



# Welcome to the SaaS Lab Program

Session 7

Innovation with AI  
& ML

This event will be recorded. Your name or other information may end up in the recording. If you do not wish to be recorded, please drop out of this session.

The event will start shortly

27:00

# Hello, meet your session presenters



## Poonam Brijesh Sampat

Cloud Solution Architect, Data & AI

About: Poonam Sampat is an ISB (Indian School Of Business) alum, worked with companies like Goldman Sachs, Honeywell has a broad experience in architecting Data and AI driven applications. Joined Microsoft as a Cloud Solution Architect focusing on Big Data & AI, working with partners across Asia region. She has experience in Investment Banking and Oil & Gas industries, passionate about analytics, how analytics can shape industries.

✉ [Poonam.Sampat@microsoft.com](mailto:Poonam.Sampat@microsoft.com)

LinkedIn <https://www.linkedin.com/in/poonam-sampat-73264853/>



## Dr. Julia Gusakova

Cloud Solution Architect, Data & AI

About: Dr. Julia holds PhD degree from NTU (Nanyang Technological University, Singapore). She joined Microsoft as Cloud Solution Architect covering Data & AI in APAC region. Dr. Julia has experience in architecting & building cloud solutions for customer engagement, IoT, location analytics and other industries. Passionate about ethical AI & how it could shape a better future.

✉ [jgusakova@microsoft.com](mailto:jgusakova@microsoft.com)

LinkedIn <https://www.linkedin.com/in/dr-julia-gusakova>



If you'd like guidance on your AI & ML journey,  
please e-mail the SaaS Lab team

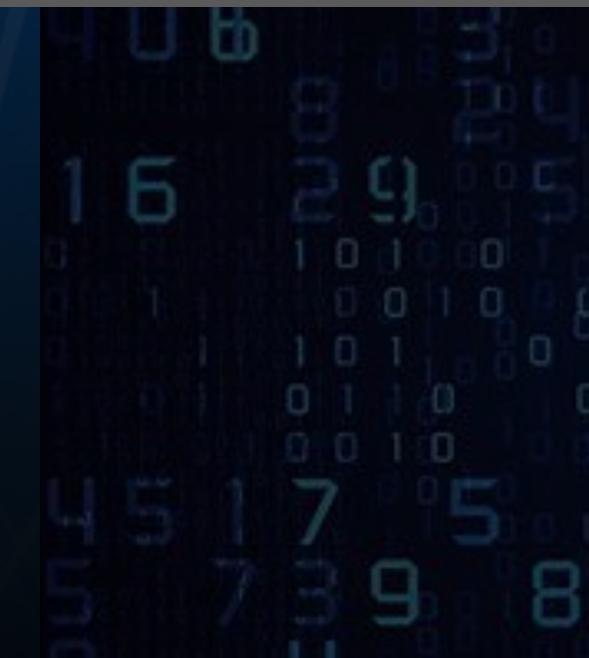
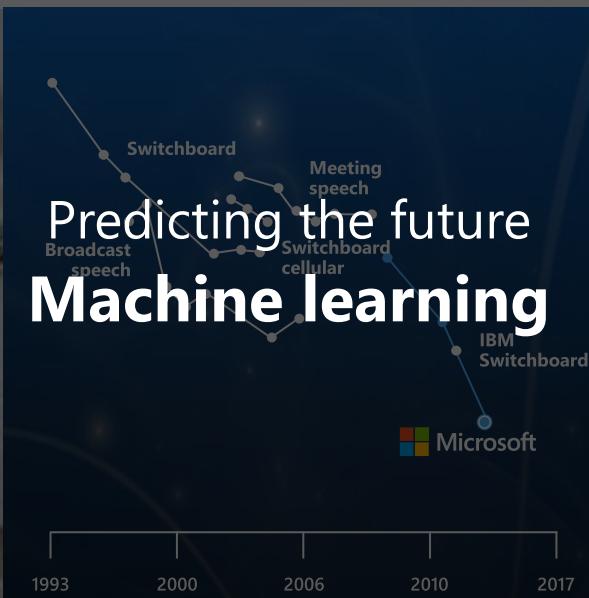
[saslab@microsoft.com](mailto:saslab@microsoft.com)

We would love to help!

