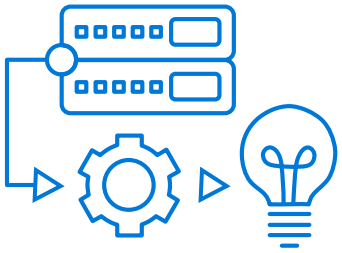

Microsoft
AI Blitz



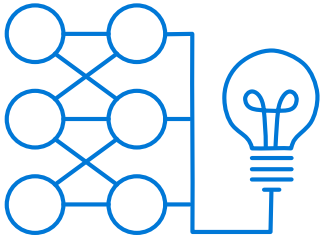
Advanced analytics

An intelligent examination of data or content to unlock deeper insights, make predictions, and generate recommendations using sophisticated techniques such as **machine learning** and **artificial intelligence.**



Machine learning (ML)

A method of data analysis that automates analytical model building



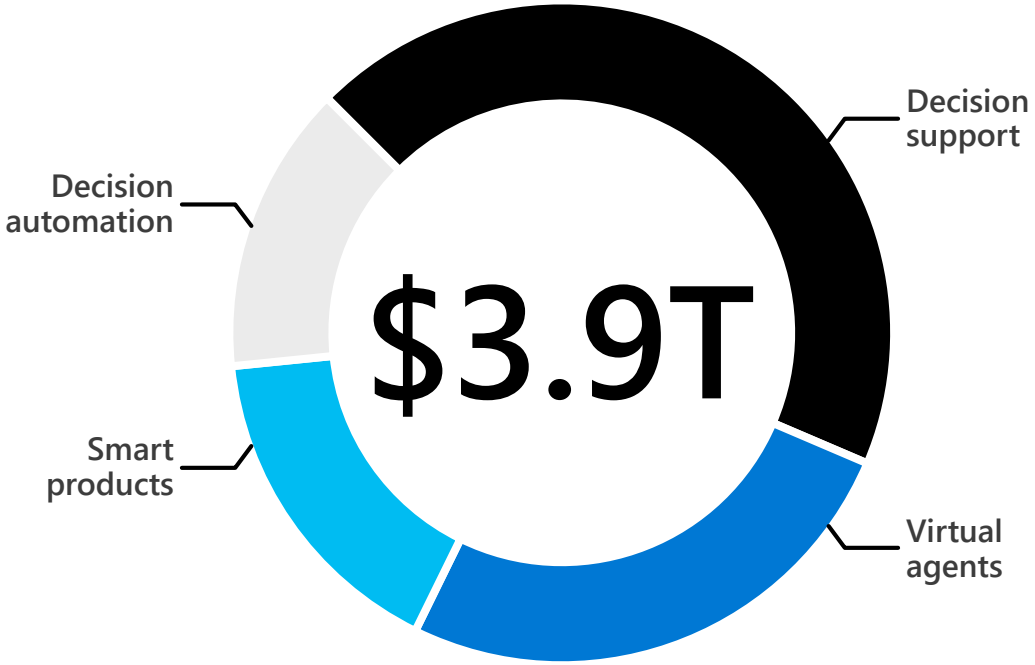
Artificial intelligence (AI)

The development of computer systems able to perform tasks that traditionally require human intelligence

Advanced analytics represents a growing opportunity

Global business value derived from AI in 2022 will reach

$3.9T



"Forecast: The Business Value of Artificial Intelligence, Worldwide, 2017-2025", Gartner, April 2018.

Computers understanding the world

Perception

Vision

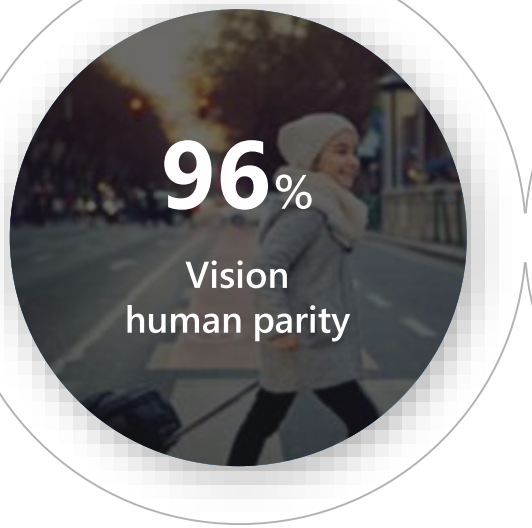
Speech

Cognition

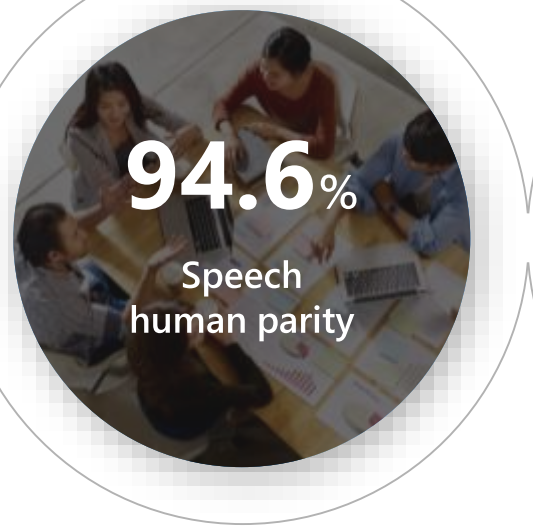
Language

Knowledge

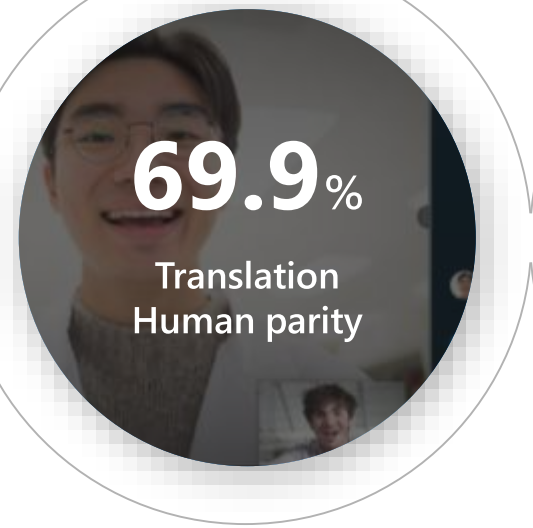
Reaching human parity



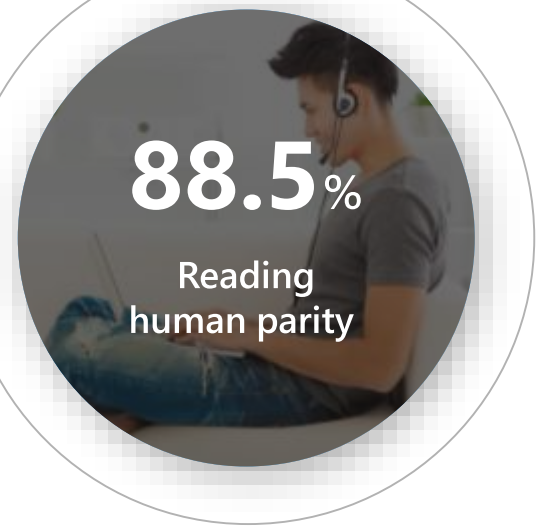
2016



2017

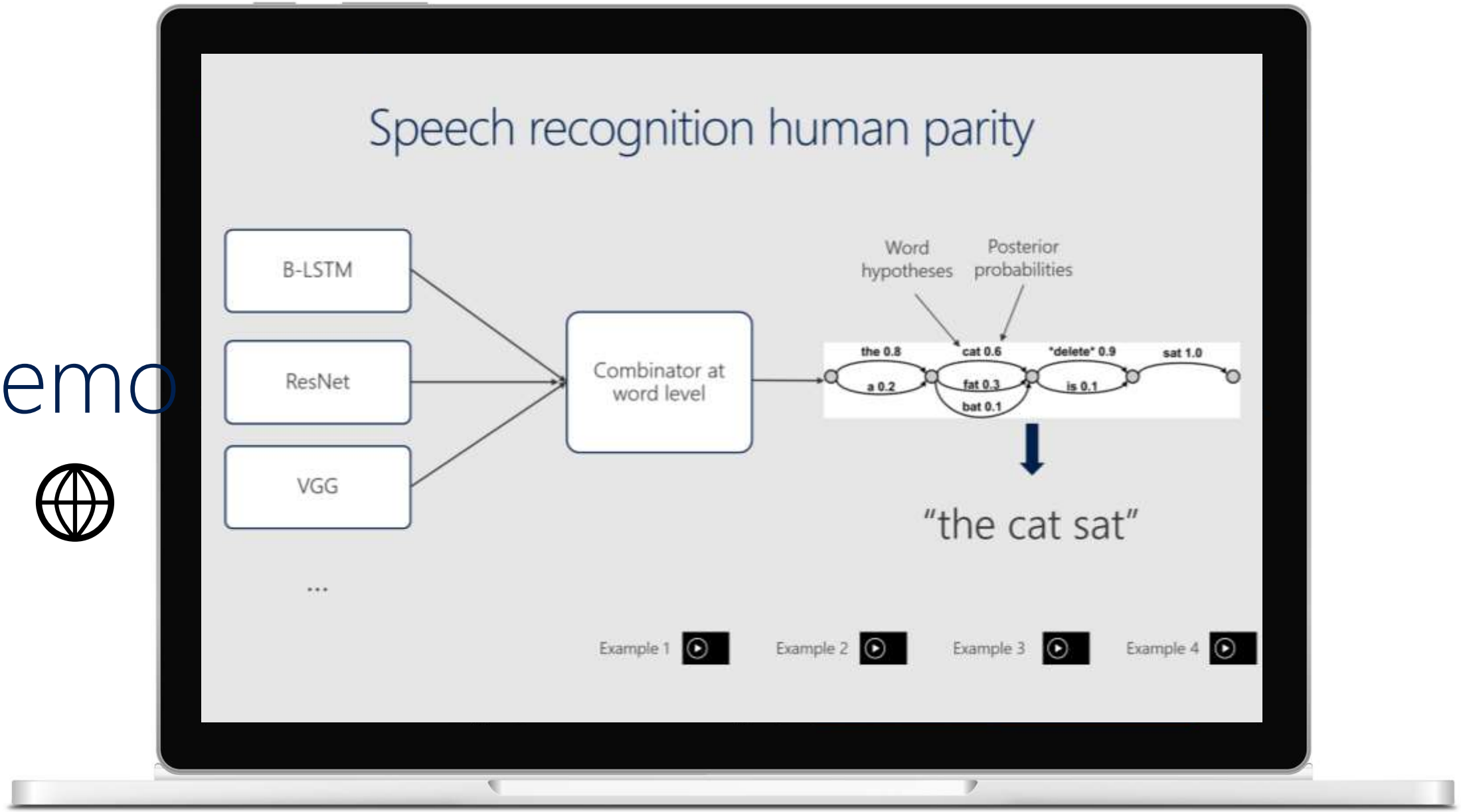


2018



2018

demo


Speech recognition human parity
B-LSTM
ResNet
VGG
...
Combinator at word level
Word hypotheses
Posterior probabilities
the 0.8
a 0.2
cat 0.6
fat 0.3
bat 0.1
delete 0.9
is 0.1
sat 1.0
"the cat sat"
Example 1
Example 2
Example 3
Example 4

