



Microsoft AI in action

Ha Cole
CTO Nonprofits

26th Oct 2022



/in/hacole

Agenda

1

Microsoft AI
in real life

2

Reimagine
what's possible

3

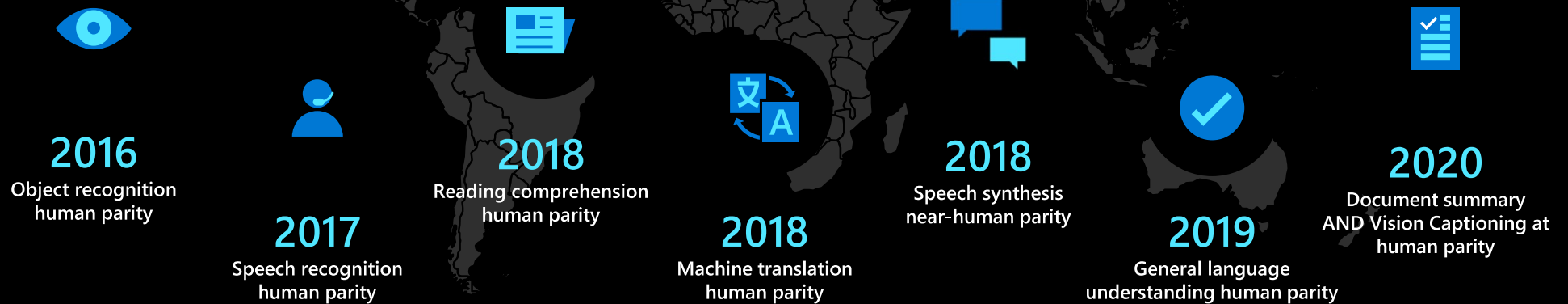
An actionable
start

**"Computers will one day
see, hear, talk, and
understand human beings."**



Driving innovation

Fueled by breakthrough research



Computer vision & machine learning for safety

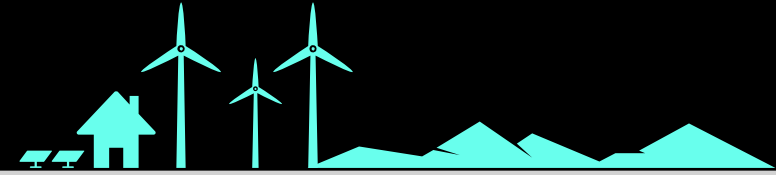




1

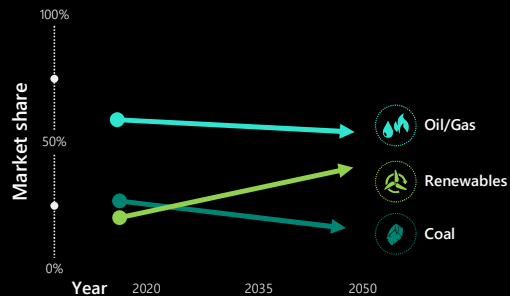
Microsoft AI in real life

Shifting Energy Landscape



ENERGY MIX

Overall Energy Demand

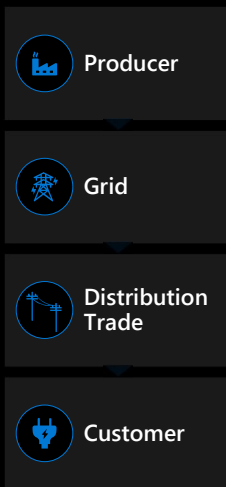


Power Generation

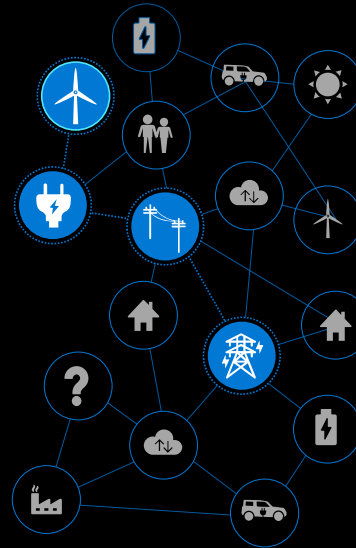
By 2035, **>50%** of electricity will be generated by renewable energy

DECENTRALIZATION

Today

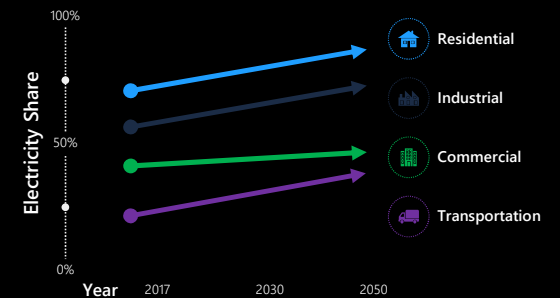


Future



ELECTRIFICATION

Power Consumption Growth



Overall Growth

By 2050, overall electricity use is expected to grow by **>50%**

Microsoft for Energy

Powering a sustainable future

Operate for the future



Increase reliability and recovery rates, and decrease variability of your operations, reducing environmental impact while generating value for stakeholders

Transition to clean



Keep people, products, and the world moving, while realizing reductions in carbon emissions and intelligently fulfilling demand with new renewable energy sources

