



ARTIFICIAL INTELLIGENCE AND ITS ROLE IN AGRICULTURE

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ARTIFICIAL INTELLIGENCE AND GEN AI

Artificial Intelligence

1956

the field of computer science that seeks to create intelligent machines that can replicate or exceed human intelligence

Machine Learning

1997

subset of AI that enables machines to learn from existing data and improve upon that data to make decisions or predictions

Deep Learning

2017

a machine learning technique in which layers of neural networks are used to process data and make decisions

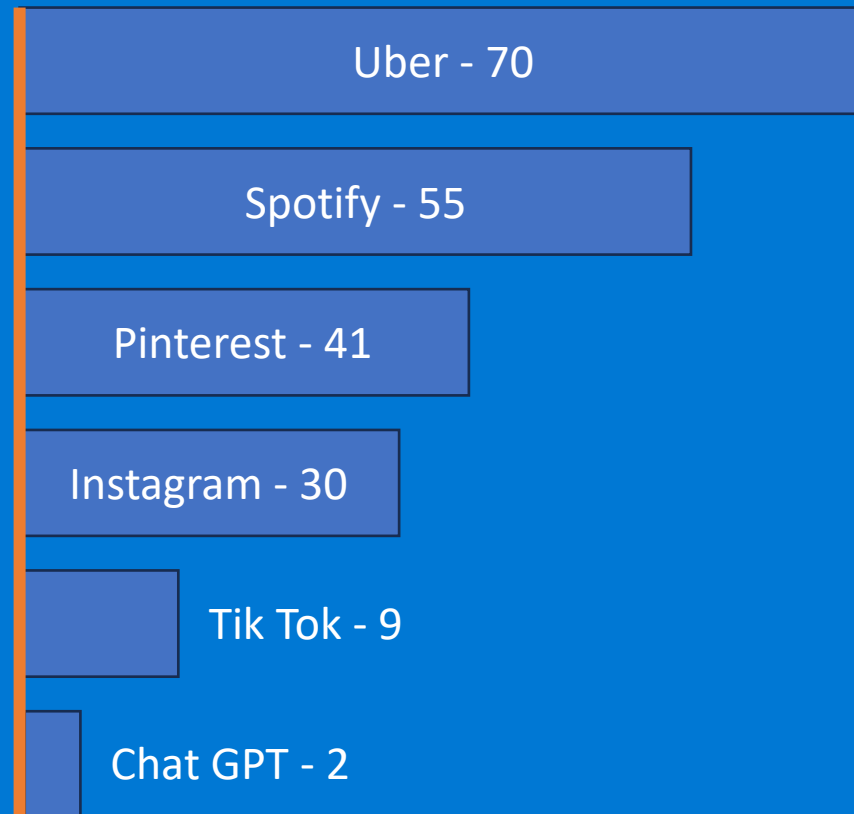
Generative AI

2021

Create new written, visual, and auditory content given prompts or existing data.



Month till reach 100 Mio average user



Grow more food

Less arable land
Using less input
Increasingly challenging climate conditions

26% of global greenhouse emissions are attributed to food production, with most emissions coming from the farm²

14BN Carbon Offsets market – A lever to improve climate impact³

66% say they would be willing to pay more for a product that is environmentally friendly¹

But don't know where their Food comes from.

Labor shortage and aging farmer population not met by the speed of automation.

BUT IS AGRICULTURE READY FOR DIGITAL TRANSFORMATION?

1. PDI Technologies, "Business of Sustainability Index," 2022

2. Our World in Data, "Food production is responsible for one-quarter of the world's greenhouse gas emissions", 2022

3. US Farmers and Ranchers in Action, Transformative Investment in Climate-Smart Agriculture, September 2020.

DIGITAL OPPORTUNITY IN AGRICULTURE

Respond to variable conditions

Timely intervention on farms



Intelligent machines & labor

Enhance capability with robotics/automation



Sustainability, Compliance

Gain value chain transparency



Supply Chain & Harvest timing

Access real-time, actionable insights.



