

# Artificial Intelligence – beyond the hype



ATV Tech Talk  
February 5. 2019

by Christian Holmegaard  
Mossing, COWI A/S

## Introduction: Biography + Digital offset

1 HOUR

### PART 1:

- Selected highlights from Applied AI Academy 2018
- Introduction to the AI technology and application
  - Impact of AI on the Engineering Industry
    - Global race for AI dominance

### PART 2:

- Application of AI in COWI
- Current trends in the Engineering Industry
  - Engineering Consultancy ver. 2.0

# My background

Experimentarium 1993 - 1997

M.Sc. Microbiology 1997 (University of Copenhagen/DTU)

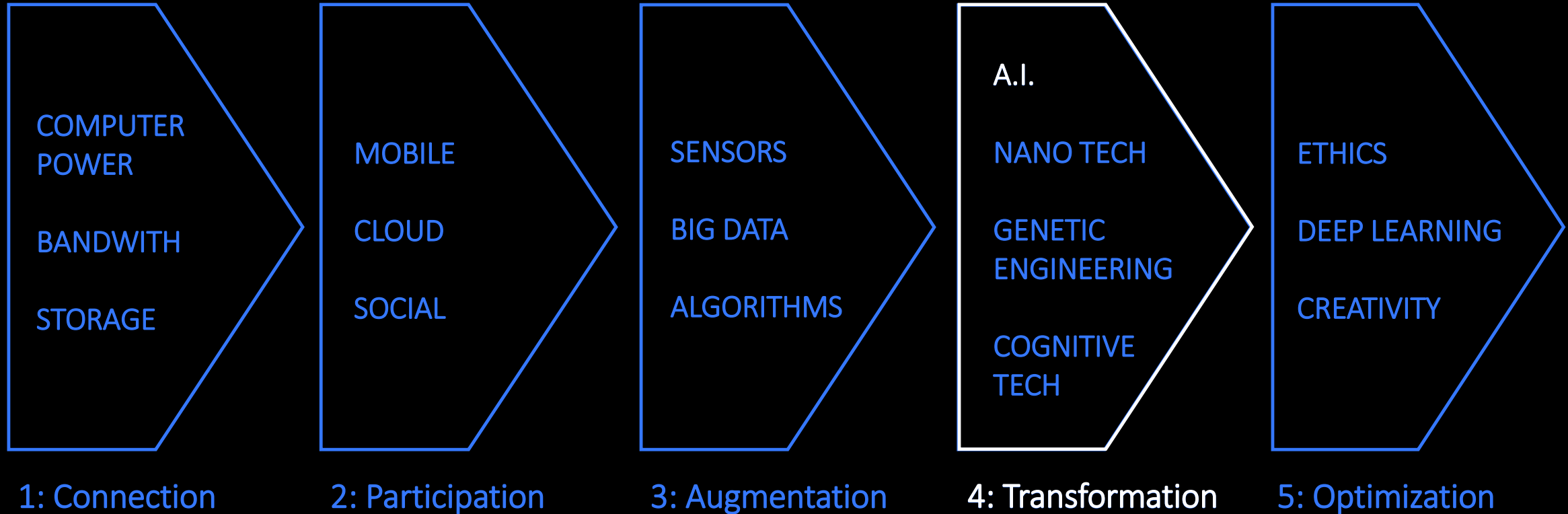
Orbicon (1998-2006)

COWI A/S (2006 – d.d.)

# The road to become a Digital Ambassador



# Five phases of digitalization



Applied AI Academy  
November 2018

# PART 1



# The Participants



# A dense programme...

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	THE PAST, PRESENT AND FUTURE OF AI	APPLIED AI CASE A VC'S PERSPECTIVE	AI EXPO 2018 AI & BIG DATA CONFERENCE	APPLIED AI CASE HANDS-ON AI	HOW TO START THE TRANSFORMATION
Morning	07.30 Welcome Program Kick-off ICDK, Palo Alto				
	08.30				
	10.00 The Future, Faster InnovationLab Keynote TheShop, SF	10.00 Tour of the Gallery Autodesk	08.30	09.00	10.00
	10.45 AI Past, Present, and Future Cisco Systems Keynote TheShop, SF	— Humanizing Customer Support with AI Autodesk	AI Expo 2018, the Leading AI and Big Data Conference and Exhibition	Turning Data into a Timeless Competitive Advantage Palantir	Bringing AI to Every Corner of Your Organization Unity
	11.30 What AI Means for Industries Panel Debate TheShop, SF	Tour & Keynote Autodesk, SF	Enterprise AI and Digital Transformation	Keynotes & Challenges-workshop Palantir, Palo Alto	Keynote Unity, SF
Afternoon	11.30		Big Data Strategies		11.30
	12.15 The Technologies Powering AI Panel Debate TheShop, SF	12.00 Applied AI from a VC's Perspective Bootstrap Labs Keynote The Vault, SF	Data Analytics for AI & IoT	11.30 Real-life AI Cases Stanford Research Institute (SRI) Menlo Park	11.45 Lunch & Debriefing
	13.15	13.30	Innovations & Investors' Zone	13.00	12.45
	14.00 AI Entrepreneurs and Intrapreneurs Co-creative workshop & pitch TheShop, SF	15.00 The Startup Pitch Roger.ai The Vault, SF	AI Expo 2018, Santa Clara Convention Center	14.30 The Lab Experience VW Automotive Lab (VAIL) Stanford University	12.45 Artificial Creativity InnovationLab Keynote & Demo TheShop, SF
	16.30 Critical Thinking About AI Keynote	15.45 Hands-on: AI-powered shopping Amazon Go, SF		15.00 TechPlomacy Office of the Tech Ambassador, ICDK	14.00
Evening	17.15 Networking Reception incl. Tech Demos Drinks & Demos TheShop, SF	17.00 Debriefing, Drinks & Prep for AI Expo Drinks & Networking The Interval, SF	18.00 Conference Networking, Drinks, and Nibbles (Optional) Hyatt Regency, Santa Clara	16.15 Dinner, Drinks & Networking Il Fornaio, Palo Alto	
	17.15	17.15			
	19.30	18.45	23.00	21.00	



