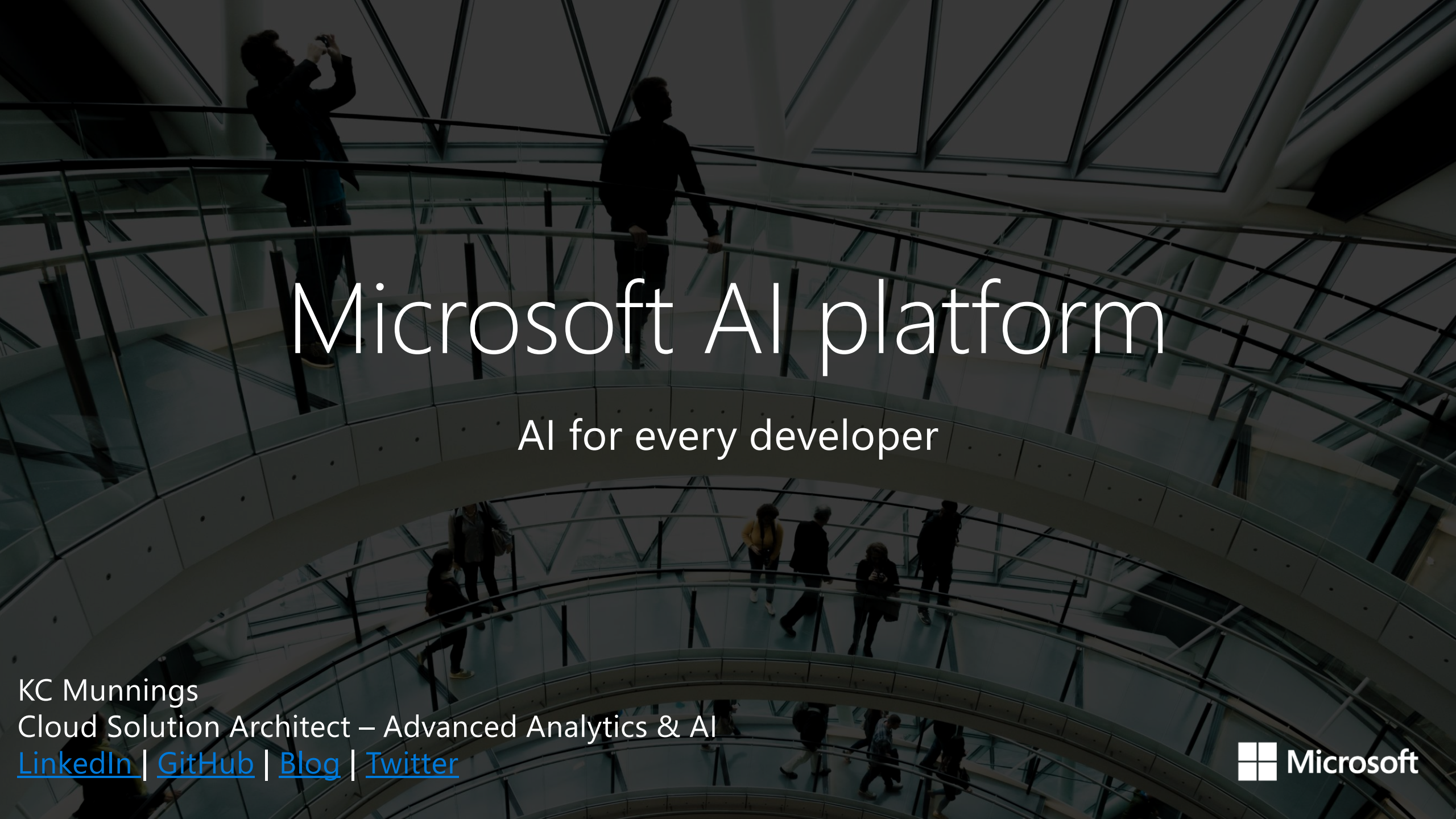


Microsoft AI platform

AI for every developer

KC Munnings
Cloud Solution Architect – Advanced Analytics & AI
LinkedIn | GitHub | Blog | Twitter

Microsoft

Healthcare Capability Map

Reference Data	Sales and Marketing	Personnel and Staffing	Healthcare delivery	Healthcare Support services	Business Support	Patient Support Services
Patient data management and EMR	Patient engagement	Attract talent	Clinical services	Pharmacy services	IT, facilities, and finance management	Support communities
External providers data management	Campaign management	Ongoing medical education, licensing and certification	Trauma services	Laboratory services	Inventory management	Rehabilitation services
Market data management	Community relations management	Services scheduling	Acute/ long-term care services	Diagnostic services	Regulatory compliance and risk management	In-home patient care
Healthcare payers data management	Funds, grants & endowments management	Performance management	Intensive care services	Immunization and preventive care	Insurance claims and reimbursements management	Community health management
Population health data management	Compliance reporting	Care provider scheduling	Ambulatory services	Biohazard waste management	Human resource management	Counselling services
	Patient and payer billing		Real-time monitoring and reporting	Healthcare research and clinical trials	Supply chain management	Donor registry
			Urgent care services	Multi-disciplinary care	Knowledge and IP management	Disease registry
				Remote care / telehealth	Revenue Cycle Management	
				Medical Imaging Services		

Microsoft's Vision for Healthcare

Digital Transformation Pillars in Healthcare

Give patients information that helps them understand, control and manage their personal health decisions.

