AI - Innovations

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2019 AFCEA-GMU Critical Issues in C4I Symposium

The evolution of AI

General AI
Revolutionary

Broad AI
Disruptive and Pervasive

Narrow AI
Emerging

▼ We are here

2050 and beyond

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Watson is creating a new partnership between humans and technology

Humans
excel at

COMMON SENSE (with biases)

MORALS

IMAGINATION

COMPASSION

DILEMMAS

ABSTRACTION

DREAMING

GENERALIZATION

AI Systems
excel at

LOCATING KNOWLEDGE

NATURAL LANGUAGE

PATTERN IDENTIFICATION

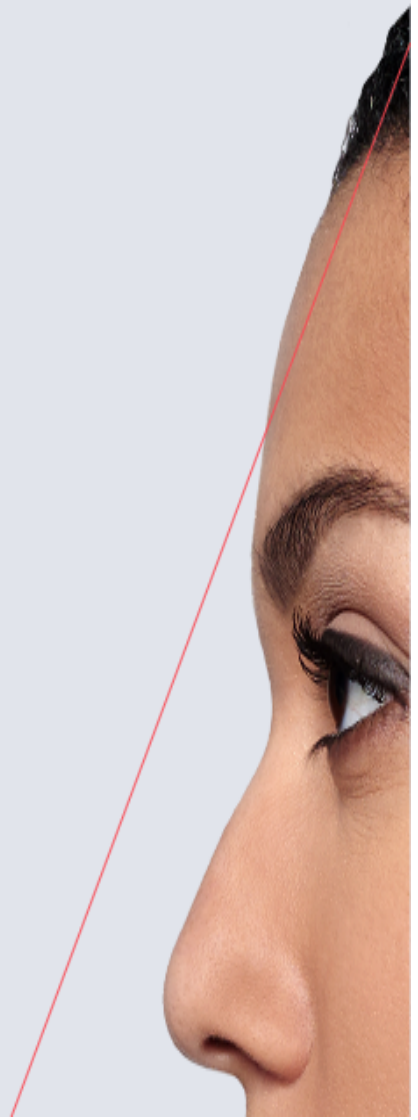
MACHINE LEARNING

ELIMINATING BIASES

PROVIDING ENDLESS CAPACITY

Can artificial intelligence expand a human mind?

IBM Project Debater



IBM Project Debater

"We should subsidize preschool"

Watsons View?

- subsidizing preschool isn't just a matter of finance — it's a moral and political imperative
- cited research showing that investment in preschool results in more successful lives, including better income and health as well as a decreased likelihood to be involved in crime.

Harish Natarajan POV

- preschool subsidy doesn't effectively address the root causes of poverty and is simply "a politically motivated giveaway" to the middle class