Transform your workforce

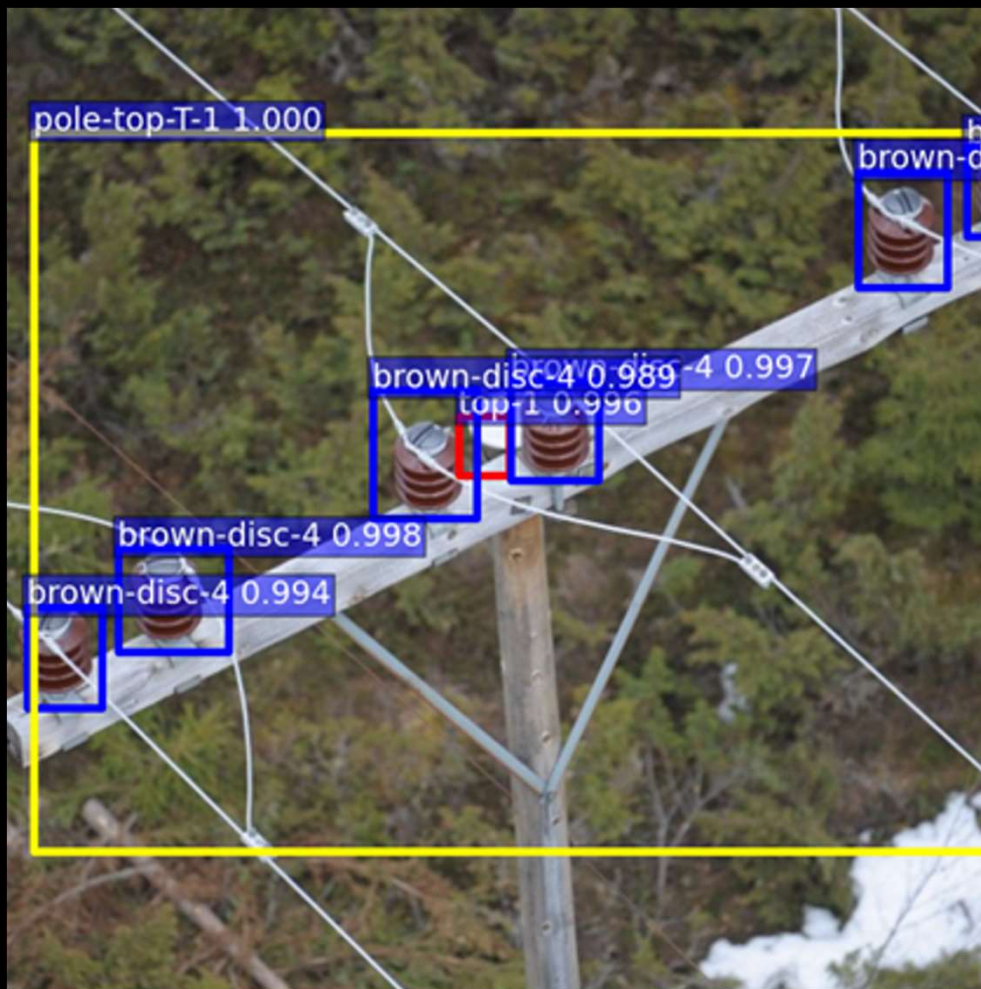


Attract, train, and retain your next generation workforce, equipping them with the skills and technologies to drive your transformation to sustainable energy operator and service provider

Reimagine energy



Shape the future of energy beyond power generation and distribution with innovations in smart cities, infrastructure, vehicles and homes, and energy services



"We're providing the brains of the smart grid.... We're using a lot of different Microsoft Azure technologies, including Azure Machine Learning, but the core solution is to help operators predict issues to prevent blackouts."

Knut Johansen, CEO

Computer vision to identify defects



Unlock latent data with cognitive services



Computer vision to detect effluent

[Minsur Azure Cognitive Services Custom Vision Case Study | Microsoft Learn](#)

Siemens-Gamesa creates a more sustainable future with wind power, AI, and the cloud

“ To review all the photos is a huge task. The more we can make it an automated process, the easier it is for us to work with the data. ”

— **Anne Katrine Karner-Gotfredsen**
*Manager Product integrity
and warranty management*




Predictive maintenance



Artificial Intelligence in the energy industry | Shell Global

https://www.shell.com/energy-and-innovation/digitalisation/digital-technologies/shell-ai.html#





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HomeOur strategy: Powering ProgressBusiness customersEnergy and innovationSustainabilityInvestorsCareers at Shell


Q


Shell Global > Energy and innovation > Digitalisation in Energy > Digital Innovation > Shell.ai











```
100 if not os.path.exists(filepath):
101     service.get_blob_to_path('ai/r-candy-store', filepath)
102
103 img = cv2.imread(filepath)
104 if img is None:
105     continue
106 img_h, img_w, _ = img.shape
107
108 annotations = item['annotations']
109
110 for annotation in annotations:
111     if 'issue_type' not in annotation or \
112         not annotation['issue_type'] or \
113         annotation['issue_type'] not in issues_dict:
114         continue
115
116 cls = issues_dict[annotation['issue_type']][0]
117
118 top = int(annotation['top'] * img_h)
119 left = int(annotation['left'] * img_w)
120 width = int(annotation['width'] * img_w)
121 height = int(annotation['height'] * img_h)
122 bottom = top + height
123 right = left + width
124
125 # Format written to file is: path to image file, absolute x coord topleft, absolute
126 # absolute x coord bottomright, absolute y coord topleft, absolute
127 # absolute y coord bottomright, classlabel of the an
128 all_annotations.append((filepath, left, top, right, bottom, cls))
129
130 # Create train and validation sets
131 # ...
```

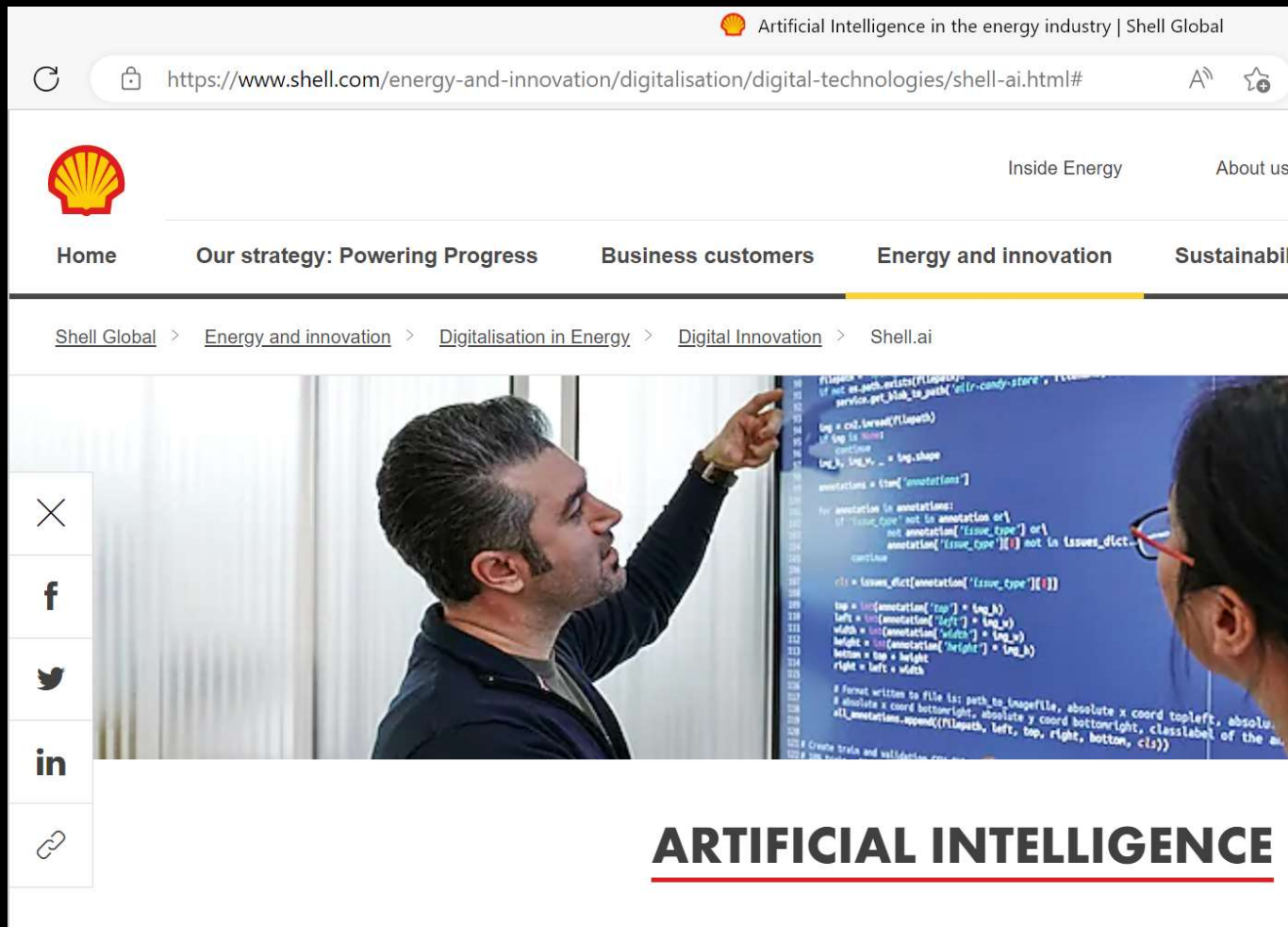
165.0	13.0	19.0	83.0
26.0	50.0	15.0	27.0
23.0	44.0	135.0	68.0
191.0	61.0	137.0	0.0