# A dense programme...

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<b>IF</b>	THE PAST, PRESENT AND FUTURE OF AI	APPLIED AI CASE A VC'S PERSPECTIVE	AI EXPO 2018 AI & BIG DATA CONFERENCE	APPLIED AI CASE HANDS-ON AI	HOW TO START THE TRANSFORMATION

Morning

## Selected sessions...

09.00

Turning Data into a Timeless Competitive Advantage  
Palantir

Keynotes & Challenges-workshop  
Palantir, Palo Alto

11.30

10.00

Bringing AI to Every Corner of Your Organization  
Unity

Keynote  
Unity, SF

11.30

Afternoon

13.30

Applied AI from a VC's Perspective  
Bootstrap Labs  
Keynote  
The Vault, SF

15.00

## ... with engineering implications



Evening

"Applied AI from a VC's perspective"



### ABOUT ME



### Benjamin Levy, Co-Founder & Managing Partner

Ben is the Co-Founder of BootstrapLabs, a leading venture capital firm, based in Silicon Valley and focused on Applied Artificial Intelligence.

Some of BootstrapLabs' portfolio companies include: [Presi](#), [AngelList](#), [Trusted Insight](#), [AGEye](#), [Qeiosius](#), [Rogeca](#), [Vidira](#), [Mendel](#), [Indus](#), and [Sibly](#).

@benlevy74

Born in France and living in Silicon Valley for the past 20 years, Ben is a repeat entrepreneur who launched, built, and exited two startups in the financial technology space. [Praxidea Solutions](#), a data mining software company using machine learning and image recognition technology, was acquired by [Plangent](#) in 2005, and [InsideVenture](#), a financial social network for the founders of venture-backed pre-IPO startups and long-only institutional investors on Wall Street, was acquired by [SecondMarket](#) in 2009 (and is now part of NASDAQ).

Earlier in his career, Ben was a Technology, Media, and Telecom Entrepreneur. [Banker](#) who advised startup founders and CoOs of Fortune 500 companies on corporate strategy, financing, and M&A. Over a period of 10 years, Ben helped his clients raise over \$100M from institutional investors and close over \$100M in M&A. Associate at [Lazard](#), Vice President at [Houlihan Lokey](#), SVP & Head of Technology, Private Equity at [SG Cowen](#), Securities, and Managing Director & Head of US at [QuantumWave Capital](#).

Ben is a frequent speaker on innovation, technology investing, entrepreneurship, artificial intelligence, and globalization in the US, Europe, and Asia.



APPLIED AI IS LEADING  
THE 4<sup>TH</sup> INDUSTRIAL REVOLUTION

**AI IS TRANSFORMING OUR WORLD  
FROM AUTOMATED TO AUTONOMOUS**

# THE STEPS TO AUTONOMOUS

## Analytics



What happened

## Predictions



What might happen

## Prescription



What might be a good idea to do

## Autonomous



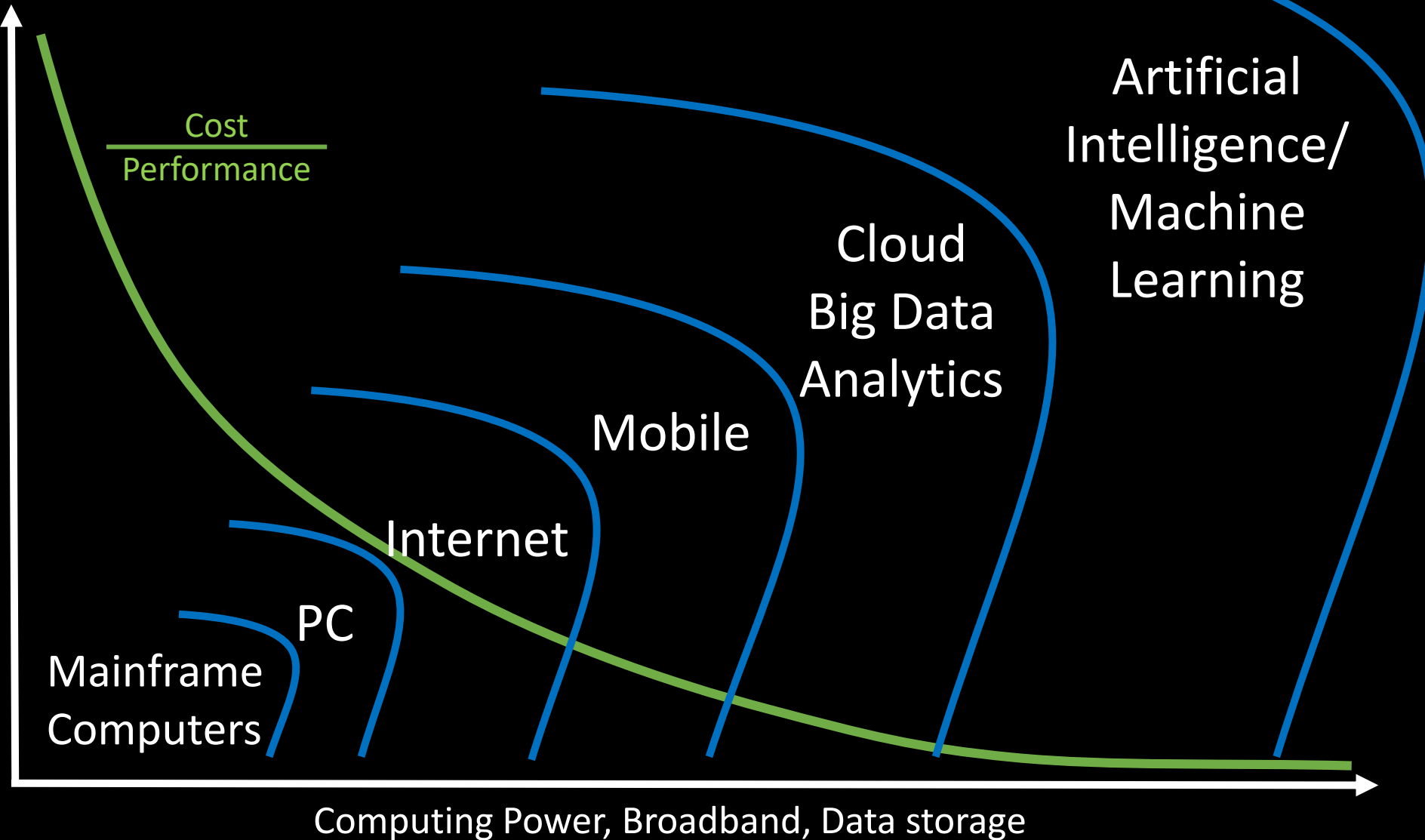
The systems make decisions themselves based on current and past acquired learning