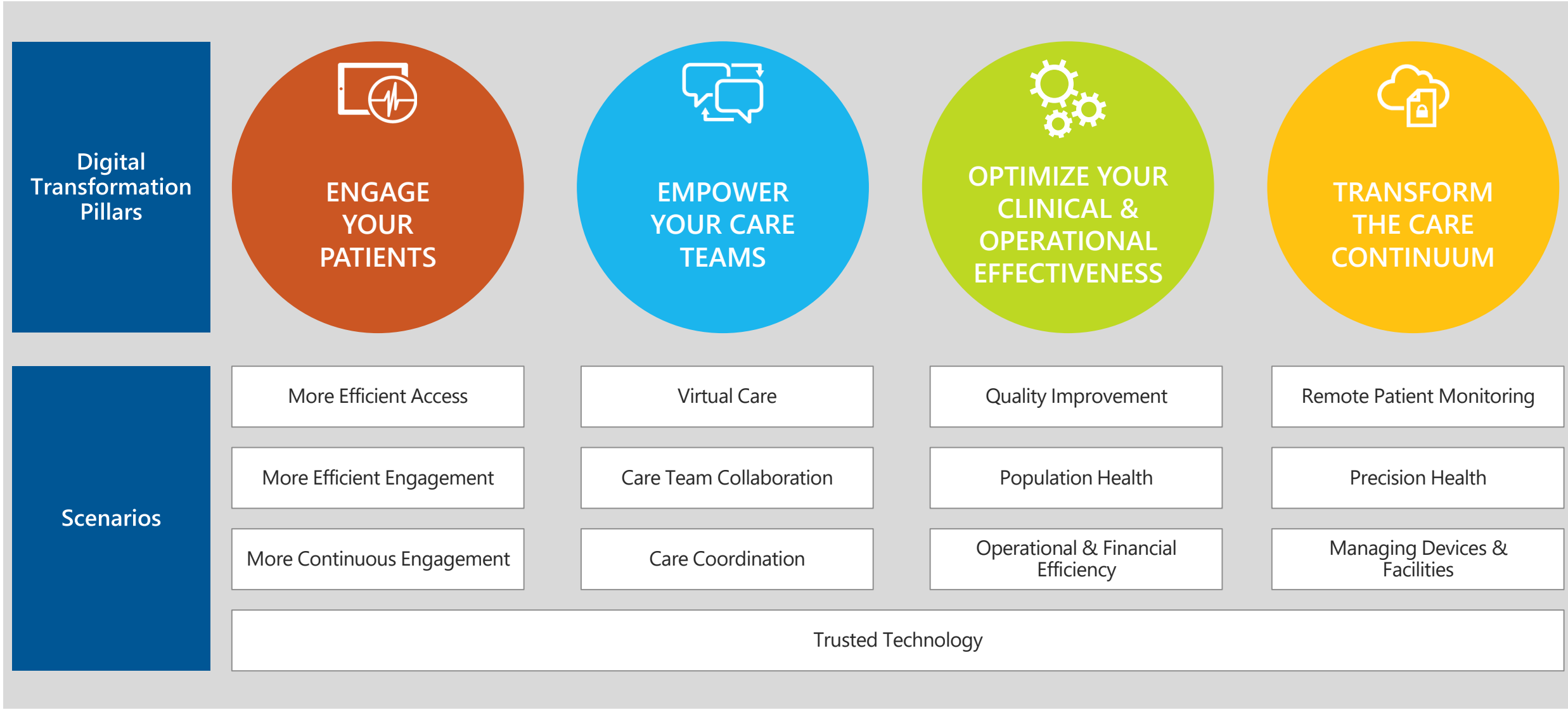
Help care teams connect with patients, increase personal productivity and work together more efficiently.

Harness data to streamline operations and improve care outcomes.

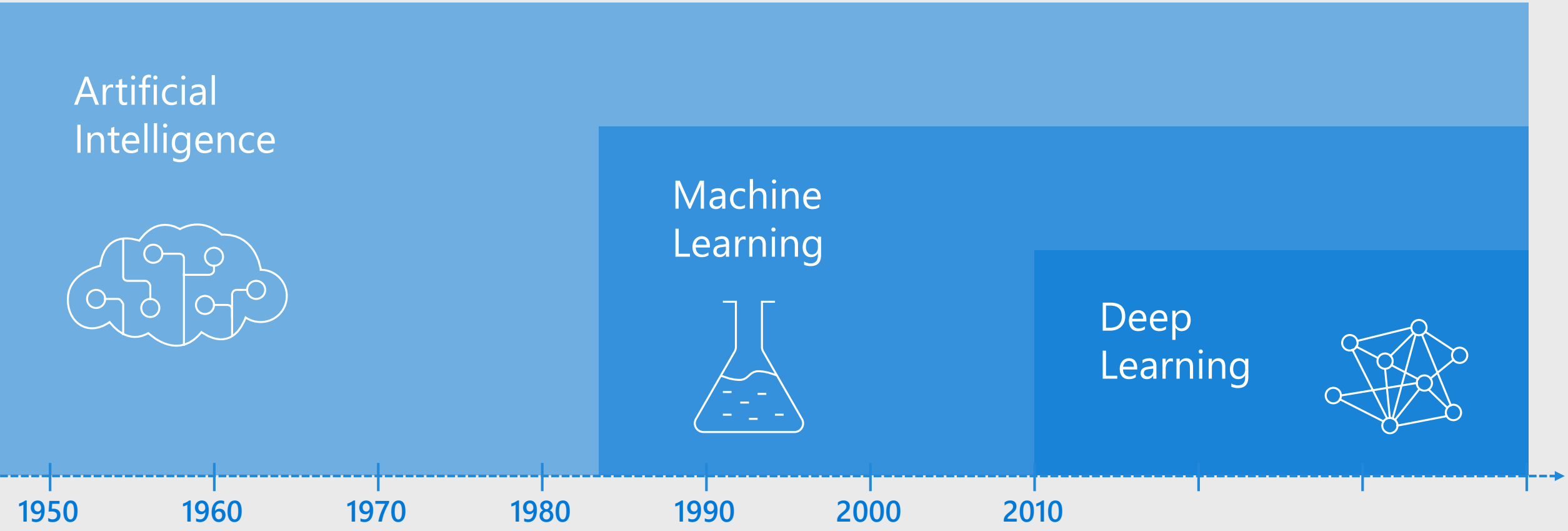
Gain more powerful insights into patient care and operational best practices.