Predicted

ARTIFICIAL INTELLIGENCE

What's happening at Shell is pretty amazing. They have a very deliberate strategy of using AI, right across their operation... from the drilling operations to safety in... Shell Retail stations.

Satya Nadella, Microsoft CEO



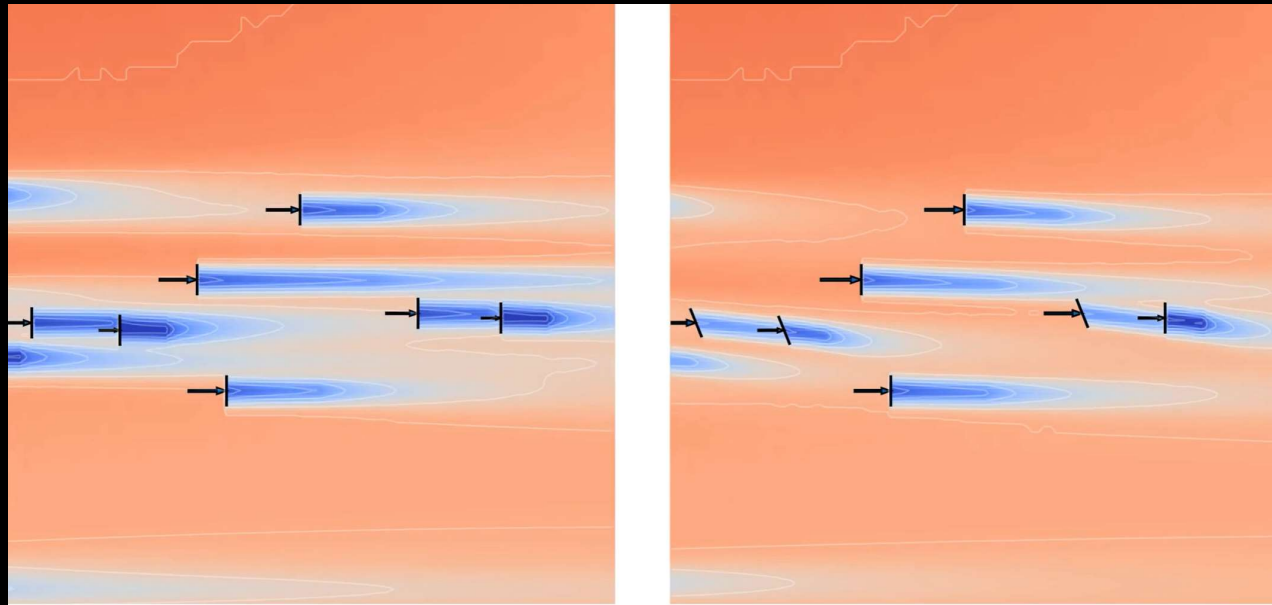
AI in energy

- Automatically processes seismic data;
- Identifies predictive maintenance needs enabling facilities to run more efficiently;
- Optimise production processes through ongoing real-time optimisation routines;
- Identifies anomalies within the facilities using machine vision;
- Using IoT sensors to detect the quality of lubricants ;
- Providing better loyalty programs and offers for retail customers; and
- Optimising the charging experience of electric mobility customers – making it cheaper and greener.

What's happening at Shell is pretty amazing. They have a very deliberate strategy for digital operation... from the drilling operations to safety in... Shell

Satya Nadella, Microsoft CEO

Vestas supercharges its wind farm control models for sustainable energy with Azure HPC



Wind farm control



Vattenfall and Microsoft



24/7 Matching

An hourly match of consumption and production of renewables



*Industry-first, 'ZeroGen'
+ 180MW wind PPA in the Netherlands +
24/7 Azure IoT platform*

Press release • 2019-11-20 07:00

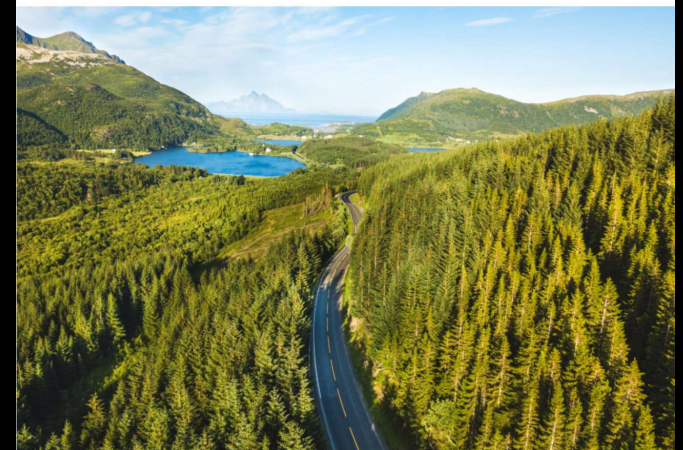
#technology #climatesmarter

Vattenfall and Microsoft pilot world's first hourly matching (24/7) of renewable energy

Vattenfall and Microsoft have jointly developed a first-of-its-kind solution, providing customers a new level of transparency into their electricity consumption making it possible to go from year-based data to hourly based data on source of origin. The solution, 24/7 Matching, is being piloted at Vattenfall and Microsoft Headquarters in Sweden.