**“AI is the alpha trend, because it’s fundamentally changing all other trends we [Accenture] are tracking.”**

**Paul Daugherty , Chief Technology & Innovation Officer, Accenture**

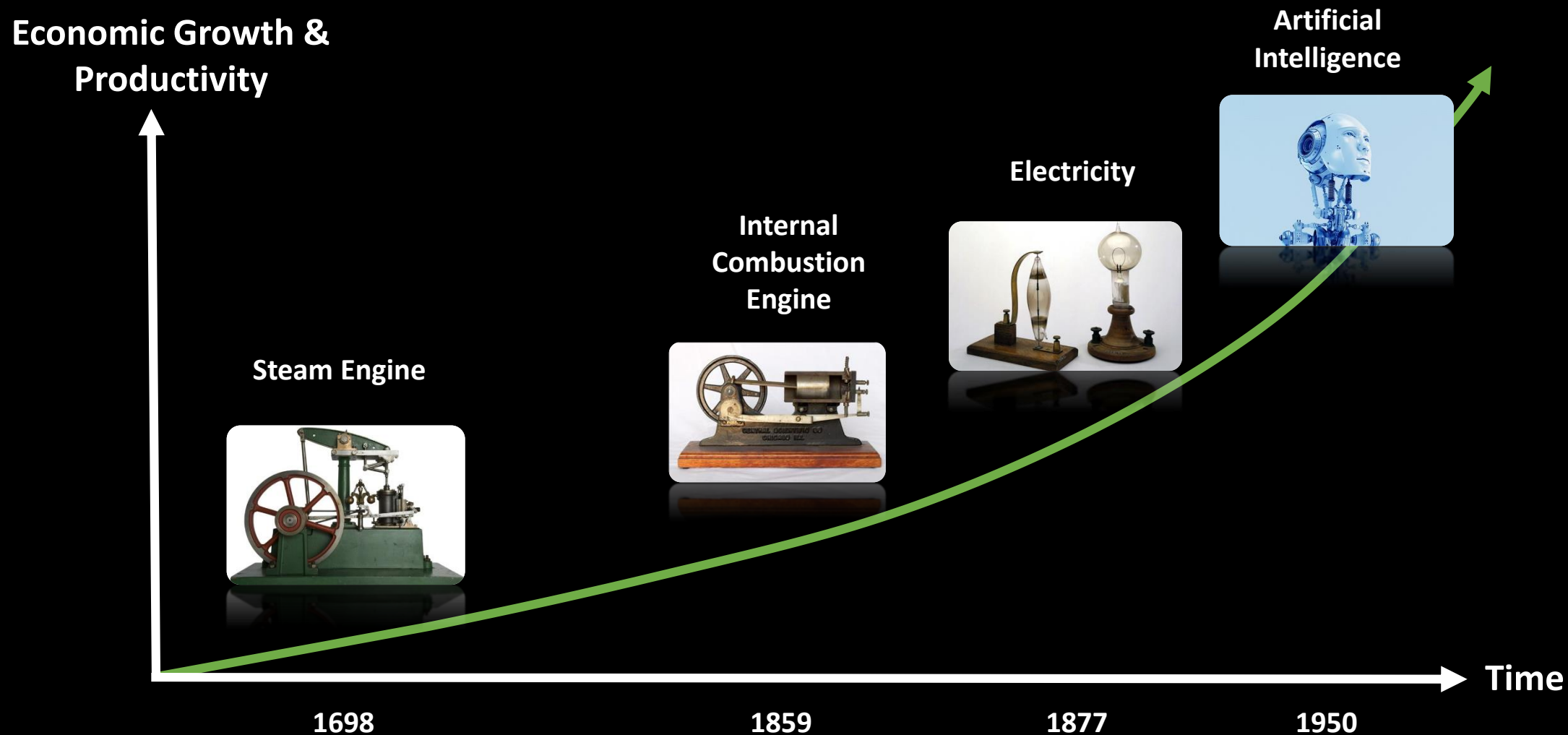
# Financial implications...