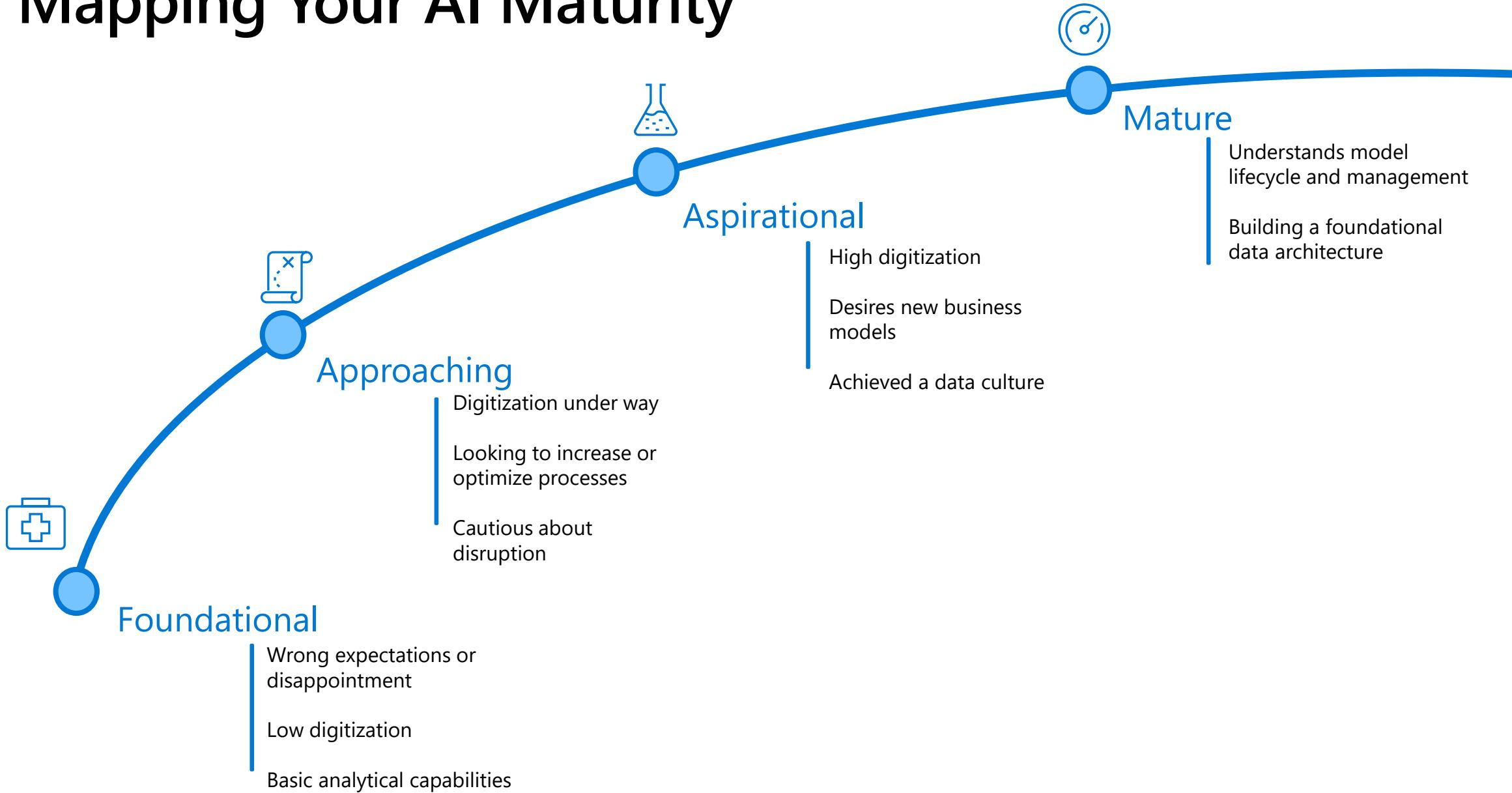
# Agenda

- Azure AI & ML Landscape
- Cognitive Service Overview
- Form Recognizer
- Break (3 mins)
- Computer Vision OCR
- Cognitive Services Containers
- MLOPS
- Quiz & Summary

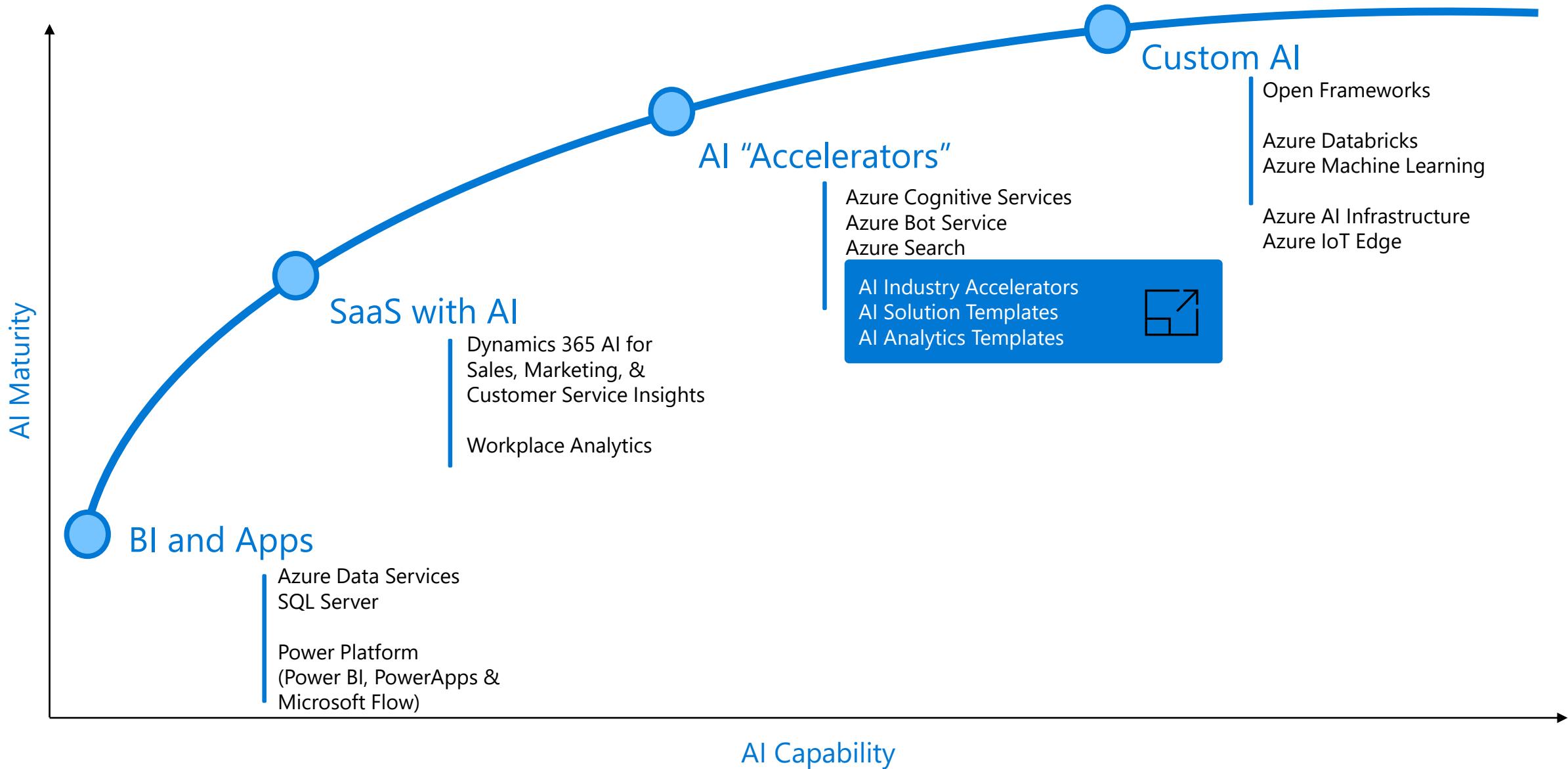
# Evolution of Intelligent Machines



# Mapping Your AI Maturity



# The AI Journey – Where to Start



# Azure AI



## On your terms

Add AI capabilities to your apps without ML expertise



## Mission Critical

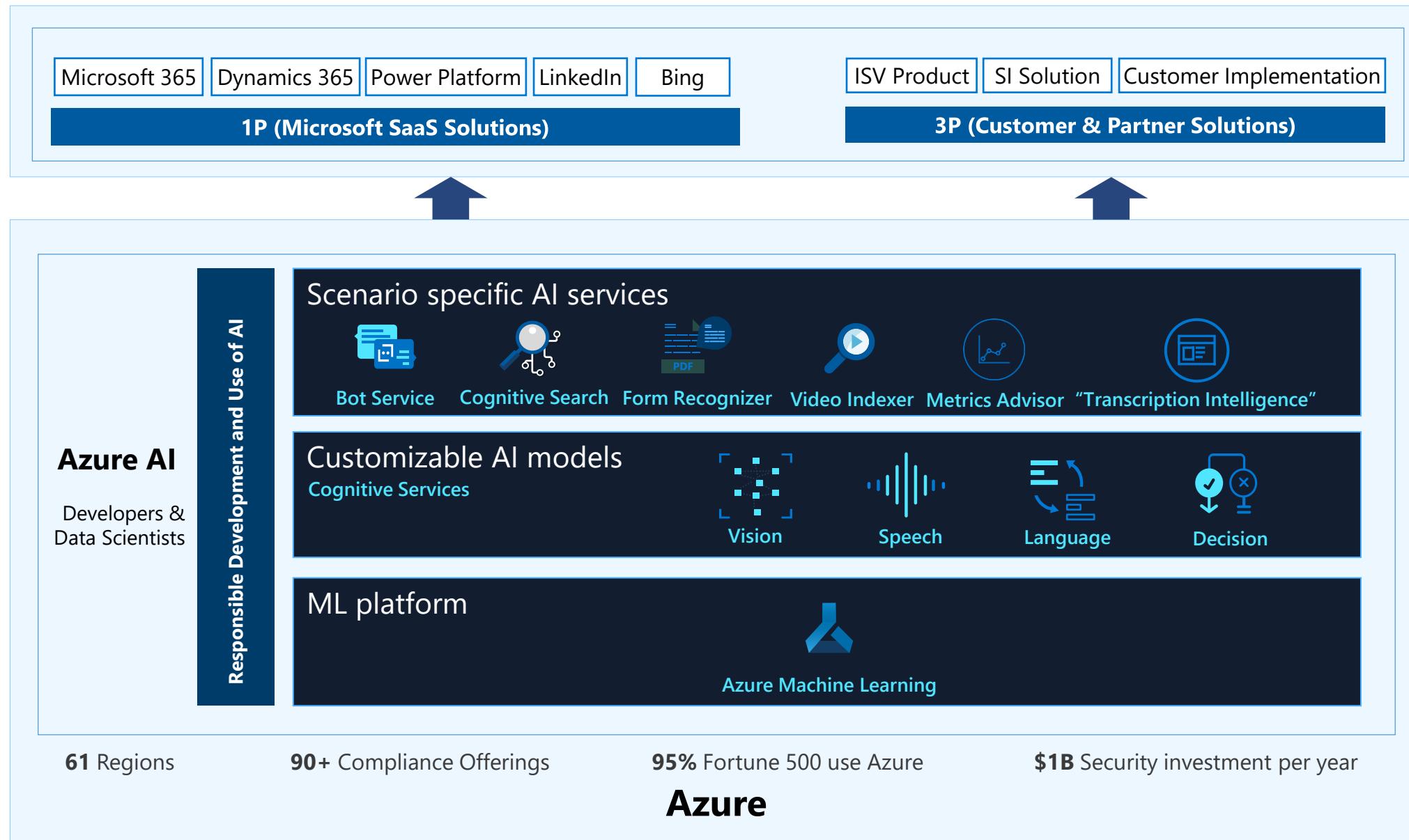
Scale without limits on the most trusted cloud, and deploy AI in containers