Building for the future: Microsoft's new Swedish datacentres have sustainability firmly in mind

29/05/2019 | Esat Dedezade

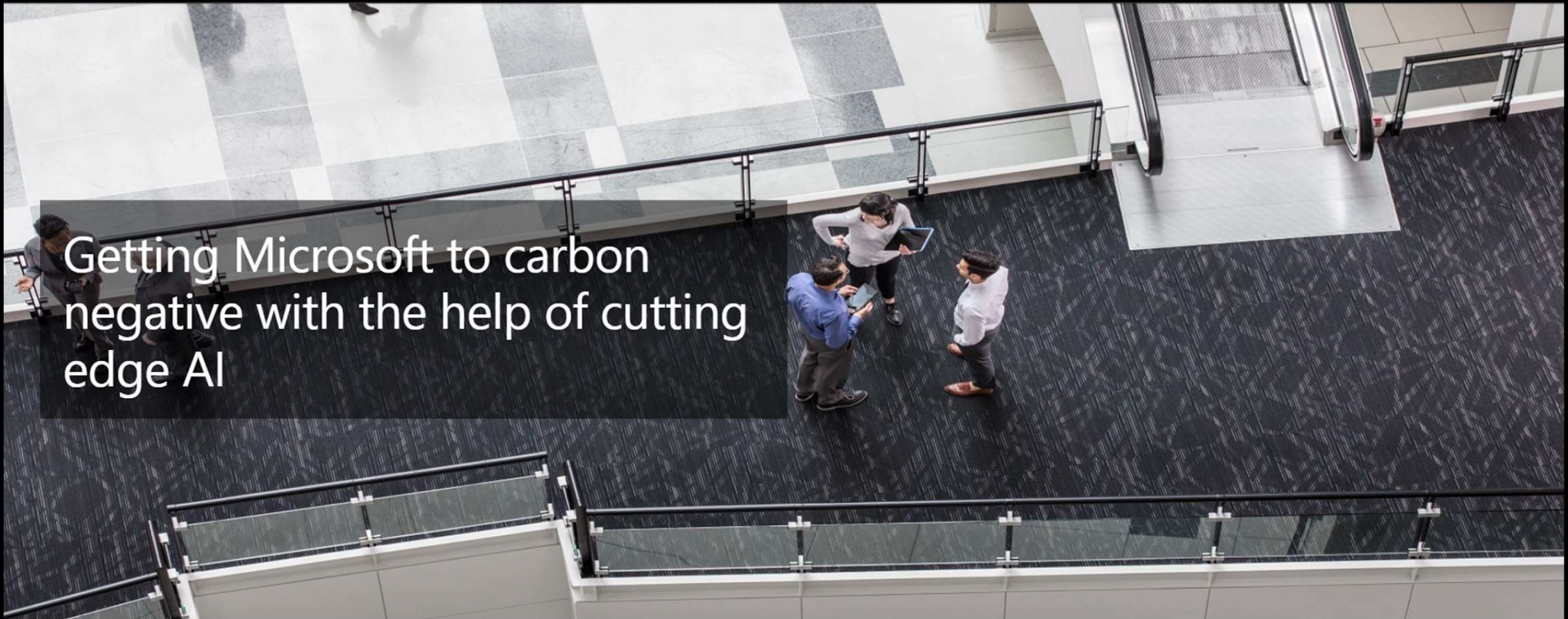


24/7 Matching



Project Bonsai

Getting Microsoft to carbon negative with the help of cutting edge AI

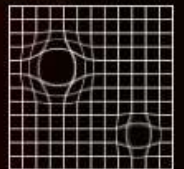
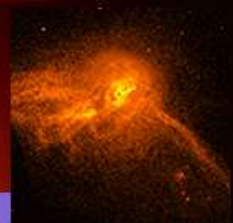


Project Bonsai

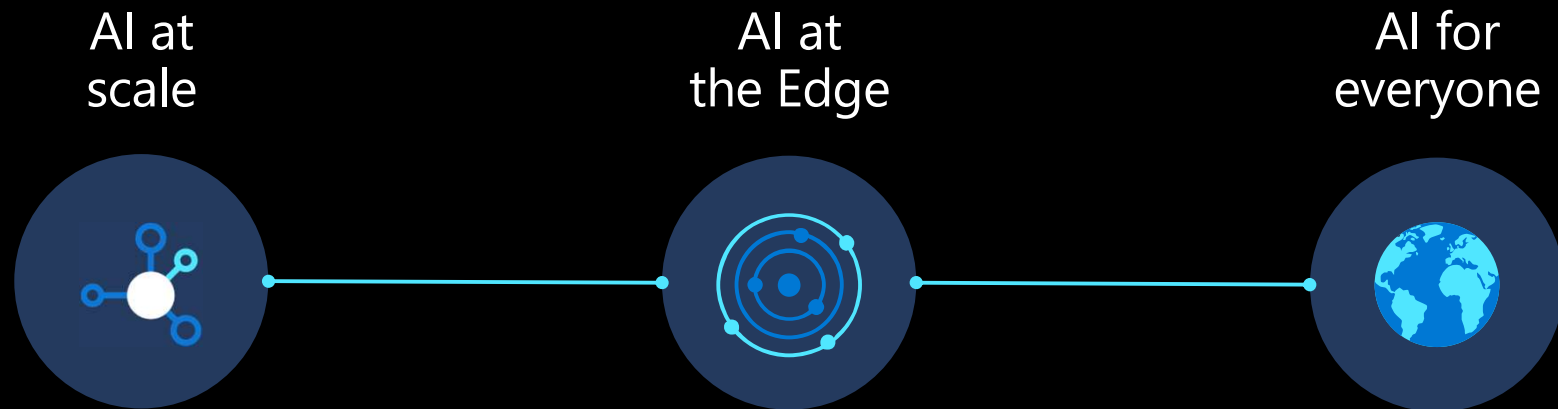
Transforming whiteboarding into AI

2

Reimagine
what's possible



Reimagine what's next with AI



Reimagine AI at Scale

$$\begin{array}{l} \text{Microsoft} \\ \text{Research} \end{array} + \left(\begin{array}{c} \text{Azure AI} \\ \text{Supercomputer} \\ + \\ \text{Massive AI} \\ \text{models} \end{array} \right) = \text{AI at scale}$$

Massive AI models

Microsoft Turing:

Largest AI model ever built
(17B parameters)

Changing how AI is developed:

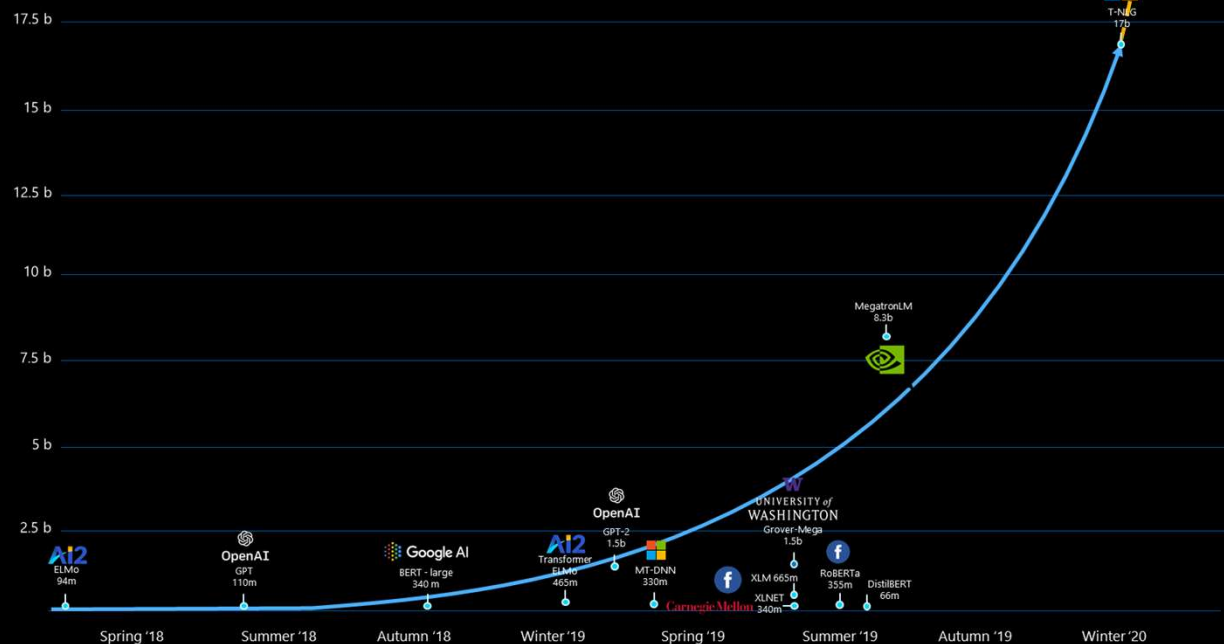
from narrow, custom models
to multi-purpose, customized,
massive models

Turing language:

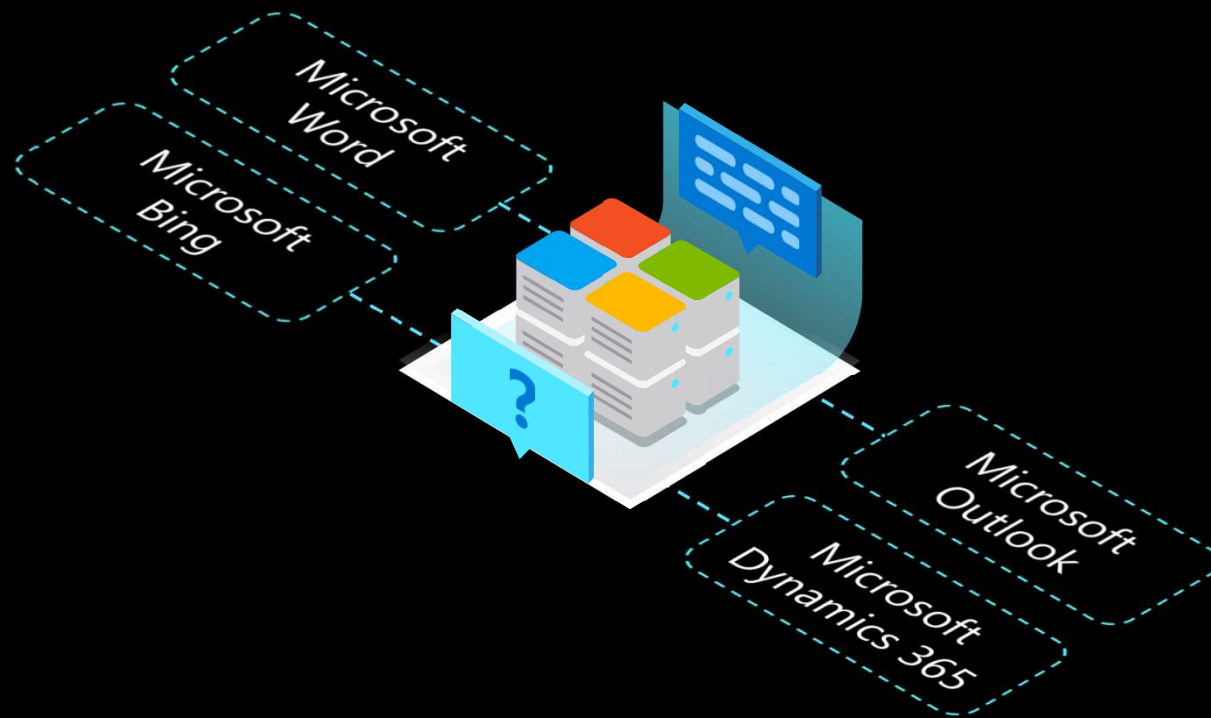
most powerful model for multi-task
natural language processing

The road of generalization:

Multi-modality text/images/video



How we use these models



How you can use these models, too



Reimagine AI at the edge

Mechanized systems



Powered by
steam or electricity

Manually operated

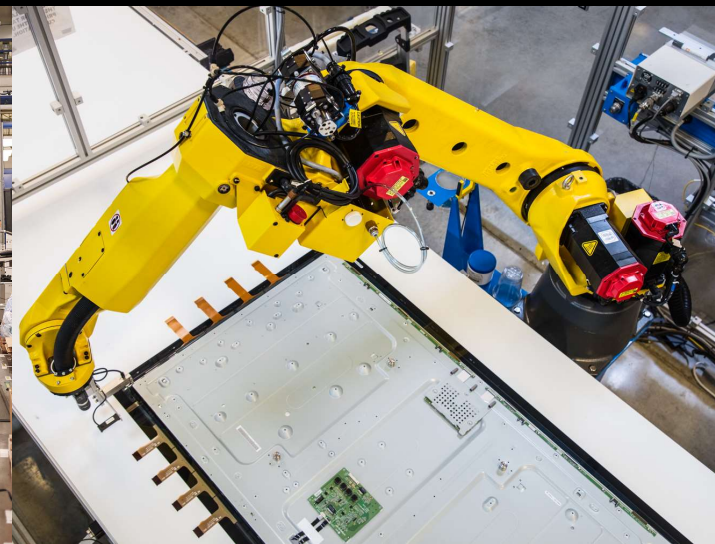
Automated systems



Powered by
software

Fixed operation

Autonomous systems



Powered by
AI

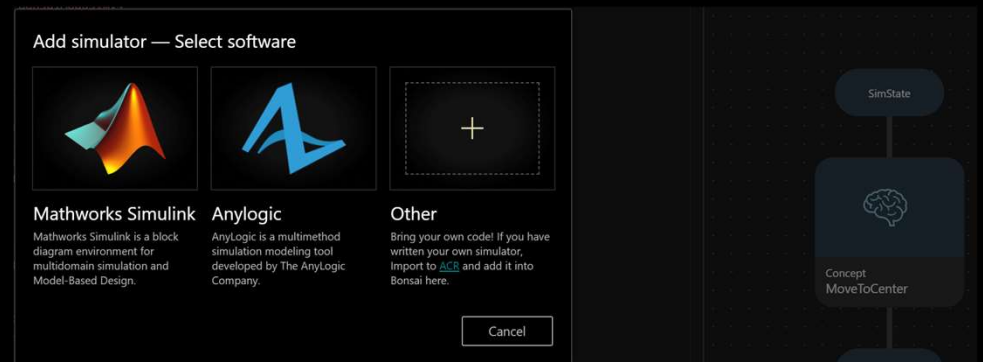
Intelligent operation
(sense/plan/act)