Advances that make AI real

Vast amounts of data

Huge computational power

BMW
pedestrian alert

BMW
pedestrian alert

Steno app

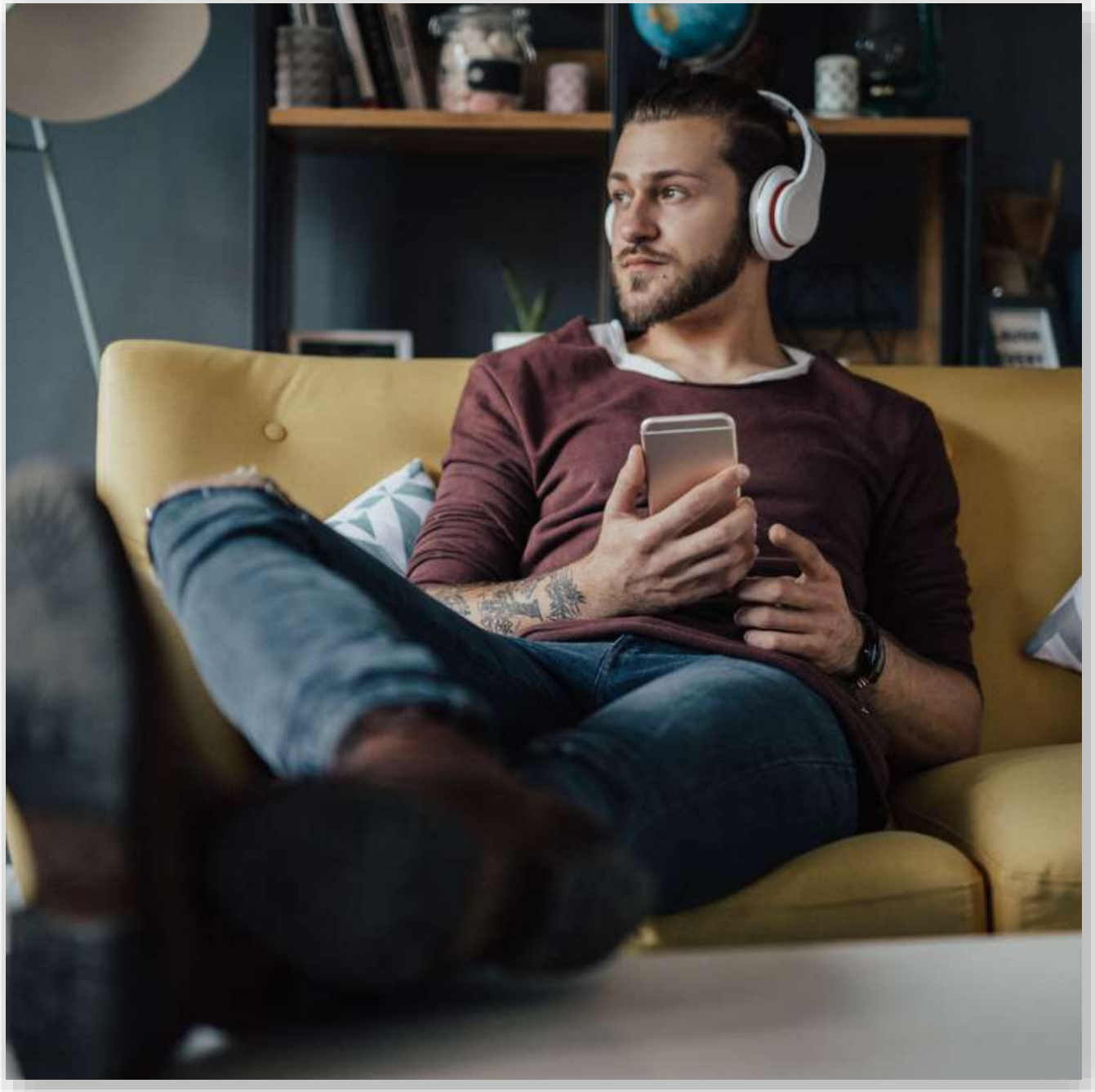
Steno app


6:32
Back
new file 2
More
0:04
-0:06
15
15
Add Bookmark
Select
Select All
This transcription app is great. You can edit on the fly. You can even add bookmarks during or after transcription.
Undo
Dismiss

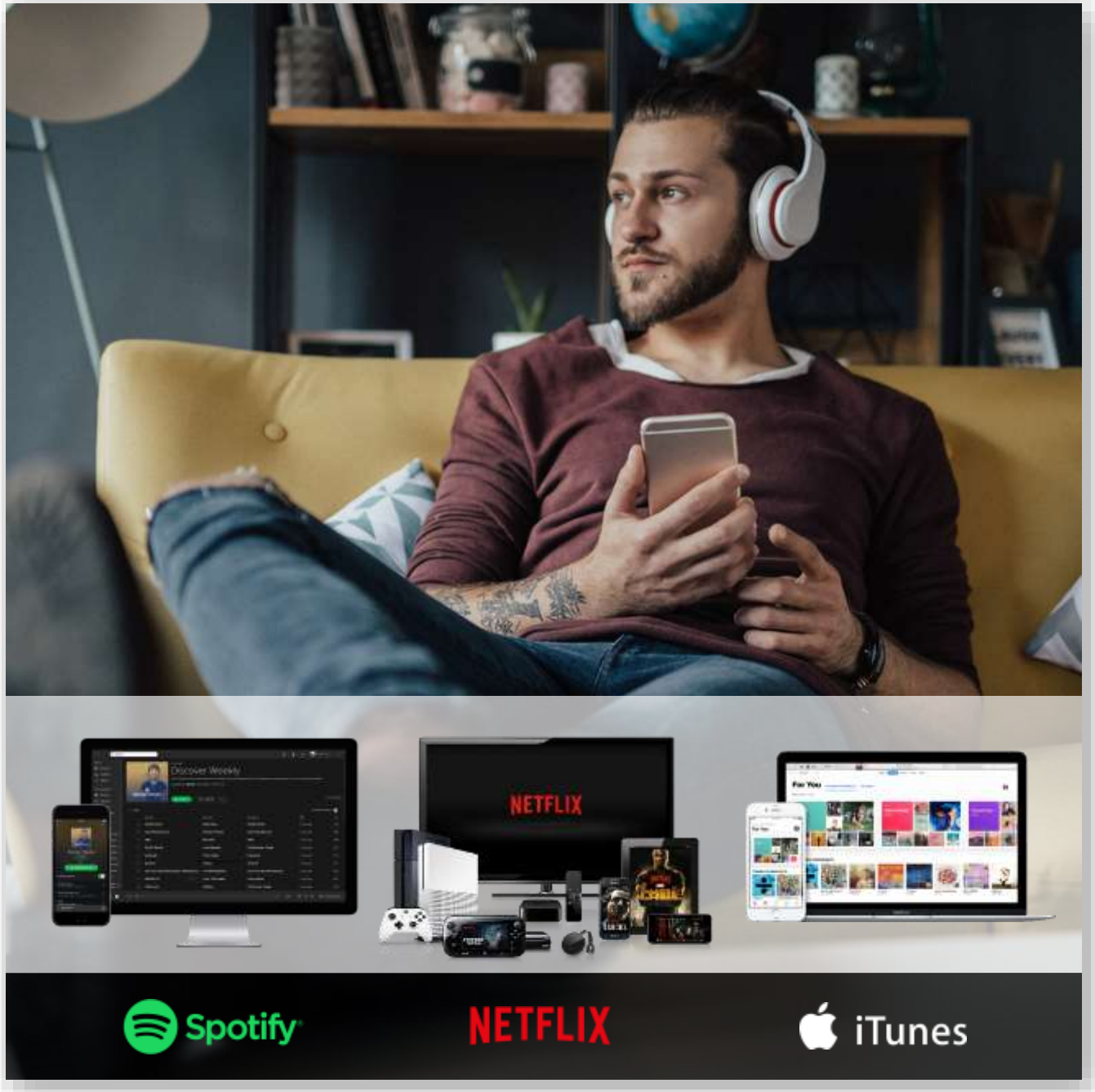
Skype Translator

Skype Translator

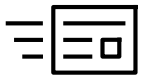
Spotify,
Netflix & iTunes



Spotify,
Netflix & iTunes



Helping you innovate across your business



Marketing

Product recommendation

Customer insights

Churn analytics

Sales

Lead scoring

Sales insights

Dynamic pricing

Service

Intelligent chatbots

Virtual assistants

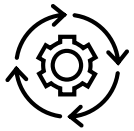
Waiting line optimization

Finance

Financial forecasting

Cash flow forecasting

Risk management

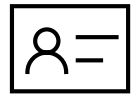


Operations

Predictive maintenance

Demand forecasting

Quality assurance



Workforce

Employee insights

HR insights

Resource planning

Leading to transformational changes

Product recommendation

- The average size of a single cart has decreased
- Provide personalized digital content to shoppers
- Increase cart size

asos
discover fashion online

ASOS delivers 15.4 million personalized experiences with **33 orders per second**

Predictive maintenance

- Unplanned downtime results in cost overruns
- Predict when maintenance should be performed
- Minimize downtime

CARNIVAL MARITIME

Hybrid solution predicts onboard water usage, saving **$200k/ship/year**

Demand forecasting

- Solar energy production is inconsistent
- Align energy supply with the optimal markets
- Maximize revenue

renewablesAI
DATA SCIENCE & ASSET MANAGEMENT

Distributed power generation increases revenue by over **€100 million**

Product recommendation

Delight customers with improved shopping experiences

The average size of a single cart has decreased

Provide personalized digital content to shoppers

Engage customers

Deliver relevant content

Increase cart size

asos
discover fashion online

ASOS delivers 15.4 million personalized experiences with 33 orders per second

Predictive maintenance

Optimize operations by minimizing downtime

Unplanned downtime results in cost overruns

Predict when maintenance should be performed

- Predict equipment failures
- Prevent disruptions
- Manage cost of supplies

CARNIVAL MARITIME

Hybrid solution predicts onboard water usage, saving $200k/ship/year

Demand forecasting

Maximize revenue by integrating with energy markets

Solar energy production is inconsistent

Align energy supply with the optimal energy markets

- Streamline product development
- Increase revenue and savings
- Drive adoption of renewable energy

renewablesAI
DATA SCIENCE & ASSET MANAGEMENT

Increases revenue by €100 million and savings of over €200 million

Financial services use cases

Effective customer engagement

Customer profiles
Credit history
Transactional data
LTV
Loyalty

Customer analytics

Customer 360 degree evaluation
Customer segmentation
Reduced customer churn
Underwriting, servicing and delinquency handling
Insights for new products

Faster innovation for a better customer experience

Decision services management

Customer segmentation
CRM data
Credit data
Market data

Financial modeling

Commercial/retail banking, securities, trading and investment models
Decision science, simulations and forecasting
Investment recommendations

Improved consumer outcomes and increased revenue

Risk and revenue management

Transaction data
Demographics
Purchasing history
Trends

Risk, fraud, threat detection

Real-time anomaly detection
Card monitoring and fraud detection
Security threat identification
Risk aggregation

Enhanced customer experience with machine learning

Risk and compliance management

CRM
Credit
Risk
Merchant records
Products and services

Credit analytics

Enterprise DataHub
Regulatory and compliance analysis
Credit risk management
Automated credit analytics

Transform growth with predictive analytics

Recommendation engine

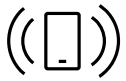
Clickstream data
Products
Services
Customer service data

Marketing analytics

Recommendation engine
Predictive analytics and targeted advertising
Fast marketing and multi-channel engagement
Customer sentiment analysis

Improved customer engagement with machine learning

Health and life sciences use cases

DNA sequences	Real world analytics	Image deep learning	Sensor data	Social data listening
FAST-Q BAM SAM VCF Expression	HL7/CCD 837 Pharmacy Registry EMR	MRI X-RAY CT Ultrasound	Readings Time series Event data	Social media Adverse events Unstructured
				
Genomics and precision medicine	**Clinical and claims data**	**GPU image processing**	**IoT device analytics**	**Social analytics**
Single cell sequencing Biomarker, genetic, variant and population analytics ADAM and HAIL on Databricks	Claims data warehouse Readmission predictions Efficacy and comparative analytics Prescription adherence Market access analysis	Graphic intensive workloads Deep learning using Tensor Flow Pattern recognition	Aggregation of streaming events Predictive maintenance Anomaly detection	Real-time patient feedback via topic modelling Analytics across publication data
Faster innovation for drug development	**Improved outcomes and increased revenue**	**Diagnostics leveraging machine learning**	**Predictive analytics transforms quality of care**	**Improved patient communications and feedback**

Media and entertainment use cases

Personalized recommendations

Customer profiles
Viewing history
Online activity
Content sources
Channels

Content personalization

Personalized viewing and engagement experience
Click-path optimization
Next best content analysis
Improved real time ad targeting

Faster innovation for customer experience

Effective customer retention

Customer profiles
Online activity
Content distribution
Services data

Customer churn prevention

Quality of service and operational efficiency
Market basket analysis
Customer behavior analysis
Click-through analysis

Improved consumer outcomes and increased revenue

Information optimization

Consumption logs
Clickstream and devices
Marketing campaign responses

Recommendation engine

Ad effectiveness
Content monetization
Fraud detection
Information-as-a-service
High value user engagement

