

Artificial Intelligence and Machine Learning: Opportunities & Challenges for Innovation in Environmental Protection

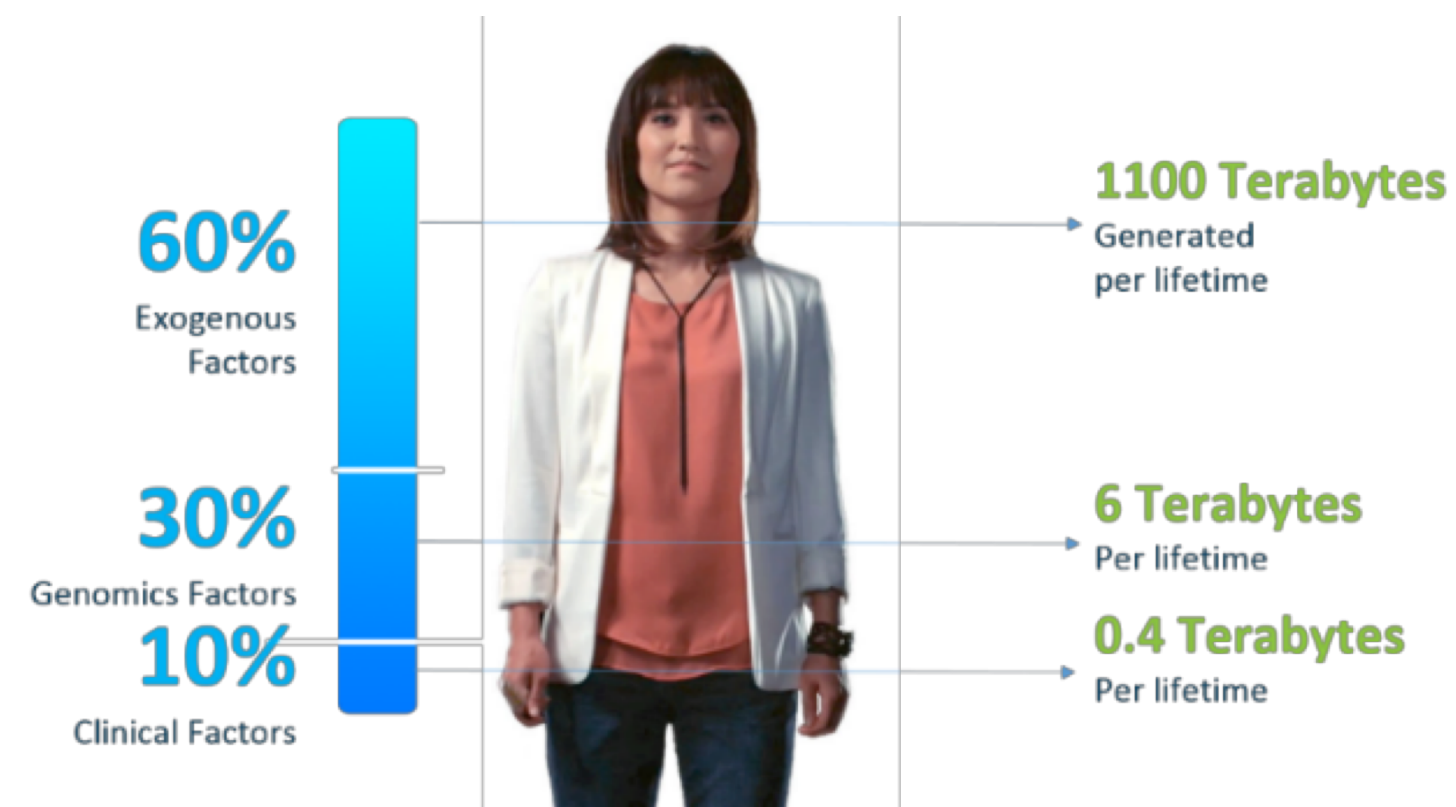
- Bhavish Madurai, Partner, IBM Global Business Services

Data is growing fast - in volume, variety, and complexity – traditional analytics solutions are unable to fully exploit its value

