*Restlessly reinventing since 1911*

# IBM Finland

## *CEO*

*Mervi Airaksinen*

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& THE VITAPHONE CORP.
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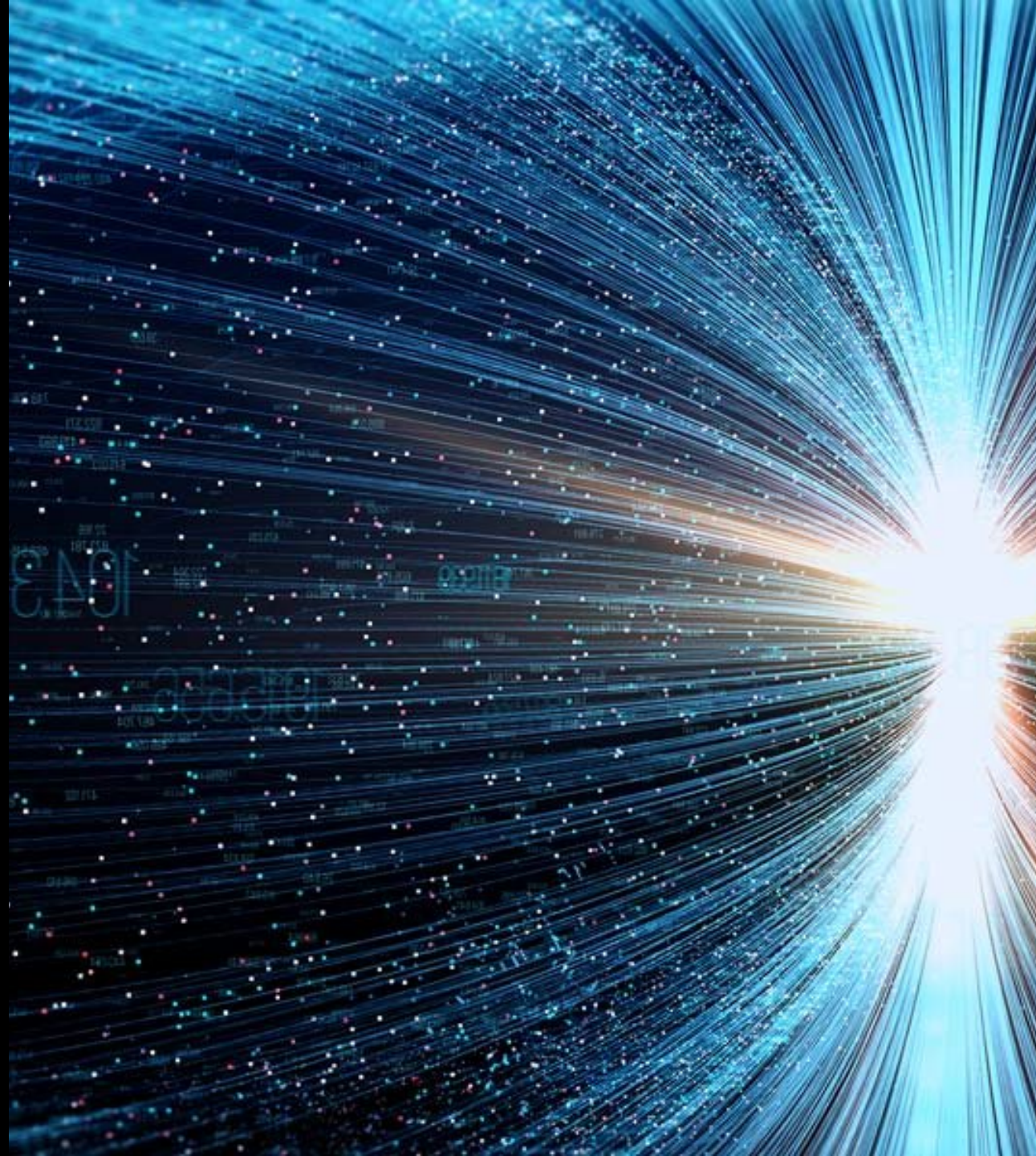
4256

THINK
DENKE
$300,000
$1,000,000
$200,000
KEN
WATSON
BRAD

We’re in the midst of a fourth industrial revolution – the digital revolution.

The pace of change is exponential, not linear, due to exponential technologies

The extent and pace of technological change will have wide-reaching implications across almost all industries.