Enhance user experience with machine learning

Inventory allocation

Transactions
Subscriptions
Demographics
Credit data

Predictive analytics

Predict audience interests
Network performance and optimization
Pricing predictions
Nielsen ratings and projections
Mobile spatial analytics

Predictive analytics transforms growth

Consumer engagement analysis

Content metadata
Ratings
Comments
Social media activity

Sentiment analysis

Demand-elasticity
Social network analysis
Promotion events time-series analysis
Multi-channel marketing attribution

Improved consumer engagement with machine learning

Retail use cases

Recommendation engine

Customer profiles

Shopping history

Online activity

Social network analysis

Next best and personalized offers

Customer 360/consumer personalization

Right product, promotion, at right time

Multi-channel promotion

Faster innovation for customer experience

Effective customer engagement

Shopping history

Online activity

Floor plans

App data

Store design and ergonomics

Path to purchase

In-store experience

Workforce and manpower optimization

Improved consumer outcomes and increased revenue

Inventory optimization

Demand plans

Forecasts

Sales history

Trends

Local events/weather patterns

Data-driven stock, inventory, ordering

Predict inventory positions and distribution

Fraud detection

Market basket analysis

Omni-channel shopping experience with machine learning

Inventory allocation

Demographics

Buyer perception

Consumer research

Market/competitive analysis

Assortment optimization

Economic modelling

Optimization for foot traffic, Online interactions

Flat and declining categories

Predictive analytics transforms growth

Consumer engagement

Historical sales data

Price scheduling

Segment level price changes

Real-time pricing optimization

Demand-elasticity

Personal pricing schemes

Promotion events

Multi-channel engagement

Improved consumer engagement with machine learning

Advertising and marketing tech use cases

Effective customer engagement

Customer profiles
Online history
Transaction data
Loyalty

Customer value analytics

Customer 360, segmentation aggregation and attribution
Audience modelling/index report
Reduce customer churn
Insights for new products
Historical bid opportunity as a service

Faster innovation for customer growth

Recommendation engine

Customer segmentation
CRM data
Credit data
Market data

Next best and personalized offers

Right product, promotion, at right time
Real time ad bidding platform
Personalized ad targeting
Ad performance reporting

Improved outcomes and increased revenue

Risk and fraud analysis

Transaction data
Demographics
Purchasing history
Trends

Risk and fraud management

Real-time anomaly detection
Fraud prevention
Customer spend and risk analysis
Data relationship maps

Risk management with machine learning

Campaign reporting analytics

CRM
Merchant records
Products
Services
Marketing data

Sales and campaign optimization

Optimizing return on ad spend and ad placement
Multi-channel promotion
Ideal customer traits
Optimized ad placement

Predictive analytics transforms growth

Brand promotion and customer experience

Social media
Online history
Customer service data

Sentiment analysis

Opinion mining/social media analysis
Deeper customer insights
Customer loyalty programs
Shopping cart analysis

Improved customer engagement with machine learning

Oil, gas, and energy use cases

Upstream optimization, maximize well life

Field data
Asset data
Demographics
Production data

Digital oil field/ oil production

Production optimization
Integrate exploration and seismic data
Minimize lease operating expenses
Decline curve analysis

Faster innovation for revenue growth

Grid operations, asset inventory optimization

Sensor stream data
UAVs images
Inventory data
Production data

Industrial IoT

Pipeline monitoring
Preventive maintenance
Smart grids and microgrids
Grid operations, field service
Asset performance as a service

Improved outcomes and increased revenue

Supply-chain optimization

Transaction data
Demographics
Purchasing history
Trends

Supply-chain optimization

Trade monitoring, optimization
Retail mobile applications
Vendor management - construction, transportation, truck and delivery optimization

Optimizing supply-chain with machine learning

Risk optimization

Sensor stream data
Transport
Retail data
Grid production data
Refinery tuning parameters

Safety and security

Real-time anomaly detection
Predictive analytics
Industrial safety
Environment health and safety

Predictive analytics transforms safety and security

Recommendations engine

Clickstream data
Products
Services
Market data
Competitive data
Demographics

Sales and marketing analytics

Fast marketing and multi-channel engagement
Develop new products and monitor acceptance of rates
Predictive energy trading
Deep customer insights

Improved customer engagement with machine learning

Security use cases

Security controls to leverage all data

Firewall/network logs
Apps
Data access layers

Intrusion detection and predictive analytics

Prevention of DDoS attacks
Threat classifications
Data loss/anomaly detection in streaming
Cybermetrics and changing use patterns

Prevent complex threats with machine learning

Actionable threat intelligence

Firewall/network logs
Network flows
Authentications

Security intelligence

Real-time data correlation
Anomaly detection
Security context, enrichment
Offence scoring, prioritization
Security orchestration

Faster innovation for threat prevention

Risk and fraud analysis

Firewall/network logs
Web/app logs
Social media content

Fraud detection and prevention

e-Tailing
Inventory monitoring
Social media monitoring
Phishing scams
Piracy protection

Risk management with machine learning

Compliance management

Firewall/network logs
Web
Applications
Devices
OS

Security compliance reporting

Ad-hoc/historic incident reports
SOC/NOC dashboards
Deep OS auditing
Data loss detection in IoT
User behavior analytics

Transform security with improved visibility

Identity and access management for analytics

Files
Tables
Clusters
Reports
Dashboards
Notebooks

Fine-grained data analytics security

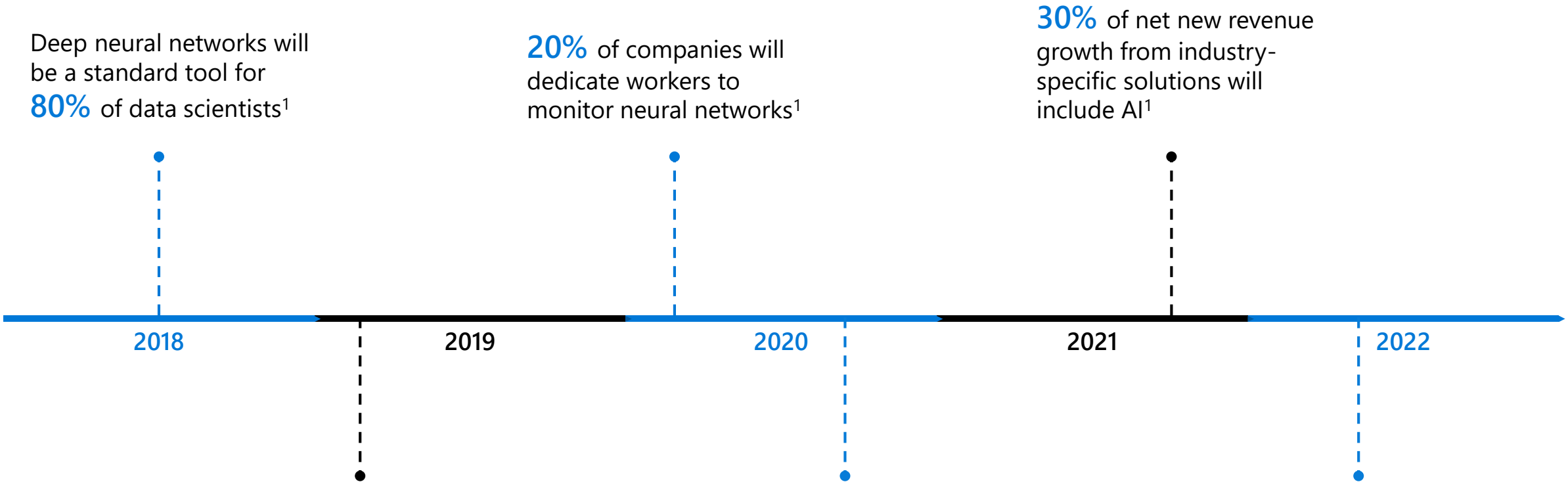
Role-based access controls
Auditing and governance
File integrity monitoring
Row level and column level access permissions

Limit malicious insiders to transform growth

Azure AI Customers

AI across Microsoft

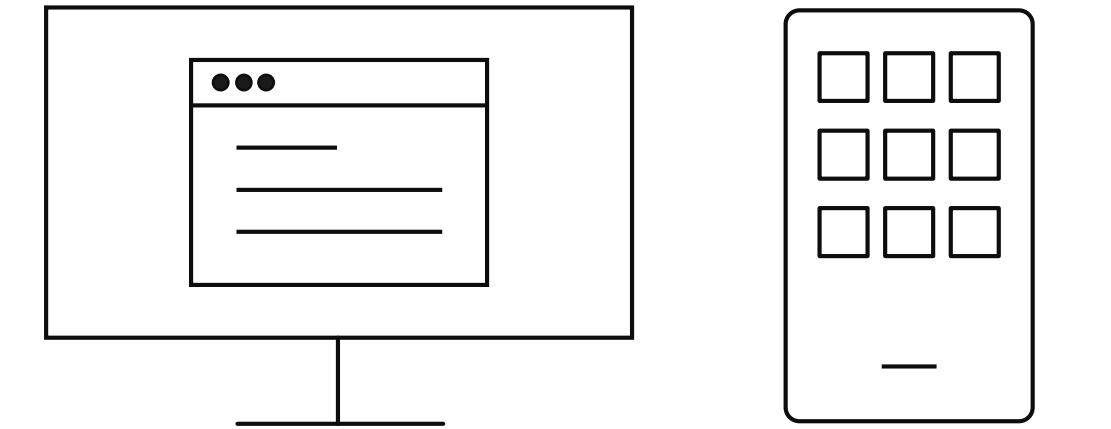
What are companies looking to do next?



[1] "100 Data and Analytics Predictions Through 2021", Gartner, 2017. [2] "Predicts 2018: AI and the Future of Work", Gartner, 2018.


Jumpstart with AI

Building AI apps & agents



Apps

+

Vision

Speech

Language

Leverage out-of-the-box AI tools and services

Cognitive services

Use pre-built AI services
to solve business problems

Map complex
information and data

Allow your apps to
process natural language

Azure search

Get up and
running quickly

Reduce complexity with
a fully-managed service

Use artificial intelligence
to extract insights

Bot services

Speed development with a purpose-built
environment for bot creation

Infuse intelligence into your bot using
cognitive services

Integrate across multiple
channels to reach more customers

Create a seamless developer experience across desktop, cloud, or at the edge using Visual Studio AI Tools

Cognitive Services

Infuse your apps with powerful, pre-trained AI models

Customize easily and tailor to your needs

Use language of your choice

+

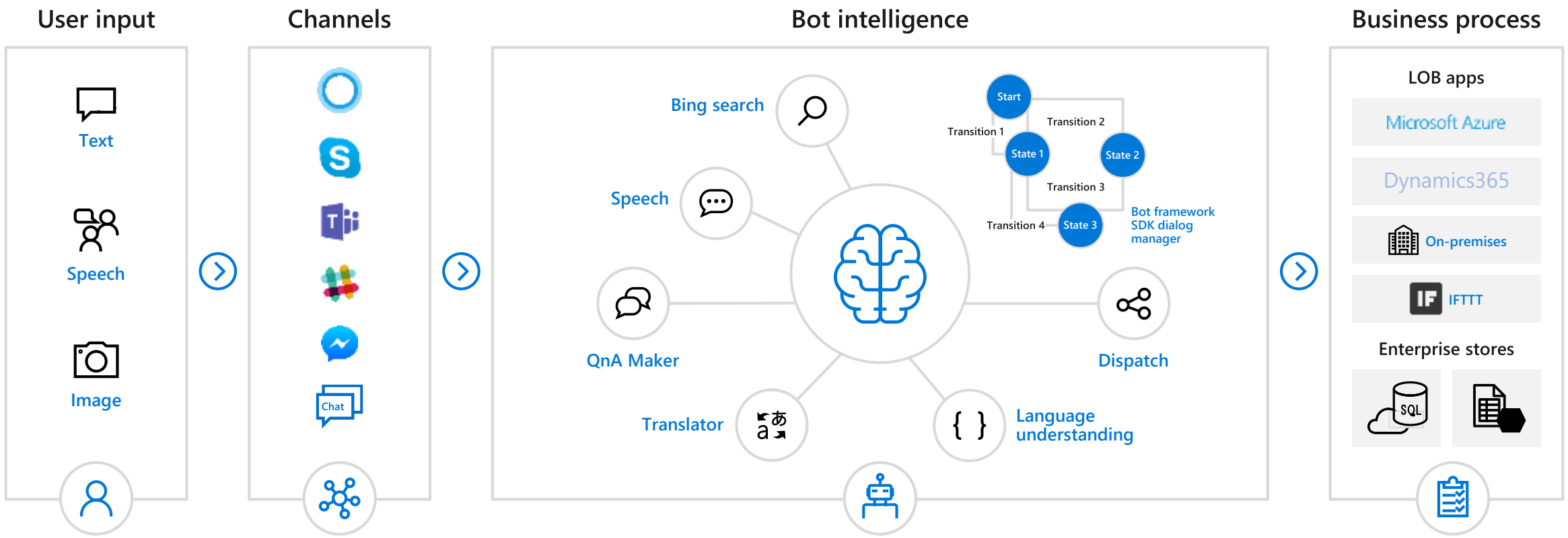
Bot Service

Accelerate bot development with an integrated environment and pre-built templates

