



IoT in Action

#IoTinActionMS



Evolving IoT with Autonomy, Drones, Mixed Reality and AI

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We are living in an automated world



...in an increasingly
autonomous world



Evolution of systems

Mechanized systems



Powered by **steam or electricity**

Manually operated

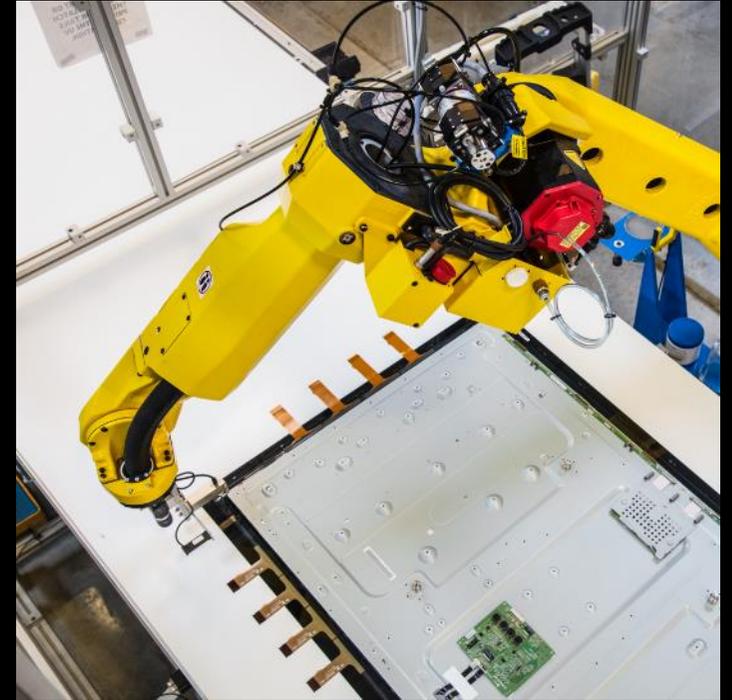
Automated systems



Powered by **software**

Fixed operation

Autonomous systems



Powered by **AI**

Intelligent operation

Microsoft platform for autonomous systems



Scale human expertise

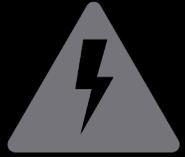
Machine Teaching

- Domain experts “teach” the machine
- No data science expertise required
- Expert provides “lesson plans” to help the AI algorithm solve the problem

The Drone as an Intelligent Edge



Infrastructure survey and inspection



Transforming cities with Drones

Asset health inspection

- Buildings, bridges, roads, tunnels, railways
- Electrical grid

Delivery

- Last mile delivery
- Cargo delivery

Surveying

- Geospatial & construction
- Evaluate asset insurability (underwriter)

Environmental

- Weather & air quality
- Environmental hazards response
- Traffic flow and incidents monitoring

Public security & disaster response

- Survey flood, fire, tornado damage
- Locate missing people (thermal imaging)
- Navigate through smoke & hazards
- Survey accident & crime scenes
- Crowd control

Microsoft AirSim

Train drones in a safe, virtual environment



Mixed Reality



Mixed reality

A blending of the physical and digital worlds in which users may interact with digital and real-world objects while maintaining presence in the physical world