Data is growing with time, but only a fraction of it is usable through traditional analytics

>2.5PB
of unstructured data from 1 million customers is stored by Walmart every hour³

Petabytes
of production data is generated by oil field sensors⁴



1TB
of data is produced a day by each cancer patient⁵

292 exabytes
of mobile traffic by 2019, up from just 30 exabytes in 2014⁶

Data generated for a single individual¹
Terabyte (TB) = 1,024 GB; Petabyte (PB) = 1,024 TB; Exabyte (EB) = 1 Billion GB

Only 1.0%

of world's data is being analyzed and over 80% is unstructured data

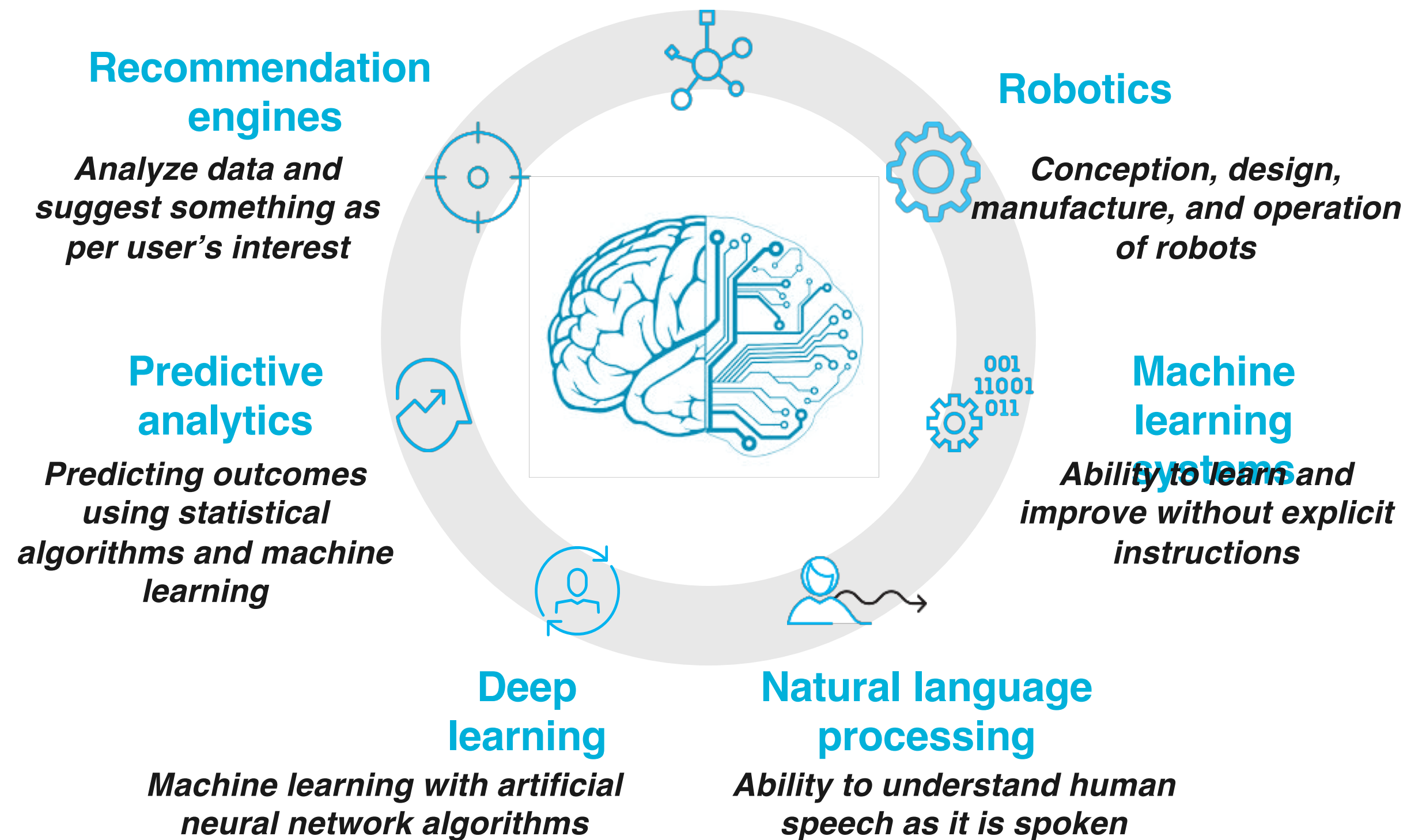


In light of this disruption, digital technologies have become a source for creating new value in government