## Responsible

Mitigate bias and ensure accountability in your AI systems

# Azure AI

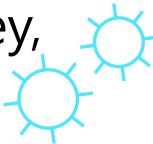


# Why Azure Cognitive Services?

## 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 capability 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



# Azure Cognitive Services



## Vision

Computer Vision
Form Recognizer
Face
Custom Vision Service
Video Indexer



## Speech

Speaker Recognition
Speech-to-Text
Text-to-Speech
Speech Translation
Voice Assistants



## Language

Text Analytics
Translator
Language Understanding
QnA Maker
Immersive Reader



## Search

Bing News Search
Bing Autosuggest
Bing Web Search
Bing Video Search
Bing Custom Search
Bing Entity Search
Bing Image Search
Bing Visual Search
Bing Local Business Search
Bing Spell Check



## Decision

Anomaly Detector
Content Moderator
Personalizer
Metrics Advisor (Preview)

# 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)
- Customizable image recognition
- Video metadata, audio, and keyframe extraction and analysis
- Explicit or offensive content moderation



## Speech

- Speech transcription (speech-to-text)
- Custom speech models for unique vocabularies or complex environment
- Text-to-speech
- Custom Voice
- Real-time speech translation
- Customizable speech transcription and translation
- Speaker identification and verification



## Language

- Language detection
- Named entity recognition
- Key phrase extraction
- Text sentiment analysis
- Multilingual and contextual spell checking
- Explicit or offensive text content moderation
- PII detection for text moderation
- Text translation
- Customizable text translation
- Contextual language understanding
- Q&A Extraction from unstructured text
- Knowledge Base creation



## Web Search

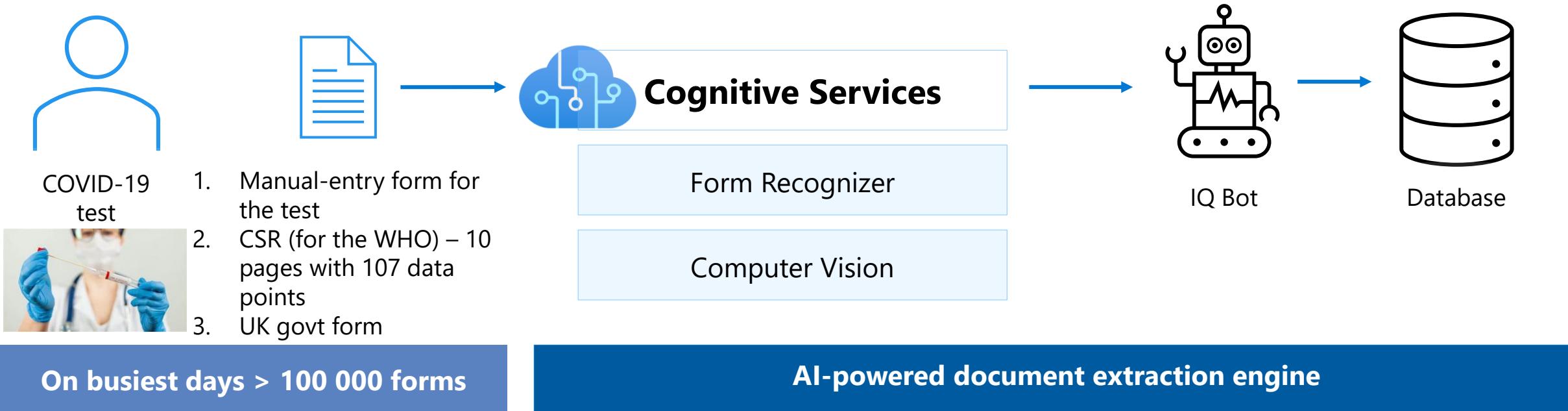
- Ad-free web, news, image, and video search results
- Trends for video, news
- Image identification, classification and knowledge extraction
- Identification of similar images and products
- Named entity recognition and classification
- Knowledge acquisition for named entities
- Search query autosuggest
- Ad-free custom search engine creation



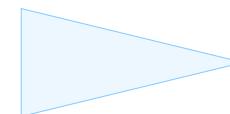
## Decision

- Find anomalies in a timeseries data
- Monitor for possible offensive, undesirable, and risky content
- Choose the best experience to show to your users, learning from their real-time behavior

# Automation Anywhere uses Azure AI platform to support UK healthcare provider's COVID-19 response



Manual processing  
(very slow)



## Outcomes:

- ✓ automatically process and submit the COVID-19 test forms at scale
- ✓ save time (processing now takes seconds)
- ✓ ensure accuracy (~ 95%)



# Customer Success with Cognitive Services

**AIRBUS**



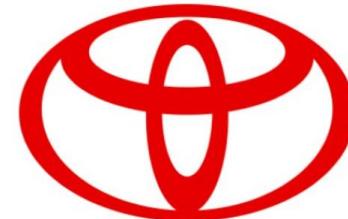
**vodafone**



**KONICA MINOLTA**



**NEC**



**TOYOTA**



**TIBCO®**

**... and many more**



# Vision Services



## Computer Vision

Distill actionable information from images



## Video Indexer

Process and extract smart insights from videos



## Face

Detect, identify, analyze, organize, tag faces in photos, and even recognize emotions