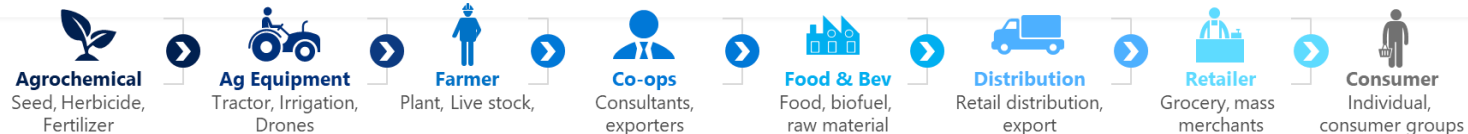
Soil Health & Water Availability

Precision application and prevention.



Risk management & Trade

Market Dynamic and Pricing.





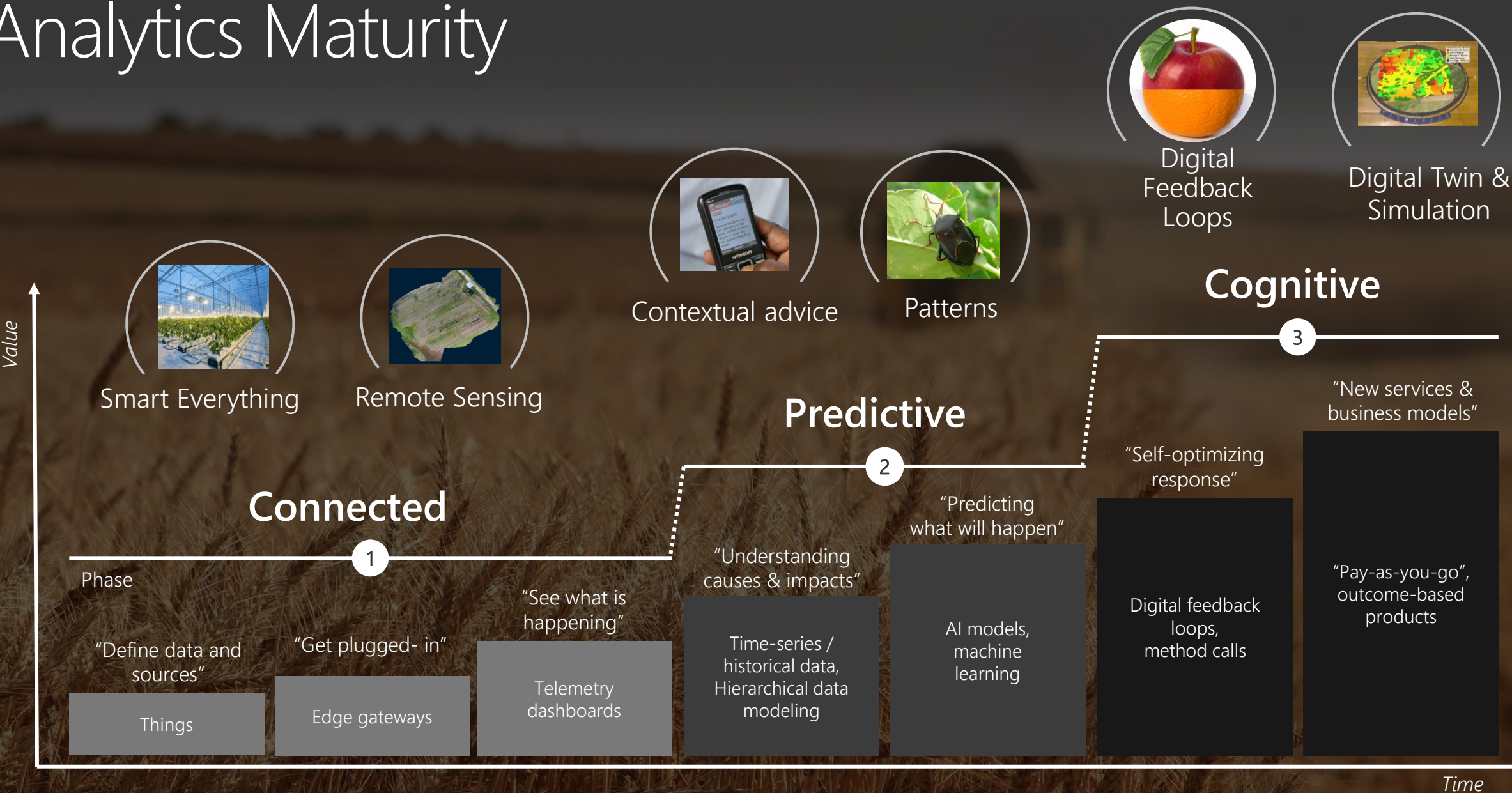
WHAT?