Cognitive Technologies

Artificial intelligence

Simulation of human intelligence processes



Value

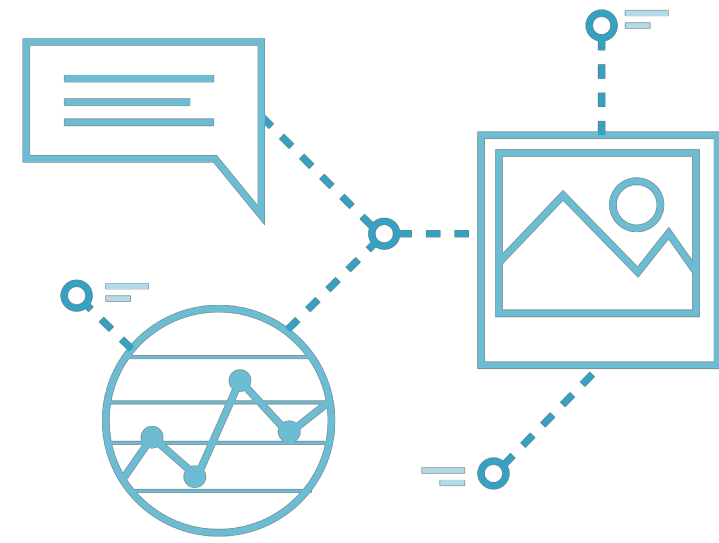
Increase the quality of citizen services securely and cost-effectively

Partner in new ways to adapt and accelerate public value creation

Address physical and cyber threats and vulnerabilities responsibly

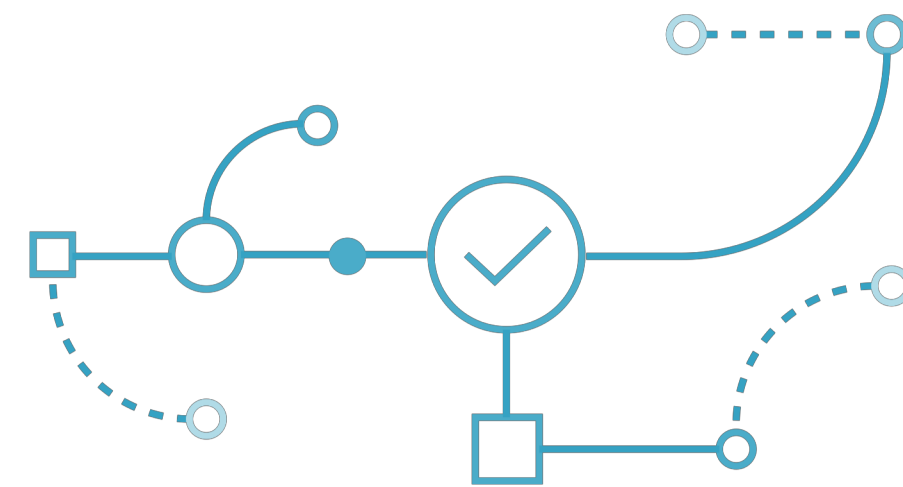
Cognitive systems are generally defined by the ability to understand, reason, learn, and interact