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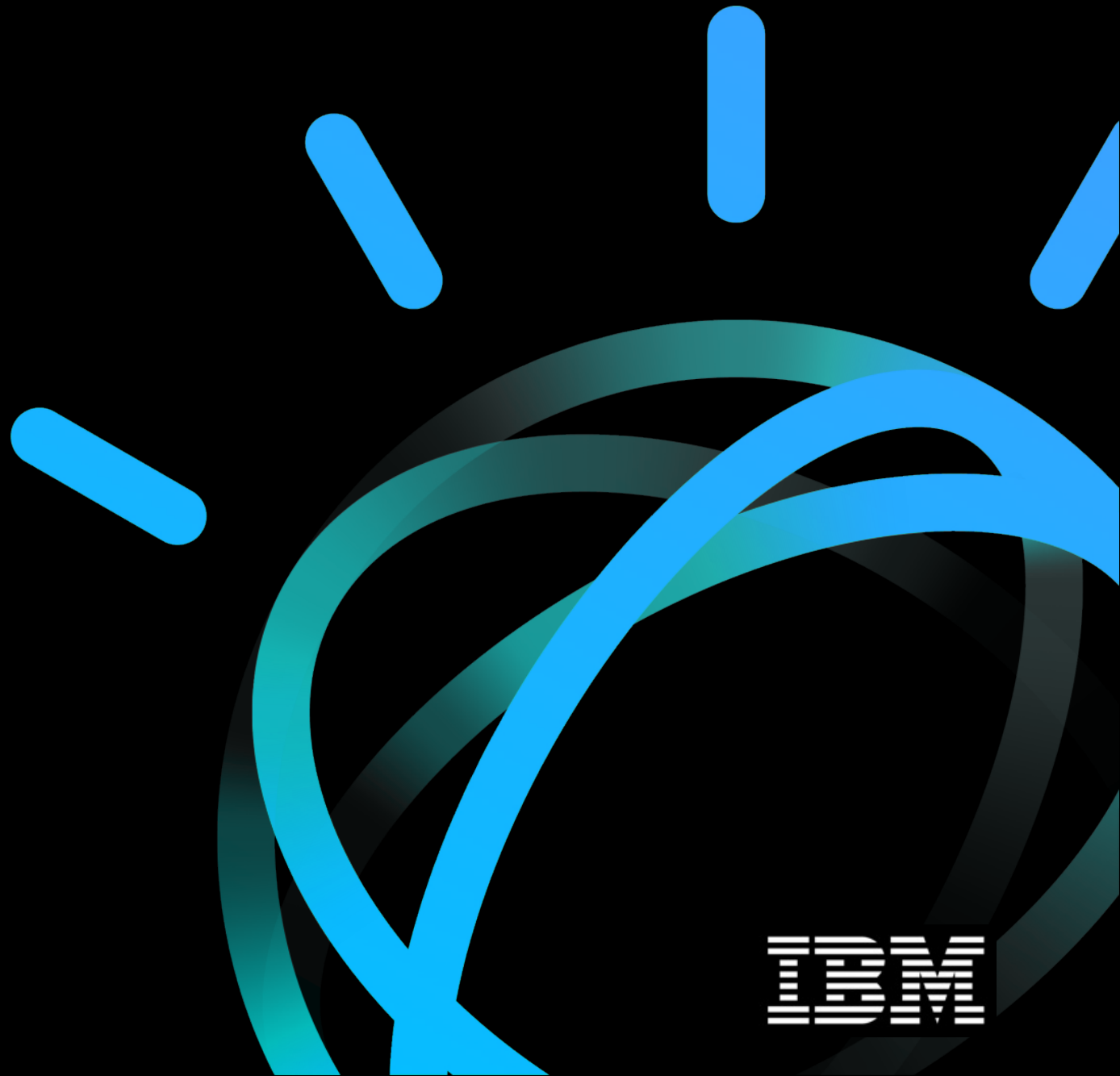
# IBM AI



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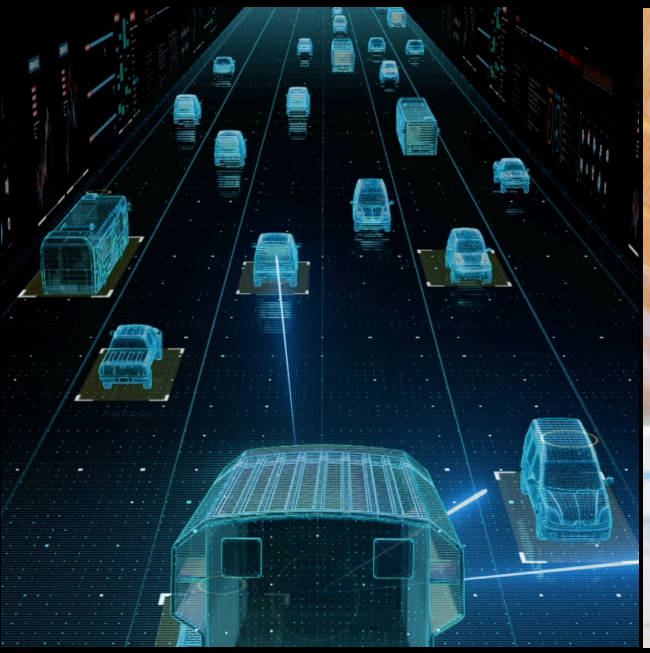
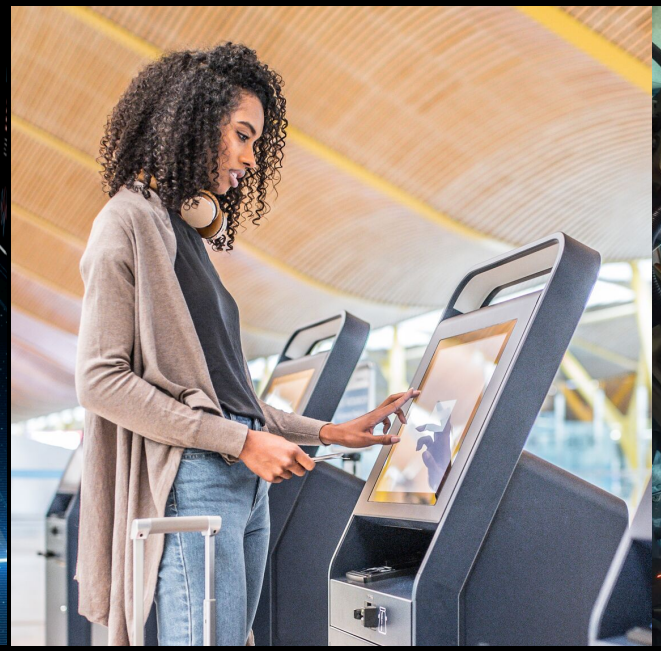
# Amount of data being created exceeds current capabilities