On February 11th, 2019

CMU creations help the visually impaired navigate the airport

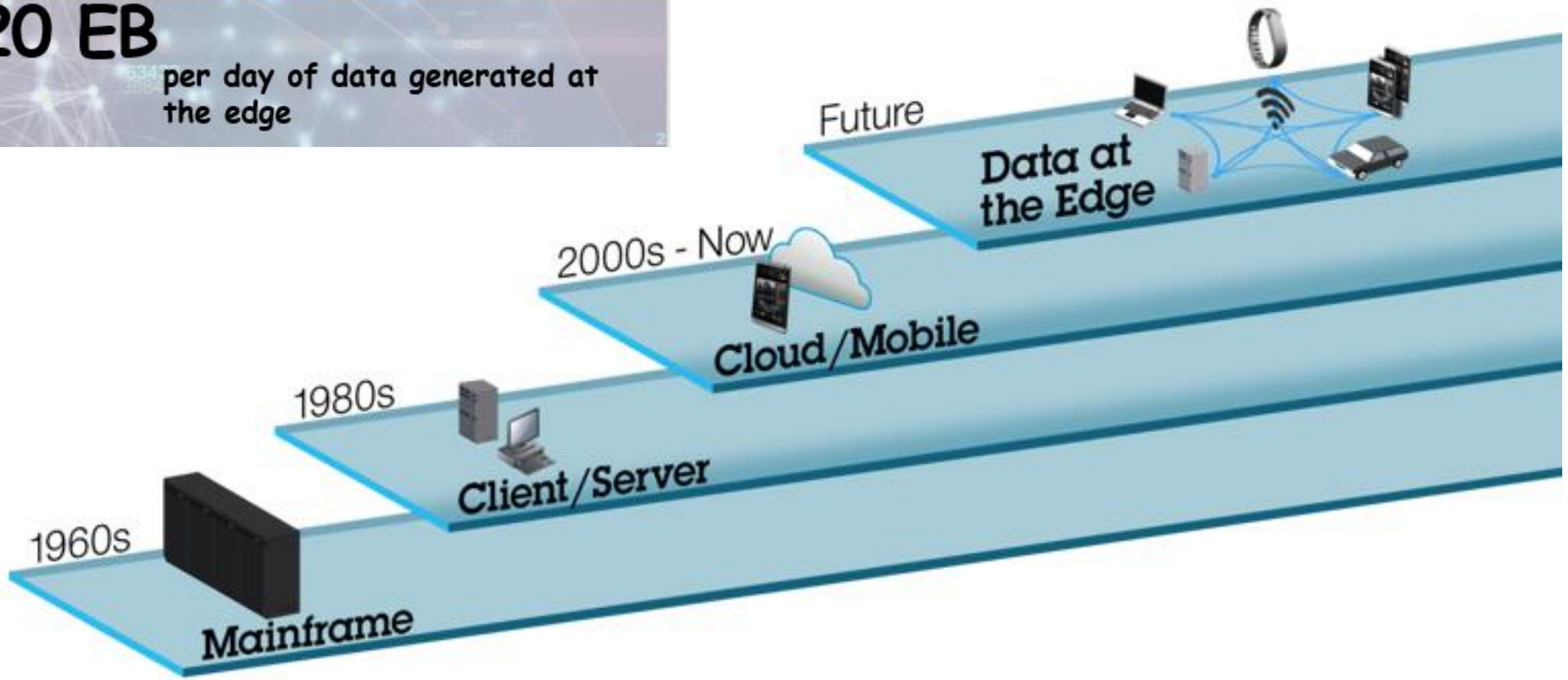
Ref - https://bit.ly/2WsMjM1

A new IT paradigm is emerging at the edge

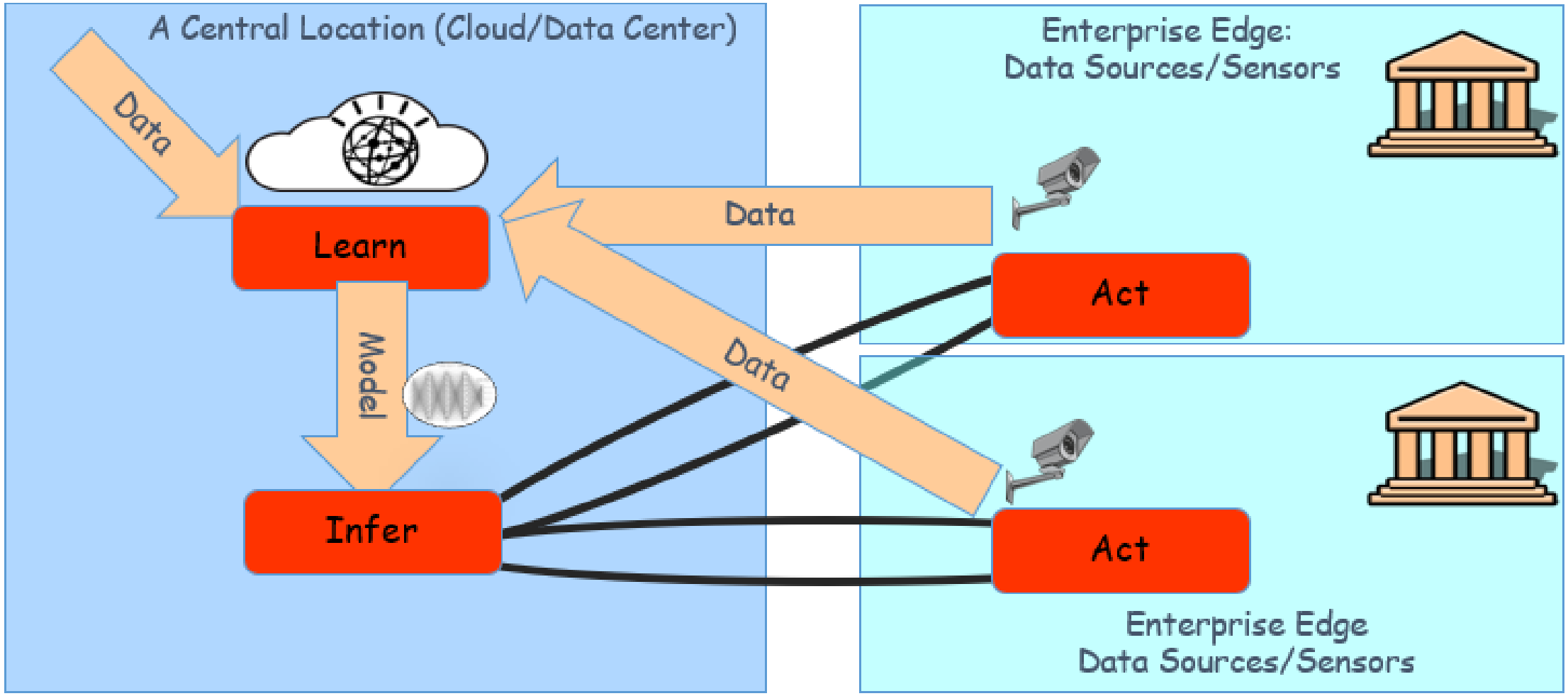
IBM

20 EB