Physical world

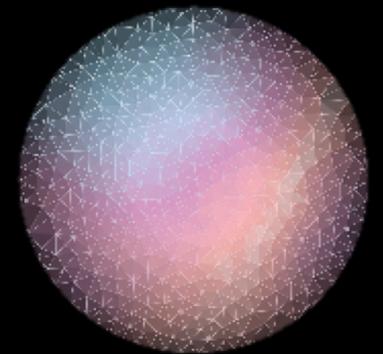


Augmented reality



Virtual reality

Digital world



Mixed reality spectrum

■ The Microsoft mixed reality stack

Mixed Reality Applications



Azure Cognitive Services



Vision



Speech



Language



Knowledge



Search

Azure Mixed Reality & IoT Services



Azure Digital Twins

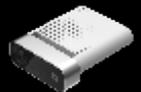


Azure Spatial Anchors



Azure Remote Rendering

Intelligent Edge Devices



Geospatial Planning



■ The 3rd wave of computing



Artificial Intelligence



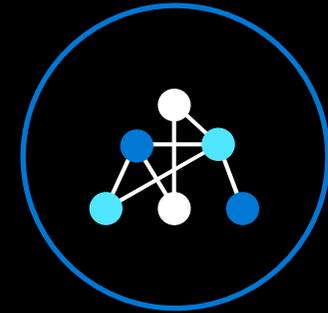
Azure AI



AI apps & agents



Knowledge mining



Machine learning

Deliver breakthrough experiences



AI apps & agents

- Cognitive Services
- Bot Service

Deliver breakthrough experiences



AI apps & agents

- Cognitive Services
- Bot Service

Azure Cognitive Services

Decision

Personalizer
Anomaly Detector

Speech

Conversation transcription capability
Neural Text-to-Speech
Speech Service Device SDK

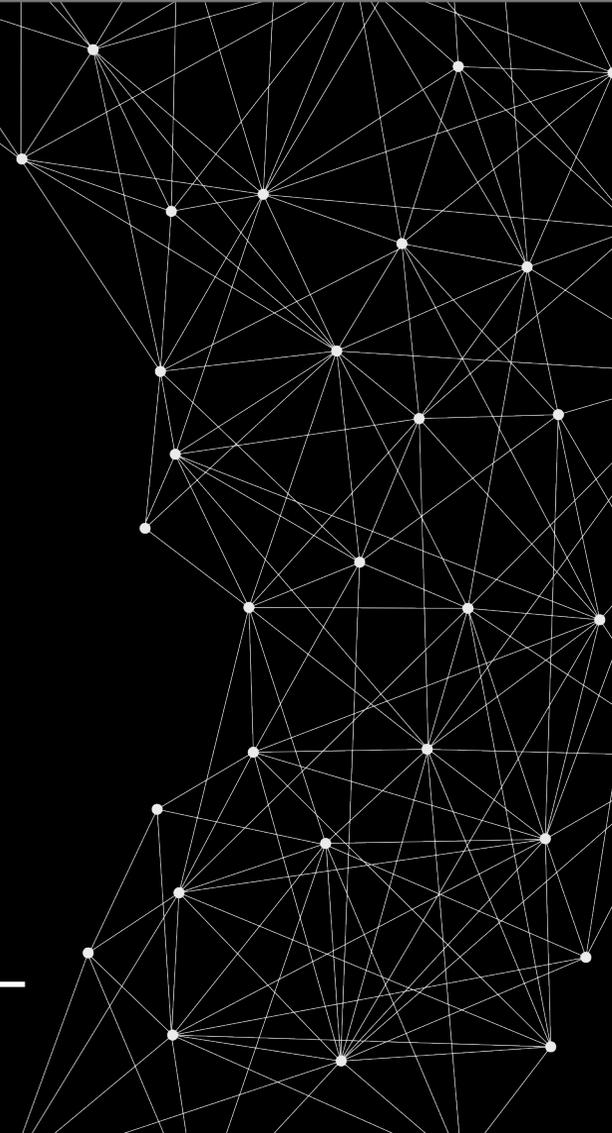
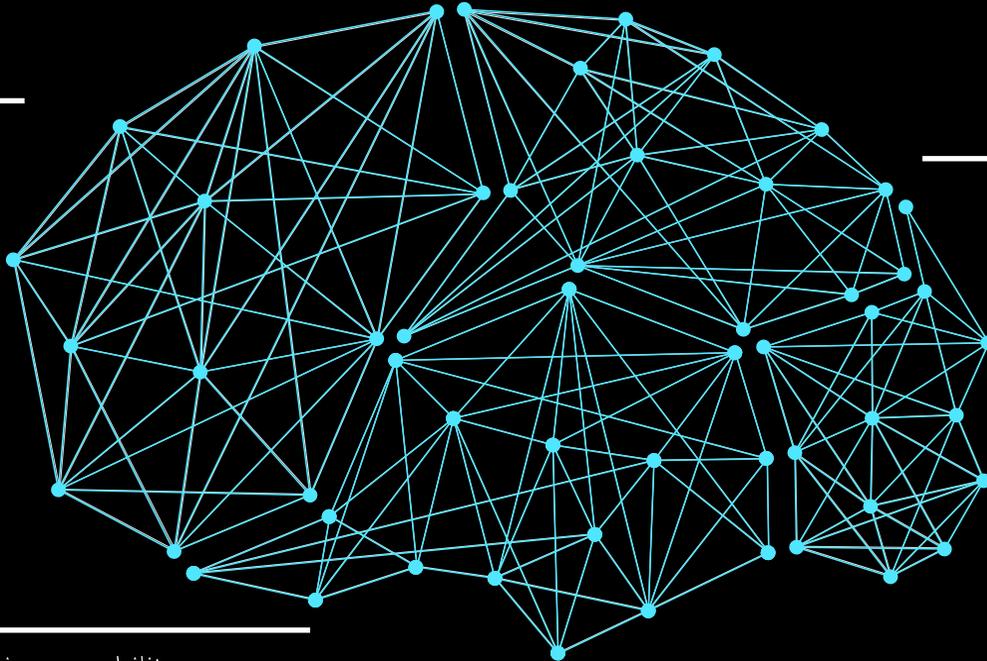
Language