## Form Recognizer

Service which extracts text, key/value pairs, tables and structures from documents



## Custom Vision

Customizable web service that learns to recognize specific content in imagery



# Form Recognizer

Easily extract text, keys, and tables from your documents

<p><b>4506-T</b> Form 4506-T (June 2019)  Department of the Treasury Internal Revenue Service</p>	<p><b>Request for Transcript of Tax Return</b></p> <ul style="list-style-type: none"> <li>► Do not sign this form unless all applicable lines have been completed.</li> <li>► Request may be rejected if the form is incomplete or illegible.</li> <li>► For more information about Form 4506-T, visit <a href="http://www.irs.gov/form4506t">www.irs.gov/form4506t</a>.</li> </ul> <p>OMB No. 1545-1872</p>	
<p><b>Tip.</b> Use Form 4506-T to order a transcript or other return information free of charge. See the product list below. You can quickly request transcripts by using our automated self-help service tools. Please visit us at IRS.gov and click on "Get a Tax Transcript..." under "Tools" or call 1-800-908-9946. If you need a copy of your return, use <b>Form 4506, Request for Copy of Tax Return</b>. There is a fee to get a copy of your return.</p>		
<p><b>1a</b> Name shown on tax return. If a joint return, enter the name shown first.  <u>Haas Jonathan</u></p>	<p><b>1b</b> First social security number on tax return, individual taxpayer identification number, or employer identification number (see instructions)  <u>234-65-2134</u></p>	
<p><b>2a</b> If a joint return, enter spouse's name shown on tax return.  <u>Haas Mary</u></p>	<p><b>2b</b> Second social security number or individual taxpayer identification number if joint tax return  <u>543-05-3243</u></p>	
<p><b>3</b> Current name, address (including apt., room, or suite no.), city, state, and ZIP code (see instructions)  <u>12345 Main St. Palo Alto, CA 98473 USA</u></p>		
<p><b>4</b> Previous address shown on the last return filed if different from line 3 (see instructions)  <u>12345 Main St. Palo Alto, CA 98473 USA</u></p>		

## Key-value pairs

---

**Name:** Haas Jonathan

**Spouse Name:** Haas Mary

**First SSN:** 234-65-2134

**Second SSN:** 543-05-3243

**Current Address:**

**12345 Main St. Palo Alto,**

**CA 98473 USA**

**Previous Address:**

**12345 Main St. Palo Alto**

**CA 98473 USA**



# Form Recognizer Includes



**Prebuilt APIs > Receipts**

## Prebuilt APIs

- Invoices
- Sales Receipts
- Business Cards
- ID Document (new)



**Layout API (Text, Tables, and Checkboxes)**

## Layout API

**Custom Forms**

## Custom Models

These models are trained with your own data, so they're tailored to your forms.



# Prebuilt APIs > Receipts



## Receipt information

Json

The prebuilt Receipt model provides both raw and normalized values. Below you can see the raw values on the left, and the normalized values on the right.

### Merchant

Starbucks Reserve Roastery

Starbucks Reserve Roastery

### Address

1124 Pike St Seattle, WA

1124 Pike St Seattle, WA

### Phone number

206-624-0173

+12066240173

### Date

05/17/2015

2015-05-17

### Time

09:06 AM

09:06:00

### Items

Cup Fund Donation

5.00

### Subtotal

\$5.00

5

### Total

\$5.00

5

### Not found

Tax, Tip

```

"valueArray": [
{
  "type": "object",
  "valueObject": {
    "Name": {
      "type": "string",
      "valueString": "Cup Fund Donation",
      "text": "Cup Fund Donation",
      "boundingBox": [
        201.7,
        335.7,
        470.7,
        342,
        470,
        373,
        201,
        366.7
      ],
      "page": 1,
      "confidence": 0.917
    },
    "TotalPrice": {
      "type": "number",
      "valueNumber": 5,
      "text": "5.00",
      "boundingBox": [
        637,
        339,
        701,
        336,
        702.3,
        363,
        638.3,
        366
      ],
      "page": 1,
      "confidence": 0.916
    }
  }
}
]

```



# Receipts Data Extracted

image

JPEG, PNG, TIFF, PDF



Cognitive Services

Form Recognizer  
Receipts API

json

Fields Extracted

- Receipt Type
- Merchant Name
- Merchant Phone Number
- Merchant Address
- Transaction Date
- Transaction Time
- Total & Subtotal
- Tax & Tip
- Items (Item Name, Quantity, Price, Total Price)

+

metadata

Size < 50 MB

Dimensions:

- Min 50x50 pixels
- Max 10000x10000 pixels

- **PDF and TIFF:** up to 2000 pages are processed. (Free tier: only the first 2 pages)
- **PDF dimensions must be at most 17 x 17 inches,** corresponding to legal or A3 paper sizes and smaller.



# Layout API (Text, Tables, and Checkboxes)

		Financial highlights (unaudited)				
(In millions, except per share data)		2019	2018	2017	2016	2015
Operating revenues	\$1,557,796	\$1,433,984	\$1,274,172	\$1,150,669	\$1,075,013	2019
Operating expenses	\$802,095	\$747,086	\$694,402	\$662,565	\$671,115	6,577
Operating income	\$755,701	\$686,898	\$579,770	\$488,104	\$403,898	7,709
Income from continuing operations	\$563,648	\$507,885	\$303,972	\$260,855	\$230,038	7,791
Income (loss) from discontinued operations, net of income taxes	\$ -	\$ -	\$ -	\$ -	\$ (6,390)	2.11
Net income	\$563,648	\$507,885	\$303,972	\$260,855	\$223,648	2.11
Earnings per share:						
Earnings per basic common share from continuing operations	\$6.66	\$5.83	\$3.36	\$2.72	\$2.11	2.21
Earnings per basic common share from discontinued operations	\$ -	\$ -	\$ -	\$ -	\$ (0.06)	2.73
Earnings per basic common share	\$6.66	\$5.83	\$3.36	\$2.72	\$2.05	2.39
Earnings per diluted common share from continuing operations	\$6.59	\$5.66	\$3.31	\$2.70	\$2.09	(18)
Earnings per diluted common share from discontinued operations	\$ -	\$ -	\$ -	\$ -	\$ (0.06)	(21)
Earnings per diluted common share	\$6.59	\$5.66	\$3.31	\$2.70	\$2.03	(5)
Cash and cash equivalents	\$1,506,567	\$904,176	\$889,502	\$791,834	\$777,706	2019
Long-term debt, net of current maturities, deferred fees and discounts	\$3,071,926	\$2,575,502	\$2,078,093	\$2,075,201	\$1,579,404	2
Total shareholders' equity (deficit)	\$ (76,714)	\$ (166,494)	\$ 401,012	\$ 317,605	\$ 901,487	(96)



```
[{"status": "succeeded", "createdDateTime": "2020-09-11T10:49:11Z", "lastUpdatedDateTime": "2020-09-11T10:49:11Z", "analyzeResult": {"version": "2.0-preview", "readResults": [{"text": "..."}, {"text": "..."}], "pageResults": [{"text": "(请在适当方格内打\n在中国运输经营方式\nCategories of shipping\n方法)"}]}, {"text": "(请在适当方格内打\n船舶来源:\nCategories of vessel\n来源)"}]}]
```

```
"status": "succeeded",
"createdDateTime": "2020-09-11T06:05:16.9619951+00:00",
"lastUpdatedDateTime": "2020-09-11T06:05:22.2933745+00:00",
"analyzeResult": {
    "version": "2.0-preview",
    "readResults": [
        { ... },
        ...
    ],
    "pageResults": [
        {
            "page": 1,
            "tables": [
                ...
            ]
        }
    ]
},
"service": "TextAnalytics"
}
```