per day of data generated at the edge

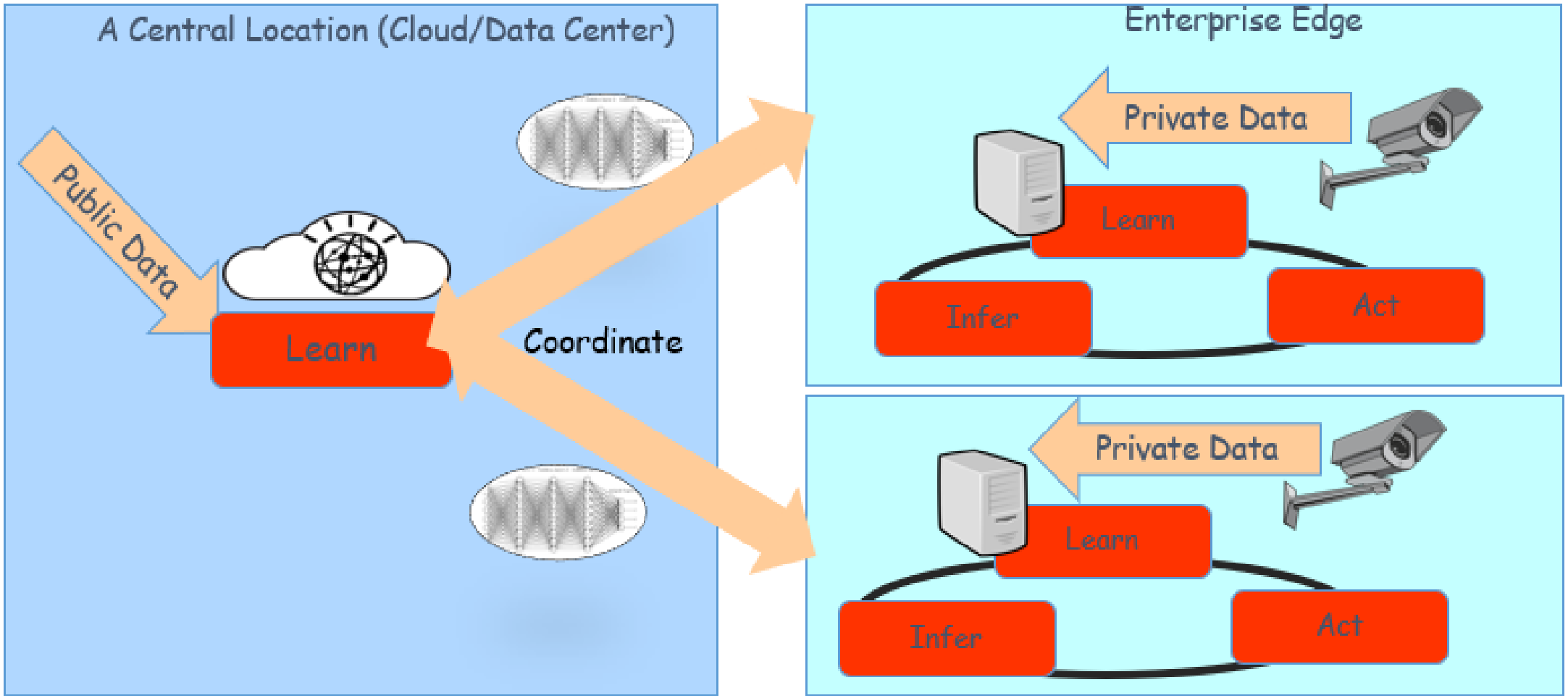


The current prevalent model for creating AI based solution



Regulations, Privacy Concerns, Network costs, Latency, Bandwidth Constraints are a hurdle for AI Solutions in many contexts.