Enable better, more timely, more precise and forward-looking decisions

HOW?

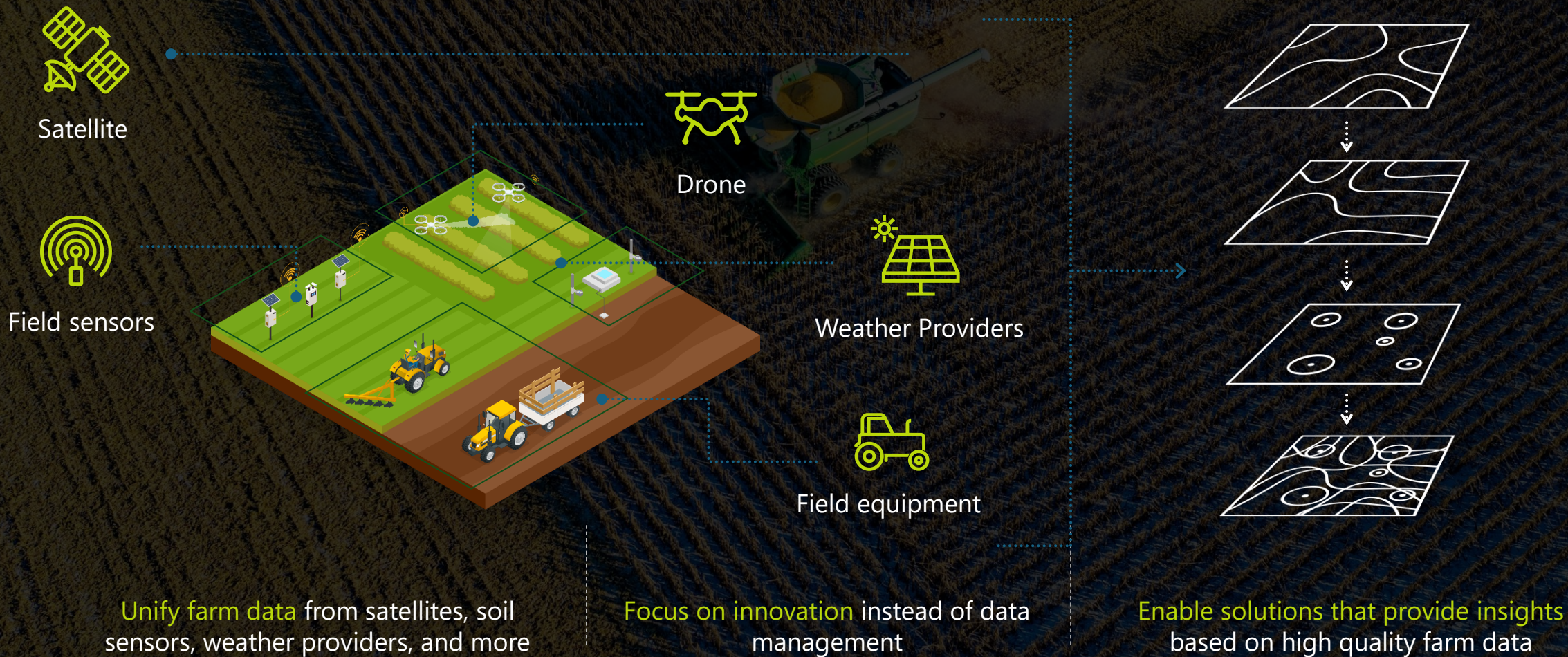
AI systems aim to mimic cognitive functions such as problem-solving, learning, reasoning, perception, understanding natural language, and decision-making.

Analytics Maturity

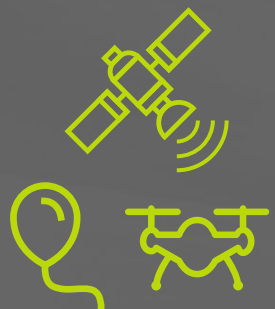


DATA-DRIVEN AGRICULTURE

Azure Data Manager for Agriculture extends the Microsoft Intelligent Data platform with industry-specific capabilities to connect farm data, enabling organizations to develop solutions that power agriculture insights.