Market Size  
(\$ Billions)



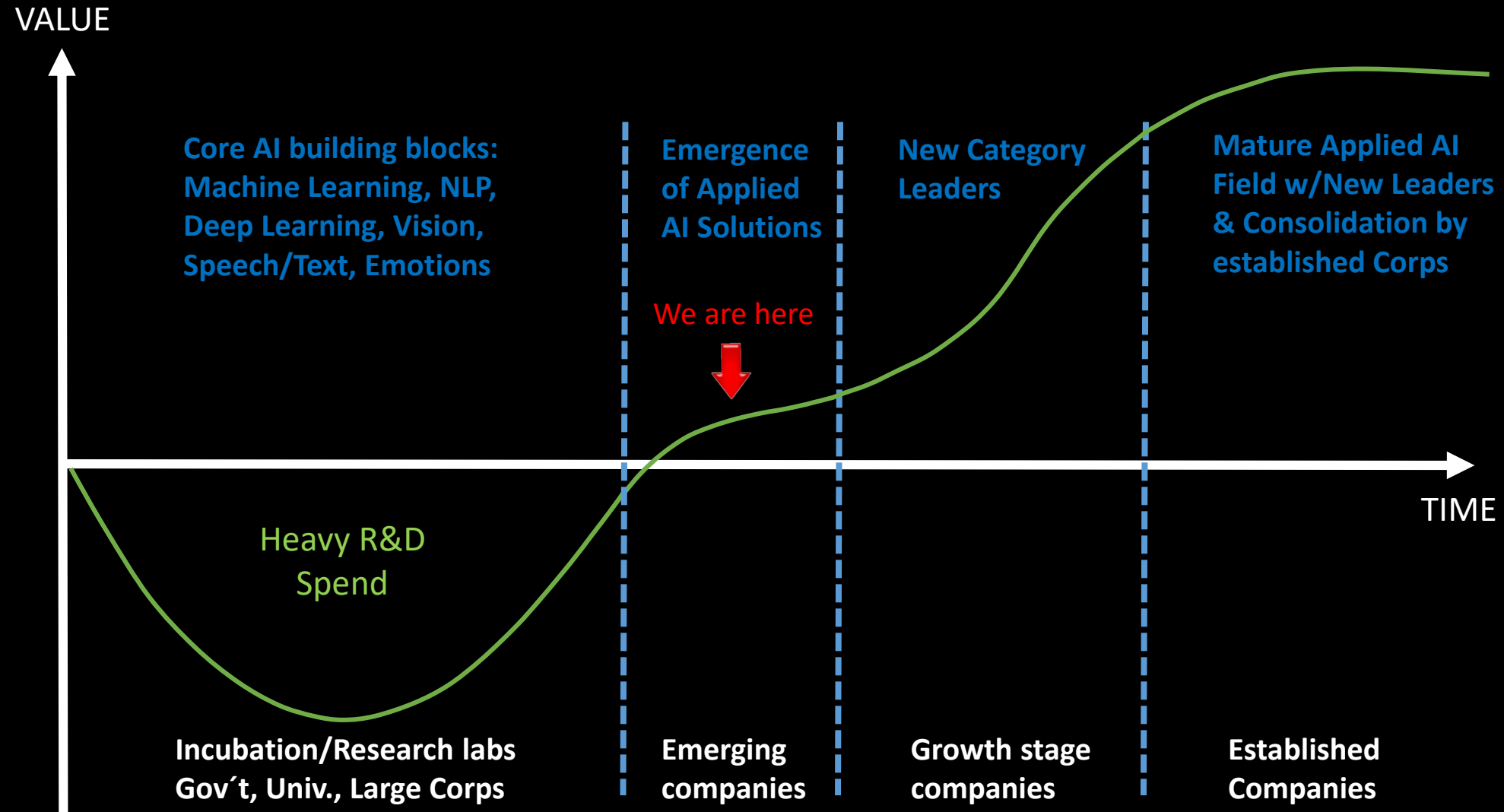
# Over the last 250 years...

General purpose technology innovation have generated massive economic and productivity growth





