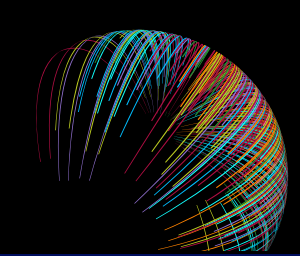
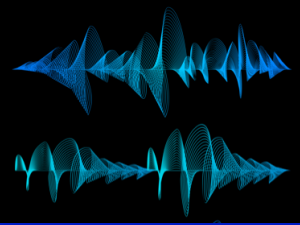
Die Zukunft ist heute … und was kommt morgen? Die ”Technology Vision” von IBM Research

Technologie Trends und
ihre Auswirkungen auf
Geschäft und Gesellschaft

Andrea Martin
Leader Watson IoT Center
IBM Distinguished Engineer

What lies ahead? Six trends according to IBM Research





AI Everywhere

Engagement Reimagined

Personalization at Scale

Instrumented Planet

New Business Networks

Deeper Insights

AI will evolve from narrow to broad to possibly (??) general AI

General AI
Revolutionary

Broad AI
Disruptive and Pervasive

Narrow AI
Emerging

▼ We are here

2050 and beyond

Research samples at the heart and foundations of core AI

AI Everywhere

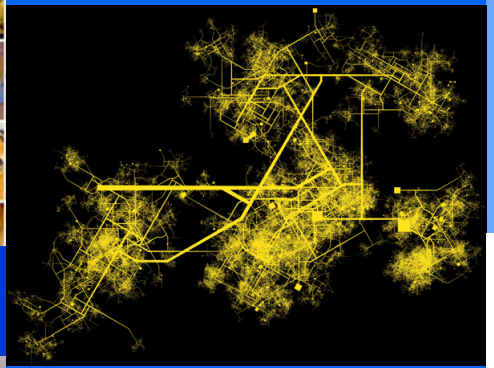
Signal Comprehension

Enhanced image recognition

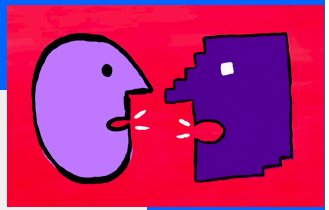
From video and text to rich human perception

Learning and Reasoning

From scalable machine learning to making a case



Teaching machines to debate



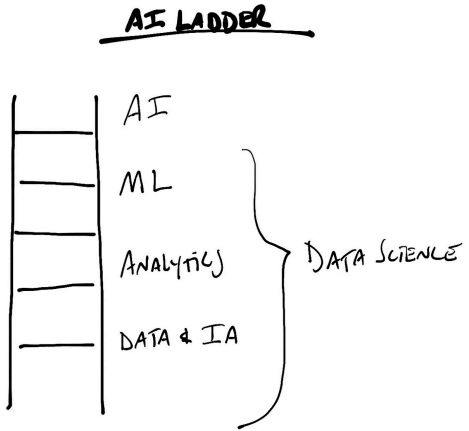
Why now?

We're in the age of (mis) information overload.

Data Foundation

"There is no AI without IA" – Information Architecture

- Data-centered culture
- Make data simple and accessible: Data preparation, data movement, feature extraction
- Otherwise: garbage-in / garbage-out



https://www.ibm.com/blogs/think/2018/02/ibm-ai-ladder/

Example

AI use case categories:

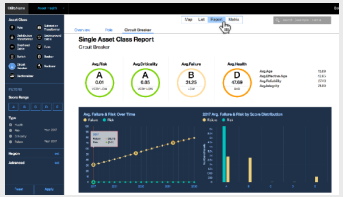
- Discovery
- Decision
- Engagement

Tony, Reliability Engineer

Investigates asset condition and prioritizes required asset work

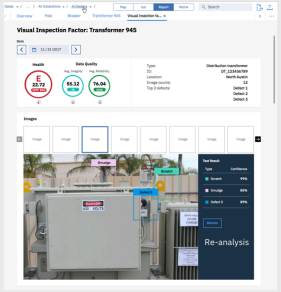
AI Everywhere

1. Find which assets require attention



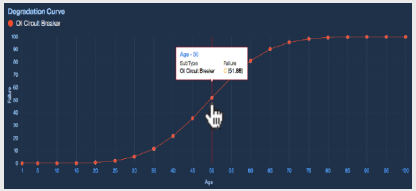
2. Investigate what's happening with the assets

3. Unlock unstructured data to get additional insights



4. Understand asset health and criticality

5. Assess how asset failure probability and remaining life will evolve over time



6. Prioritize asset work

AI systems will perceive and understand both extrinsic and intrinsic attributes, sentiment, and even humor, e.g. via face attributes & expressions

Working to transform Parkinson's disease care

1 in 1,000
expected to develop Parkinson's

10%
are under 50 years of age

$25 billion
in annual costs of care, social payments, and lost income

With the IBM AI principles and ethics as well as pragmatic guidance we differentiate our business model from other market participants and drive trust in and acceptance of AI

> When you introduce powerful technologies into this world you have a responsibility that they are introduced in the right way

Ginni Rometty, CEO IBM Corporation, at the World Economic Forum Davos, 2017

Our principles:

Purpose
The purpose of AI is to augment human intelligence

Ownership
Data and insights belong to their creator

Transparency
New technology, including AI systems, must be transparent and explainable

https://www.ibm.com/blogs/collaboration-solutions/2017/01/31/augmented-intelligence-not-artificial-intelligence/
https://www.weforum.org/videos/ginni-rometty-it-should-be-augmented-intelligence-not-artificial
https://www.ibm.com/blogs/policy/trust-principles/

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Prerequisites for trust in AI:

- **FAIRNESS** – Is it fair?
- **EXPLAINABILITY** – Is it easy to understand?
- **ROBUSTNESS** – Did anyone tamper with it?
- **ASSURANCE –** Is it accountable?

Pragmatic solutions, e.g.:

- Watson OpenScale
- AI Fairness 360 Open Source Toolkit
- AI Explainability 360 Open Source Toolkit
- Everyday Ethics for Artificial Intelligence – A practical guide for designers & developers

https://www.ibm.com/blogs/collaboration-solutions/2017/01/31/augmented-intelligence-not-artificial-intelligence/
https://www.weforum.org/videos/ginni-rometty-it-should-be-augmented-intelligence-not-artificial
https://www.ibm.com/blogs/policy/trust-principles/

We're developing the world's smallest computer

The world's smallest computer is an edge device that can monitor, analyze, communicate, and even act on data

1mm X 1mm
computer size

10 cents
expected manufacturing cost

Solar cell
allows for standalone power

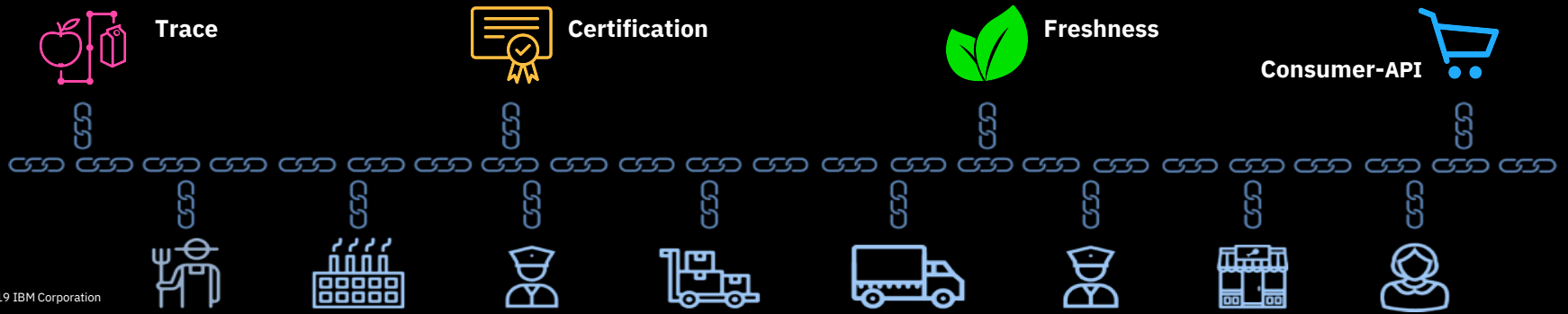
Several 100,000
transistors into a footprint barely visible to the human eye