AI @ Edge: Fully Distributed Model



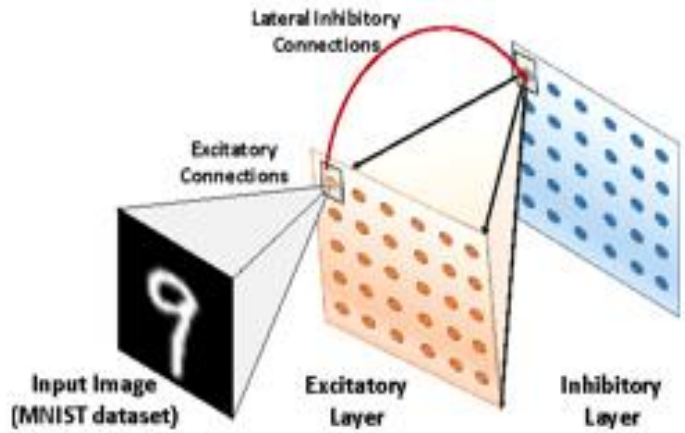
Learning happens at many different locations, and different locations coordinate the models they learn with each other

AI @ Edge Challenge IV – Learning to Forget

IBM

- New privacy requirements (EU GDPR, California Privacy) has built-in provisions for right to forget
- In machine learning models, especially deep learning models, one input datum can potentially impact millions of model parameters
- How to provably "forget" one datum (vital to crowdsourced IoT solutions to provide an opt-out)
- First of a kind solution for a simple machine learning model (ridge regression – a generalization of linear regression) that simultaneously provably supports both incremental and decremental learning

Courtesy: https://livescience.com



Complex dependency structure makes forgetting hard

Staying competitive in the cognitive era will demand an effective use of intelligent automation

Invest with intention

- Prioritize the landscape of emerging technologies
- Always align technology with business strategies and goals
- Investing intentionally requires detailed execution plans
  - ✓ Impact analysis
  - ✓ Communication plans
  - ✓ Change management

Rebuild the business for automation

- Layering new technologies on top of old business processes is not productive
- Rethink processes for the cognitive age – optimize workflows for automation
- Envision the end; enable through prototyping; repair and scale

Educate to automate

- Build agile, innovative workforces
- Encourage employees to think “big”, focus on higher-level tasks
- Participate in broader ecosystems to expand new ways of thinking and working

Main issues/concerns in AI

Short-term issues:
- Bias
- Explainability
- Transparency
- Accountability
- Data responsibility
- Value alignment
- Ethics/morality

- Impact on jobs and society

Long-term issues:
- Singularity
- Superintelligence
- Off switch problem

Human + Machine: Ethical challenges

Value alignment

- Is it following my same (ethical) principles?

Fairness

- Is it fair in its decisions, or does it favour some group more than others?

Explanations

- Why is it making/suggesting a certain decision?

Interpretability

- Can I check its reasoning process?