Scenarios for Healthcare

Digital Transformation Pillars in Healthcare



AI, Machine Learning and Deep Learning



Our strategy is to build best-in-class **platforms** and productivity services for an **intelligent cloud and an intelligent edge** infused with **artificial intelligence** ("AI").

Microsoft
Form 10-K 2016

Azure Data + AI Solution Areas

Data

Data Modernization on-premises

Data modernization to Azure

Globally distributed data

Cloud Scale Analytics

+

AI

AI apps & agents

Machine learning

Azure Data + AI Solution Areas

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AI

AI apps & agents

Machine learning

Azure Bot Service

Bot builder

- SDK updates
  - Speech support
  - Improved dialog tools
  - Debugging improvements
  - Channel inspector
- Improved tooling

Platform

- New channels
  - Cortana
  - Bing
  - Skype for Business
- Adaptive cards
- Speech support
- Payments

Intelligence

- Analytics
- Bot controls
- Speech support
- Cognitive services

What is the bot framework?

What?

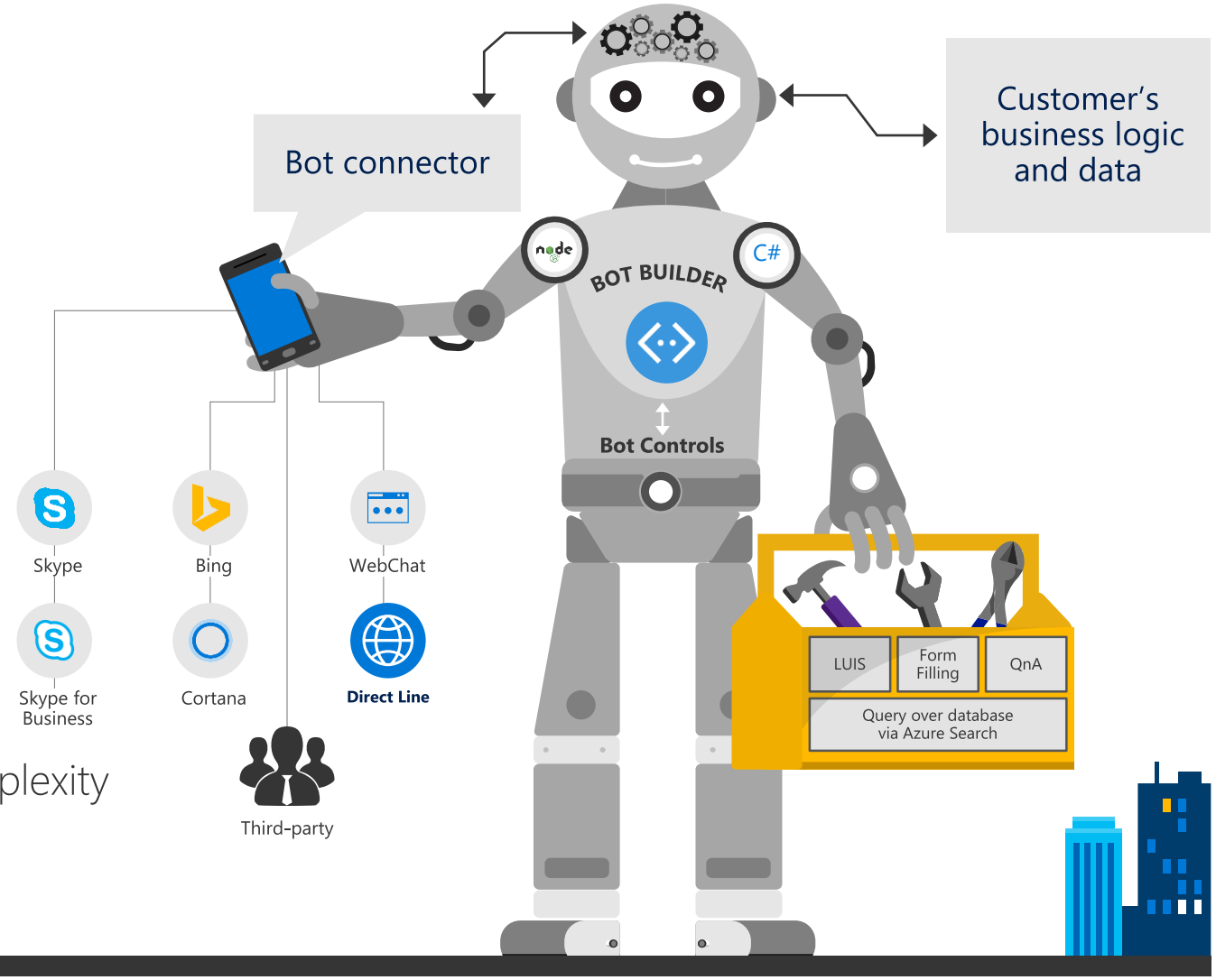
- Tools for building REST websites
- Services to enrich
- Mechanisms for receive events
- Data to debug and tools to analyze

Why?