GEOSPATIAL ANALYTICS



Aerial imagery



+



Sensors

×



Machine Learning

=



Precision map

Precision Farming

Supply Chain excellence

Risk Management

Predictive Analytics

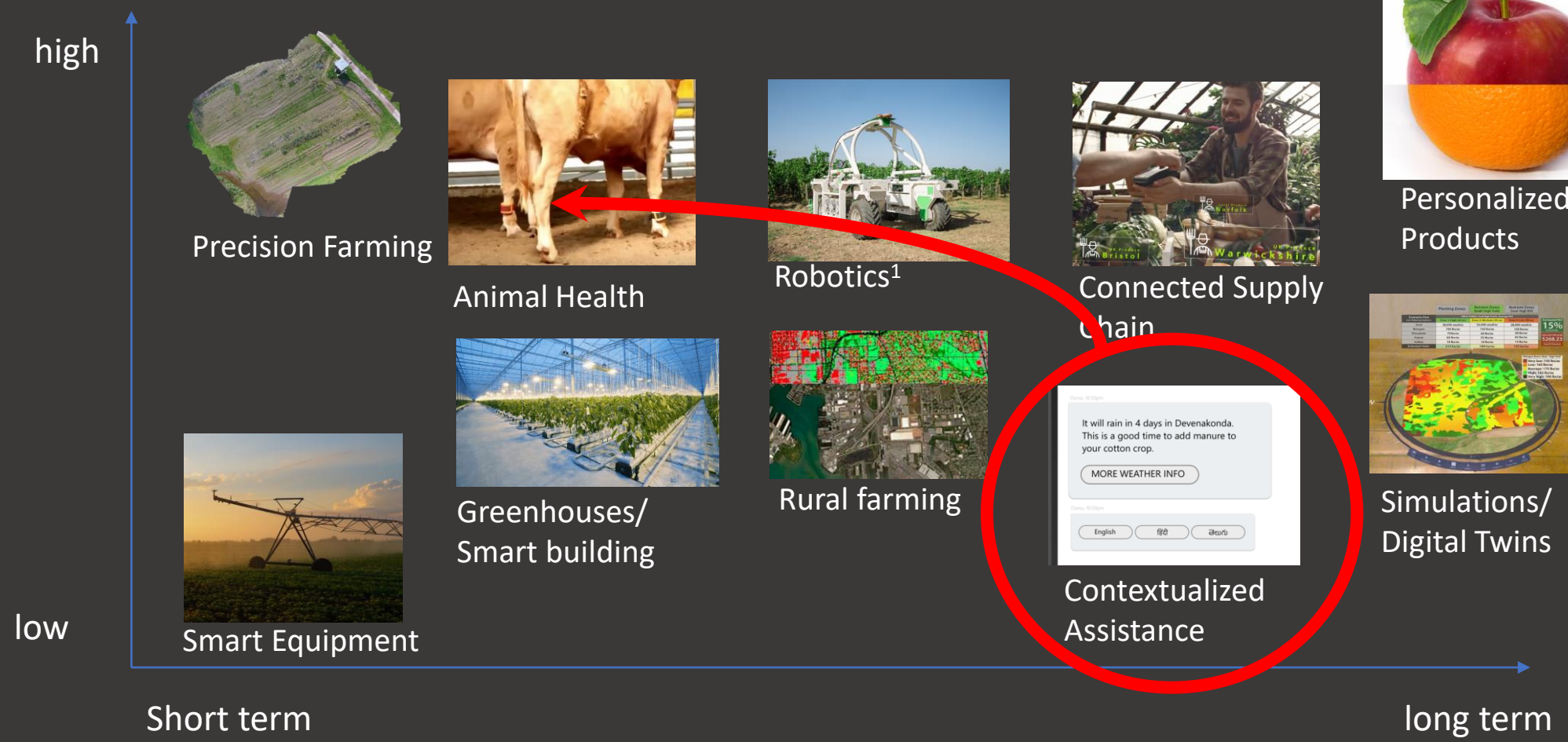
Transparency & Compliance

Sustainable Sourcing

Intelligent machines

Digital Twin

VALUE CREATION WITH MACHINE LEARNING & ARTIFICIAL INTELLIGENCE



¹ image by NAI0

CONTENT CREATION & USABILITY - EXAMPLES

Brainstorming

Copilot Smart ear tags for tracking	Copilot Automated feeding systems	Copilot Robots for milking and cleaning	Copilot Sensors for monitoring animal health	Copilot Virtual fencing technology	Copilot Data-driven breeding decisions
Copilot AI-powered disease detection	Copilot Precision farming tools	Copilot Smart grazing management system	Copilot Real-time milk composition monitoring	Copilot Autonomous animal transportation	Copilot Smart barn management system
Copilot Automated animal waste management	Copilot Robotic animal health check-ups	Copilot Breeding prediction AI tool	Copilot Crop-growing algorithms for livestock feed	Copilot Wearable health monitoring devices	Copilot Livestock facial recognition

Image creation



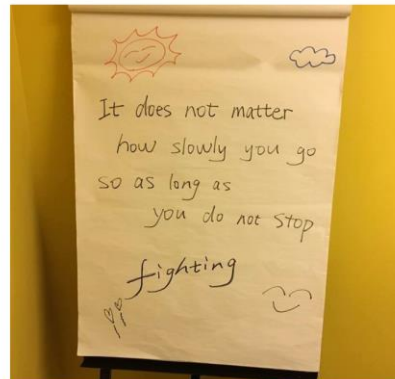
COGNITIVE SERVICES



FEATURE NAME:	VALUE