Data handling

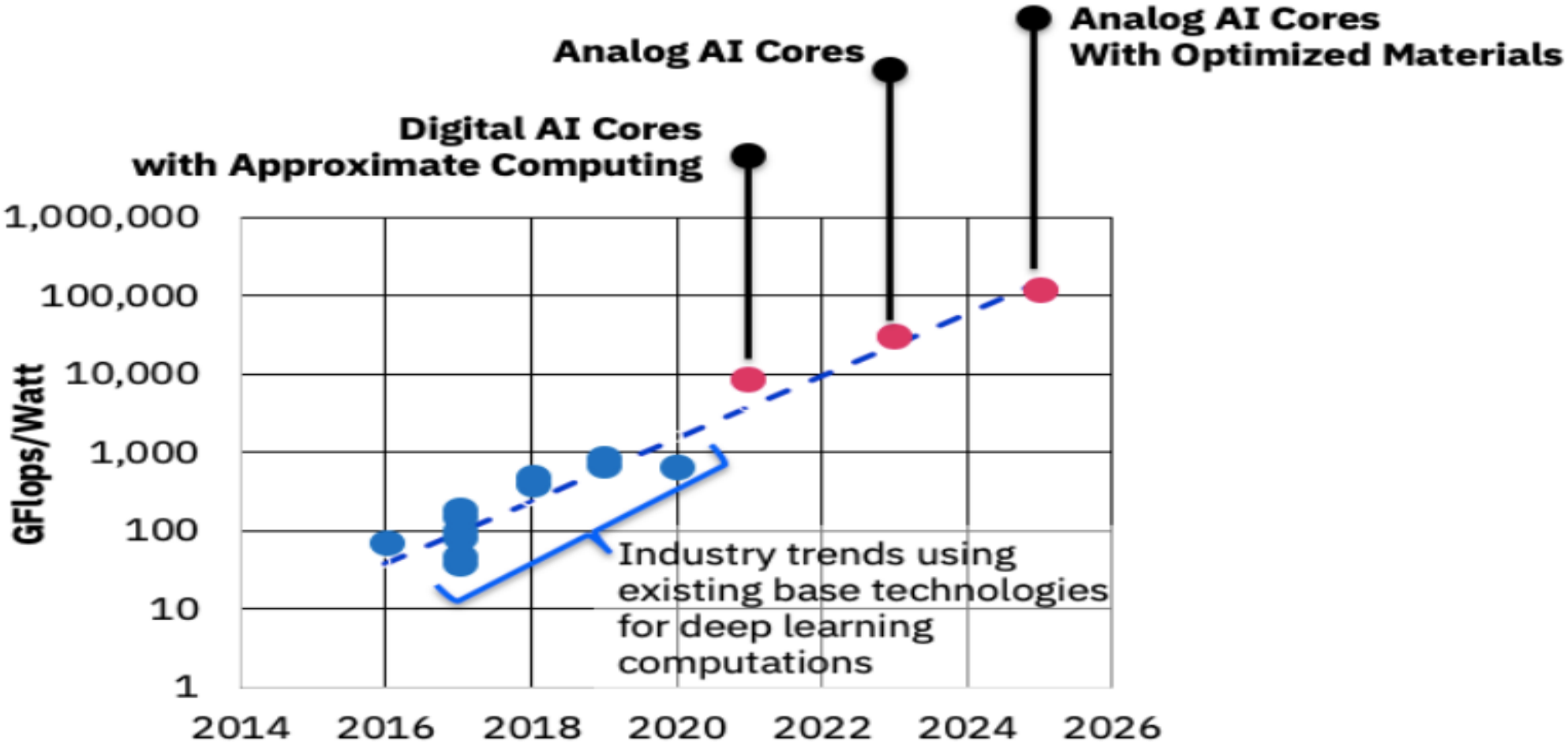
- How is it using my data? Is it reusing it for other customers? Is it sharing it with others?

QUEST – AI for Structured Data

Quest uses Natural Language Processing (NLP) to “ automatically create SQL queries” from English sentences. Questions can be typed or spoken.