UNDERSTAND



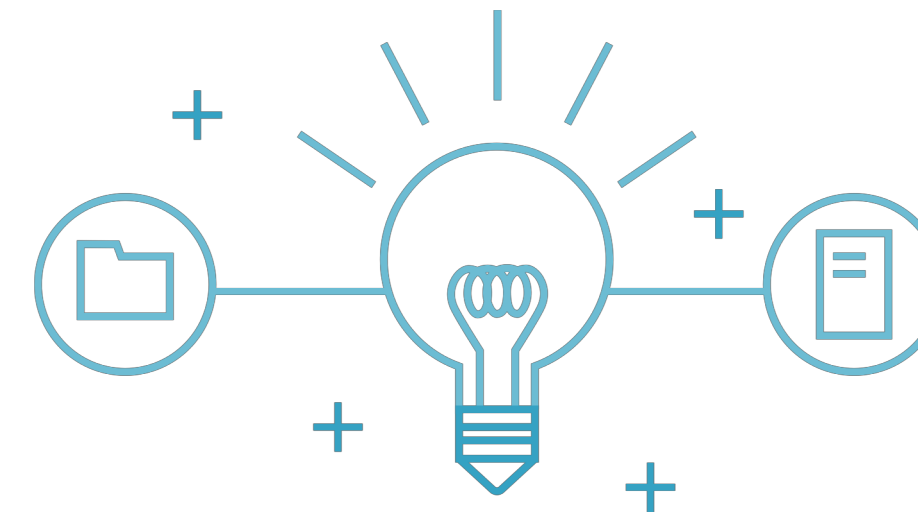
Cognitive systems can understand unstructured information the same way humans do

REASON



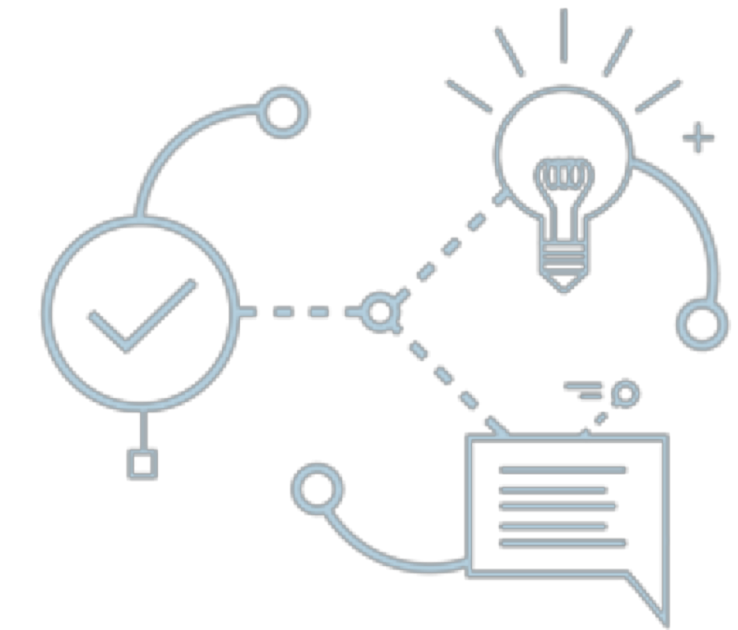
They can reason, grasp underlying concepts, form hypotheses, and infer to extract ideas

LEARN



Each data point, interaction and outcome helps to continuously sharpen expertise

INTERACT



With abilities to see, talk and hear, cognitive systems interact with humans in a natural way

Applied AI / Artificial General Intelligence

Applied AI is the use of artificial intelligence to enhance and extend software applications



The Best Applied AI organizations today are:

- **Using machine learning to automate decision-making with high accuracy.**
- **Put a high emphasis on continuous learning from process and feedback data.**
- **Use human experts-in-the-loop to fill in the gaps.**
- **Proactively monitor for quality and bias.**

Characteristics of Applied AI

- Better data = better outcomes
- Training > Programming
- AI anxiety?... Think IA (Intelligent Assistant)
- Core Principles :
 - An increased focus on end-to-end process automation.
 - Use of advanced machine learning techniques to ingest variety of information.
 - Better articulated performance objectives and model accuracy.
 - Appropriate use of human judgement and automated predictions.
 - Continuous learning and adaptation through feedback loops.
 - Approaches to limit the impact of model error and bias.