Machine teaching +simulations

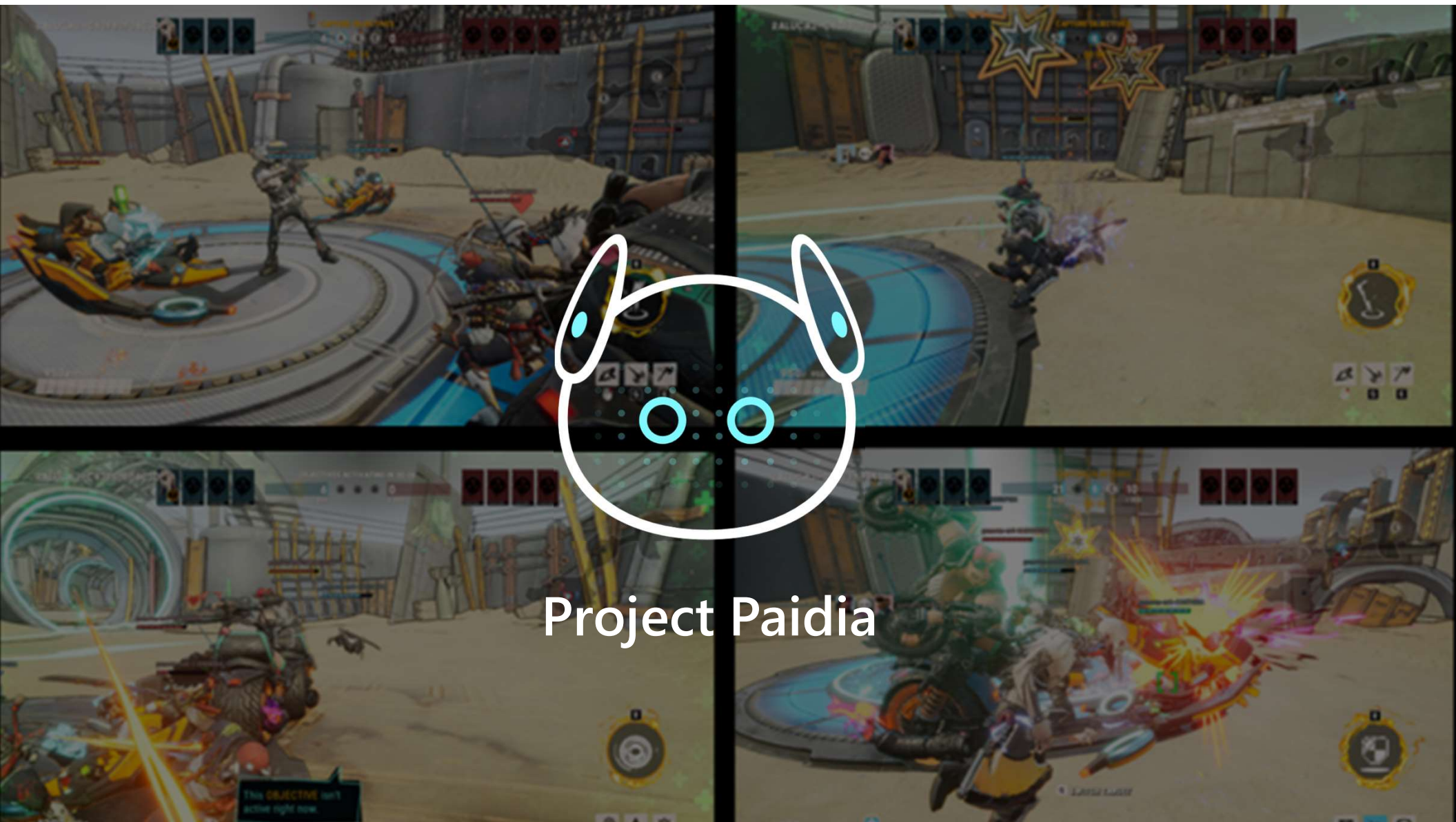


Empowering Developers and Engineers
to teach autonomous systems

Teaching concepts	Machine Teaching
Conceptual Progression	Concept decomposition
Progressive Difficulty	Curriculum learning
Analogies	Transfer Learning
Demonstration	Apprenticeship learning
Praise and Criticism	Augmented reward signals
Student Feedback	Training Visualizations
Active Student Participation	Hints and Advice to Teacher



Bell Autonomous System

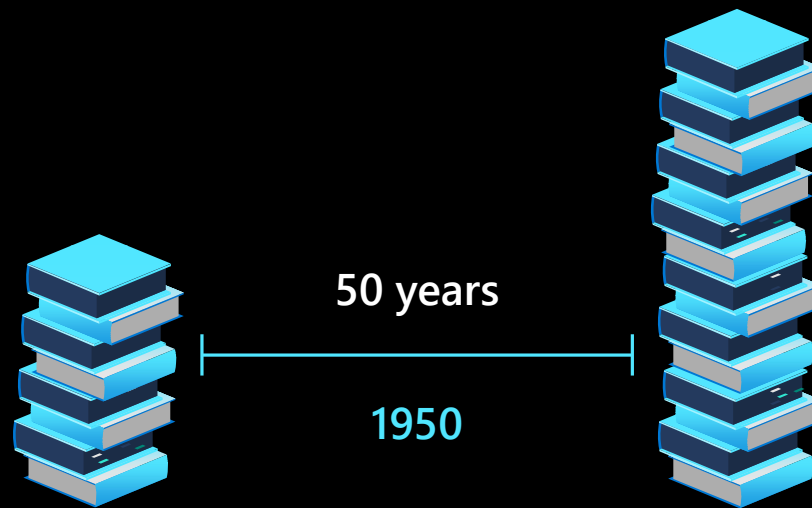


AI for everyone

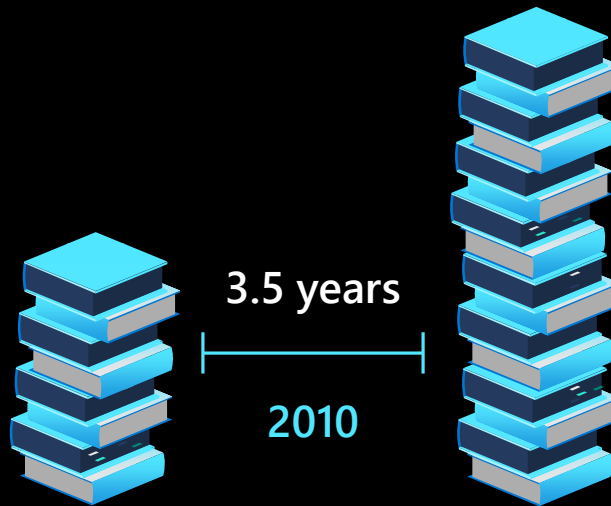
The **promise of AI becomes real** when it is put in the hands of subject matter experts to uncover hidden insights

To transform how we work, how we collaborate, and how we find meaning faster and with more accuracy