- Implements standard protocols
- Modeling conversations is hard; tools help!
- UI across multiple canvases is hard; cards rock!
- Language understanding is hard
- Common and well understood patterns

Goals

- Start simple; add complexity; no dead-ends
- Bot adapts to the user, based on context
- Composable and intelligent controls to manage complexity



Azure Data + AI Solution Areas

Data

Data Modernization on-premises

Data modernization to Azure

Globally distributed data

Cloud Scale Analytics

+

AI

AI apps & agents

Knowledge mining

Machine learning

Machine Learning on Azure

Domain specific pretrained models
To simplify solution development


Vision


Speech


Language


Search

Familiar Data Science tools
To simplify model development


Visual Studio Code


Azure Notebooks

Jupyter


Command line

Popular frameworks
To build advanced deep learning solutions


PyTorch


TensorFlow

Scikit-Learn


ONNX

Productive services
To empower data science and development teams


Azure Databricks


Azure Machine Learning


Machine Learning VMs

Powerful infrastructure
To accelerate deep learning


CPU


GPU


FPGA


From the Intelligent Cloud to the Intelligent Edge

Why Microsoft Cognitive Services?

Easy

Roll your own with REST APIs

Simple to add: just a few lines of code required

Get a key, Build

Flexible

Integrate into the language and platform of your choice

Breadth of offerings helps you find the right for your app

Bring your own data for your custom experience

Tested

Built by experts in their field from Microsoft Research, Bing, and Azure Machine Learning

Quality documentation, sample code, and community support

Cognitive Services capabilities

Infuse your apps, websites, and bots with human-like intelligence

Vision

Object, scene, and activity detection

Face recognition and identification

Celebrity and landmark recognition

Emotion recognition

Text and handwriting recognition (OCR)

Video metadata, audio, and keyframe extraction and analysis

Explicit or offensive content moderation

Custom image recognition

Speech

Speech transcription (Speech-to-text)

Speech Synthesis (Text-to-speech)

Real-time speech translation

Speaker identification and verification

Custom Speech models for transcription and translation

Custom voice

Language

Language detection

Text sentiment analysis

Key phrase extraction

Entity recognition

Spell checking

Explicit or offensive text content moderation, PII detection

Text translation

Customizable text translation

Contextual language understanding

Knowledge

Q&A extraction from unstructured text

Knowledge base creation from collections of Q&As

Semantic matching for knowledge bases

Customizable content personalization learning

Search

Ad-free web, news, image, and video search results

Trends for video, news

Image identification, classification and knowledge extraction

Identification of similar images and products

Named entity recognition and classification

Knowledge acquisition for named entities

Search query autosuggest

Ad-free custom search engine creation

Sophisticated pretrained models

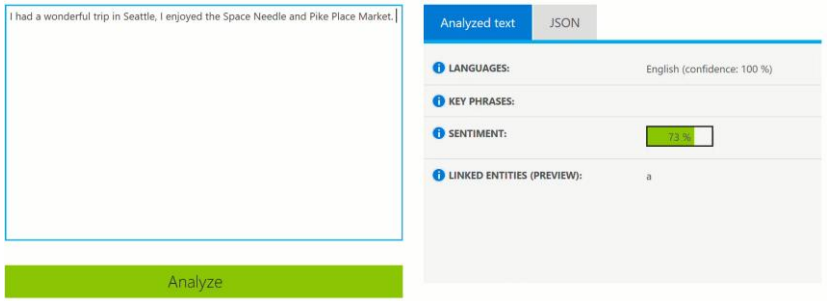
Infuse apps with powerful, pre-trained AI models

Customize easily and tailor to your needs

Vision

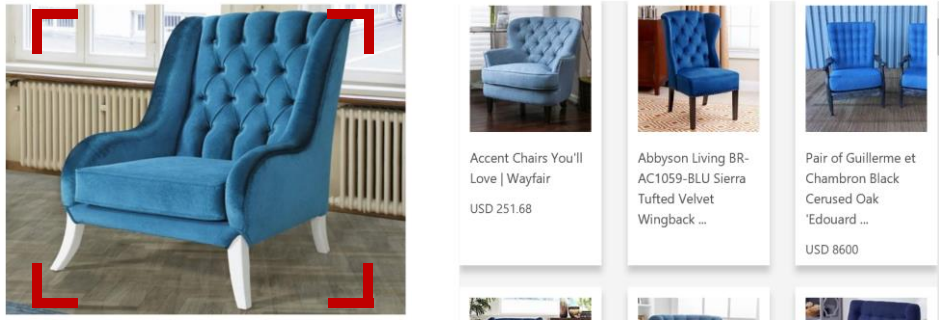
Computer Vision | Video Indexer | Face | Content Moderator

Language



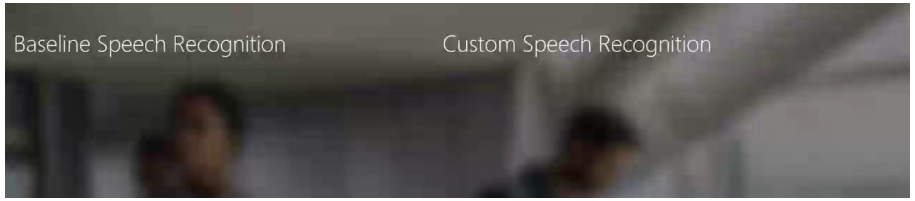
Text Analytics | Spell Check | Language Understanding | Text Translation | QnA Maker

Bing Search



Big Web Search | Video Search | Image Search | Visual Search | Entity Search | News Search | Autosuggest