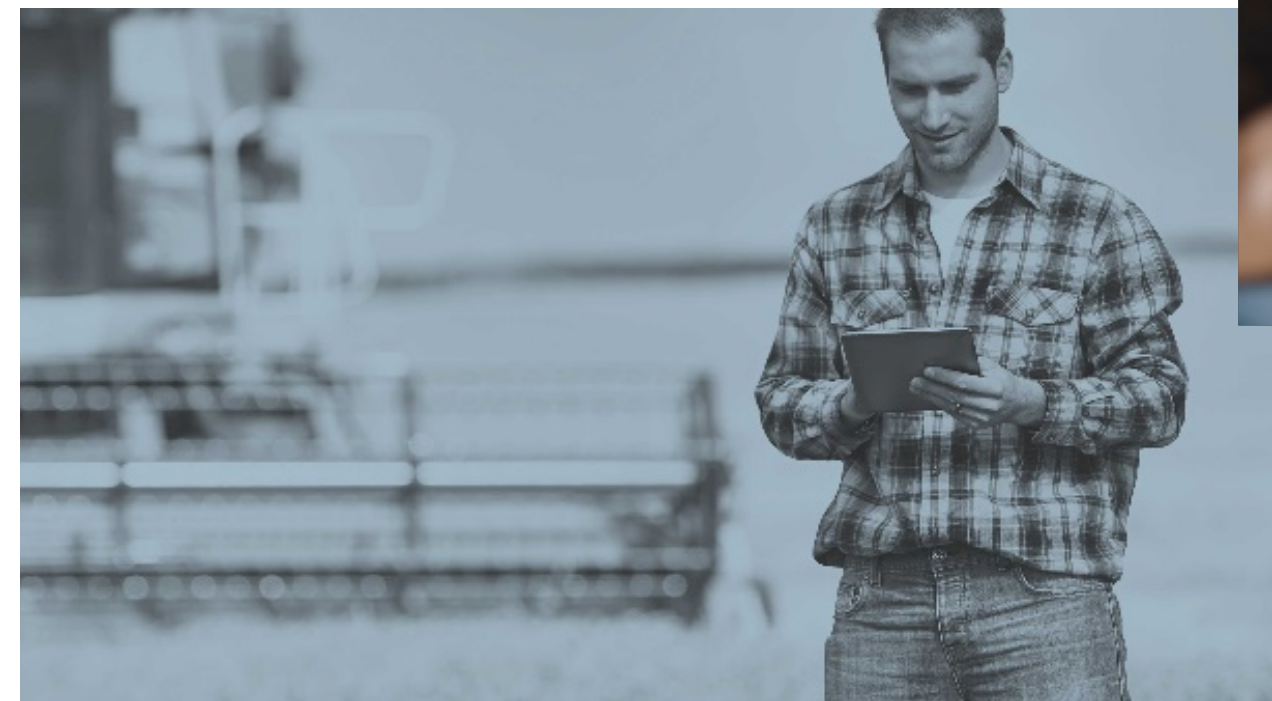
Applied AI in our everyday lives

Common

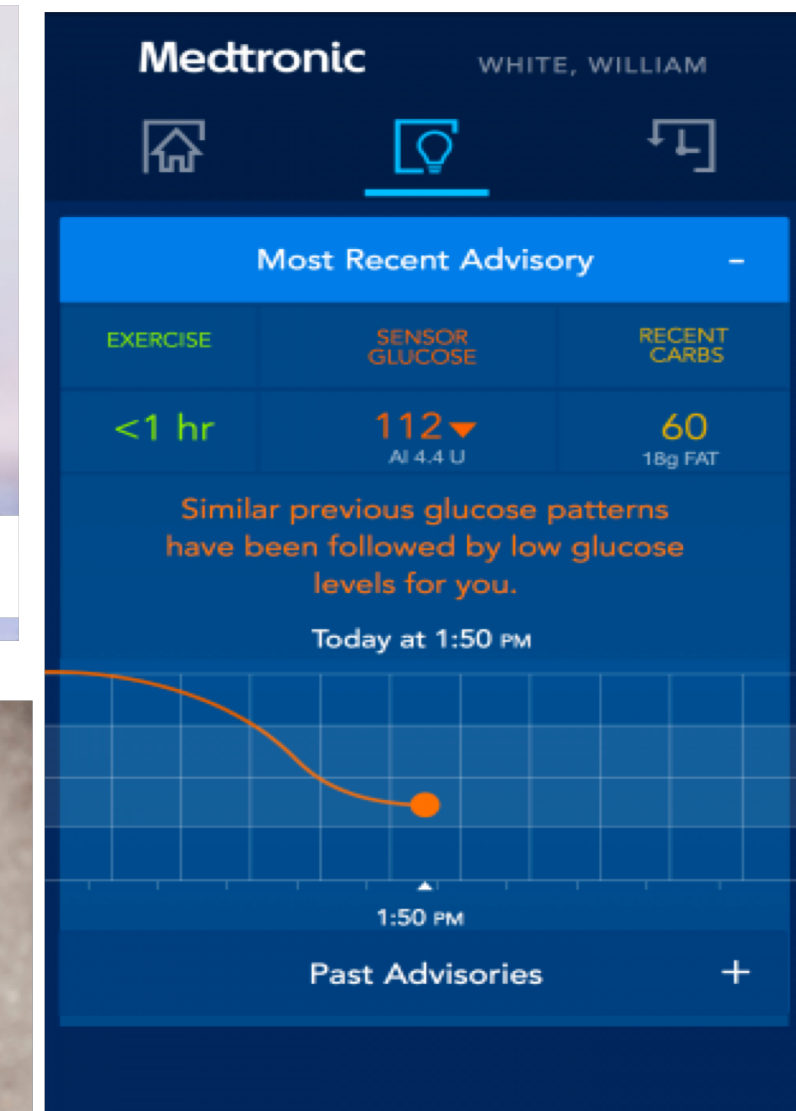
- Voice Assistants
- Chatbots
- Social Media
- GPS
- Commercial air travel
- Music Streaming
- Drones
- Taxes
- Order fulfillment
- Advertising / shopping

Specialties

- People matching
- Precision Agriculture
- Energy optimization
- Logistics
- Image processing
- Business Analytics
- Art (movie trailers, books)
- Wine production
- Medical diagnosis
- Weather forecasting



Watson at work: EJGallo



The ubiquitous digital ecosystem is creating new ways of working.



IBM Research in AI : Environment

Underwater to Outer Space:

5 Ways Scientists are Using AI to Save the Planet

Space - Cosmic Data, Clean Energy:

In China, scientists are drawing on data generated by environmental monitoring stations, traffic systems and meteorological satellites to forecast renewable energy availability, and to optimize industrial energy consumption that adds up to over 70% of China's total energy use.

Air - Pollution Solution:

In South Africa, researchers are using IoT sensor data, machine learning and cognitive models to understand the sources of air pollution to help authorities develop intervention strategies.

Water - Plankton Microscopes:

Researchers are building small, autonomous microscopes that can be placed in bodies of water to monitor plankton in order to predict threats to our water supply.



Sun - Personalized Solar System:

Scientists in Johannesburg have built a free, web-based app that calculates the solar power needs of an individual's home or business based on their location, the appliances they own, and the duration they run for. The app also provides an overall cost estimate for the installation.