Engage your audience easily across multiple channels

Conversational AI

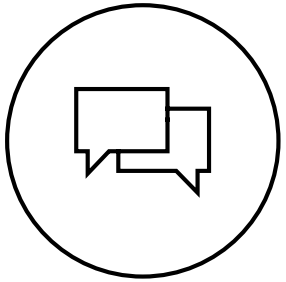
Azure bot service + cognitive services



Azure Tools | Security | Logging | Auditing | Integration

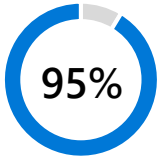
Microsoft

Enterprise scenarios for AI

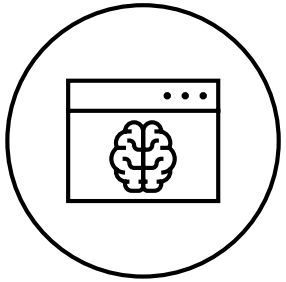


Conversational agents

Transform your engagements with customers and employees

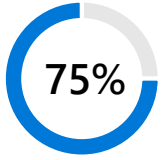


Of customer interactions powered by AI bots by 2025

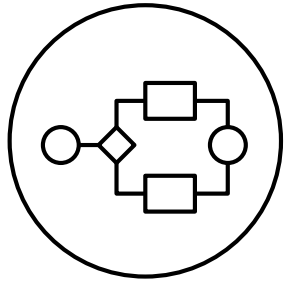


Intelligent apps

Leverage AI to create the future of business applications

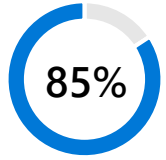


Applications to include AI by the end of this year



Business processes

Transform critical business processes with AI

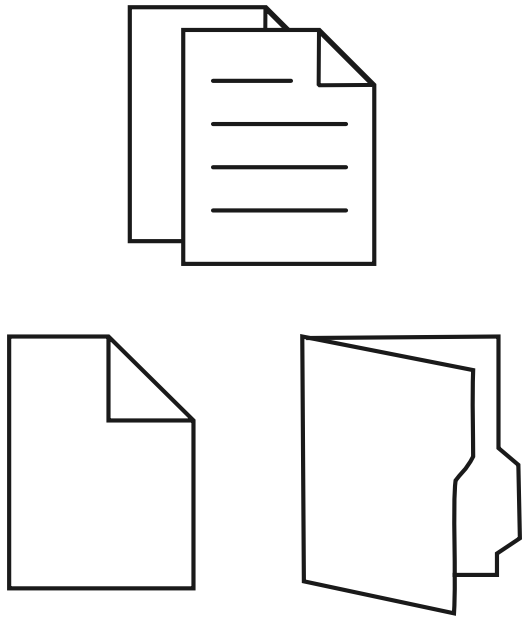


Of enterprises using AI by 2020

Custom Vision Demo


What about knowledge mining

What is knowledge mining?



Business documents

Unlock valuable information lying latent in all your content

Knowledge mining with Azure Search

Documents

Cognitive skills

Key Phrase extraction

Organization entity extraction

Face detection

Custom skills

Location entity extraction

Persons entity extraction

Celebrity recognition

Landmark detection

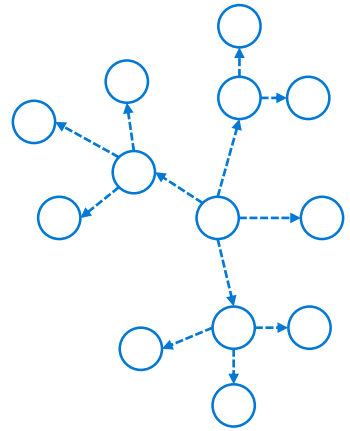
Sentiment analysis

Language detection

Tag extraction

Printed text recognition

Fully text-searchable rich index



Canada’s largest automobile search site drives seamless search experience

auto TRADER.ca

Audio AI experts use cloud-based search platform to connect listeners to audio content

audioburst

Prime property listings site powered by cloud-based search and analytics

JLL


JFK Files


Get deeper

Productive Machine Learning services

Empower data science and development teams

Integrated data science & data engineering teams

Desktop solutions not adequate

Need a unified big data & machine learning solution

Individual data scientists

Desktop solutions adequate

Need cloud for sporadic compute needs

Azure Databricks + Azure Machine Learning

Machine Learning VMs

Popular frameworks

Build advanced deep learning solutions

Use any deep learning framework

TensorFlow

PyTorch

Scikit-Learn

MXNet

Chainer

Keras

+

without getting locked into one framework

ONNX

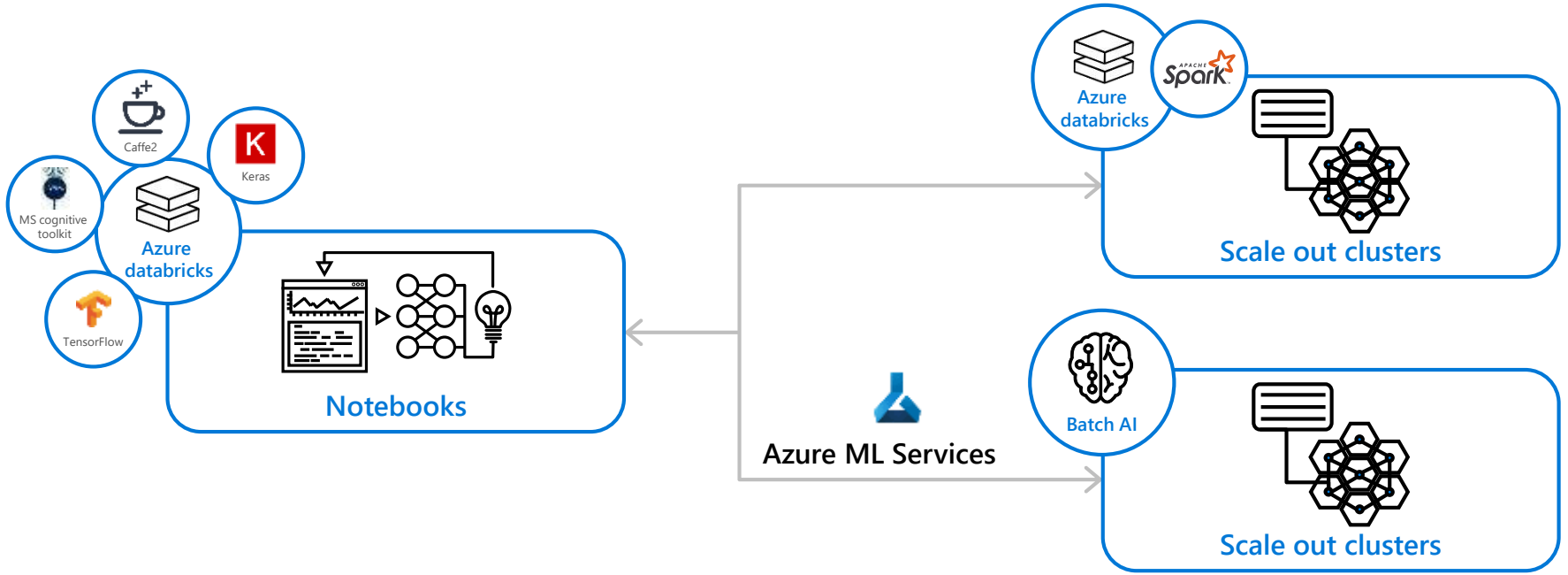
Community project created by Facebook and Microsoft

Use the best tool for the job. Train in one framework and transfer to another for inference

NVIDIA QUALCOMM Windows vespa SOPHON

intel skymizer MathWorks NETRON Visual DL

Build and deploy deep learning models



Streamline AI development efforts

Leverage popular deep learning toolkits

Develop your language of choice

Scale compute resources in any environment

Choose VMs for your modeling needs

Process video using GPU-based VMs

Quickly evaluate and identify the right model

Run experiments in parallel

Provision resources automatically

Leverage deep learning services and frameworks

Azure databricks

Accelerate processing with the fastest Spark engine

Integrate natively with Azure services

Access enterprise-grade Azure security

Azure ML services

Bring AI to the edge

Increase your rate of experimentation

Deploy and manage your models everywhere

Leverage your favorite deep learning frameworks

TensorFlow | MS Cognitive Toolkit | PyTorch | Scikit-Learn | ONNX | Caffe2 | MXNet | Chainer

Introducing Azure Databricks

Fast, easy, and collaborative Apache Spark™-based analytics platform

Increase productivity

Build on a secure, trusted cloud

Scale without limits

Built with your needs in mind

- Role-based access controls
- Effortless autoscaling
- Live collaboration
- Enterprise-grade SLAs
- Best-in-class notebooks
- Simple job scheduling

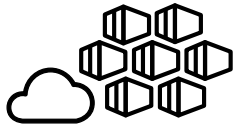
Seamlessly integrated with the Azure Portfolio

Azure Machine Learning Services

Bring AI to everyone with an end-to-end, scalable, trusted platform

Boost your data science productivity

Increase your rate of experimentation



Deploy and manage your models everywhere

Built with your needs in mind

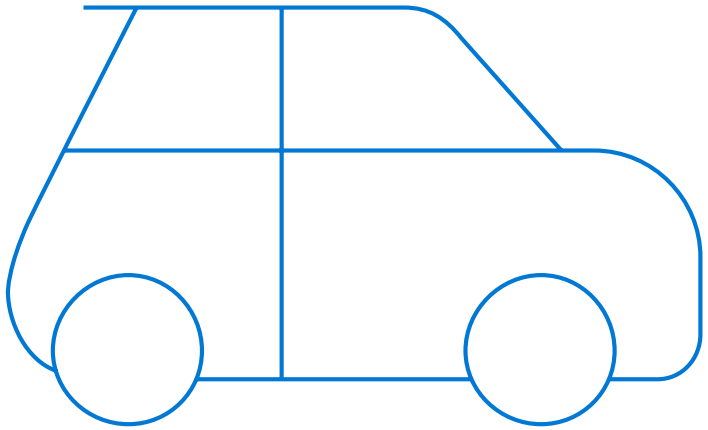
- GPU-enabled virtual machines
- Low latency predictions at scale
- Integration with popular Python IDEs
- Role-based access controls
- Model versioning
- Automated model retraining

Seamlessly integrated with the Azure Portfolio


New capabilities

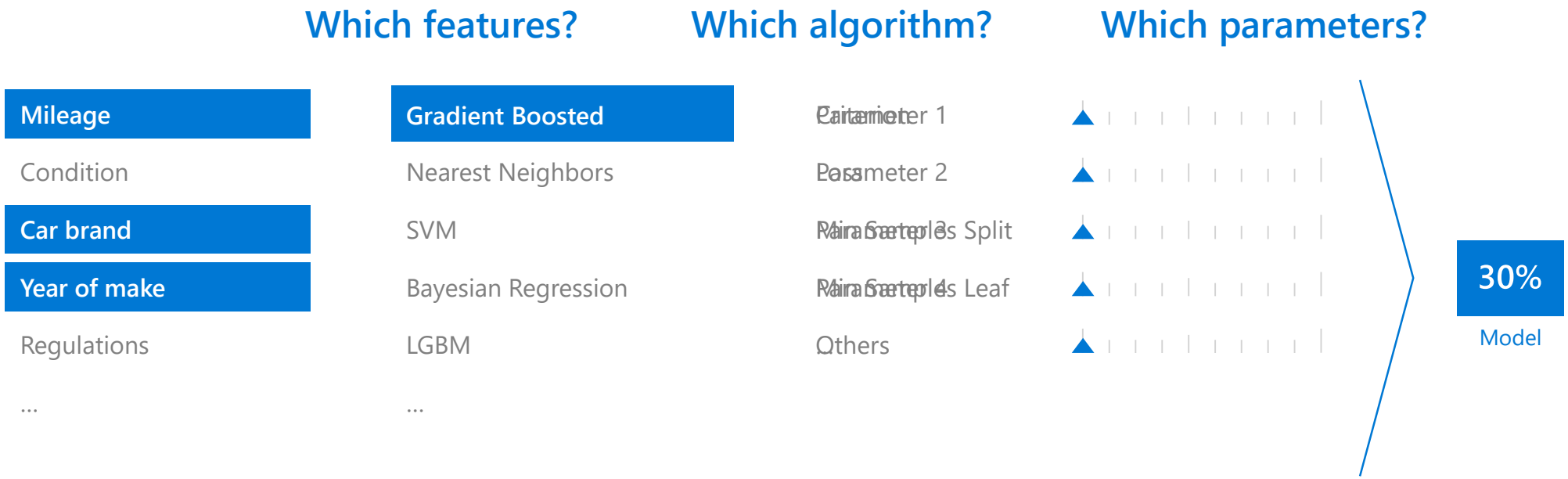
Azure Machine Learning

Automated machine learning



How much is this car worth?