Language Understanding
QnA Maker

Vision

Ink Recognizer
Computer Vision

Web search



Azure Cognitive Services

The most comprehensive pre-trained AI

Decision

Personalizer
Content Moderator
Anomaly Detector

Vision

Ink Recognizer
Computer Vision
Face
Video Indexer
Custom Vision
Form Recognizer

Language

Text Analytics
Translator Text
Bing Spell Check
Language Understanding
Content Moderator
QnA Maker

Speech

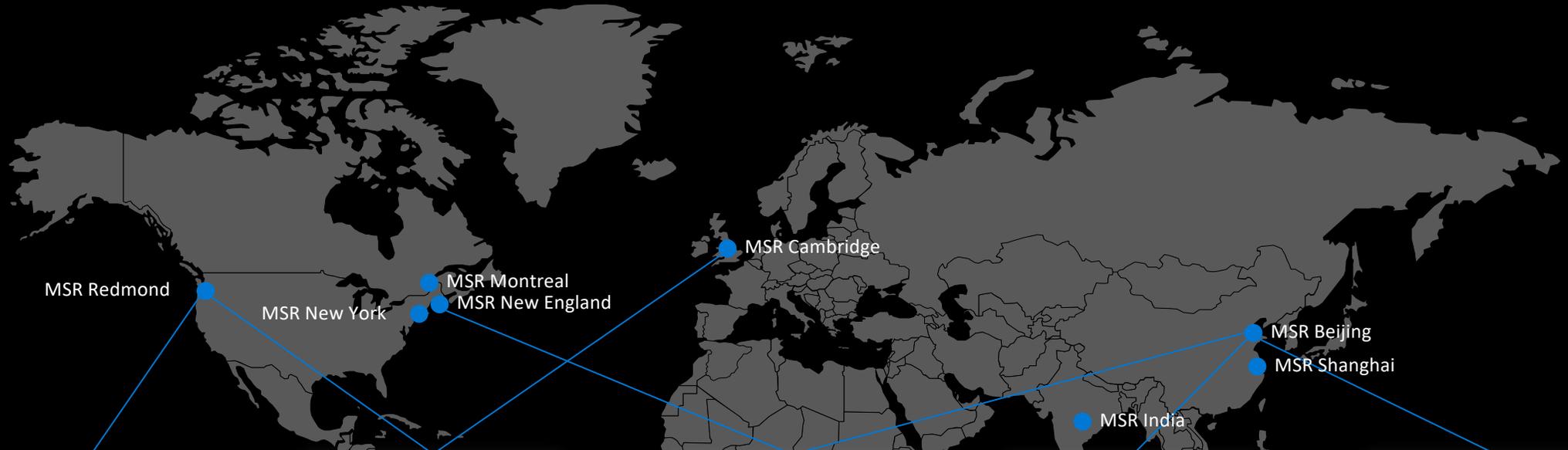
Conversation transcription capability
Custom Speech
Speech transcription
Text-to-Speech
Neural Text-to-Speech