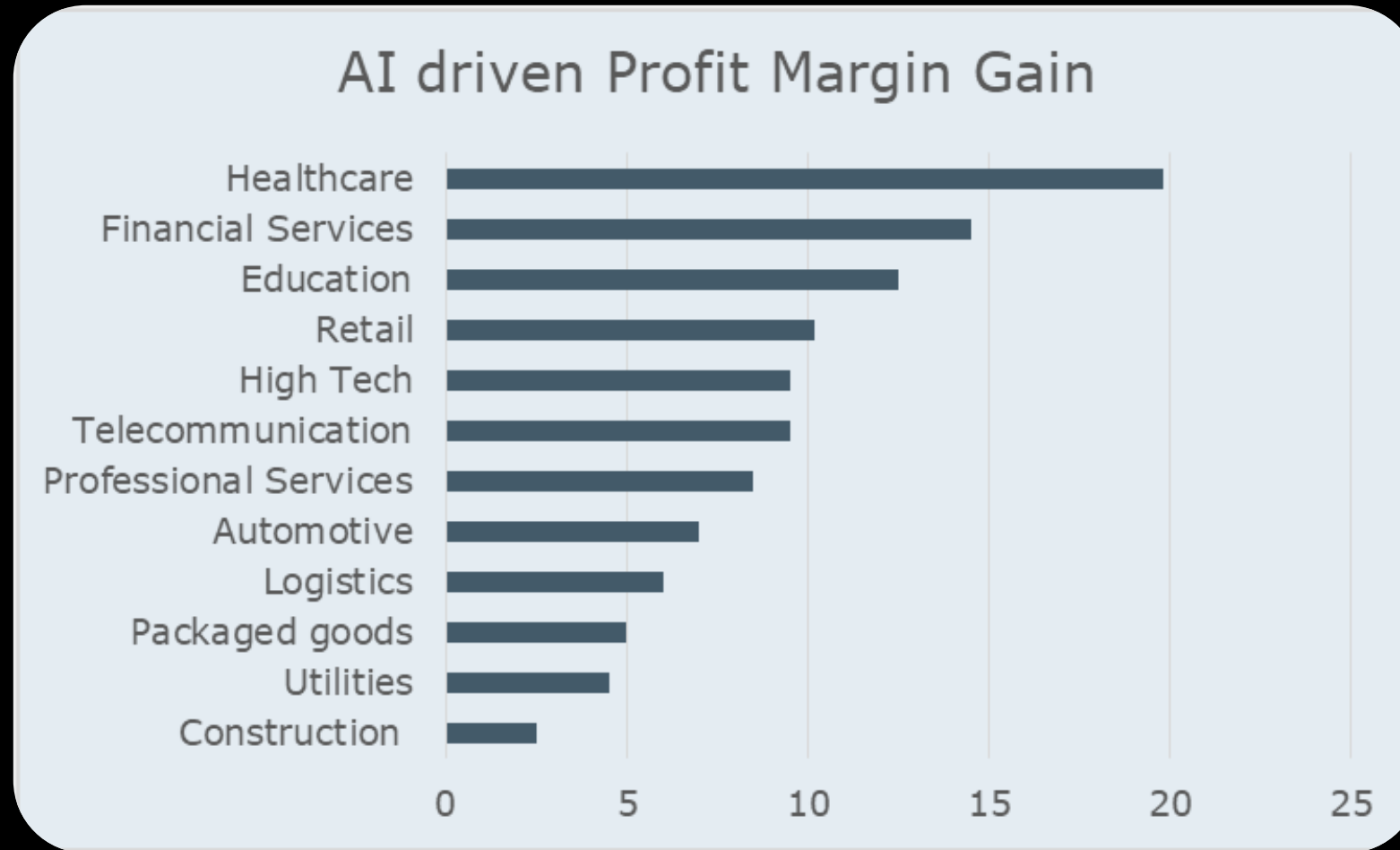
# AI – where are we now?



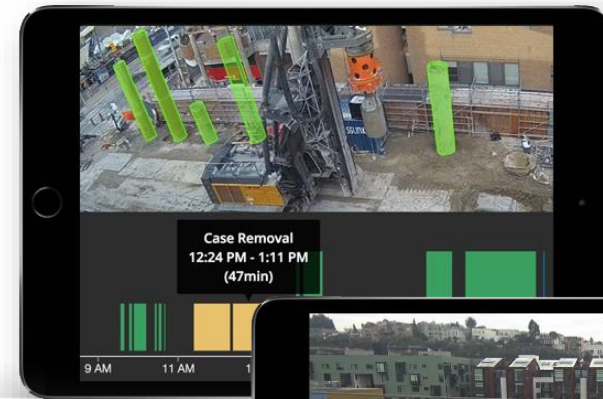
"AI has the potential to boost rates of profitability by an average of 38% and could lead to an economic boost of US\$14 trillion in additional gross value added (GVA) by 2035"