Model creation is typically a time consuming process



Model creation is typically a time consuming process

Which features?

- Mileage
- Condition
- Car brand
- Year of make
- Regulations
- ...

Which algorithm?

- Gradient Boosted
- Nearest Neighbors
- SVM
- Bayesian Regression
- LGBM
- ...

Which parameters?

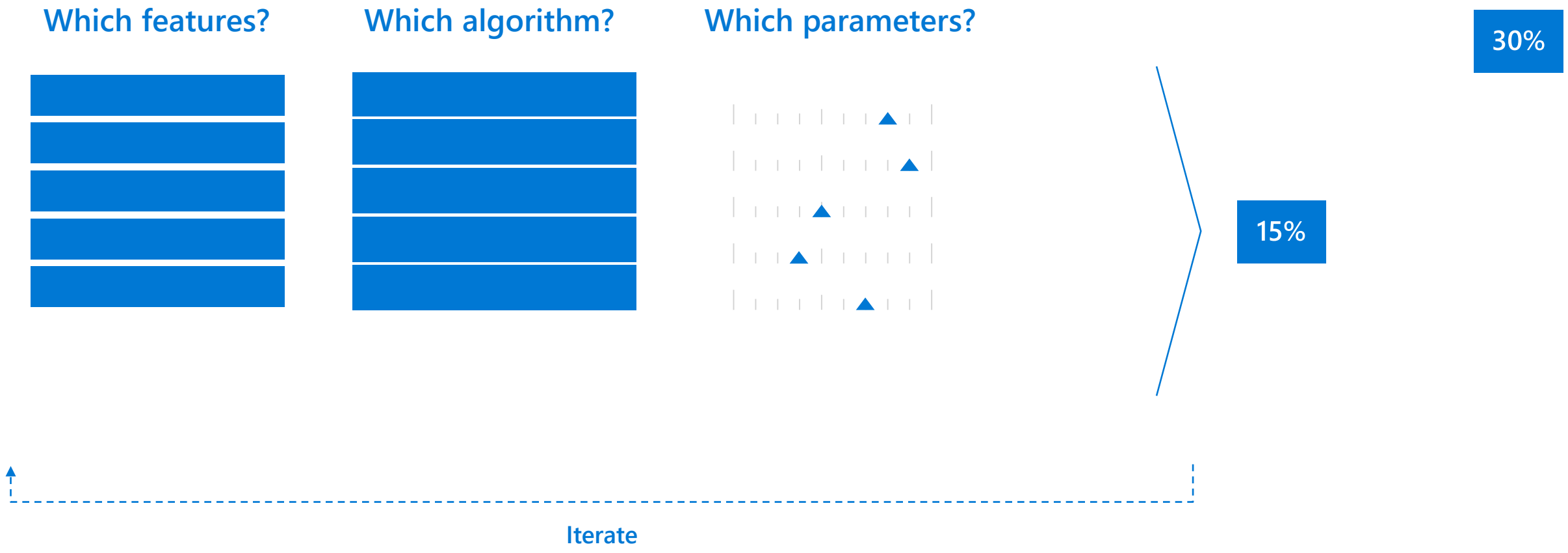
- Number of Neighbors
- Weights
- Metric
- Min Samples Split
- Min Samples Leaf
- Others