✓ the appropriate box(es) )

1、班轮运输  
2、不定期船舶运输

✓ the appropriate box(es) )

1、自有船舶 Self – owned;  
2、期租 Time charter  
3、程租 Voyage charter  
4、其他 Other cases (需



# Supported Languages

1

## Form Recognizer v2.0

- ✓ English (printed & handwritten)

9

## Form Recognizer v2.1 (preview.2)

- ✓ Chinese (Simplified)
- ✓ English (printed & handwritten)
- ✓ European (Dutch, French, German, Italian, Portuguese, Spanish)
- ✓ Japanese

73

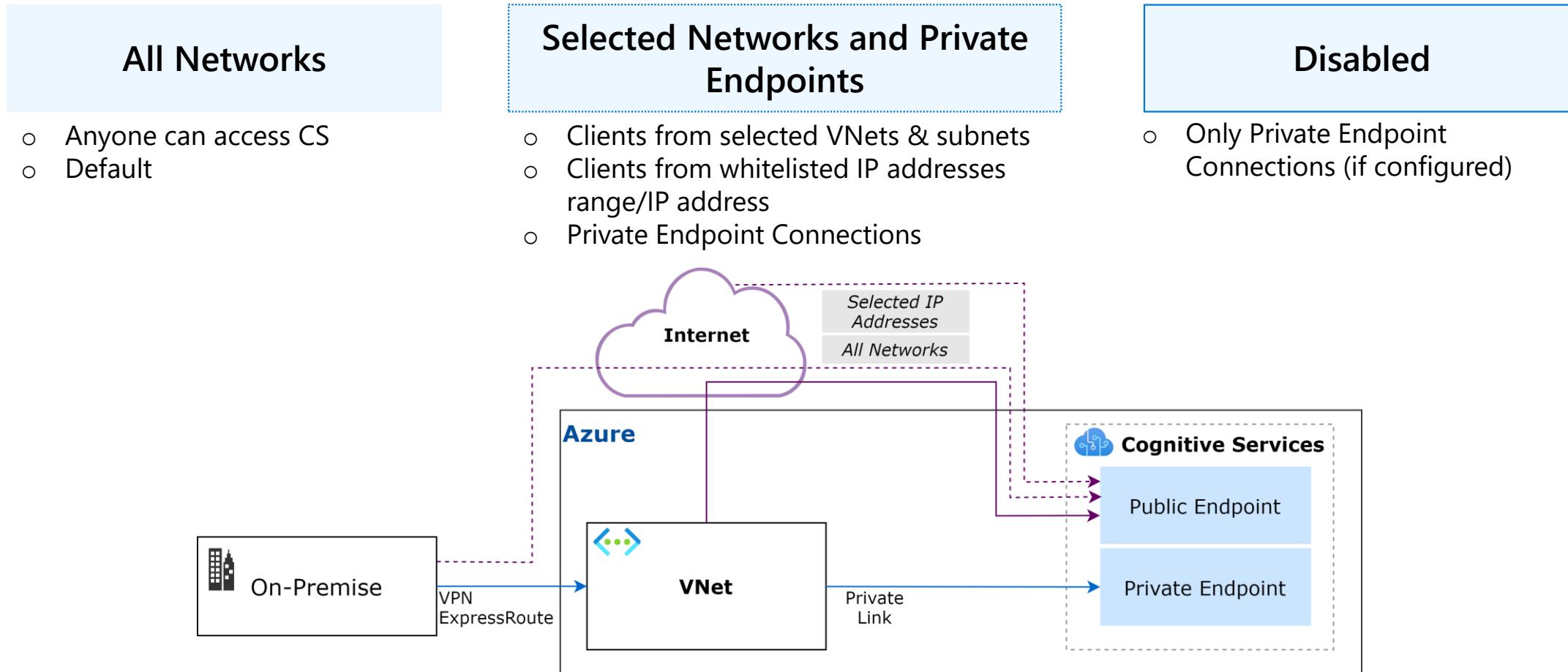
## Form Recognizer v2.1 (preview.3)

- ✓ English
- ✓ Chinese (Simplified & Traditional)
- ✓ Filipino
- ✓ Indonesian
- ✓ Javanese
- ✓ Malay (Latin)
- ✓ Other languages



# Networking & Security

- ✓ Cognitive Services (CS) endpoints are exposed over HTTPS enforce **TLS 1.2**
- ✓ Control Endpoint Access with **Firewalls & Virtual Networks**



# Demo #1

## Form Recognizer

- Create Form Recognizer Resource
- Limit access to a single IP address
- Extract data from receipt with Receipt API
- Extract data from receipt with Layout API

# Break 3 min

Reach out to us if you would like explore AI&ML use cases or need help on your AI & ML journey

[saas.lab@microsoft.com](mailto:saaS.lab@microsoft.com)



# Computer Vision Capabilities



- ✓ Object Detection
- ✓ Brand Detection
- ✓ Content Tags
- ✓ Image Categorization
- ✓ Image Descriptions
- ✓ Image Type Detection

- ✓ Face Detection
- ✓ Domain-specific Content
- ✓ Color Scheme Detection
- ✓ Smart-cropped Thumbnails
- ✓ Adult Content Detection

## Analyze Image API

- Objects, Faces, Brands
- Tags, Image Type, Adult, Categories, Color, Description

## Tag Image API

## Get Area of Interest API

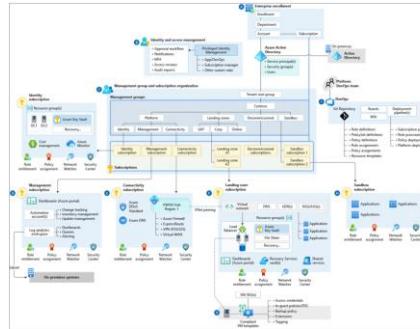
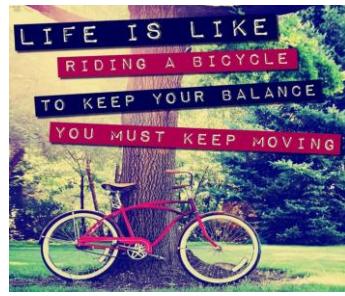
## Detect Objects API

## Describe Image API

Get image description (multiple) in multiple languages

## Get Thumbnail API

## Recognize Domain Specific Content



- ✓ Optical Character Recognition  
(Printed & Handwritten text)