Speech



Speech to Text | Text to Speech | Speech Translation | Speaker Recognition

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Familiar Data Science tools

Choose any python development environment

Visual Studio Code

Azure Notebooks

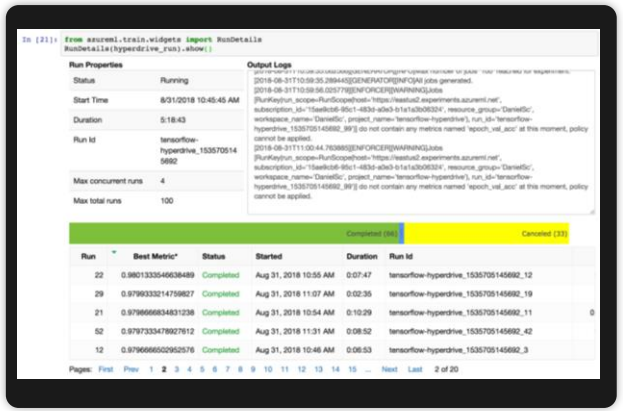
Jupyter

PyCharm

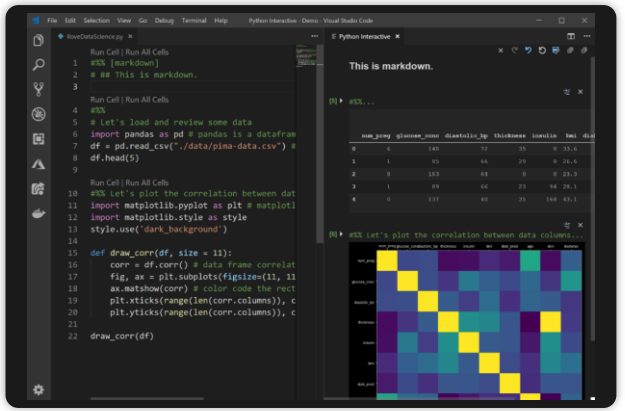
Zeppelin

Command line

And improve data science productivity



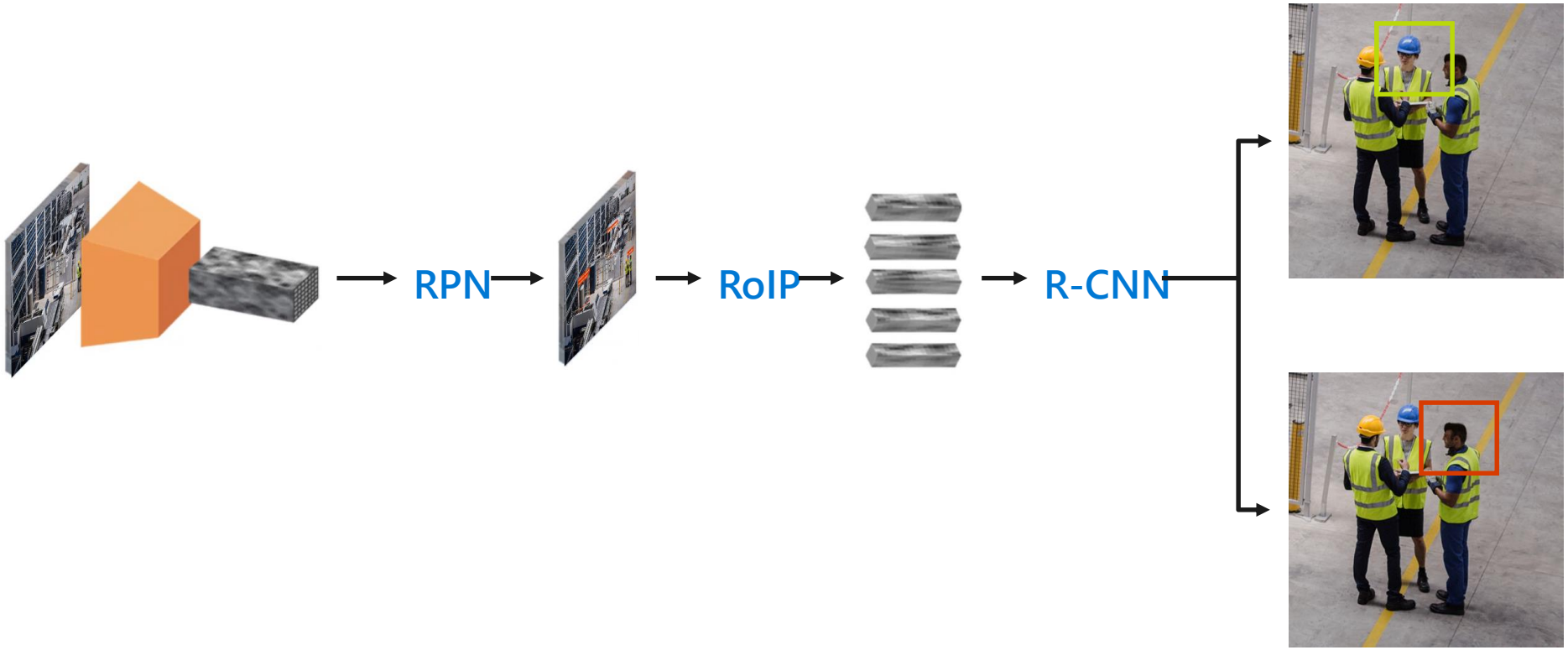
Interactive widgets for Jupyter Notebooks