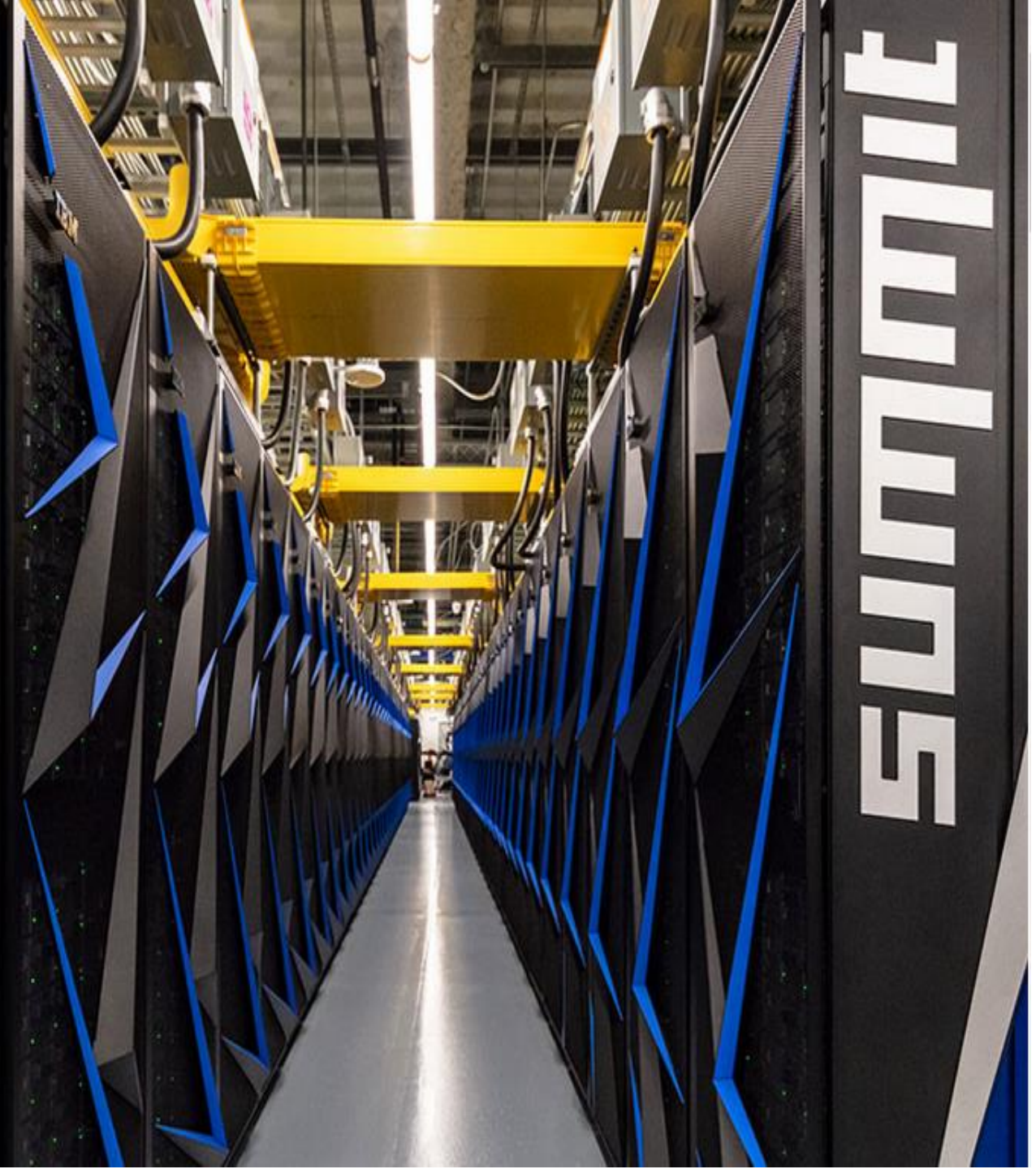
This extends the use of Watson AI & MDC2 platforms to support both un-structured and structured data.

SWAP AI Chips – 1000x Performance Increase



The most powerful computer on the planet

The Summit supercomputer at Oak Ridge National Laboratory has reached speeds of 200 petaflops. Summit will help us model supernovas, pioneer new materials and explore cancer, genetics and the environment — using technologies available to all businesses.



IBM Data & AI Portfolio

Everything you need for Enterprise AI, on any cloud

The Ladder to AI

Open Source meets a multicloud, working as ONE

Pre-built Use Cases
Watson Applications

Prepare	Build	Run	Manage
Watson Knowledge Catalog	**Watson Studio**	**Watson Machine Learning**	**Watson OpenScale**

Open Source Frameworks

Hybrid Data Management
Db2 Family

Data Governance & Integration
InfoSphere Family

AI
Cyber

Multicloud Data & AI Platform
IBM Cloud Private for Data

IBM Cloud · RED HAT OPENSHIFT · amazon web services · Azure · openstack · Google Cloud · intel · IBM Z · IBM Power Systems

AI on IBM Cloud Private for Data

Add-on AI Services

Watson Studio/ML
Data Science Premium

Premium tools to design, build & deploy AI models

SPSS Modeler | Data Refinery | Model Builder | Decision Optimization | Watson Explorer | Streams Designer

Watson OpenScale	*Operational optimization services*
Watson Assistant	*Conversational AI services*
Watson Discovery	*Knowledge discovery AI services*
Watson APIs	*Interactive AI services (e.g., speech)*
AI Digital Automation	*AI-automated business processes*

Foundational AI Services

AI Services

Open Source frameworks to build, train and deploy Machine Learning models powered by **Watson Studio** and **Machine Learning**

TensorFlow | Keras | Caffe | XGBoost | Studio | jupyter | Apache Zeppelin | Scala | learn | python | Spark ML | torch