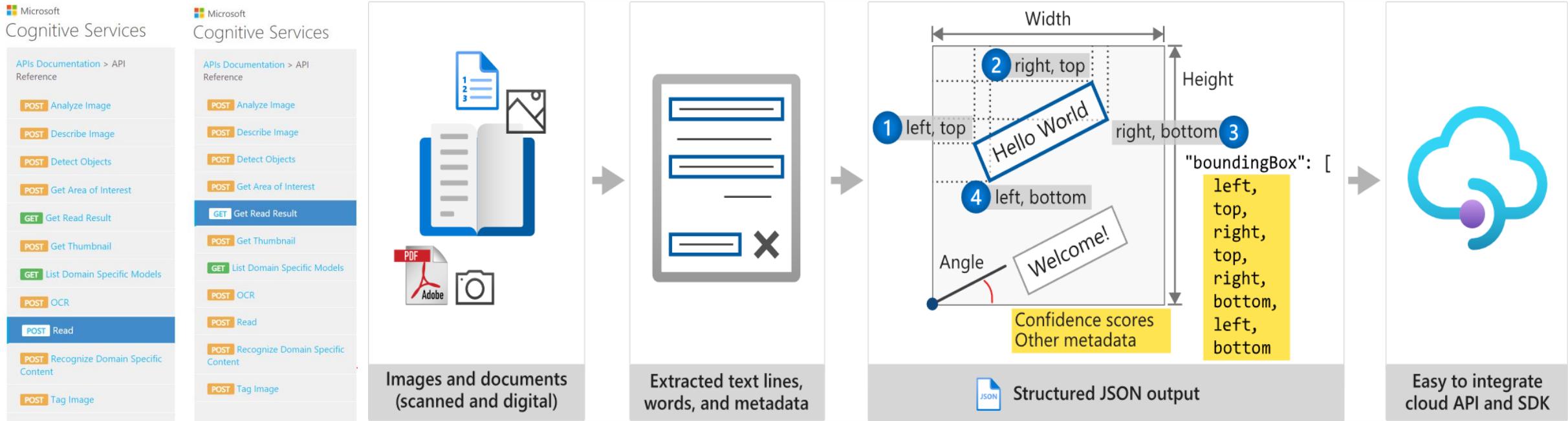
## Read API

Extract printed & handwritten text.  
Optimized for text heavy documents  
**Async**

## OCR API – retiring



# OCR (Read API v3.x) Overview



- Supported file formats: JPEG, PNG, BMP, PDF, and TIFF.
- For PDF and TIFF, up to 2000 pages are processed.
- The file size must be less than 50 MB and dimensions at least 50 x 50 pixels and at most 10000 x 10000 pixels.
- The PDF dimensions must be at most 17 x 17 inches, corresponding to legal or A3 paper sizes and smaller.
- Read API is optimized to extract text from text-heavy images and multi-page PDF documents with mixed languages.

## Free Tier (F0)

**20 calls per minute & 5K calls per month**

## Standard Tier (S1)

**10 requests per second (RPS)** that can be increased upon request



# What's new in Read API v3.2 (preview)

- Support of 73 languages
- Reading order for multi-page documents
- Process only selected pages from multi-page documents

26

## OCR API

- ✓ English
- ✓ Chinese (Simplified & Traditional)
- ✓ Other languages

7

## Read API v3.0/3.1

- ✓ English
- ✓ Dutch, French, German, Italian, Portuguese, Spanish

73

## Read API v3.2 (preview)

- ✓ English
- ✓ Chinese (Simplified & Traditional)
- ✓ Filipino
- ✓ Indonesian
- ✓ Javanese
- ✓ Malay (Latin)
- ✓ Other languages

# Demo #2

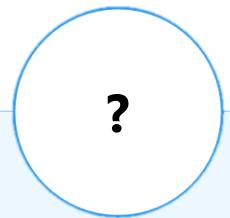
## Computer

## Vision

1. Call Read API endpoints (analyze & get result) without SDKs
2. Process image with handwritten text
3. Process images with printed text
4. Monitoring



# Cognitive Services Containers



Need Azure Cognitive Services APIs

## BUT

- Bandwidth constrains
- Traverse data over internet



## Cognitive Services Containers

Flexibility to bring Cognitive Services closer to your data for compliance, security or other operational reasons

- ✓ Portable Architecture
- ✓ Immutable Infrastructure
- ✓ Control Over Model Updates
- ✓ Control Over Data
- ✓ High Throughput / Low Latency
- ✓ Scalability
- ✓ Same API & Simple Billing



+

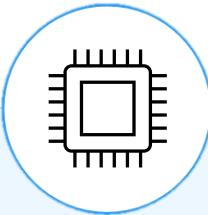
Azure Subscription  
Internet access (to send metering data)



# Cognitive Services Containers



x64 based containers



Any compatible

- Linux Node, VM, Edge Device

- ✓ Supports x64 Linux Docker Containers

- ✓ Has CPU Processors & Internet Access



Vision



Read OCR (Computer Vision)  
• Form Recognizer



Speech



Speech-to-Text  
• Text-to-Speech  
• Custom Speech-to-Text  
• Custom Text-to-Speech  
• Neural Text-to-speech  
• Speech Language Detection



Language



Language Understanding  
• Text Language Detection  
• Sentiment Analysis  
• Key Phrase Extraction



Search



Decision



Anomaly Detector



# Minimum & Recommended Configurations

## Form Recognizer

Container	Minimum	Recommended
Form Recognizer	2 core, 4-GB memory	4 core, 8-GB memory
Recognize Text	1 core, 8-GB memory	2 cores, 8-GB memory

## Computer Vision Read API

Container	Minimum	Recommended
Read 2.0-preview	1 core, 8-GB memory	8 cores, 16-GB memory
Read 3.2-preview	8 cores, 16-GB memory	8 cores, 24-GB memory

- Each core must be at least 2.6 gigahertz (GHz) or faster.