30%

Model

Iterate

Model creation is typically a time consuming process



Azure Machine Learning accelerates model development

with automated machine learning

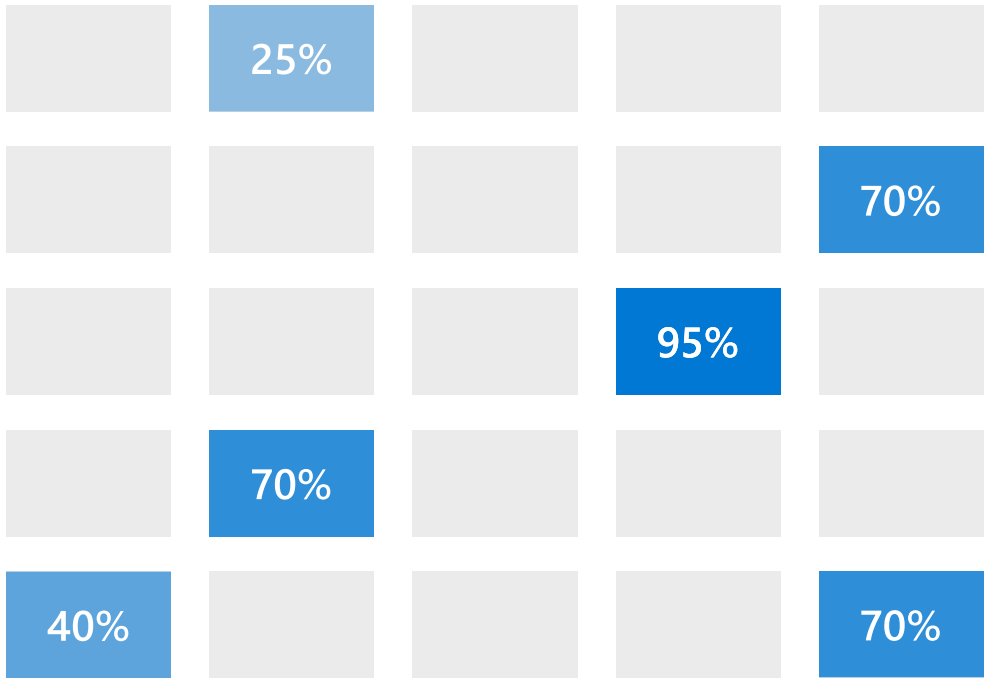
Input

Enter data

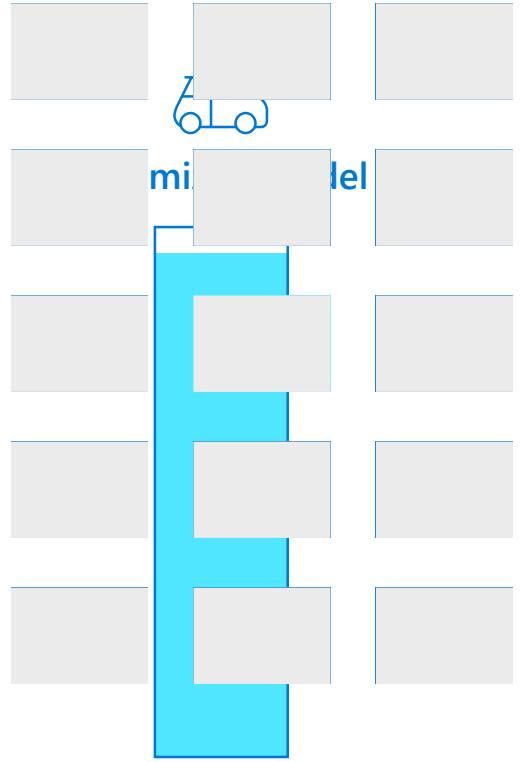
Define goals

Apply constraints

Intelligently test multiple models in parallel

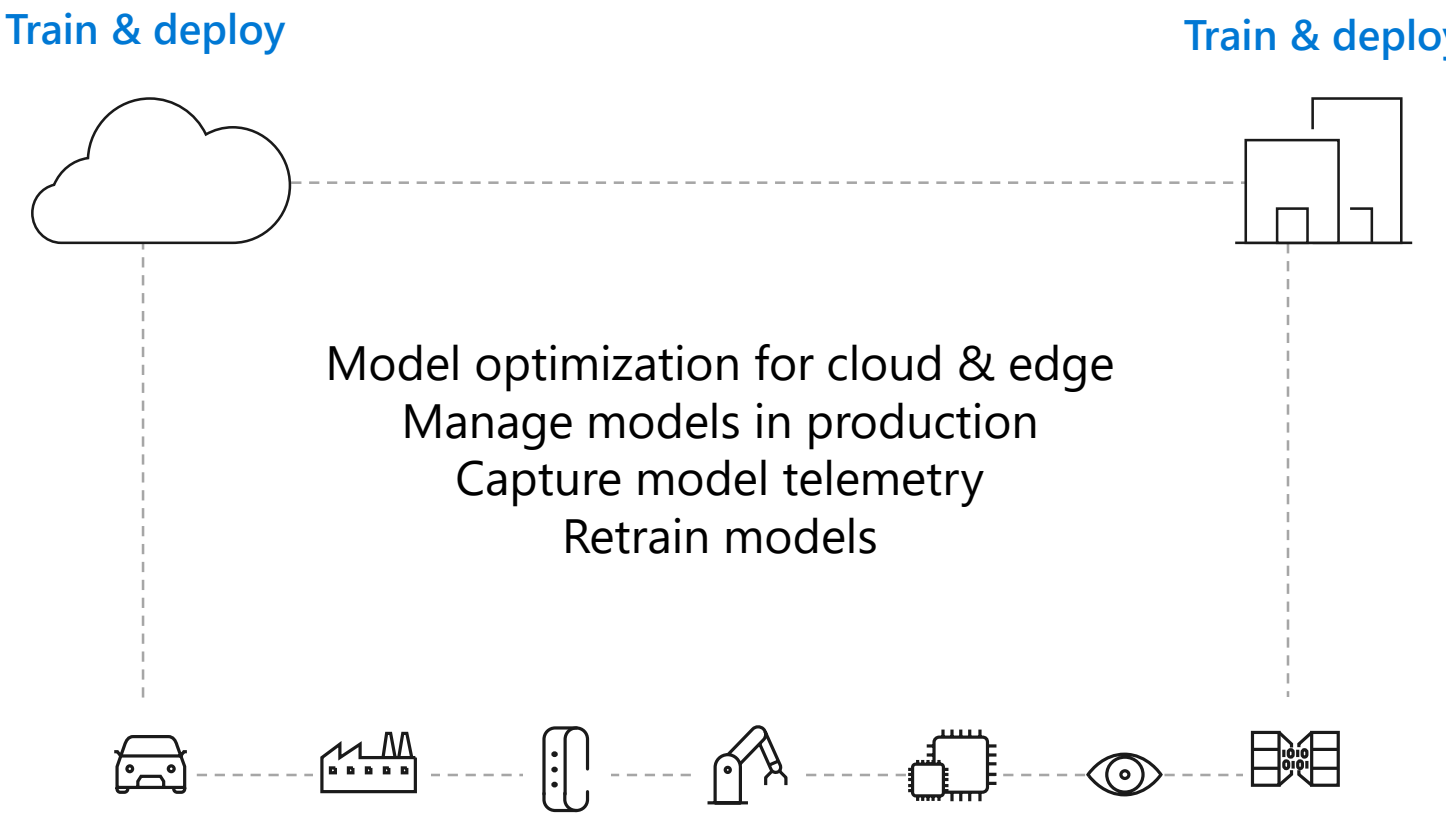


Output



Flexible deployment

Deploy and manage models on intelligent cloud and edge



Machine learning on Azure

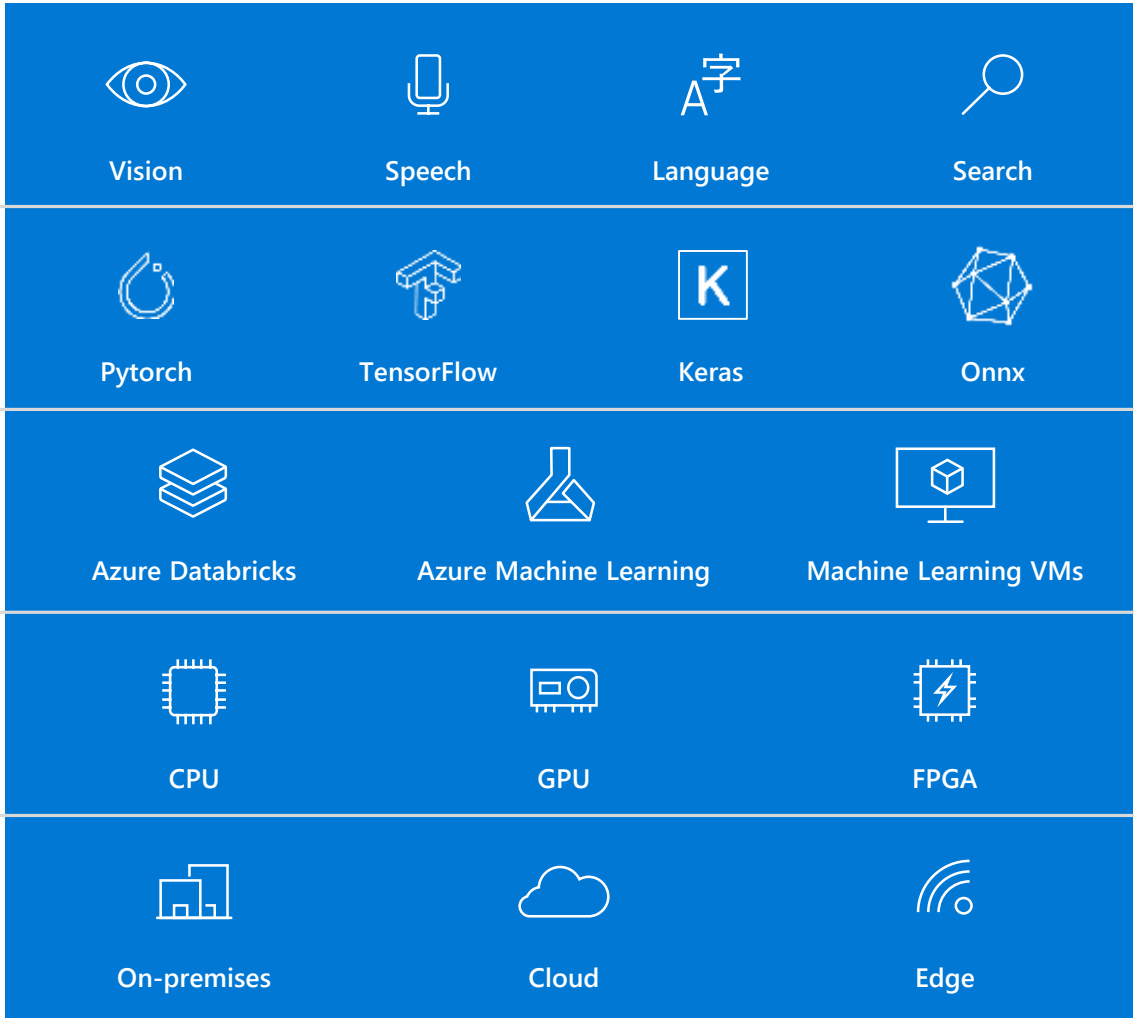
Sophisticated pretrained models
To simplify solution development

Popular frameworks
To build advanced deep learning solutions

Productive services
To empower data science and development teams

Powerful infrastructure
To accelerate deep learning

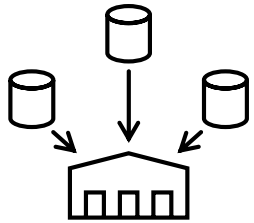
Flexible deployment
To deploy, manage models on intelligent cloud & edge




The Architecture

How companies are transforming

Serving business users and end users with **intelligent** and **dynamic** applications

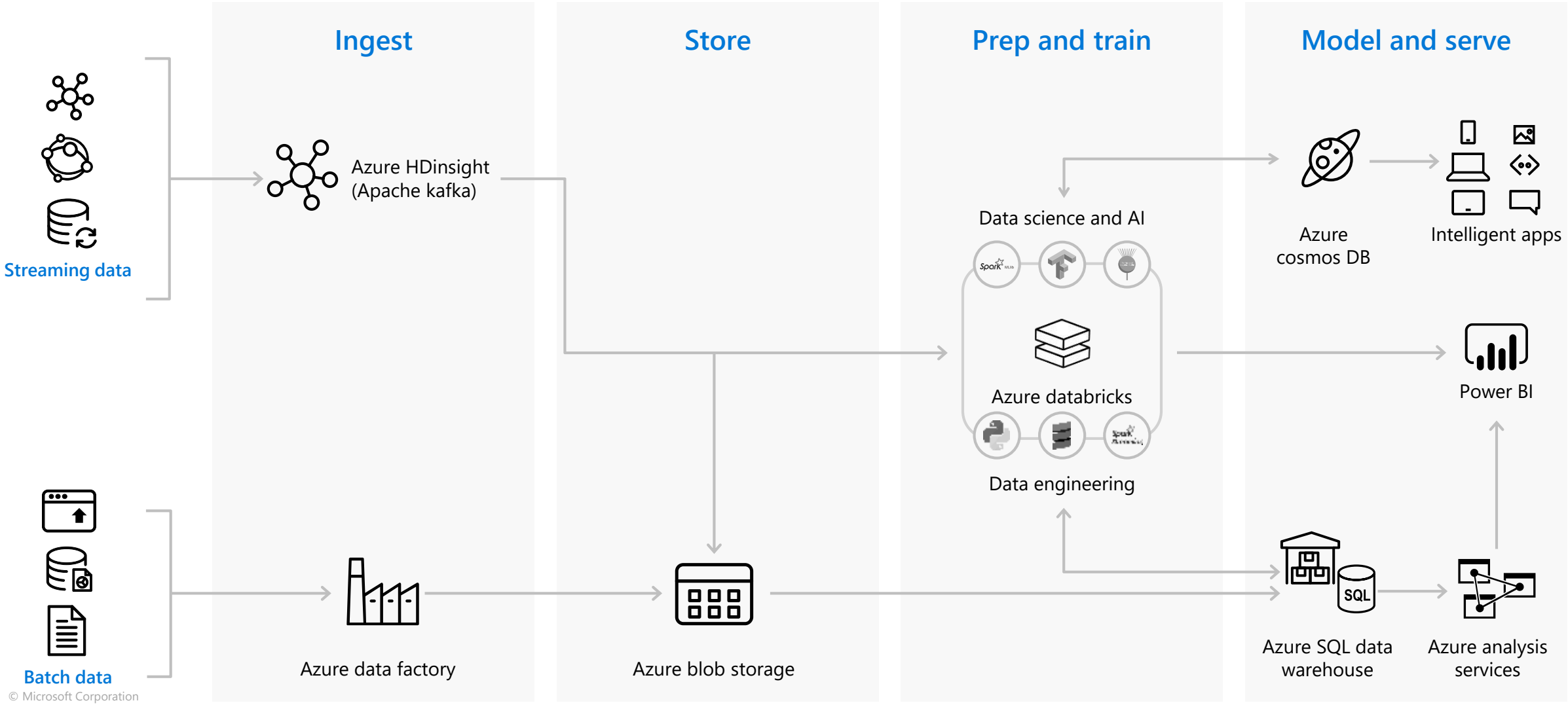


Build a unified and usable data pipeline

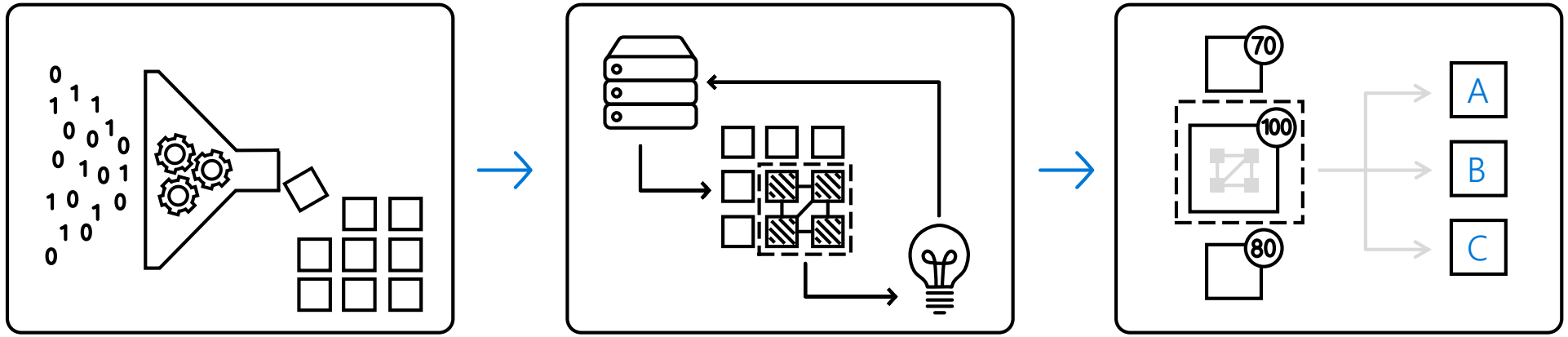
Train ML and DL models to derive insights