Azure Machine Learning for Visual Studio Code extension

Get started with AML on Azure Notebooks: http://aka.ms/aznotebooks-aml

Next challenge is to build a model



Time-consuming

Needs specialized knowledge

Complex

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Powerful frameworks

Build advanced deep learning solutions

Use your favorite deep learning frameworks


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

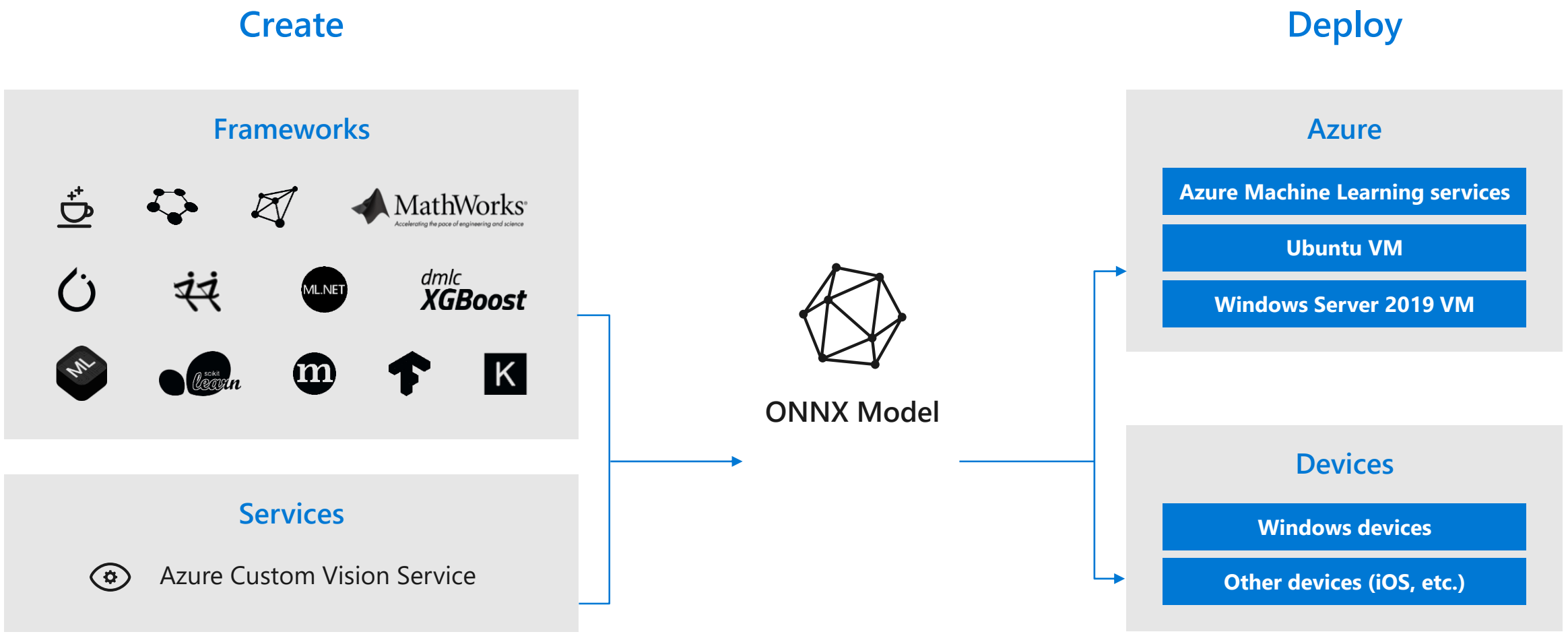









ONNX is the new open ecosystem for AI models



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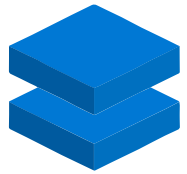
Azure Machine Learning

Python-based machine learning service

Develop models faster with automated machine learning

Use any Python environment and ML frameworks

Manage models across the cloud and the edge.



Azure Databricks

Apache Spark-based big-data service

Prepare data clean data at massive scale

Enable collaboration between data scientists and data engineers

Access machine learning optimized clusters

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

- Optimized Apache Spark environment
- Collaborative workspace
- Integration with Azure data services
- Auto scale and auto terminate
- Optimized for distributed processing
- Support for multiple languages and libraries

Seamlessly integrated with the Azure Portfolio

Azure Machine Learning service

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

- Automated machine learning
- Managed compute
- DevOps for machine learning
- Simple deployment
- Tool agnostic Python SDK
- Support for open source frameworks

Seamlessly integrated with the Azure Portfolio

Model creation is typically a time consuming process

Which features?

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

Which algorithm?

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

Which parameters?