The minimum and recommended configurations for each container offering

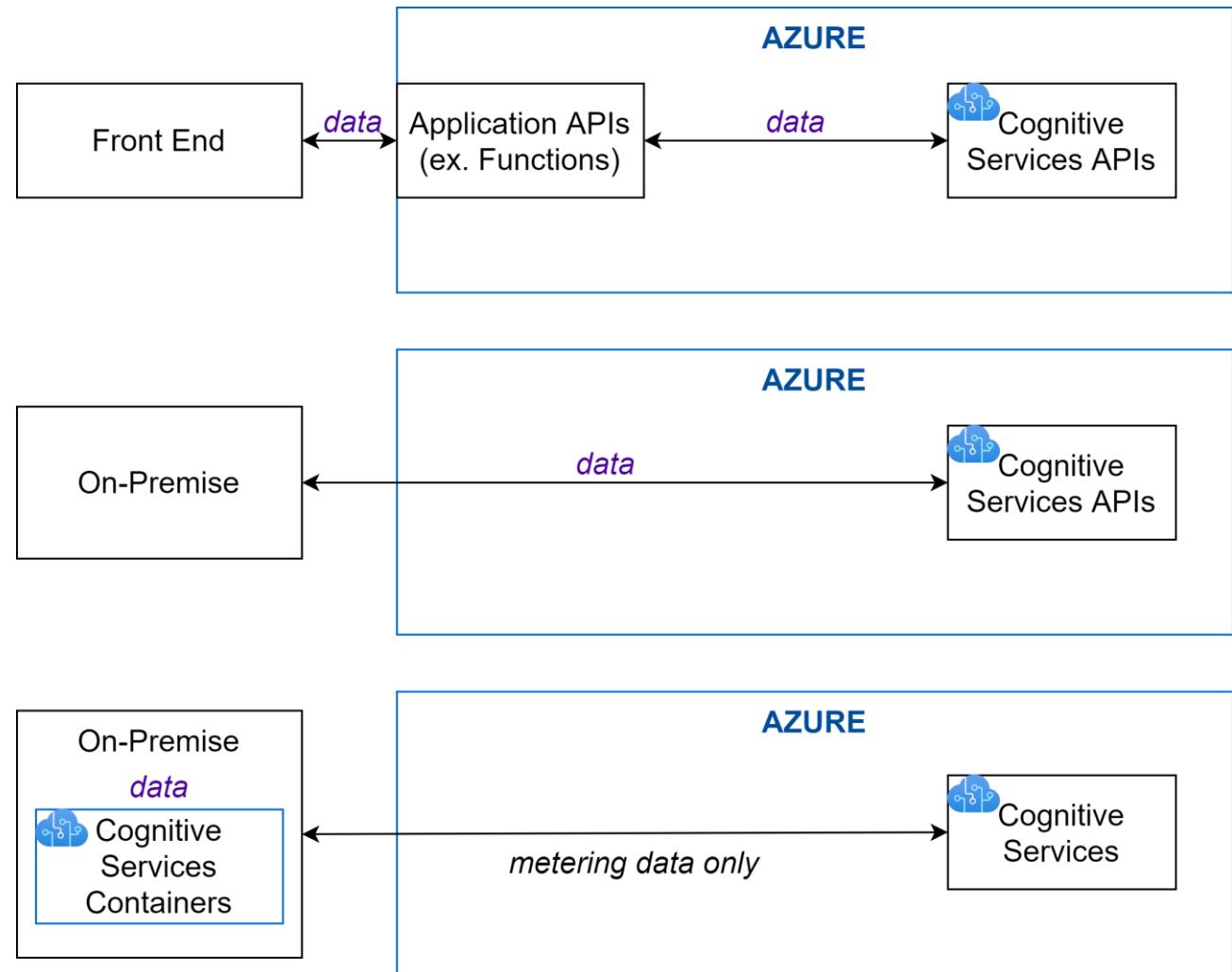
[Anomaly Detector](#)  
[Computer Vision](#)  
[Face](#)

[Form Recognizer](#)  
[Language Understanding  
\(LUIS\)](#)

[Speech Service API](#)  
[Text Analytics](#)



# Cognitive Services Integration



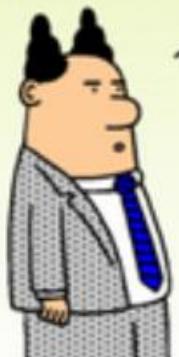
**Cognitive Services APIs**

**Cognitive Services Containers**

## How to get Machine Learning Models to work for you organization !!

HOW'S YOUR  
QUANTUM COMPUTER  
PROTOTYPE COMING  
ALONG?

GREAT!



THE PROJECT EXISTS  
IN A SIMULTANEOUS  
STATE OF BEING BOTH  
TOTALLY SUCCESSFUL  
AND NOT EVEN  
STARTED.

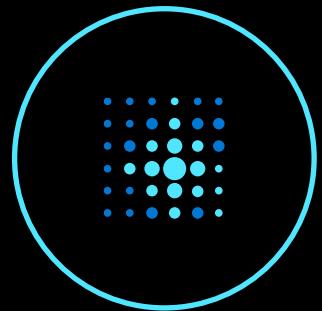
Dilbert.com DilbertCartoonist@gmail.com

CAN I  
OBSERVE  
IT? THAT'S  
A TRICKY  
QUESTION.

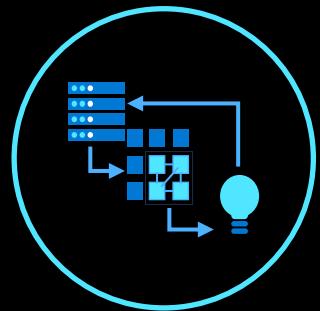


4-17-12 © 2012 Scott Adams, Inc. /Dist. by Universal Uclick

# Azure Machine Learning



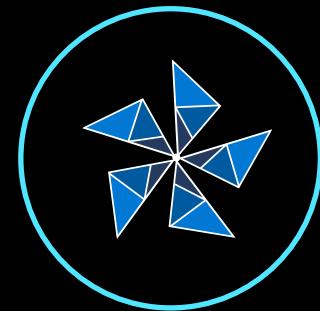
For all  
Skill levels



Full Lifecycle  
Management (MLOps)



Responsible ML



Open and  
interoperable



# 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
- Simple deployment
- DevOps for machine learning
- Support for open source frameworks
- Tool agnostic Python SDK



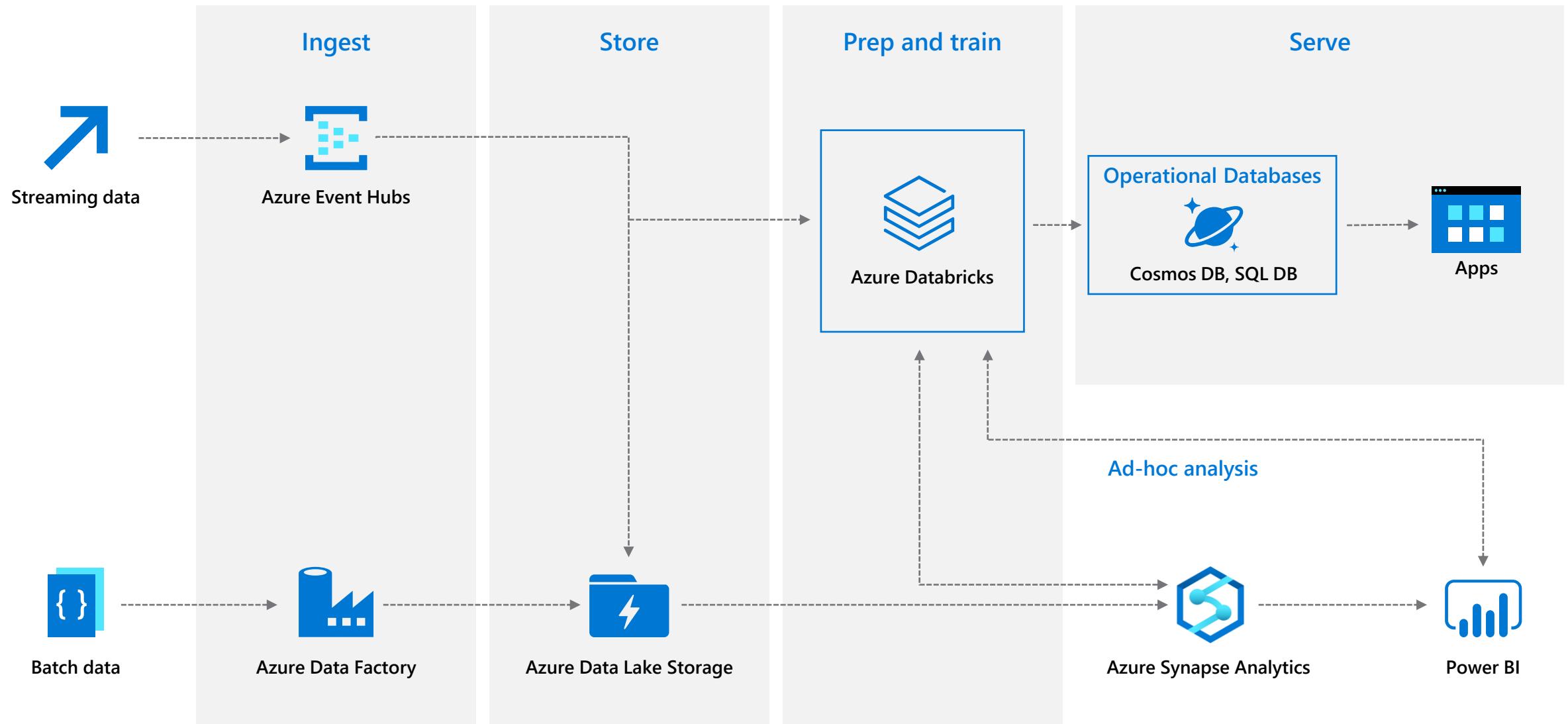
Seamlessly integrated with the Azure Portfolio