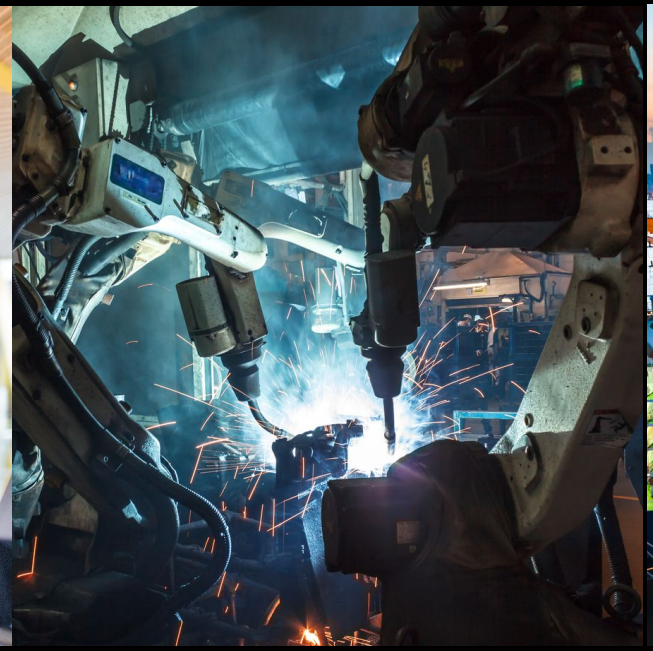
## Connected experiences

Improve individual experiences and device performance



## Distributed IT Modernization

Provide over-the-air updates and real-time diagnostics, and trigger immediate action



## Industry 4.0

Improve production line performance to improve product quality

## Supply Chain and Asset Management

Dynamically plan inventory and execute delivery end-to-end

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# Our Point of View

**Data** fuels digital transformation

**AI** unlocks the value of Predictive Data

**Hybrid cloud** is the Data Platform

*AI is not magic, it's a journey!*

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# The Evolution of AI

## Narrow AI

Single task, single domain

Superhuman accuracy and speed for certain tasks

## Broad AI

Multi-task Multi-domain

Explainable

## General AI

Cross-domain Learning & reasoning

Broad Autonomy

We are here

2050 and beyond

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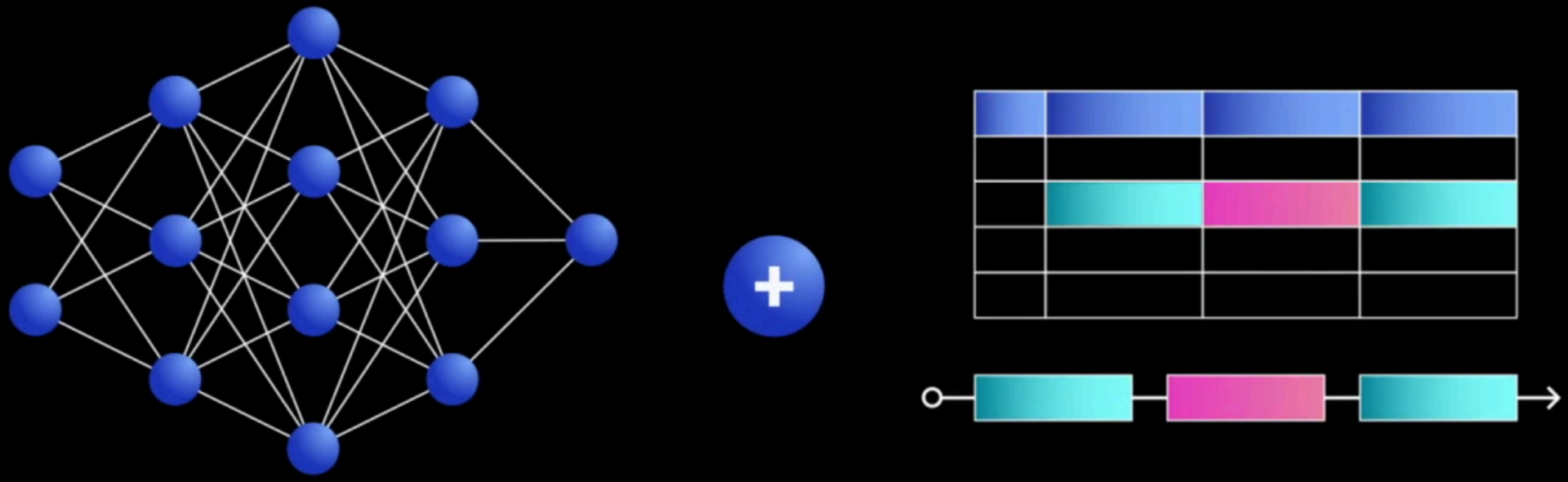
# Neuro-symbolic AI is emerging technique