Web search

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

Azure AI

Fueled by Microsoft breakthrough research



First FPGA deployed in a datacenter

39.5 Teraflops with Intel Stratix 10

Speech recognition human parity

94.9% on Switchboard test

Machine translation human parity

69.9% with MT Research system

Conversational Q&A human parity

89.4% on Stanford CoQA test

Object detection human parity

96% on RESNET vision test

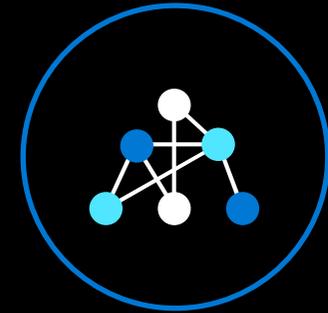
Azure AI



AI apps & agents



Knowledge mining



Machine learning

Machine Learning on Azure

Domain specific pretrained models

To simplify solution development



Vision



Speech



Language



Web search



Decision

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 Machine Learning



Azure Databricks



Machine Learning VMs

Powerful infrastructure

To accelerate deep learning



CPU



GPU



FPGA

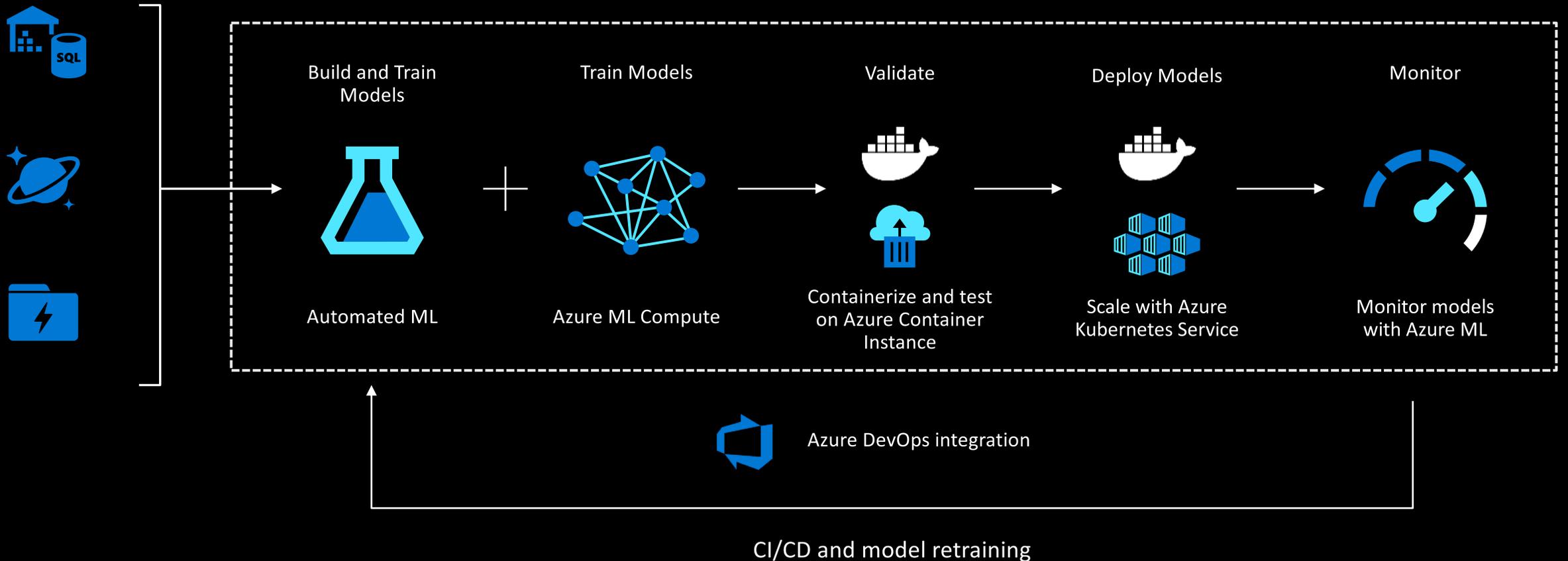


From the Intelligent Cloud to the Intelligent Edge



Deploy machine learning models at scale

Azure Machine Learning service





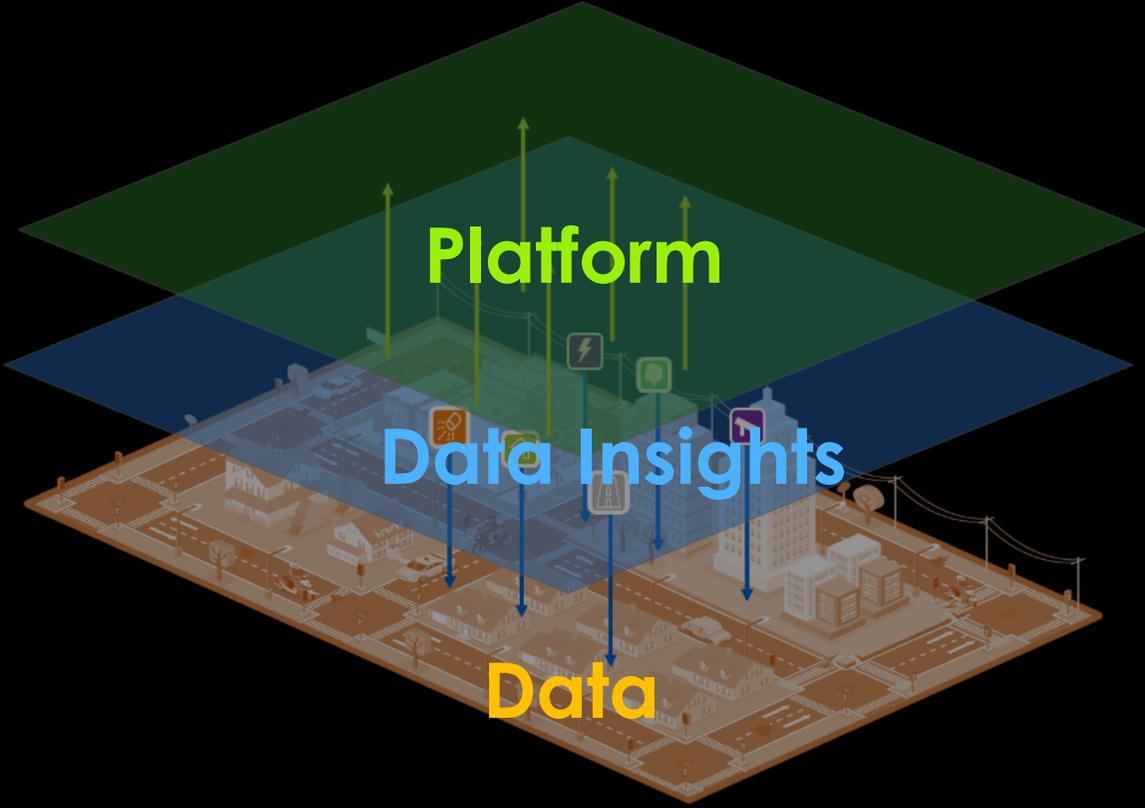
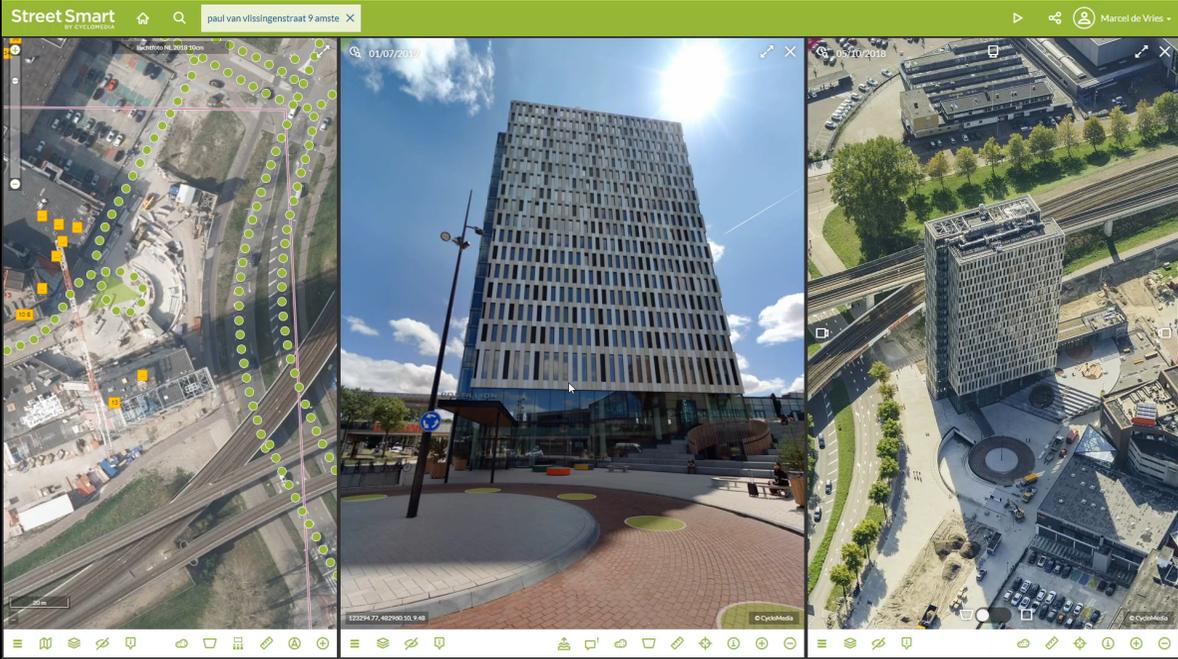
Visualize a Better World