IBM Food Trust helps track goods from “farm to fork”

A **blockchain-enabled** food supply chain enhanced by **IoT devices** and **AI computing**

- IoT sensors could be used to track fruits, vegetables, or any other food items on the long journey from field to grocery store.
- AI-enhanced, real-time data could also help retailers learn more about consumer eating patterns.

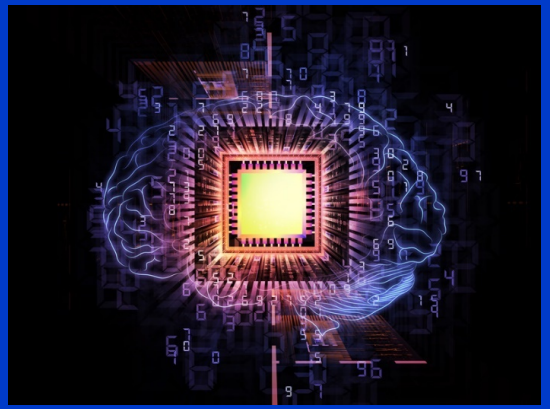
Helps us move closer to zero-waste food consumption



New computing paradigms (among many)

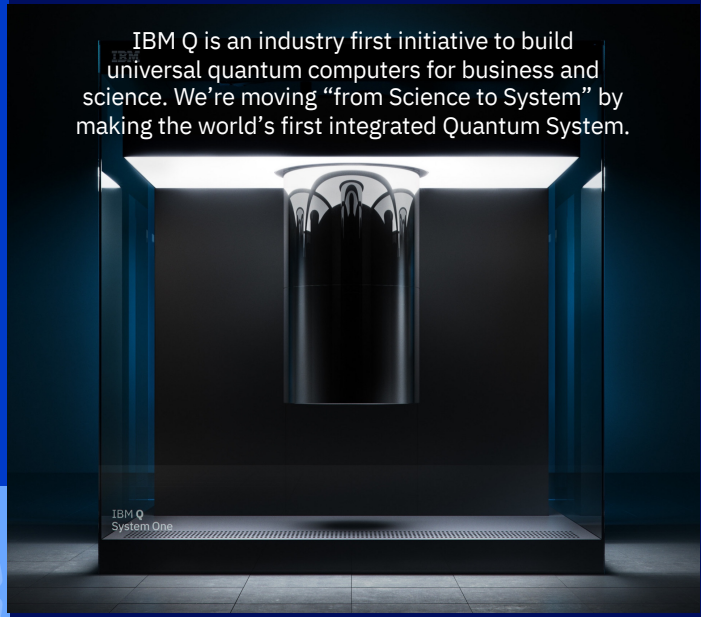
Deeper Insights

Brain-Inspired Neuromorphic Systems



Ideal for Input-to-Action calculation (learning)
E.g. image recognition

Quantum Computing



Idea: Solve "large problems" (e.g. related to simulation, optimization) based on quantum computing principles like superposition and entanglement

We need to embrace a new culture to embrace the future

Homo Sapiens

Homo Faber

Homo Ludens

- Making
- Failing (Fast)
- Learning
- Iterating
- Collaborating
- …

Danke schön!

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