Accenture

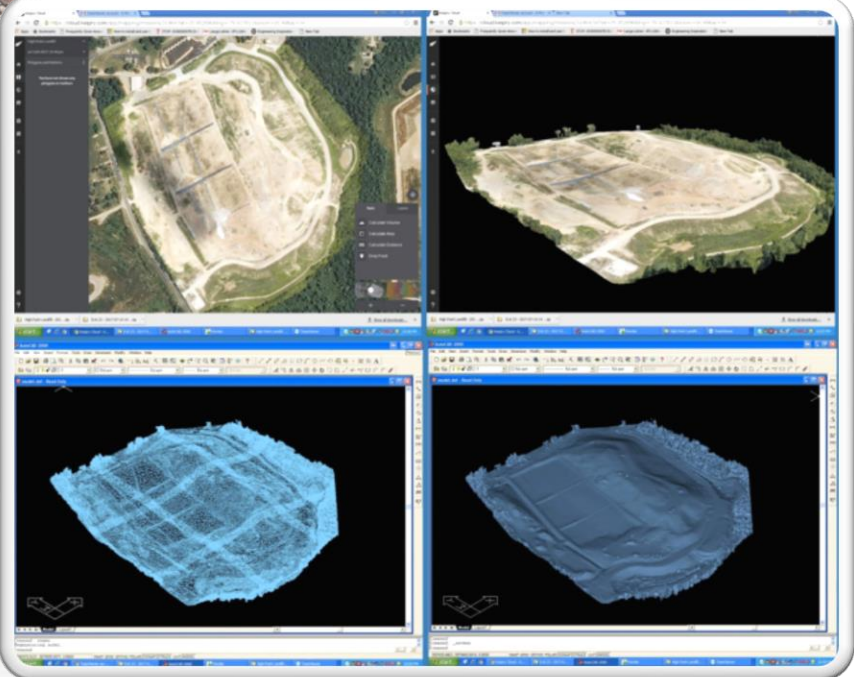
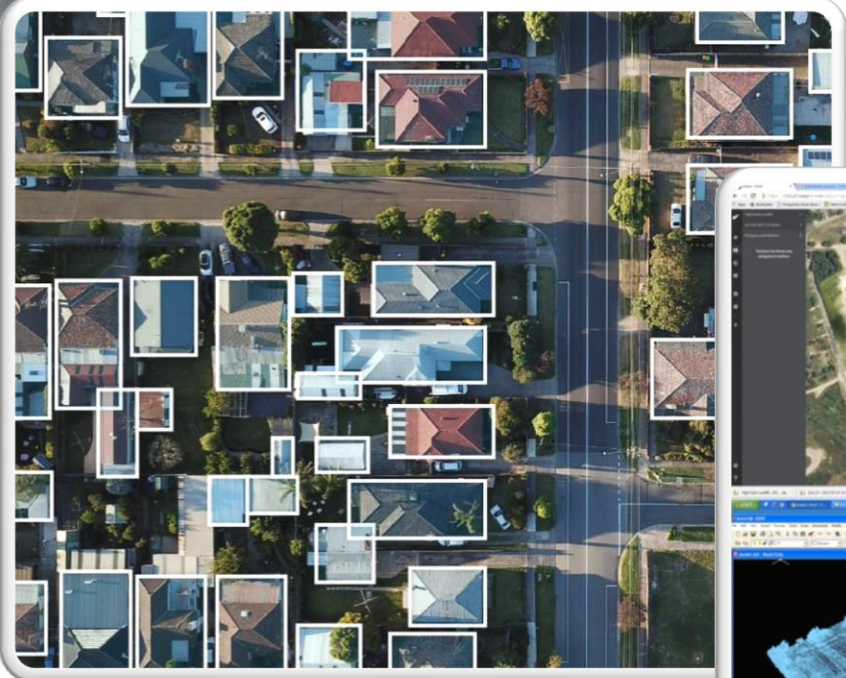
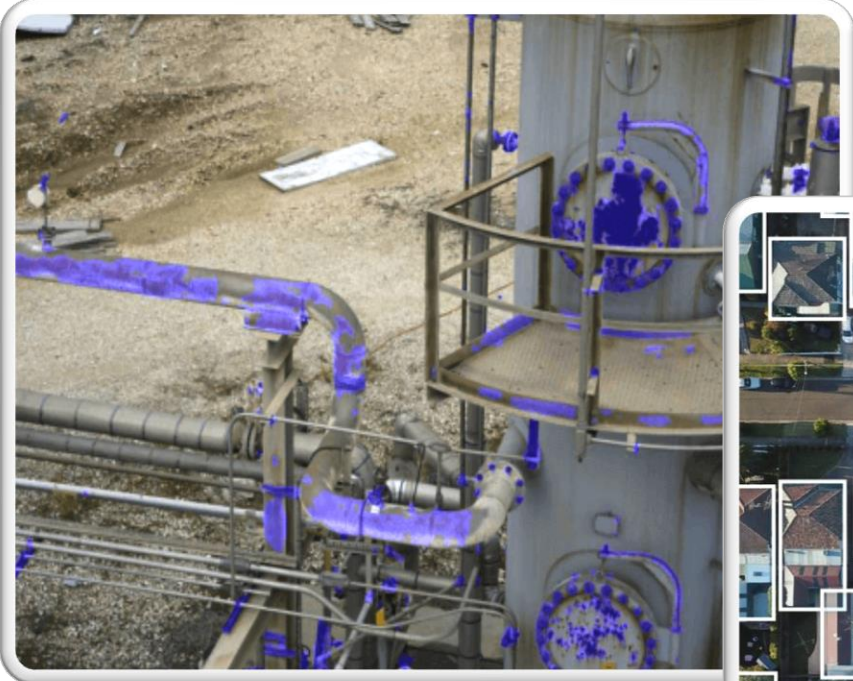
# Applied AI potential in different Industries