- Could give Machines With True Common Sense
- Combines the power of neural networks with symbolic methods
- Neuro-symbolic AI would also require far less training data and manual annotation, as supervised learning consumes a lot of data and energy — to the point that if we keep on our current path of computing growth, by 2040 we'll exceed the 'power budget' of the Earth.



neural networks

symbolic reasoning

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# Changing the debate

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# AI and ethics need to go hand in hand

Everyday Ethics for Artificial Intelligence

1. ***Accountability:*** *designers and developers are responsible for decision processes and outcomes.*
2. ***Value Alignment:*** *align with the norms and values of your user group in mind.*
3. ***Explainability:*** *humans must easily perceive, detect, and understand the decisions.*
4. ***Fairness:*** *minimize bias and promote inclusive representation.*
5. ***User Data Rights:*** *protect user data and preserve the user's power over access and uses.*

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What matters most

# AI will have a significant impact on workers and skills

More than **120 million** workers in the world's 12 largest economies may need to be retrained or reskilled in the next 3 years (1)

According to 2018 Country Survey, **67%** executives expect that advancements in AI and automation technology will require roles and skills that don't exist today (2)

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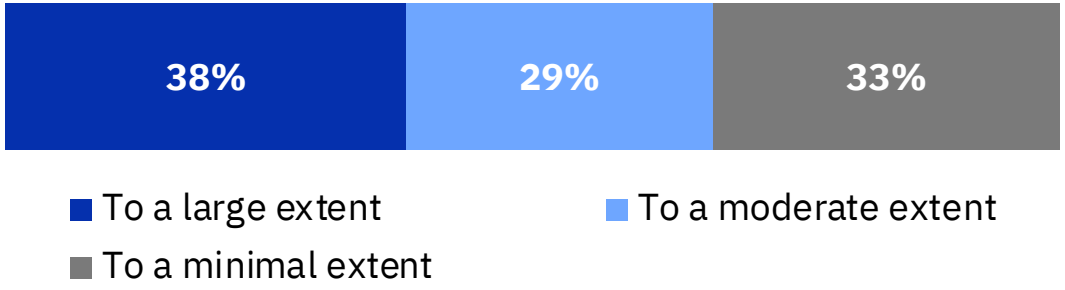
## Investing in skills – including training employees to work with AI – will be critical to maintaining a quality workforce

CHRO: Organizations have an obligation to retrain or reskill workers impacted by AI technology (3)

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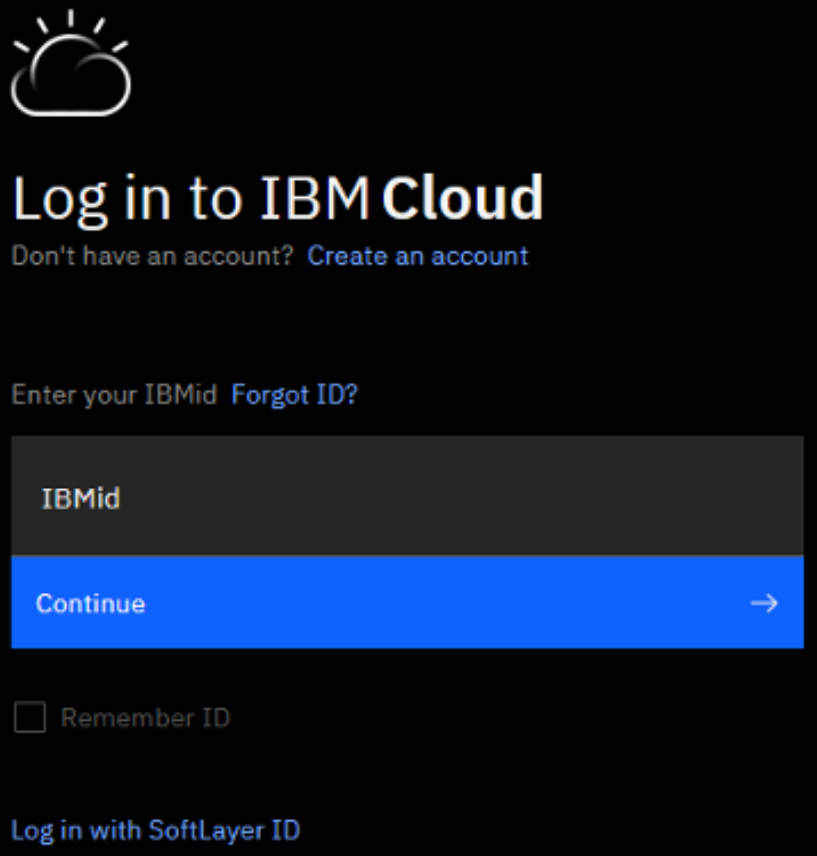
# Start developing today your AI skills!