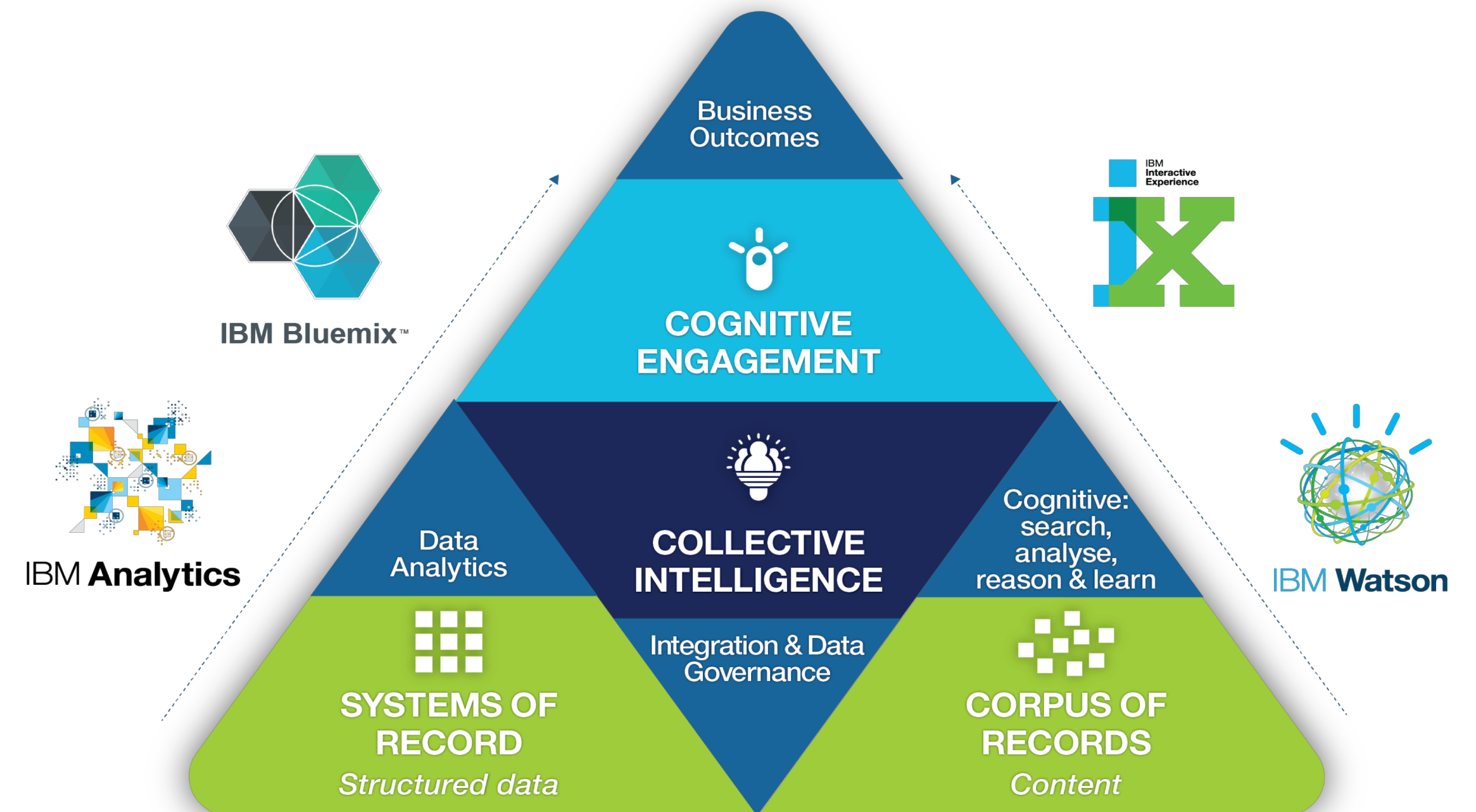
Land - Internet of Farms (IoF):

Researchers in India have built an [IoT project](#) that allows farmers to send cell phone pictures of ailing plants to an AI model that identifies and prescribes the exact cure their plants need.

Cognitive Solutions

The use of cognitive technologies that help understand, learn, reason, interact and thus, increase efficiency.

1. Leveraging techniques like Machine learning, Deep Learning and Entity Extraction to enable maximum insights from IoT
2. Image recognition and insight
3. Skills and workforce optimization through NLP driven approaches
4. By generating cognitive insights, farmers can make data-based operational decisions that will optimize yield and boost revenue while minimizing expenses and the chances of crop failure.
5. Smart-Agri Advisors (Chatbots) for farmers to provide information on macronutrients and pesticide use



“Cognitive computing in agriculture is going to be the most disruptive force in the industry, as big as the green revolution.”

- Rick Morris, IBM Smarter Agriculture Executive

IBM





THANK YOU