Operationalize models and distribute insights at scale

Microsoft has a recommended reference architecture



Prep and train



Collect and prepare data

- Azure data factory
- Azure databricks

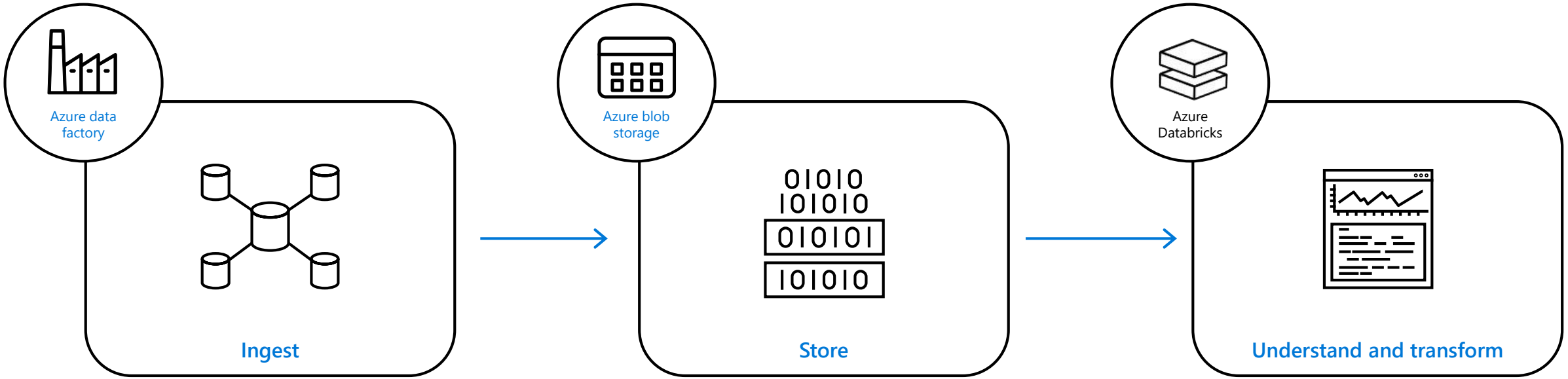
Train and evaluate model

- Azure databricks

Operationalize and manage

- Azure ML services
- Azure databricks

Collect and prepare all of your data at scale



Connect to data from any source

Integrate with all of your data sources

Create hybrid pipelines

Orchestrate in a code-free environment

Leverage best-in-class analytics capabilities

Leverage open source technologies

Collaborate within teams

Use ML (machine learning) on batch streams

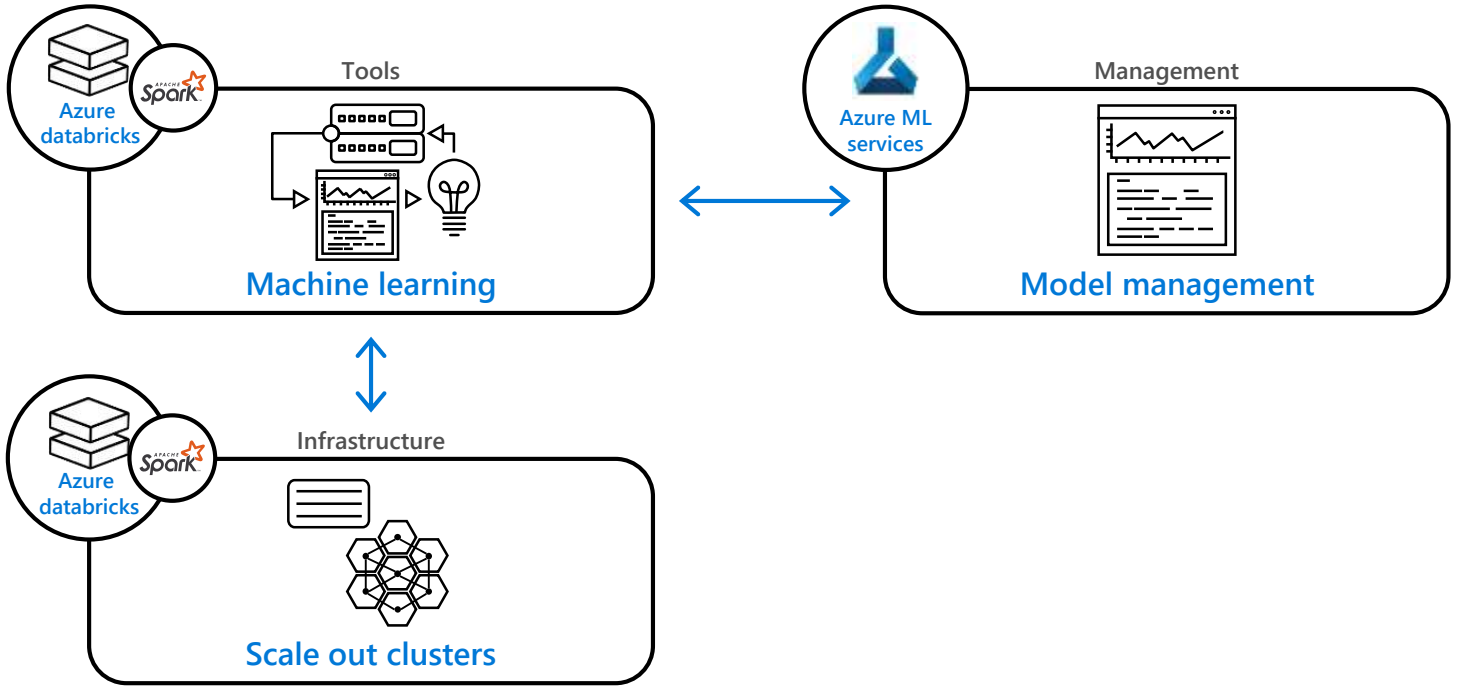
Scale without limits

Build in the language of your choice

Leverage scale out topology

Scale compute and storage separately

Train and evaluate Machine Learning models



Simplify model development

Collaborate in interactive workspaces
Access a library of battle-tested models
Automate job execution

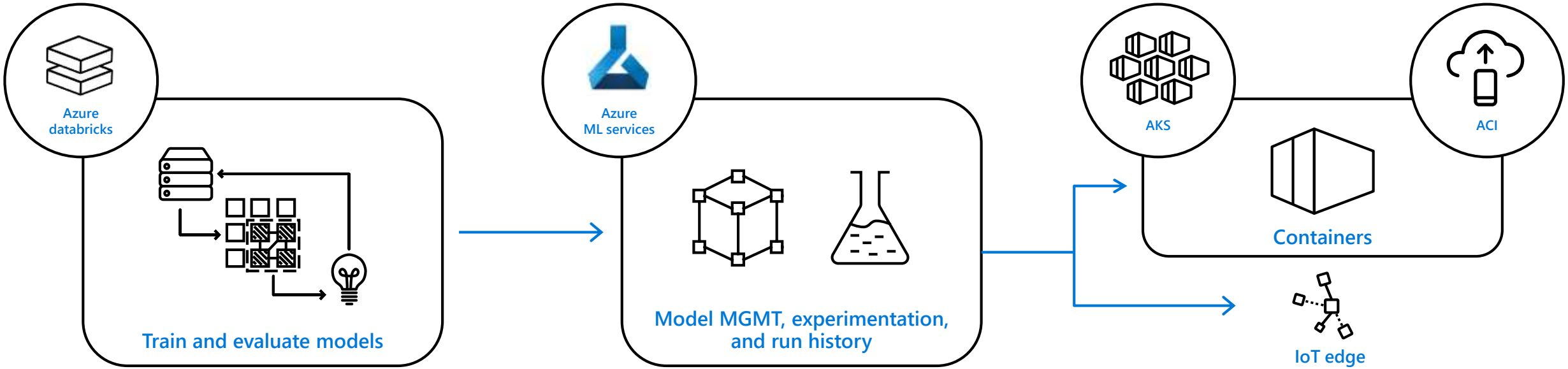
Scale compute resources to meet your needs

Easily scale up or scale out
Autoscale on a serverless infrastructure
Leverage commodity hardware

Quickly determine the right model for your data

Determine the best algorithm
Tune hyperparameters to optimize models
Rapidly prototype in agile environments

Operationalize and manage models with ease



Bring models to life quickly

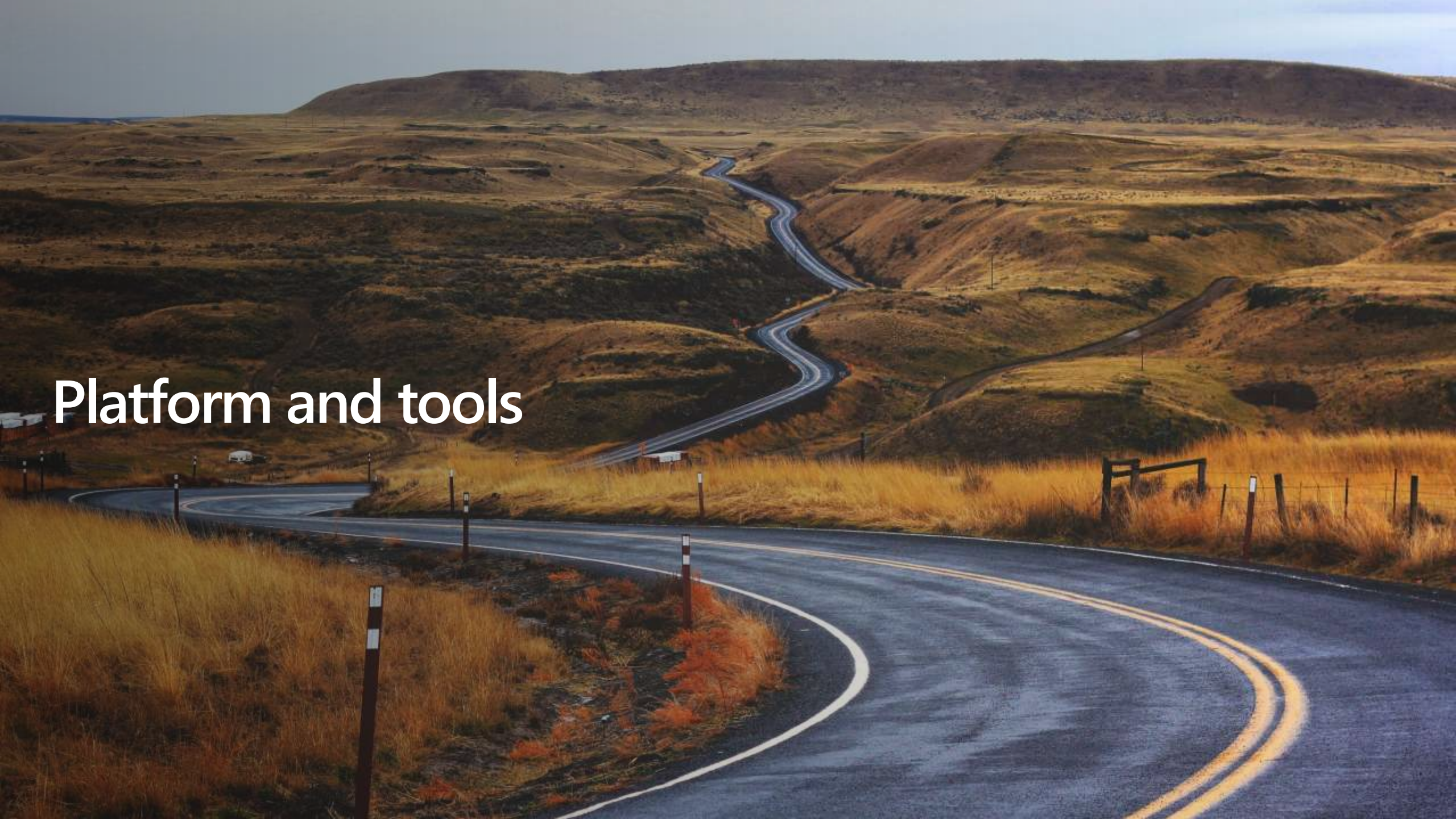
Build and deploy models in minutes
Iterate quickly on serverless infrastructure
Easily change environments

Proactively manage model performance

Identify and promote your best models
Capture model telemetry
Retrain models with APIs

Deploy models closer to your data

Deploy models anywhere
Scale out to containers
Infuse intelligence into the IoT edge


Platform and tools

Microsoft AI Platform

Azure AI Services

PRE-BUILT AI

Cognitive Services

CONVERSATIONAL AI

Bot Service

CUSTOM AI

Azure Machine Learning &
Azure Databricks / HDInsight

Azure Data, IoT, & Infrastructure

AI ON DATA

Cosmos DB | SQL DB | SQL DW | Data Lake

IoT

IoT Hub | IoT Edge

AI COMPUTE

Spark | DS VM | AI Batch

CPU, FPGA, GPU

Tools

CODING & MANAGEMENT TOOLS

VS Tools for AI | Azure ML Studio | Azure Databricks

Others (PyCharm, Jupyter Notebooks…)

DEEP LEARNING FRAMEWORKS

3rd Party

Cognitive Toolkit | TensorFlow | Caffe

Others (Scikit-learn, MXNet, Keras, Chainer, Gluon…)