https://cloud.ibm.com/

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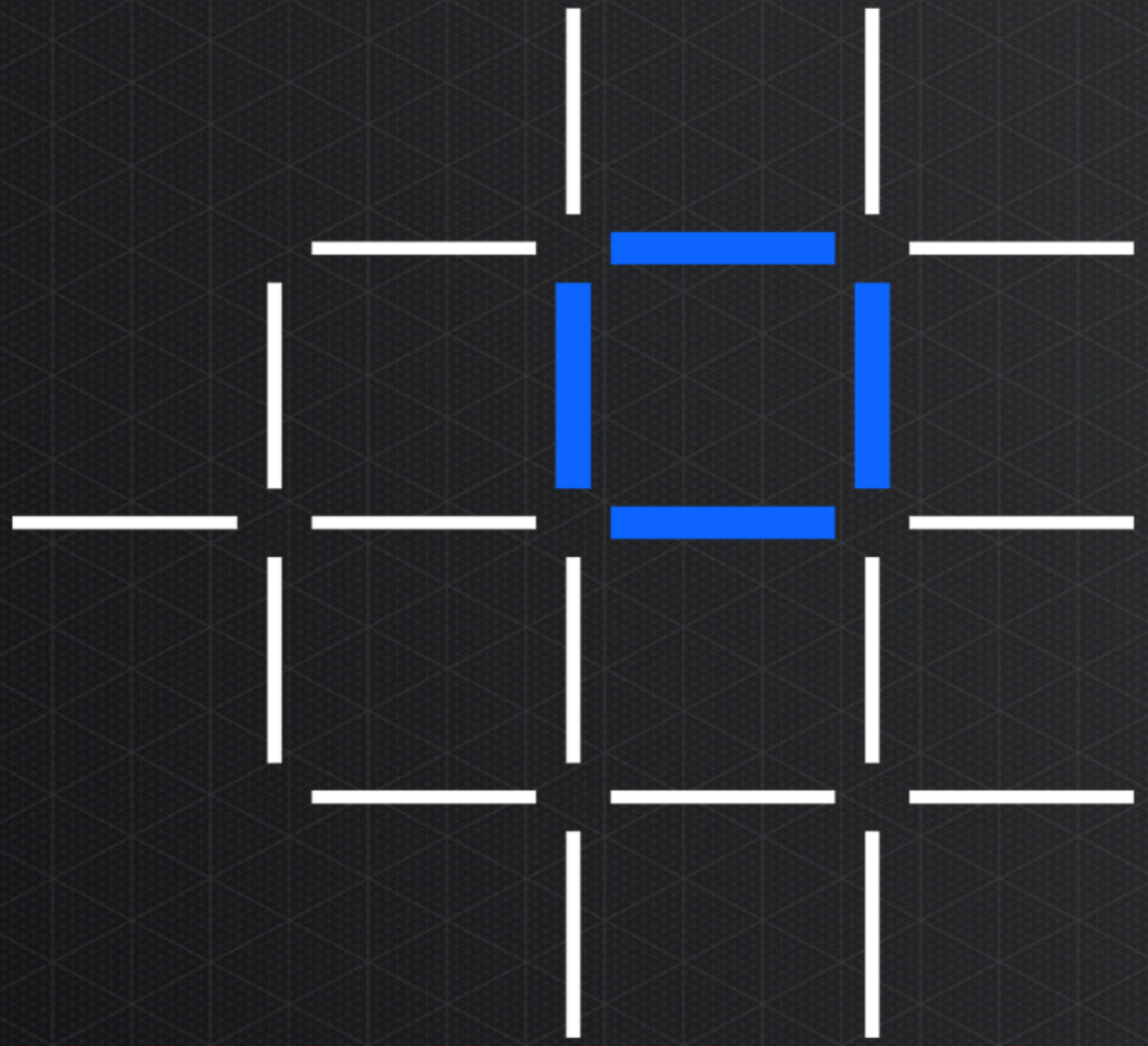
# IBM Blockchain