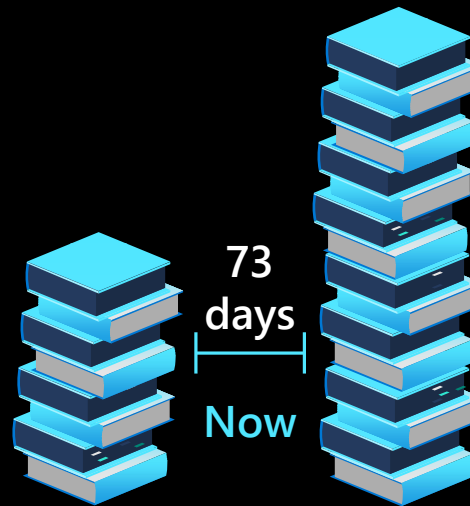
Medical knowledge doubling speed



Medical knowledge doubling speed



Medical knowledge doubling speed



AI breakthroughs in Biomedical Research



Biomedical NLP



Customer:

Novartis

Industry:

Healthcare

Size:

Corporate (10,000 + employees)

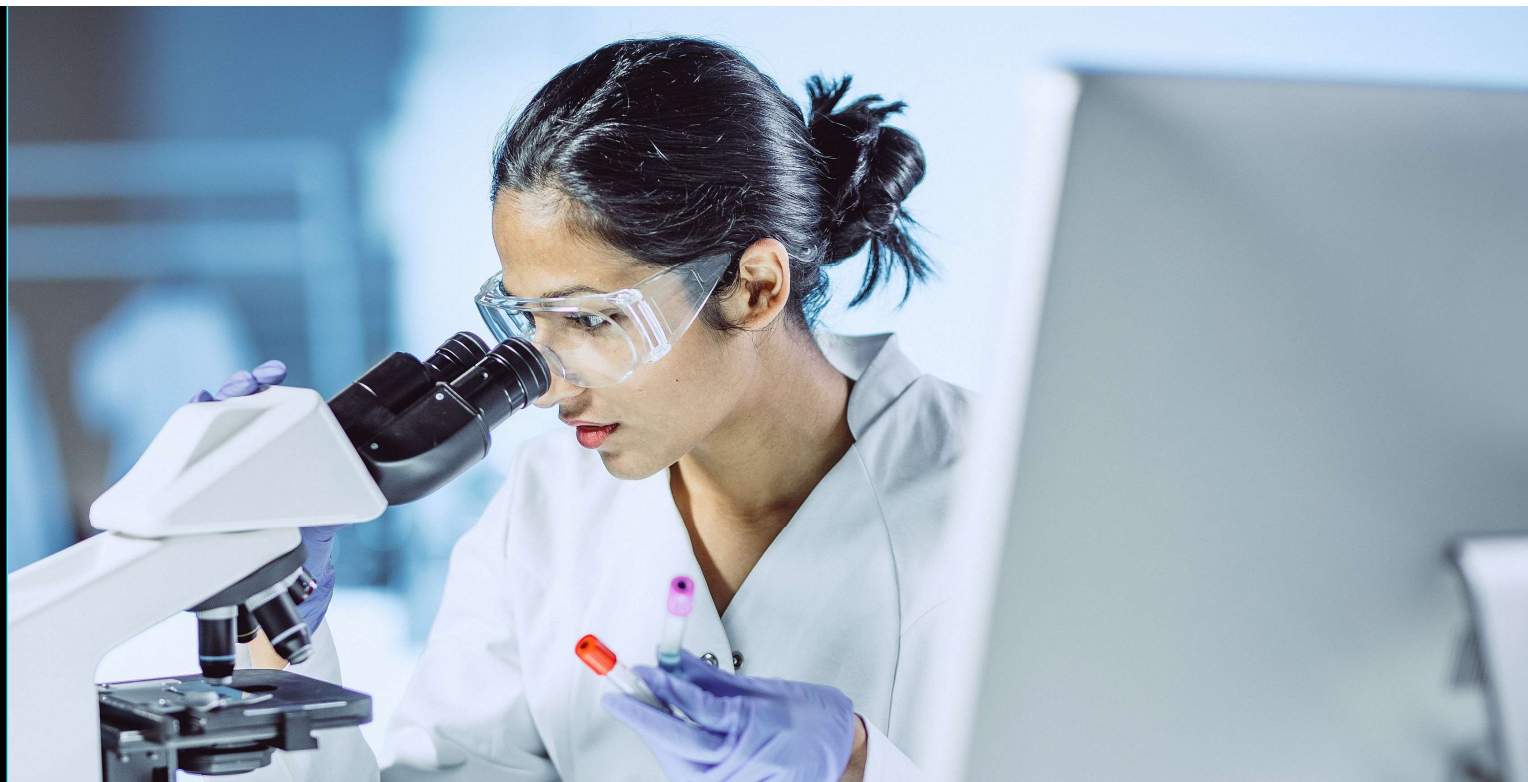
Country:

United States

Products and services:

Azure Cognitive Services

[Read full story here](#)



Situation

The company wanted a way to bring the power of AI to the desktop of every employee—not just data scientists and developers—with a goal of transforming how medicines are discovered, manufactured, and commercialized

Solution

By putting AI in the hands of every Novartis associate, they'll be able to reason over Novartis' vast quantities of unstructured pharmaceutical information to take on the next wave of challenges in medicine

Impact

Novartis scaled AI to a majority of their 50K employees to help them quickly derive insights and transform how medicines are discovered, manufactured, and commercialized