- N Neighbors
- Weights
- Min Samples Split
- Min Samples Leaf
- XYZ

30%

Model

Iterate

Azure Machine Learning accelerates model development

with automated machine learning

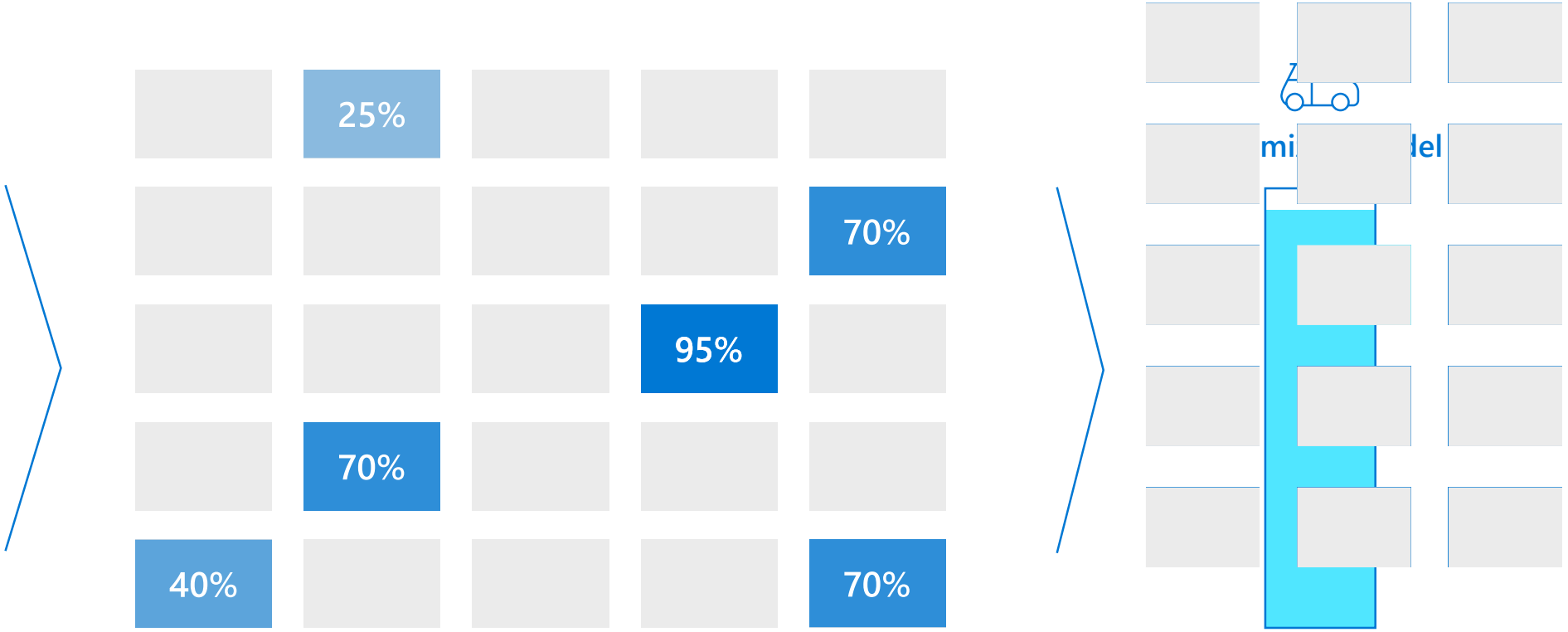
Input

Enter data

Define goals

Apply constraints

Intelligently test multiple models in parallel



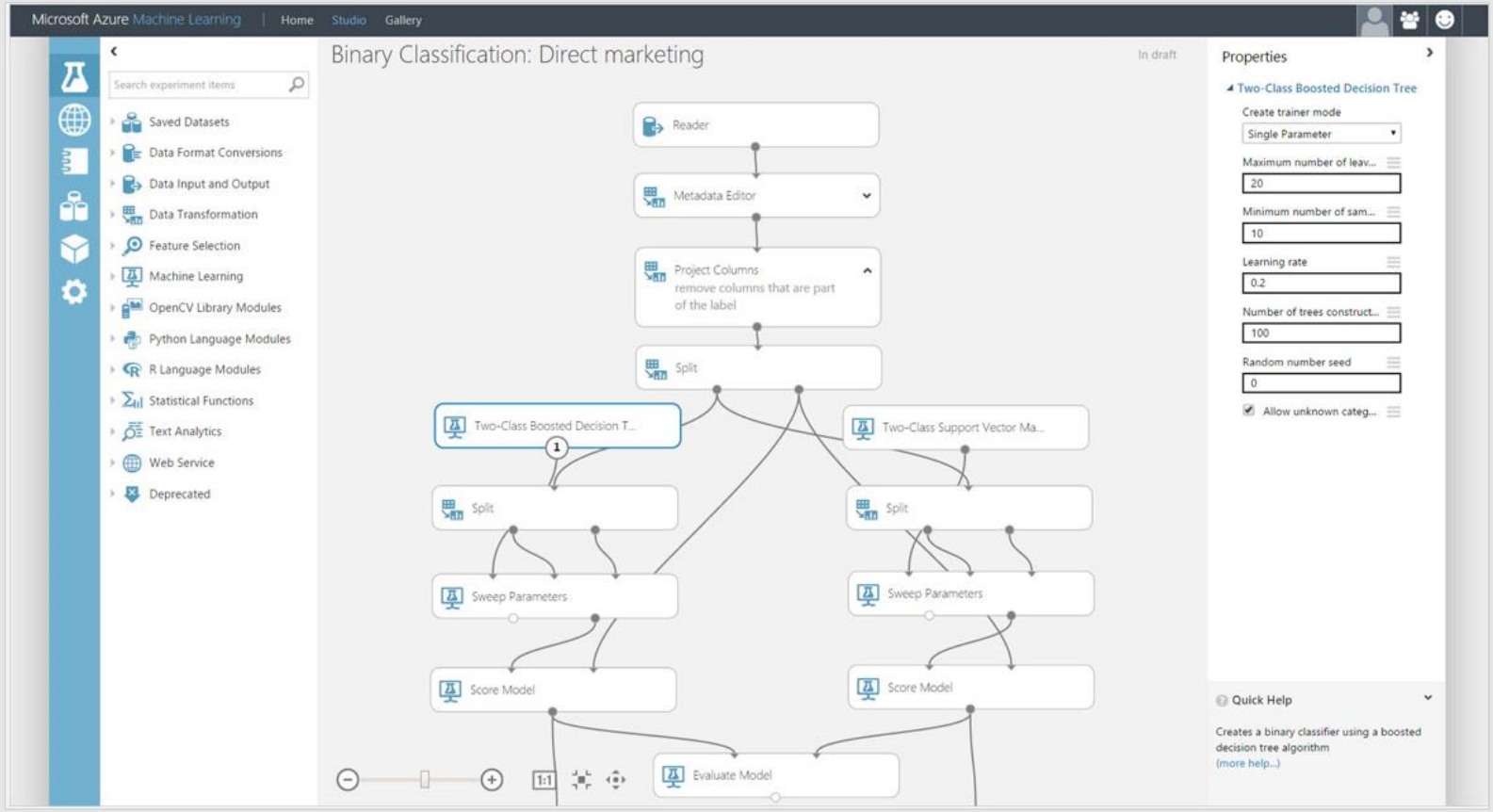
Azure Machine Learning Studio

Platform for emerging data scientists to graphically build and deploy experiments

- Rapid experiment composition
- > 100 easily configured modules for data prep, training, evaluation
- Extensibility through R & Python
- Serverless training and deployment