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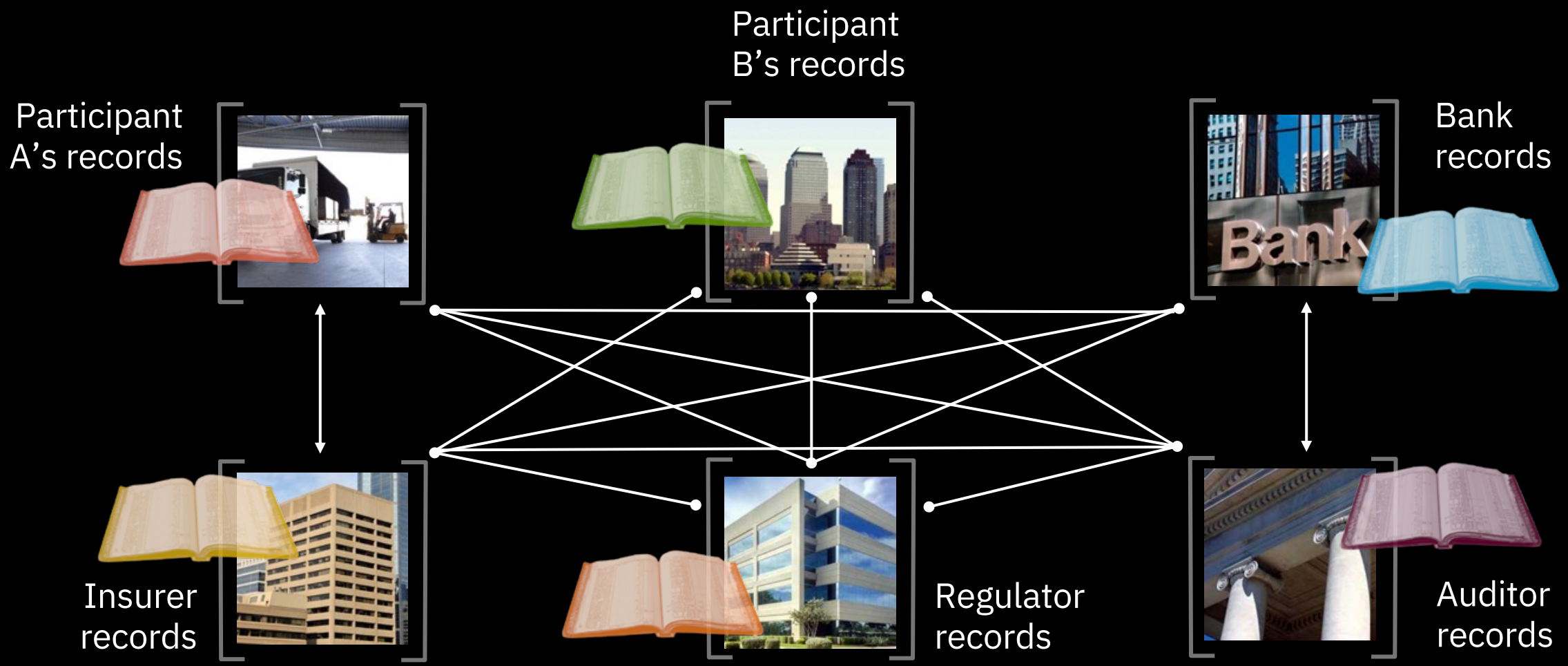
# Problem ...