Microsoft Research

Turning ideas into reality for 29 years



8
MSR Labs

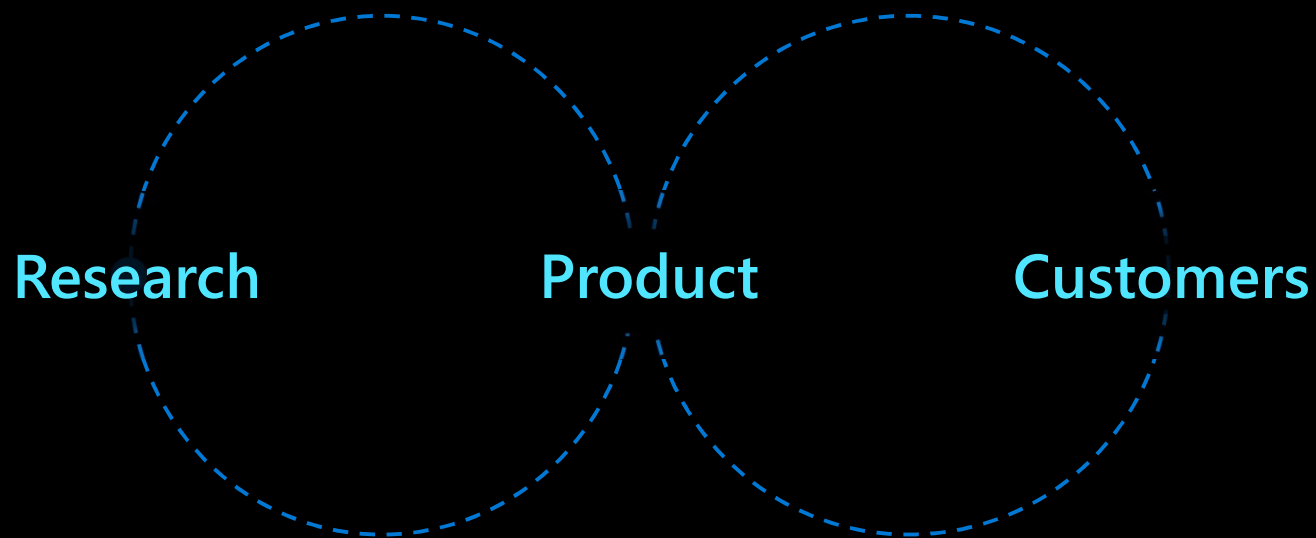
1k+
Researchers

20+
Fields

4k+
WW Patents

22k+
Papers

How we approach innovation



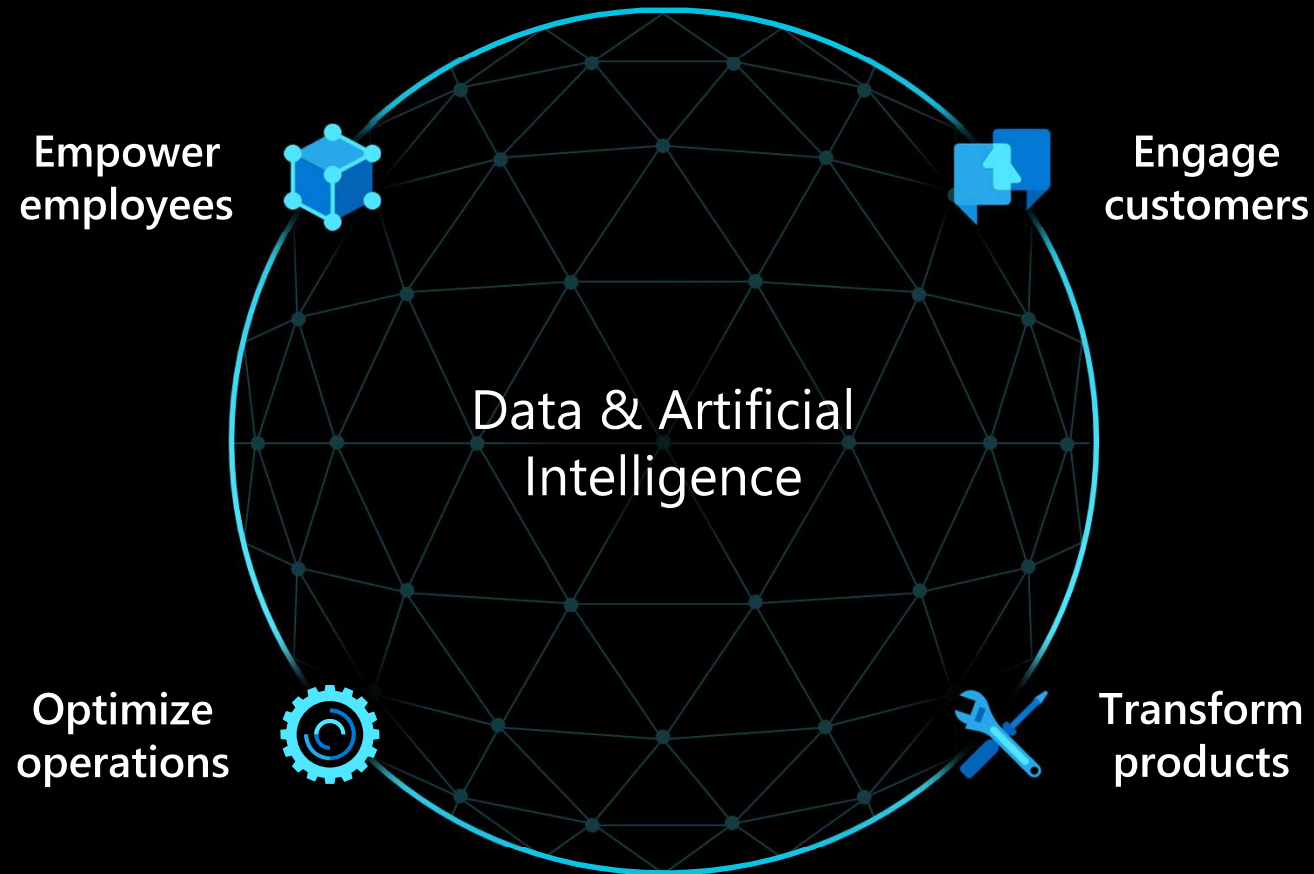
Innovation culture and an innovation architecture create a continuous innovation loop that enables us to translate our creative energy into business results.

An aerial photograph of a wind farm situated on a mountain ridge. Several white wind turbines are visible, some partially obscured by a thick layer of fog or low clouds that fills the valleys and lower slopes. The terrain is covered in green grass and some rocky patches. A dirt road or path winds through the landscape. In the background, more mountain peaks are visible under a clear sky.

3

An actionable
start

Digital Feedback Loop



Bridge today *and* tomorrow with Microsoft AI

1

Put AI into action

Make it
meaningful
Empower everyone
Act responsibly

2

Respond today with AI

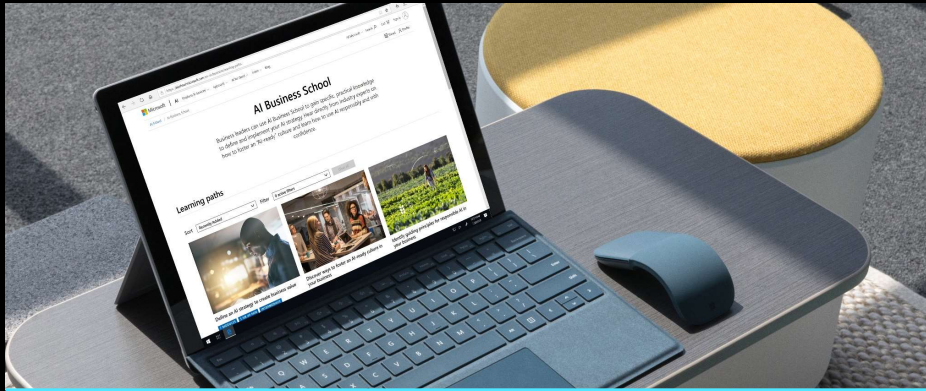
Solve today's
challenges
Lay a foundation
for what's next

3

Reimagine what's possible

AI at scale
AI for every employee
and skill level
From automation
to autonomous

AI Business School



- Case studies
- Thought leadership videos
- Practical guides
- Executive insight videos
- Technology talks

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4.7/5.0 average rating

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