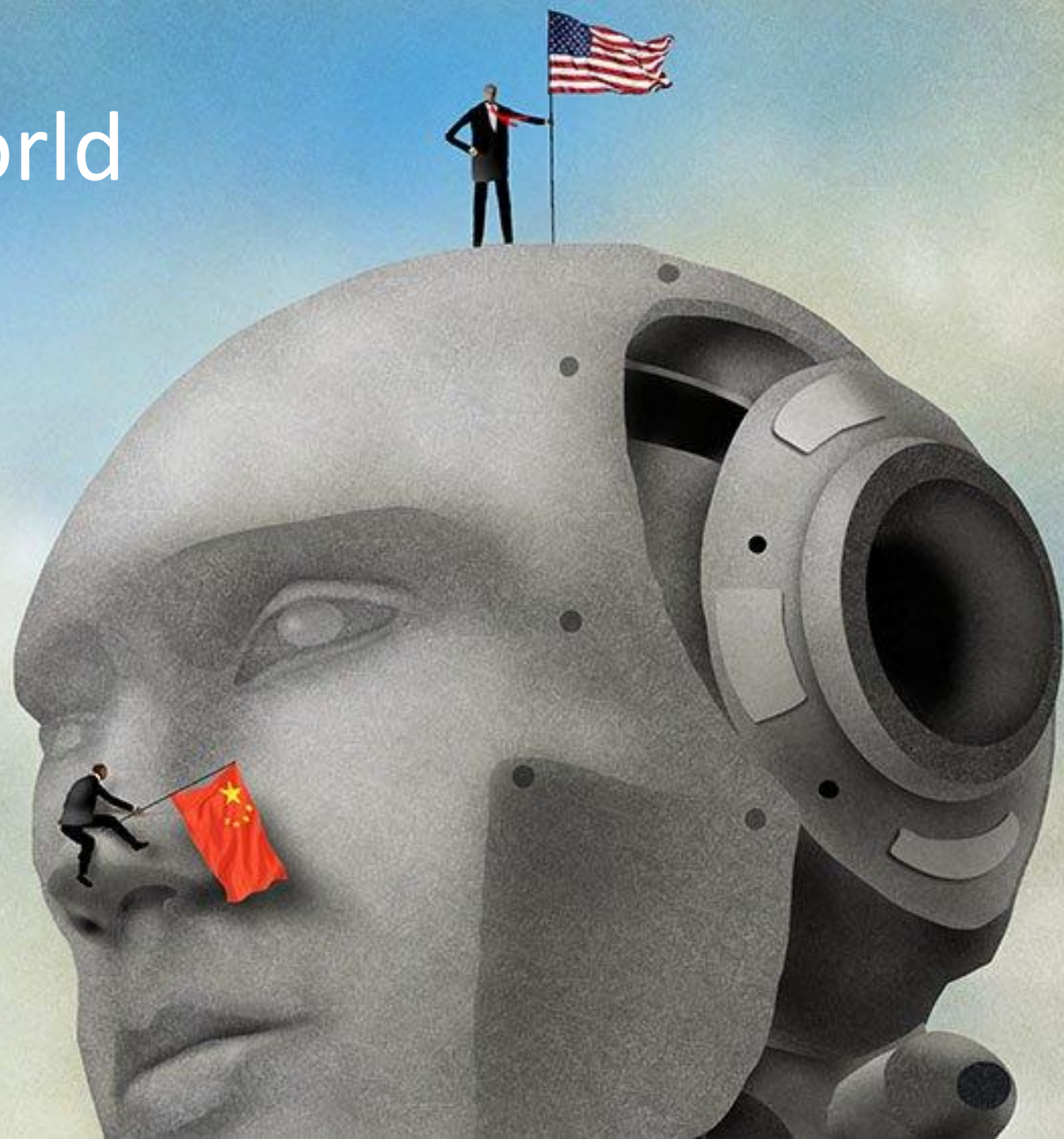
# Applied AI disrupting the Construction Industry...



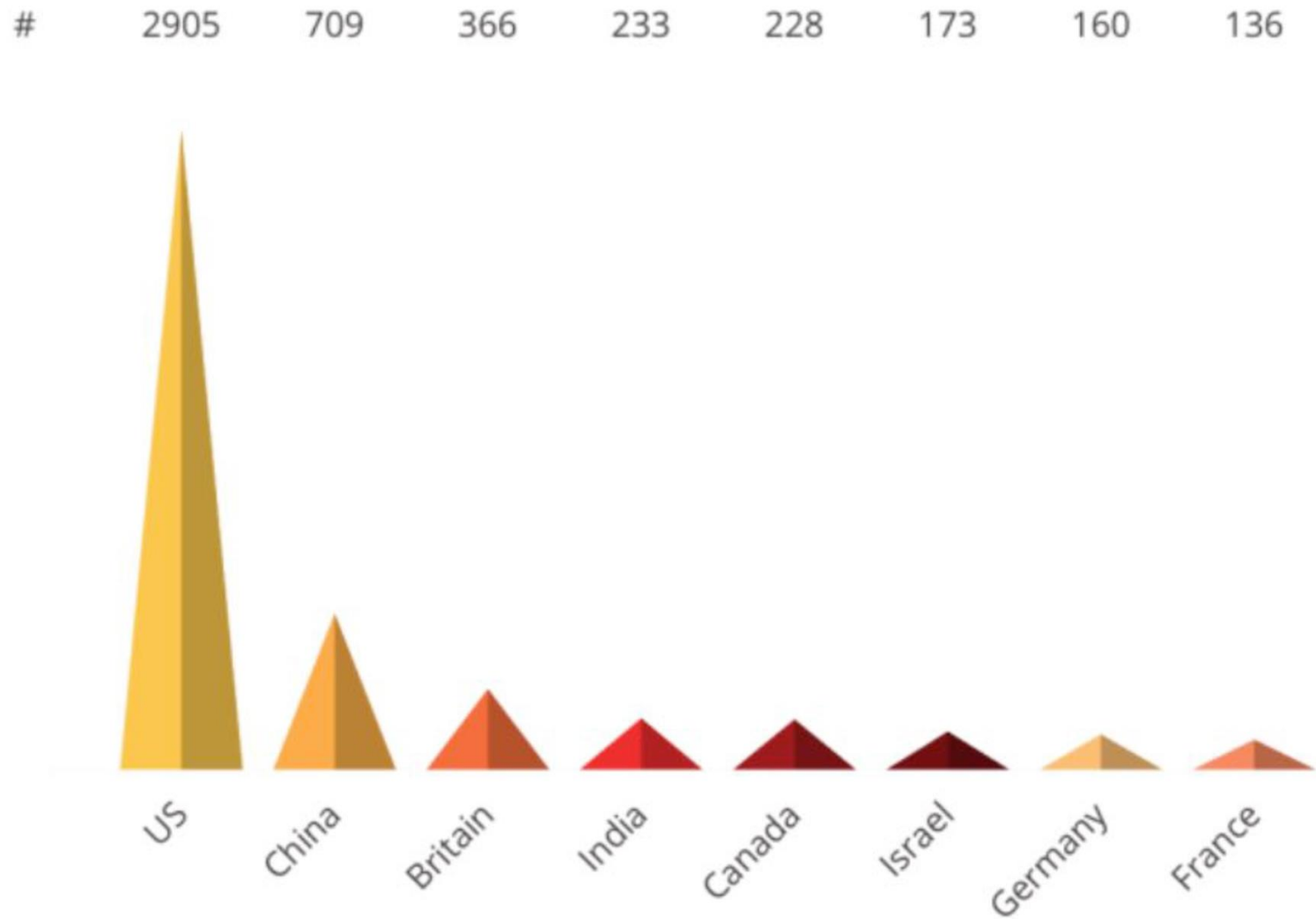
# Applied AI disrupting Inspection, Maintenance & Testing...