# Demo #3

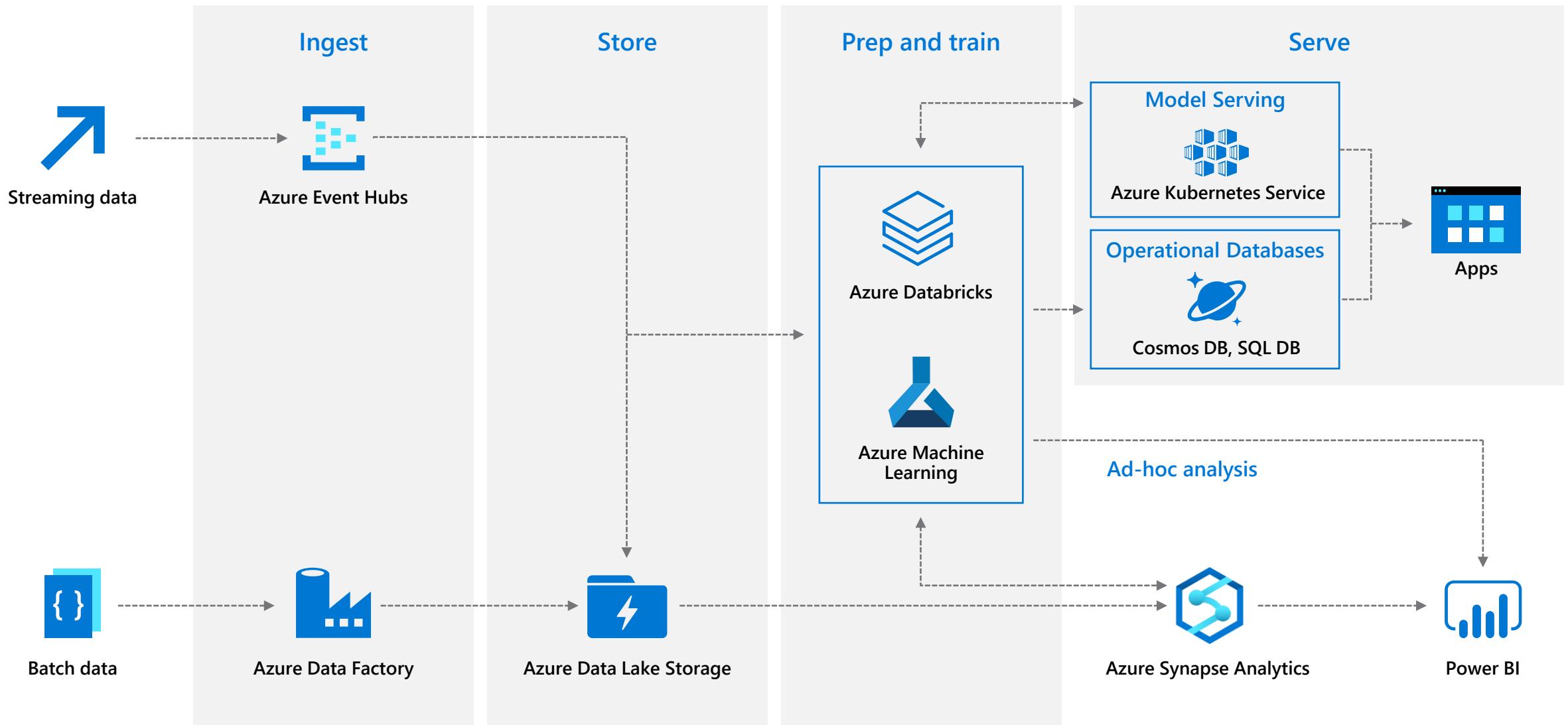
# Azure Machine Learning

- Azure ML Demo
- How to get started
- Experiments
- Deployment

# Machine learning



# Machine learning



# Knowledge check time!



<http://www.kahoot.it> or use the Kahoot! mobile app

Game PIN: in the chat window



# Your feedback is important

Please help us improve this program by completing this short feedback form.



<https://aka.ms/saaslabfeedback7>

# Resources

## Notebooks

[ProjectWisdom/1.1 FormRecognizer PrebuiltAPIs ReceiptsAPI.ipynb](#)

[ProjectWisdom/1.2 FormRecognizer LayoutAPI.ipynb](#)

[ProjectWisdom/2 ComputerVision ReadAPI.ipynb](#)

## Form Recognizer

[What is Form Recognizer?](#)

[Language support - Form Recognizer \(Preview\) - Azure Cognitive Services](#)

## Computer Vision

[Computer Vision documentation - Quickstarts, Tutorials, API Reference - Azure Cognitive Services](#)

[Cognitive Services APIs Reference \(microsoft.com\)](#)

[Language support - Computer Vision - Azure Cognitive Services](#)

## Cognitive Services Containers

[Use Azure Cognitive Services Containers on-premises - Azure Cognitive Services](#)

## Machine Learning

[What is Azure Machine Learning](#)

[Machine Learning Architecture](#)

# Session takeaways

## Add AI capabilities

Adding AI capabilities to your application starts with identifying use case.

## Integrate Cognitive Services

Integrate Cognitive Service into your existing applications either using SDKs or as REST APIs.

Prebuilt models allow you to integrate AI services in the solution even if you don't have a team of AI engineers & data scientists.

## Monitor & Protect

Monitor Cognitive Services Usage

Protect with Firewall & Network security (whitelist networks & IP addresses, block everyone else)

Do not store endpoints & keys in code

## ML Architectures

Possible ML Architectures on Azure

MLOps

How Azure Machine Learning can help data scientists and AI Engineers collaborate and create an MLOPS focused solution.

Q & A





If you'd like more help on your using AI & ML,  
exploring AI & ML use cases, PoC please e-mail the  
SaaS Lab team

[saaslab@microsoft.com](mailto:saaSlab@microsoft.com)

Thank you for being part of the SaaS Lab Program