CycloMedia
Rutger Gerritz

IoT in Action



CycloMedia Building Blocks



Challenge City:

Admin \neq Physical Reality

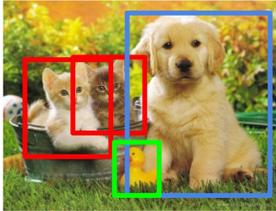
Incorrect, incomplete, outdated or
non-existent data

No digital asset management



Applying The Principles

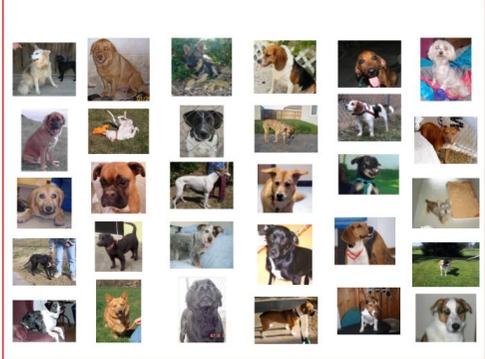
Algorithms

Classification	Classification + Localization	Object Detection	Instance Segmentation
			
CAT	CAT	CAT, DOG, DUCK	CAT, DOG, DUCK
Single object		Multiple objects	

Recall

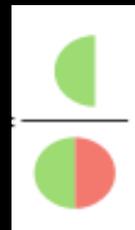


Data

Cats	Dogs
	

Sample of cats & dogs images from Kaggle Dataset