... inefficient, expensive, vulnerable

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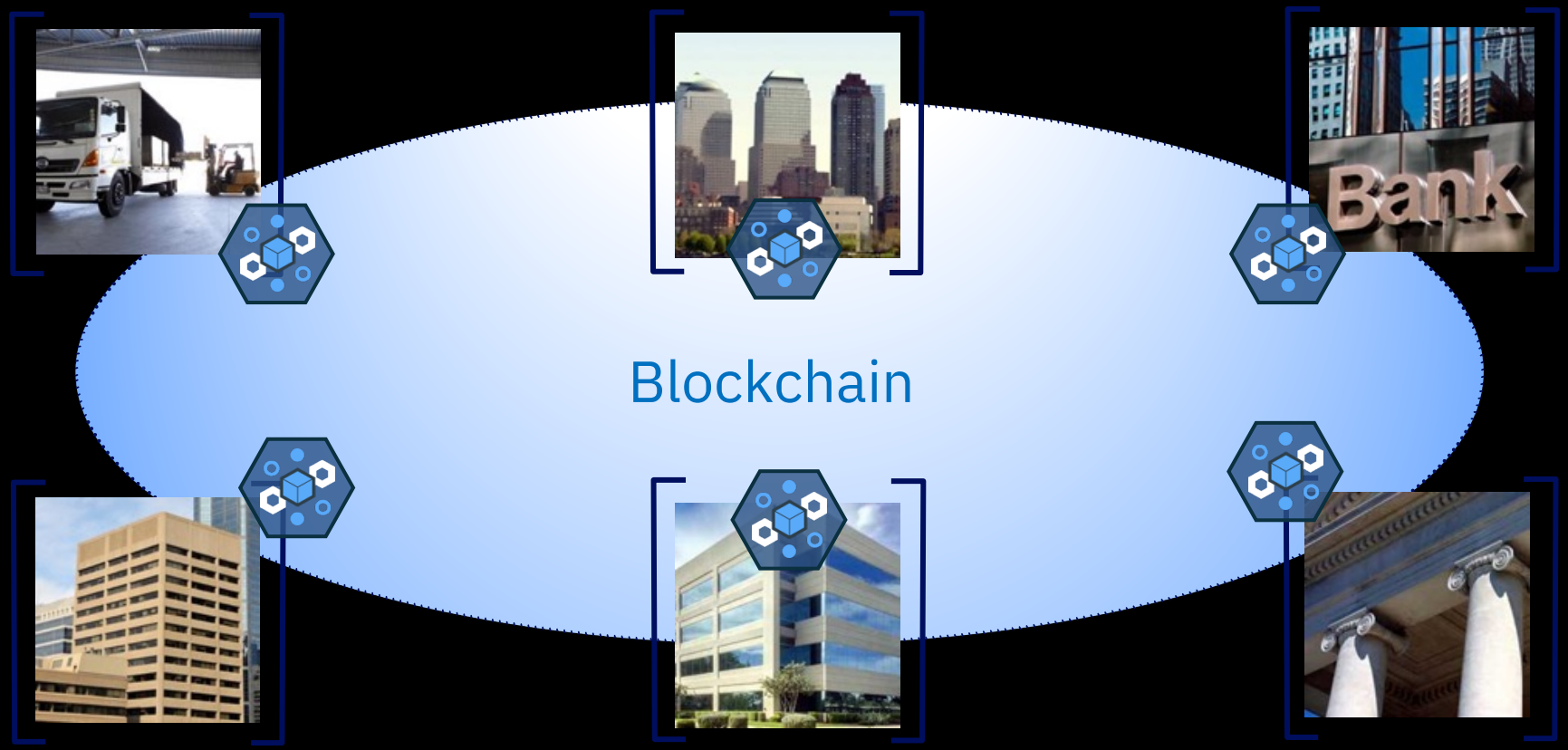
# Solution is a shared ledger ...






... with consensus, provenance and finality

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# Containers may spend more time at harbor than at sea.

Maersk and IBM launched blockchain-based shipping platform Tradelens.com

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# 45% of fruits and vegetables goes to waste. 80% are willing to pay more for transparent products.

Kvarøy Arctic and Atea joined IBM Food Trust –blockchain platform.

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# Start developing your skills today with IBM Blockchain

https://developer.ibm.com/technologies/blockchain/

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# IBM Quantum

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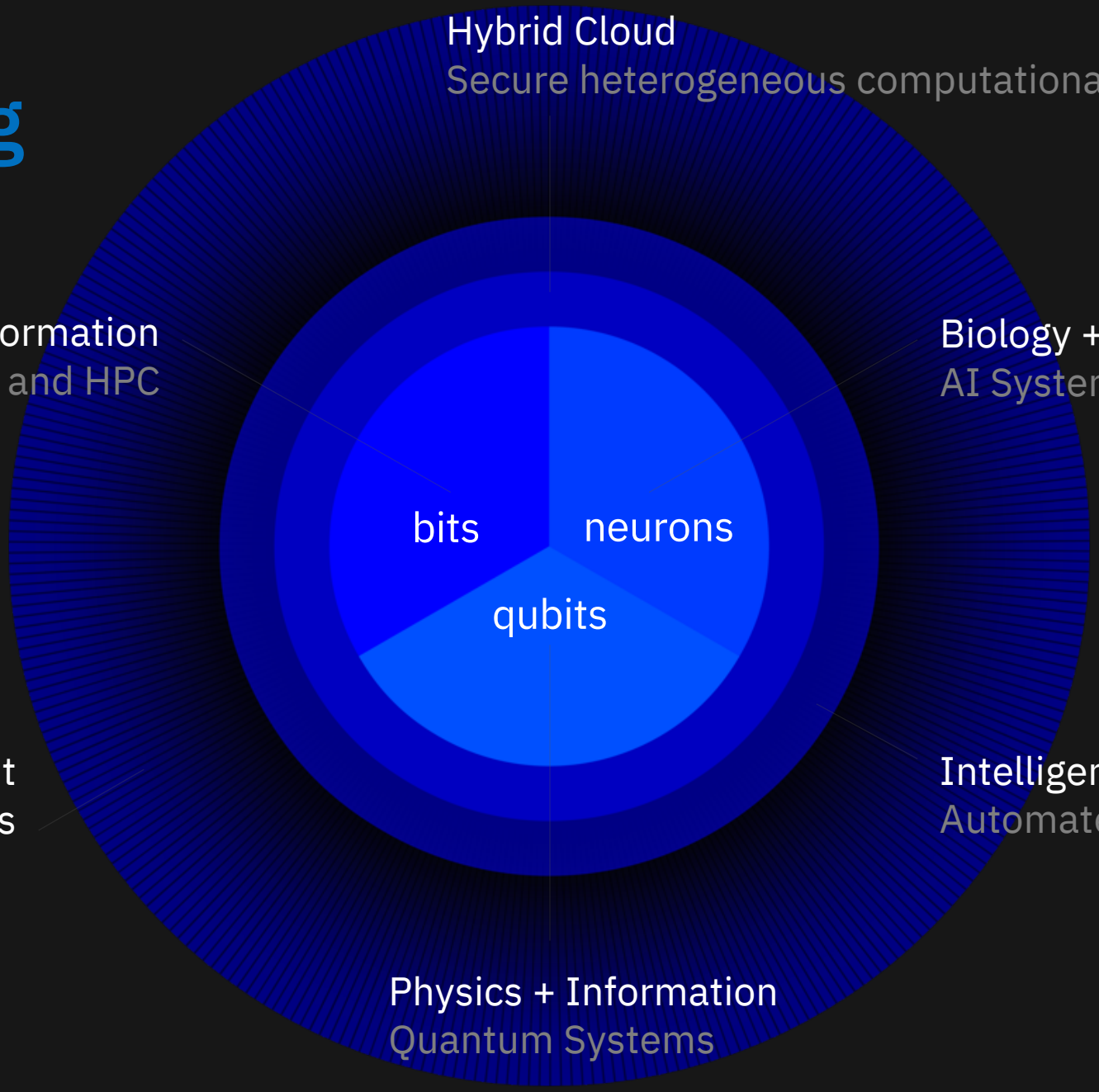
# The future of computing