Objects	[{ "rectangle": { "x": 798, "y": 82, "w": 677, "h": 769 }, "object": "Tomato", "parent": { "object": "Vegetable", "parent": { "object": "Food", "confidence": 0.833 }, "confidence": 0.805 }, "confidence": 0.728 }, { "rectangle": { "x": 115, "y": 333, "w": 670, "h": 517 }, "object": "Food", "confidence": 0.752 }]
Tags	[{ "name": "tomato", "confidence": 0.9561183 }, { "name": "vegetable", "confidence": 0.8946861 }, { "name": "plant", "confidence": 0.597619653 }, { "name": "fruit", "confidence": 0.0343686 }, { "name": "food", "confidence": 0.02278873 }]
Description	{ "tags": ["tomato", "table", "indoor", "bowl", "sitting", "red", "small", "food", "fruit", "plate", "orange", "counter", "white", "vase", "board"], "captions": [{ "text": "a close up of a tomato",

Examples:

- Food safety
- Disease, Pest recognition
- Quality control
- Yield prediction
- Counting



Preview JSON

It does not matter
how slowly you go
so as long as
you do not Stop
Fighting

Image URL

Submit

Browse

- ## Examples:
- Paper record
 - Recognition
 - Translation
 - Pattern detection
 - Food safety

SETTING THE STAGE FOR GENERATIVE AI IN AGRICULTURE

- Transform every sector
- Interface - more natural, intuitive, human interaction
- Natural language every application
- Revolutionize Information management/Predictions
- Start with a draft



Display fields with recent harvest activity.

Which of my fields had applications last season?

How did planting date affect the wheat crop yield?

What's the difference between planting and harvest hectares?