Precision

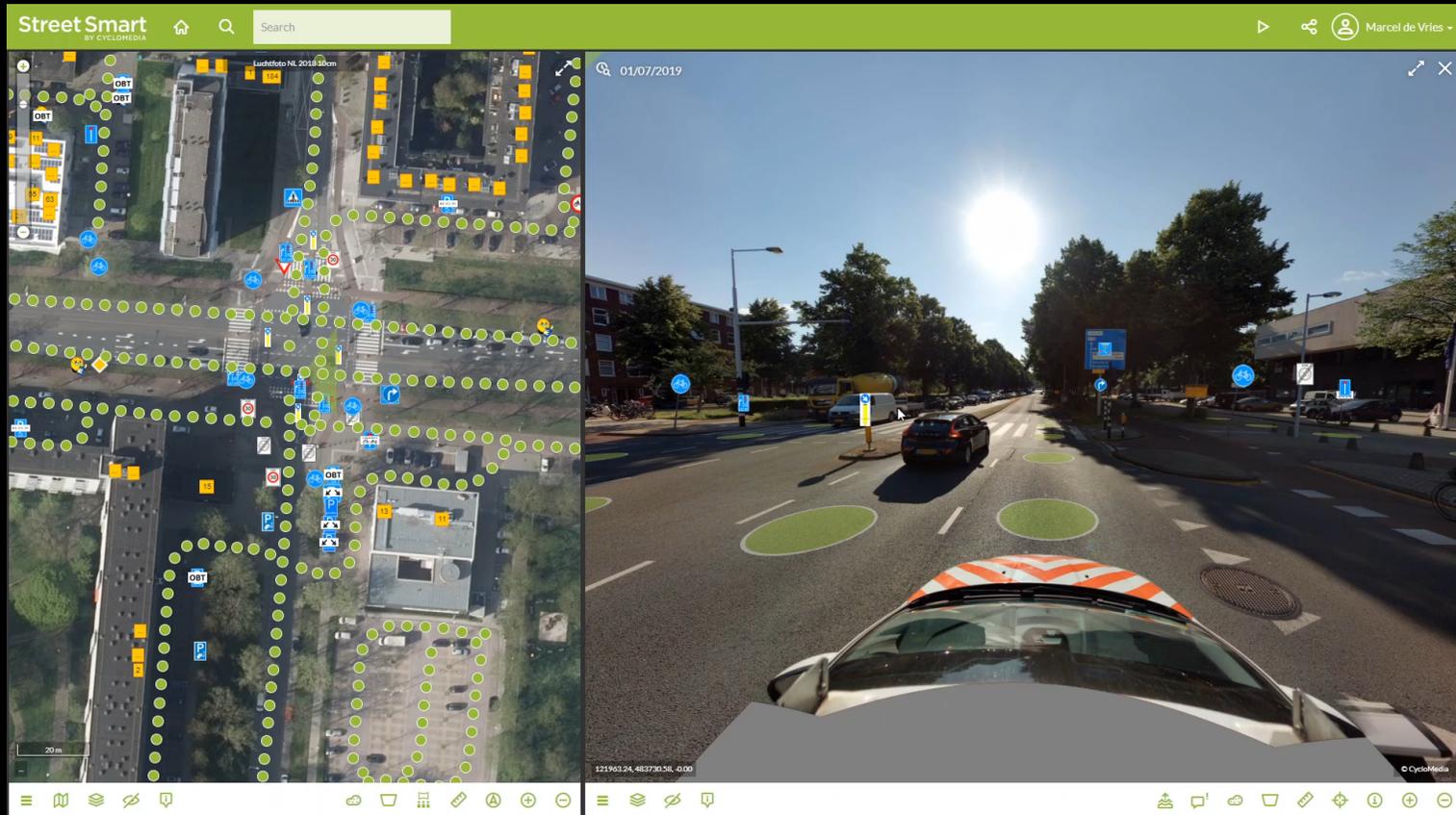


Project #1196 - 16.43% Complete



Log out Previous group All Positive All Negative Reset All Finished & next group

Case Traffic Signs: **A Smart City Knows**



'How many traffic signs has the City of Amsterdam?'

98,735

A Digital Twin

- Location, Type, Orientation, Bearer

Asset Management

- Plan, Design, Install, Maintain, Replace, Repair
- Managing Costs

Impact

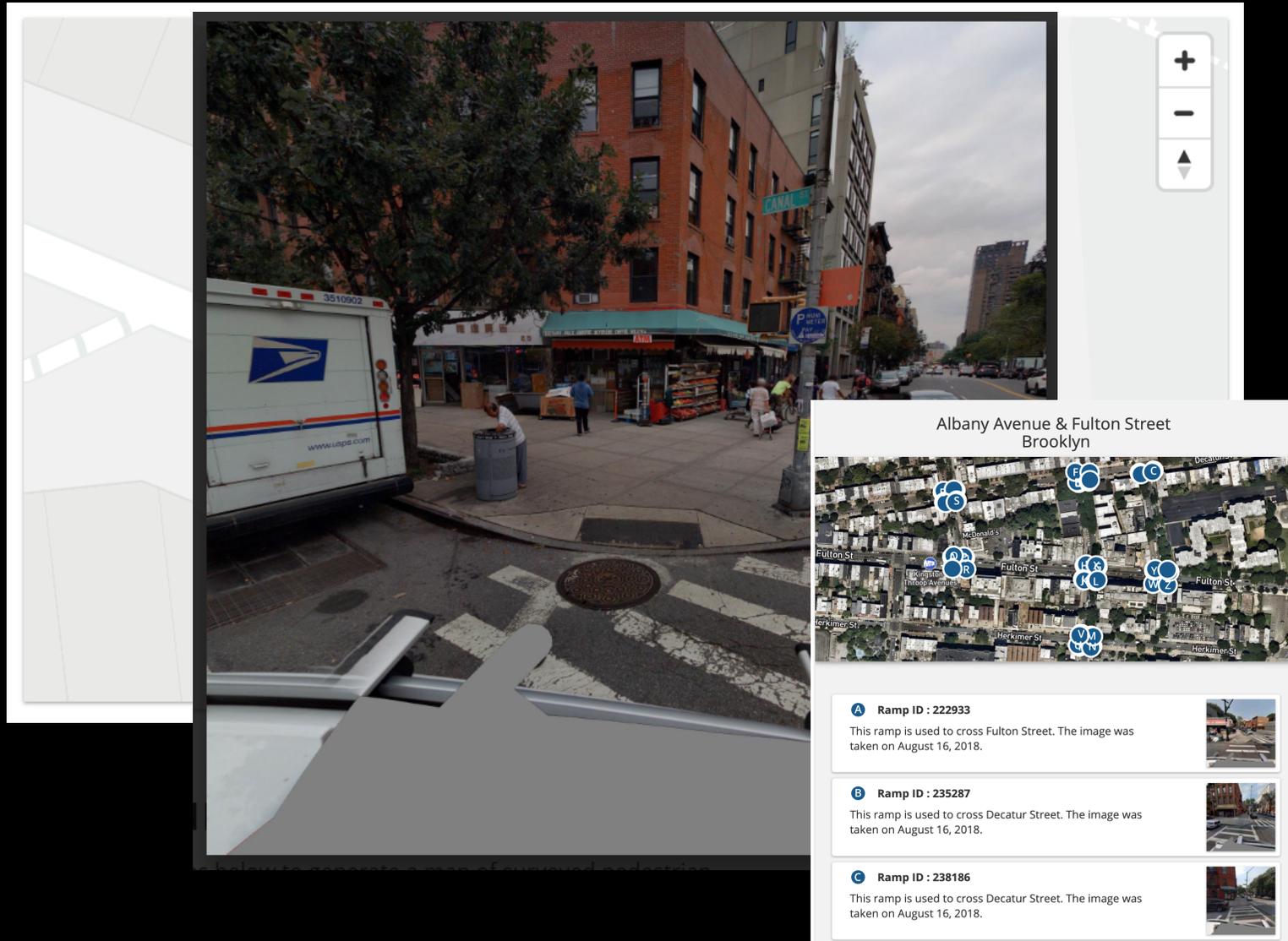
- Improving Safety
- Avoiding Congestion
- Anticipating Future Changes In The Way We Move Around