Some numbers:

- 100's of thousands of deployed models serving billions of requests



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Accelerate deep learning

CPUs

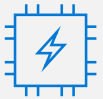
General purpose machine learning

D, F, L, M, H Series

GPUs

Deep learning

N Series



FPGAs

Specialized hardware accelerated deep learning

AML hardware accelerated models (Project Brainwave)

Optimized for flexibility

Optimized for performance

Machine Learning & AI Portfolio

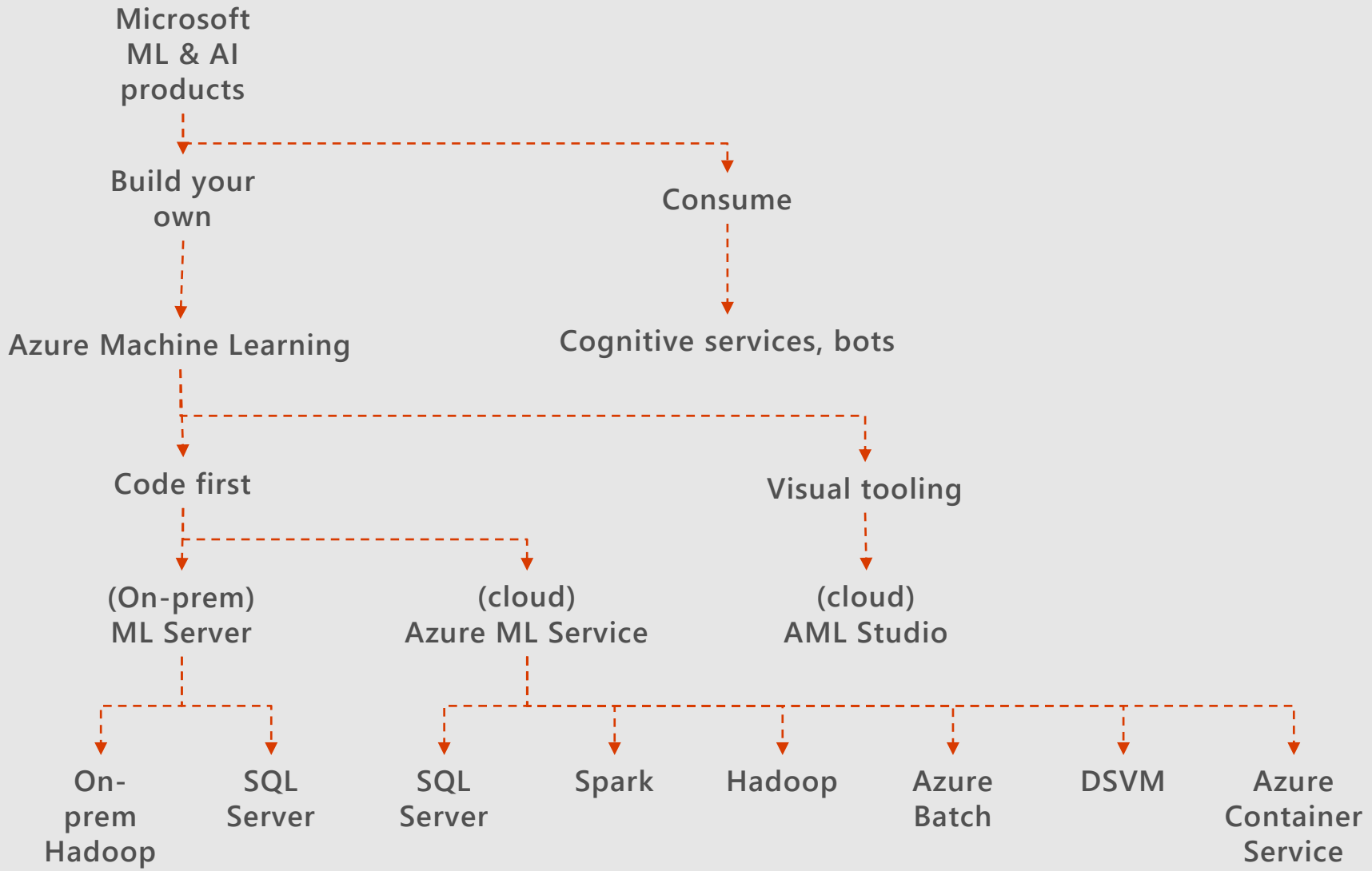
When to use what?

Build your own or consume pre-trained models?

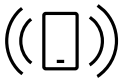
Which experience do you want?

Deployment target

What engine(s) do you want to use?



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**

Getting Started…Links! (https://aka.ms/kc-healthcare-slides)

- Get Azure!
  - Azure Trial - https://azure.microsoft.com/en-us/free/
  - Azure Education Trial - https://azure.microsoft.com/en-us/education/
- Conversational AI
  - Create a Bot - https://docs.microsoft.com/en-us/azure/bot-service/bot-builder-tutorial-basic-deploy?view=azure-bot-service-4.0&tabs=csharp
- Cognitive Services
  - List - https://docs.microsoft.com/en-us/azure/cognitive-services/welcome
  - Try for free - https://azure.microsoft.com/en-us/try/cognitive-services/my-apis/
- Azure ML
  - https://docs.microsoft.com/en-us/azure/machine-learning/service/overview-what-is-azure-ml
- Azure Notebooks
  - https://docs.microsoft.com/en-us/azure/notebooks/azure-notebooks-overview
- Data Science VM - https://azure.microsoft.com/en-us/services/virtual-machines/data-science-virtual-machines/
- Azure GitHub - https://github.com/Azure
- Power BI Desktop - https://powerbi.microsoft.com/en-us/desktop/