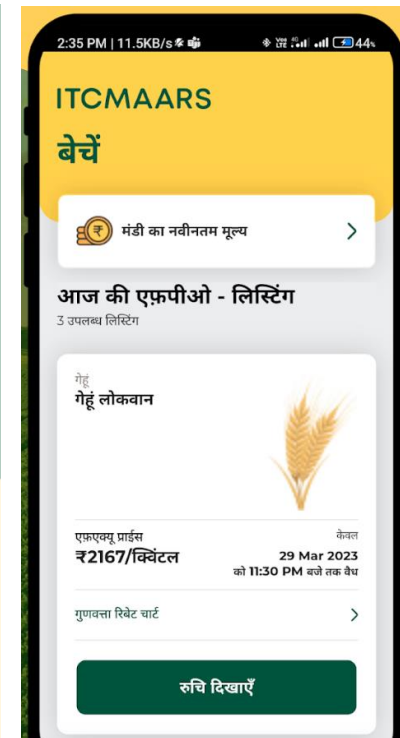
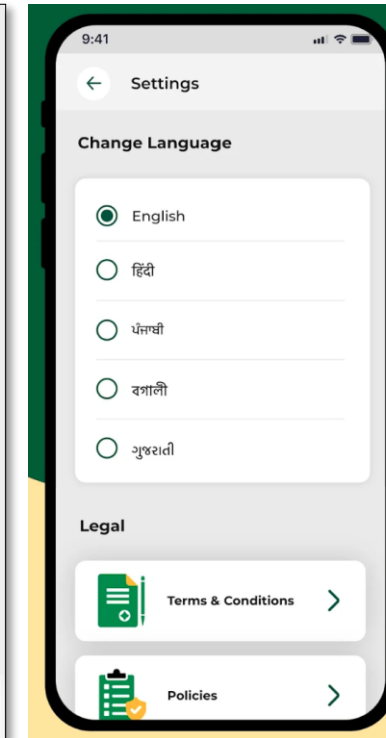
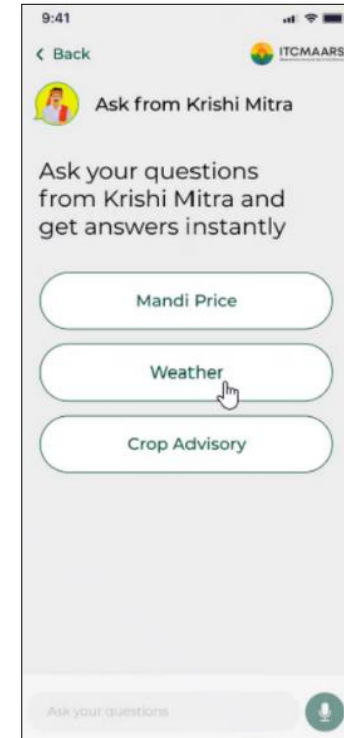
ITC: EMPOWERING INDIAN FARMERS WITH ANSWERS

Krishi Mitra is an AI chatbot that delivers tailored responses to users' specific queries.

- Uses generative AI to comprehend and respond to natural language queries—for example, about weather conditions, time to harvest or market price information.
- Delivers detailed, personalized response in the user's local language.



Krishi Mitra by ITC



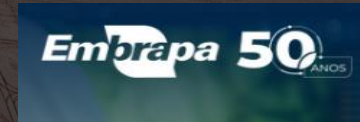
ITCMAARS

CAN GPT-4 PASS AGRICULTURE EXAMS?



US Multiple Choice Questions

Model	Accuracy	+ RAG	+ Context	+RAG + Context
GPT 3.5	82%	82%	82%	88%
GPT 4	90%	90%	93%	93%



Brazil long form answers

Model	Accuracy	+ Context
GPT 3.5	59%	78%
GPT 4	72%	84%

Agri Exam

India Multiple Choice Questions

Model	Accuracy	+ RAG	+ Context	+RAG + Context
GPT 3.5	65%	69%	67%	68%
GPT 4	70%	78%	76%	79%
Human (#1 in the exam)	78%			

GPT also makes mistakes...

Who is the advocate of the "Marthandam" Rural Development Programme?