Challenge: Access for Everyone



Case: Ped Ramp Project New York: **An Inclusive City**

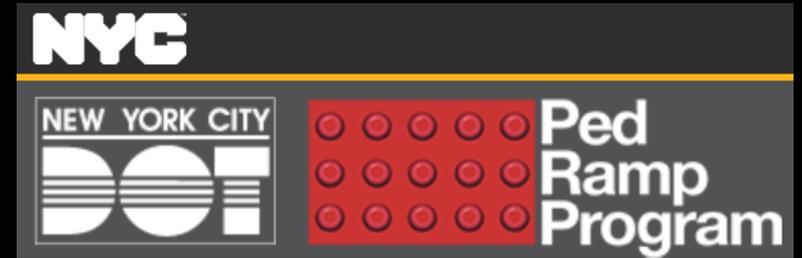


Albany Avenue & Fulton Street
Brooklyn

A Ramp ID : 222933
This ramp is used to cross Fulton Street. The image was taken on August 16, 2018.

B Ramp ID : 235287
This ramp is used to cross Decatur Street. The image was taken on August 16, 2018.

C Ramp ID : 238186
This ramp is used to cross Decatur Street. The image was taken on August 16, 2018.



From the Commissioner:
New York City has one of the largest and most complex street networks in the world, including over 12,000 miles of sidewalks and more than 320,000 ramps. DOT is committed to making our pedestrian space safe and accessible for all users. I hope you will learn more about our pedestrian ramp program from the resources provided on this site – and contact us with any questions or concerns. **–Polly Trottenberg**



To keep in mind

- Use the Best Data
- Focus on Business Value
- Educate for Public Acceptance
- Ensure Process Integration
- Be Able to Scale



Real Data

True Understanding

Big Impact



Free AI online training & certification



AI Business School



Business leaders can use AI Business School to gain specific, practical knowledge to define and implement your AI strategy. Hear directly from industry experts on how to foster an “AI-ready” culture and learn how to use AI responsibly and with confidence.



Define an AI strategy to create business value

8 MODULES 4 HR 16 MIN BEGINNER > INTERMEDIATE

[Learn More >](#)



Discover ways to foster an AI-ready culture in your business

6 MODULES 3 HR 10 MIN INTERMEDIATE

[Learn More >](#)

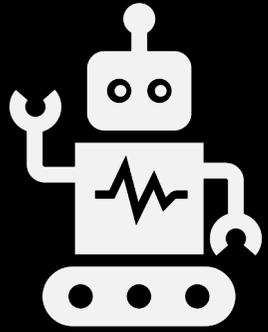


Identify guiding principles for responsible AI in your business

3 MODULES 55 MIN INTERMEDIATE

[Learn More >](#)

The Intelligent Edge





Dank u!



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