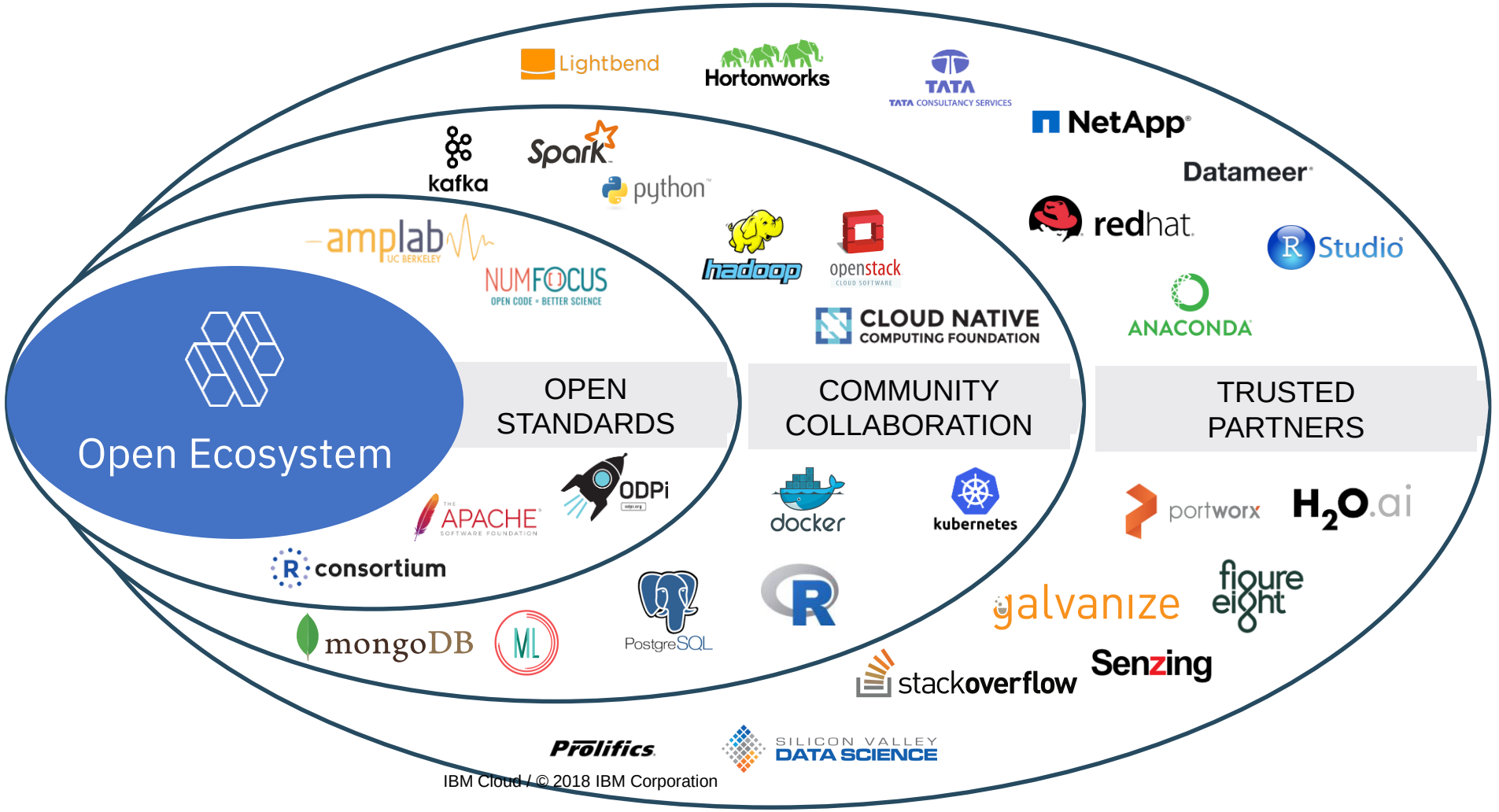
- **Data visualization**
- **Machine learning learning**
- **Model build & deploy**
- **Model management**
- **Dashboards & reporting**

Data Collection Services

Data Organization Services

IBM Cloud | Red Hat OpenShift | openstack | amazon web services | Azure

ICP for Data is a platform with a thriving Open Ecosystem – where we work with open standards, communities, and partners



We continue to innovate and touch every aspect of modern life, even beyond the unexpected…

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