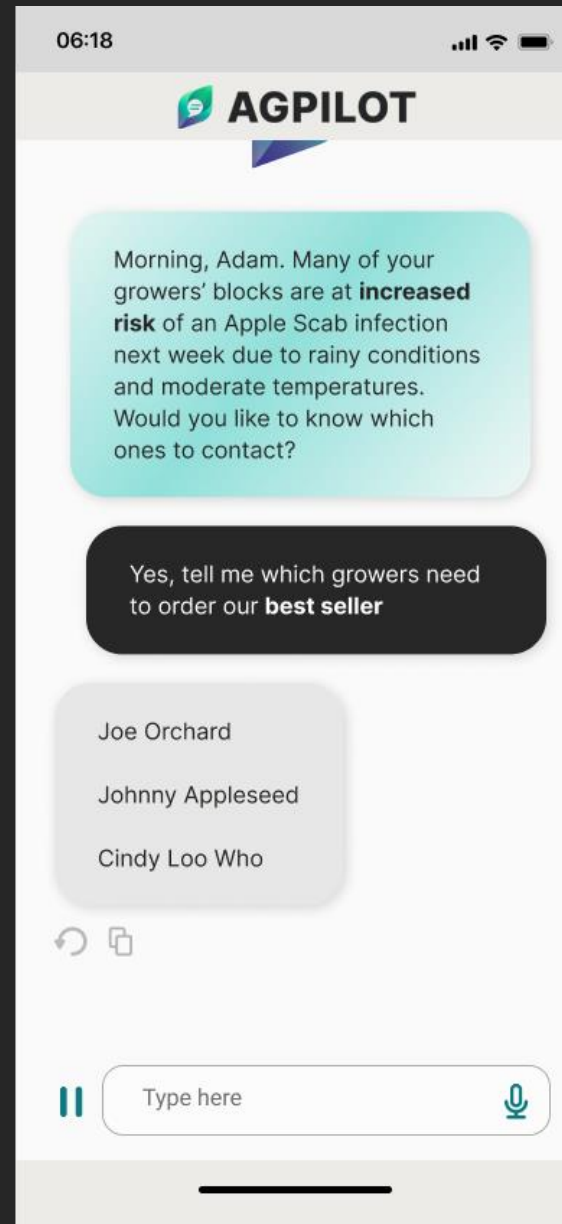
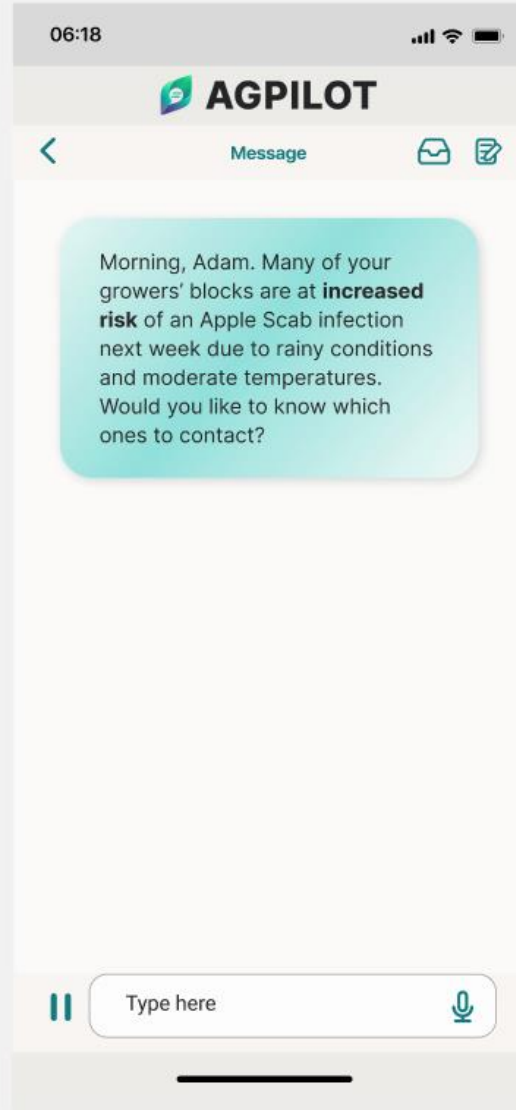
- a) Spencer Hatch
- b) Daniel Hamiltion
- c) A.T. Mosher
- d) M.K. Gandhi

Ref Answer: a) Spencer Hatch
GPT Answer: b) M.K. Gandhi

Lock Screen 9

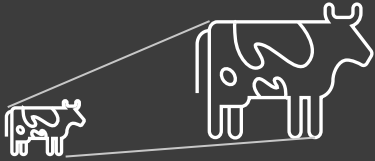


Frame 49



- Event-triggered
- Field level/
ERP/historical
data
- Business Process
Automation
- Increase
Productivity

NEW OPPORTUNITIES WITH GEN AI



Digital Twin to monitor health, behavior, and welfare.



Synthetic data to train models



Create alerts, process automation, and optimize operations



Revolutionize data collection and leveraging existing data



Design habitats, sounds, atmosphere that stimulates cognition and emotion



Create next gen usability of analytics with language, translation, images

Thank you