Hybrid Data | AI built-in | Most secure | Lowest TCO

Reason over any data, anywhere

Flexibility of choice

Security and privacy

Powerful infrastructure

Accelerate deep learning

CPUs

General purpose machine learning

D, F, L, M, H Series

GPUs

Deep learning

N Series

FPGAs

Specialized hardware accelerated deep learning

Project Brainwave

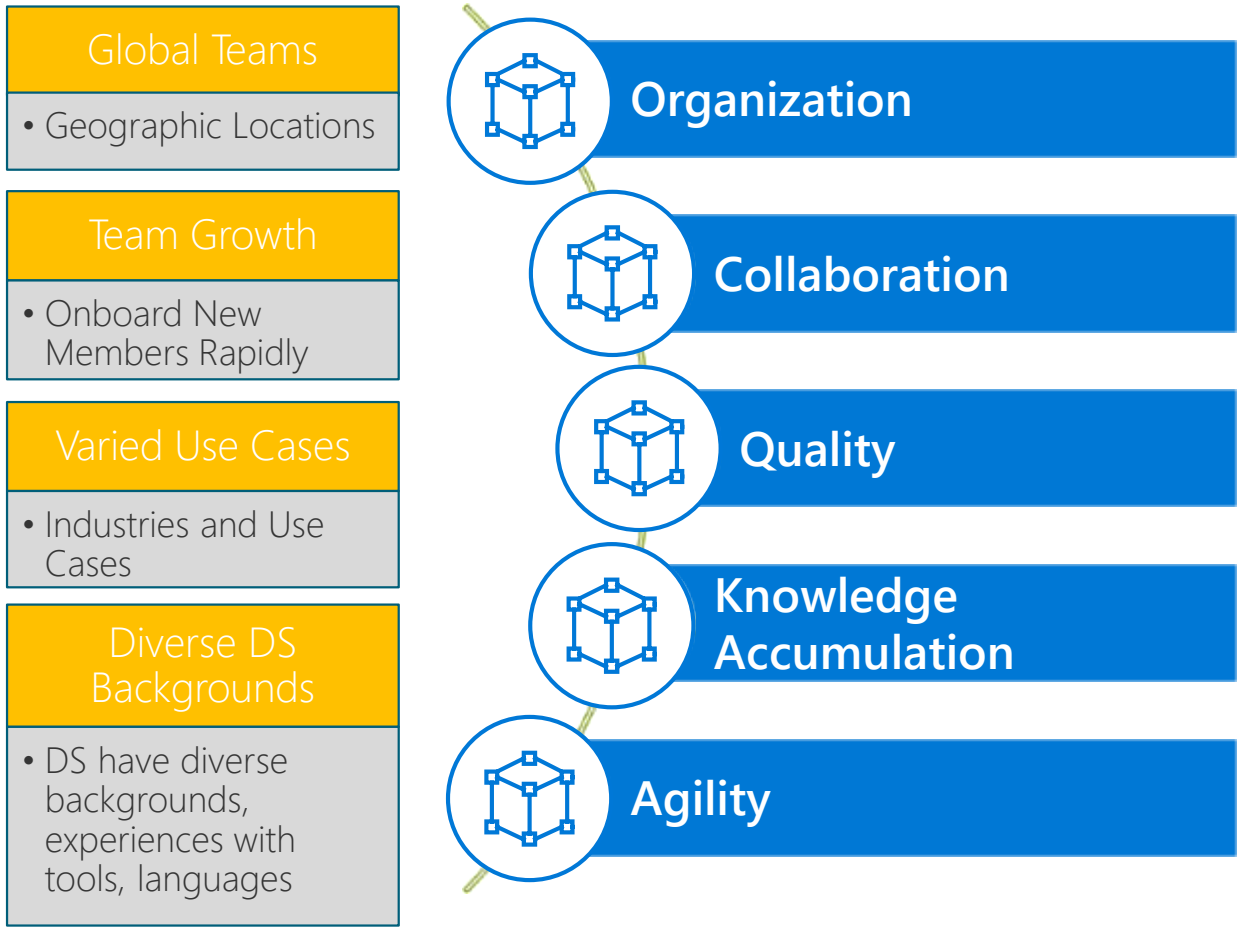
FPGA NEW UPDATES:

Support for image classification and recognition scenarios

ResNet 50, ResNet 152, VGG-16, SSD-VGG, DenseNet-121


The Process

Process Challenge in Data Science

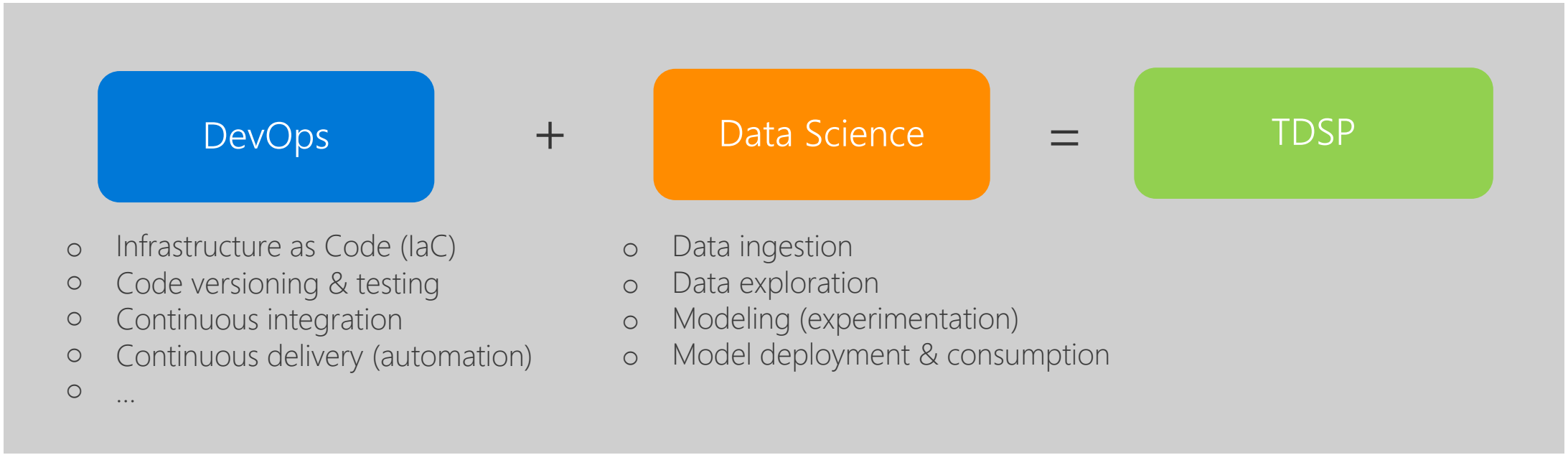


"Artificial Intelligent" applications, that consist of custom ML models, has unique complexity during development not always encountered in other Software Development scenarios

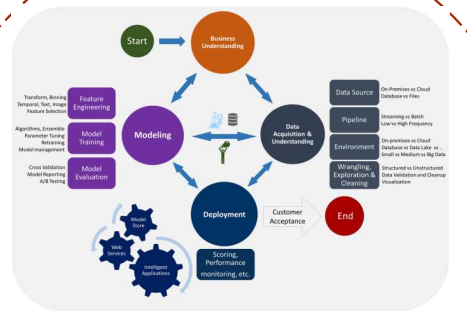
Process: A detailed **sequence of activities** necessary to perform specific business tasks, **standardize procedures** and **establish best practices**

What s Team Data Science Process

Team Data Science Process is the combination from Data Science process steps, software development & operations practices to enable continuous delivery and continuous improvement with high quality, robustness and efficiency in data science engagements



Team Data Science Process Pillars



designed for personas that, by adopting best practices, will enable continuous delivery and continuous improvement with high quality in data science engagements

Identify personas as part of the engagement team, describe their characteristics / activities / responsibilities and map them other pillars

Provide delivery best practices for management, development, testing and operationalization to enable continuous delivery and continuous improvement for data science engagements

Provide quality checklist to ensure the process is being done correctly and following the appropriates practices

Document real-case scenarios, provide readiness material and create guidance to accelerate the adoption

Some process components for a data science teams

Standardized Data Science Lifecycle

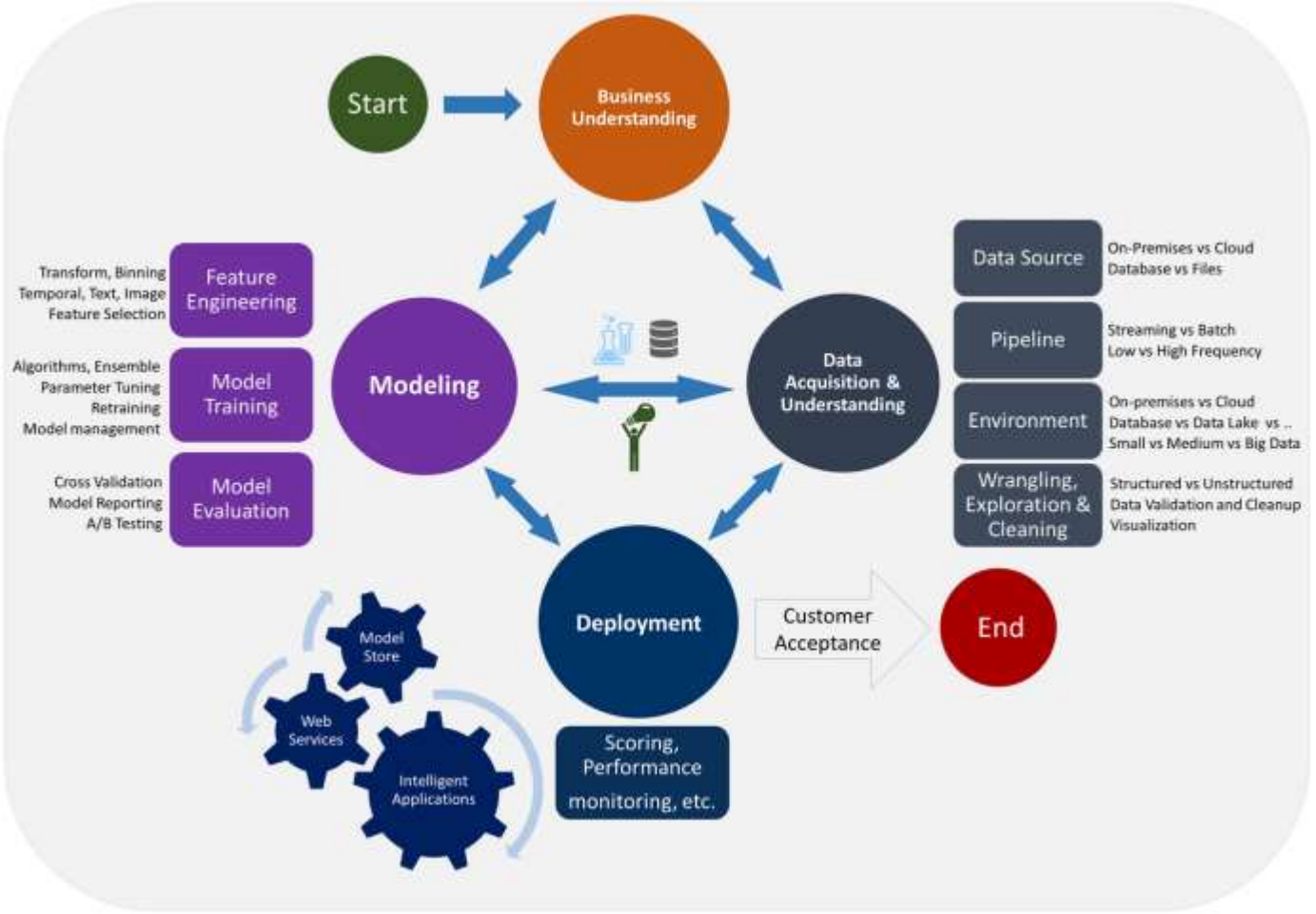
Infrastructure & Toolkits

Project Structure, Templates & Roles

Project Execution Framework
(may incl. DevOps components)

Re-usable Data Science Utilities

Data Science Process Lifecycle



- Primary stages:
  - Business Understanding
  - Data Acquisition and Understanding
  - Modeling
  - Deployment

Team Data Science Process stages are described as

Business Understanding main goals:

- Work with the customer and other stakeholders to understand and **identify the business problem**. Clearly and explicitly specifying the model objective(s) as a sharp question which is used to drive the customer engagement.
- **Find relevant data sources** that helps to answer the questions that define the objective(s) of the project.
- **Establish a business strategy** context within which this project exists, this strategic context provides a value setting for judging the project success, and for suggesting extended or not directly related projects in the future.

Data Acquisition & Understanding main goals:

- Data are **moved to the environment**, ready to model.
- Data are inspected to be clean and be of high-quality. Relations to the **target variables are understood.**
- A solution **architecture of the data pipeline** to refresh and score data regularly has been developed

Data Modeling main goals:

- Detect **optimal data features** for the machine learning model.
- **Determine the machine learning model** that predicts the business objective most accurately.
- Start the development activities to **implement the data pipeline** *(optional, if scoped)*.

Operationalization & Deployment main goals:

- Models and pipeline are **deployed** to a production or production-like environment.
- Setup test data pipeline to **monitor** the model's performance
- Setup **retrain process**
- **Visualize** outputs/integrate with systems

Azure is the best place for AI

Accelerate time to value with agile tools and services


Pretrained AI services


Powerful tools


Comprehensive platform

Innovate with AI everywhere in the cloud, at edge and on-premises


Cloud


Edge


On-premises

Use any language, any development tool and any framework

Benefit from industry leading security, privacy, compliance, transparency and AI ethics standards

>90% of Fortune 500 companies use Microsoft Cloud


Microsoft
Democratize AI