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# Exponential growth

A classical bit can be **0** or **1**

A quantum bit, or *qubit* can be **0** or **1** or **both**

**n qubits** – $2^n$ quantum state dimensions.

$2^{10} = 1{,}024$

$2^{20} = 1{,}048{,}576$

$2^{50} = 1{,}125{,}899{,}906{,}842{,}624$

$2^{64} = 18{,}446{,}744{,}073{,}709{,}551{,}616$

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IBM and partners explore the possibilities of new chemical innovation

IBM and partners test novel paths for production and transportation

IBM and partners try to speed up calculations in quantitative finance

Find better patterns within AI/ML processes by leveraging quantum systems that map data to higher dimensions for training and use

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# The road to Quantum Advantage

## Quantum Science

Create the fundamental theoretical and physical building blocks of quantum computing.

1900s

## Quantum Ready

Engage the world to prepare for the quantum computing era.

Launch of the IBM Q Network

2016

## Quantum Advantage

Commercial advantage to solving real world problems with quantum computing systems.

~2020s

2050+

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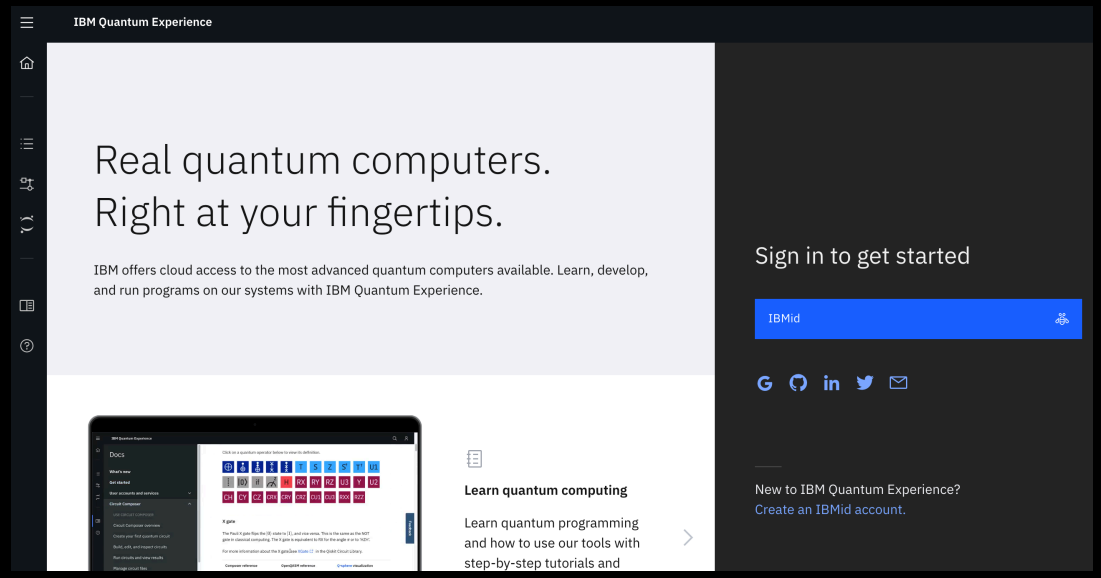
# IBM Q Experience

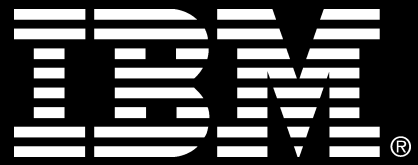
**Start developing your skills today with IBM Q systems.**

**https://quantum-computing.ibm.com/**




# IBM Q Network

**Advancing quantum research and building the foundations of a business**

**Aalto University is a member**

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