The battle for AI world  
dominance is on...



# GLOBAL DISTRIBUTION OF AI COMPANIES

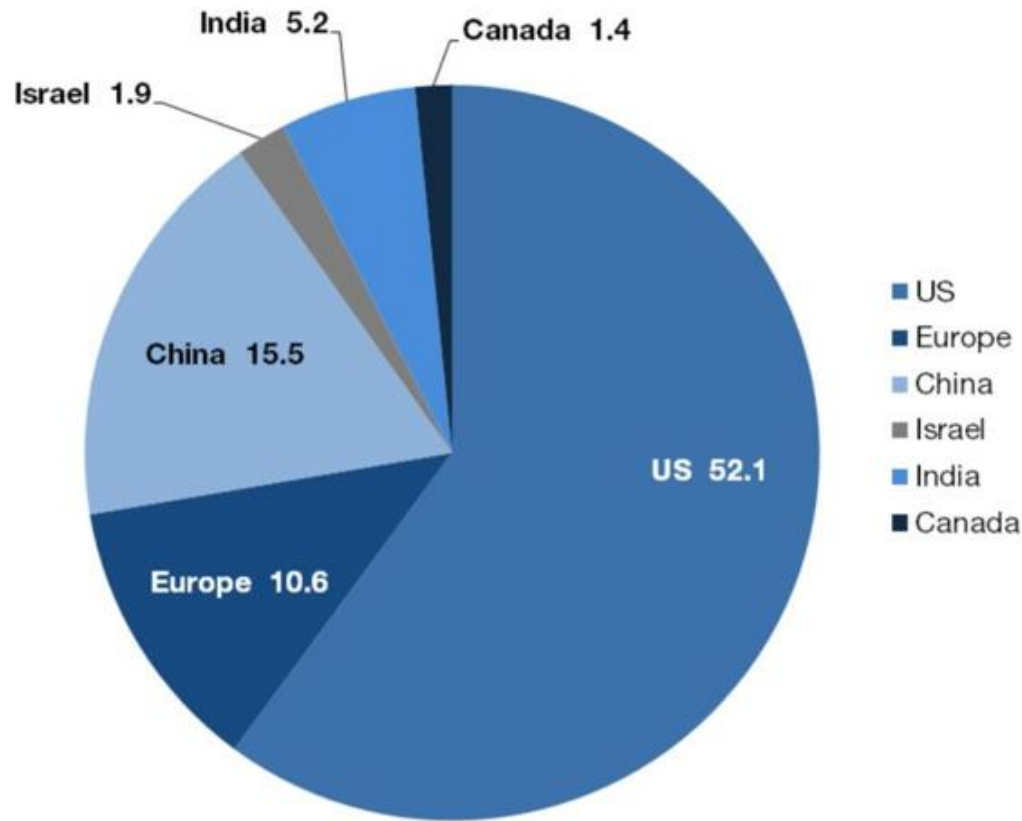


Source: Wuzhen Institute  
Infograph: Synced

# VC Capital invested in 2014...

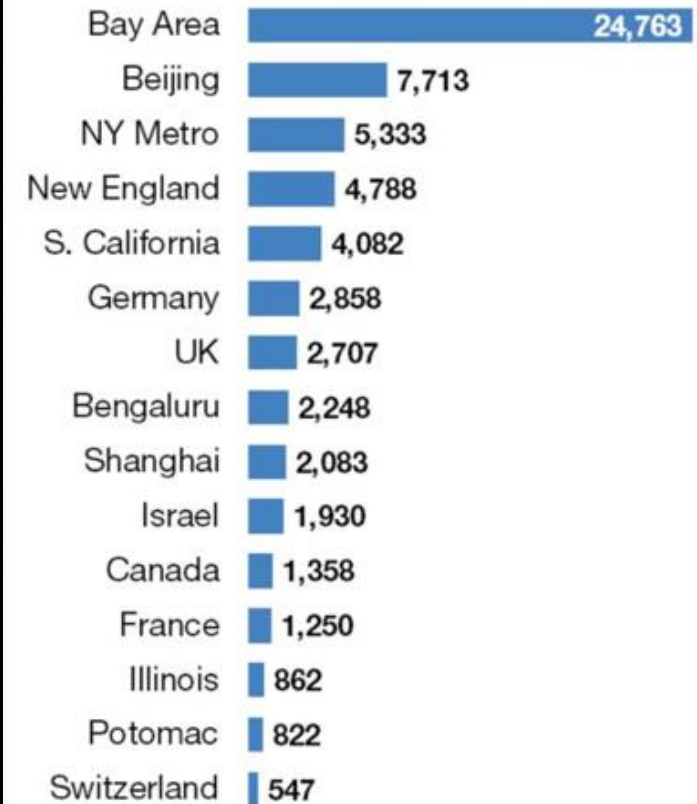
## Top countries for total venture capital invested

Share of total venture capital invested 2014, \$ billions



Source: Ernst & Young

## Where is venture capital going? 2014, US\$m



Source: World Economic Forum Collaborative Innovation report 2015





# Global investments in Artificial Intelligence in 2017: \$15,2 billion

China | 48%

USA | 38%

Rest of  
the world | 14%

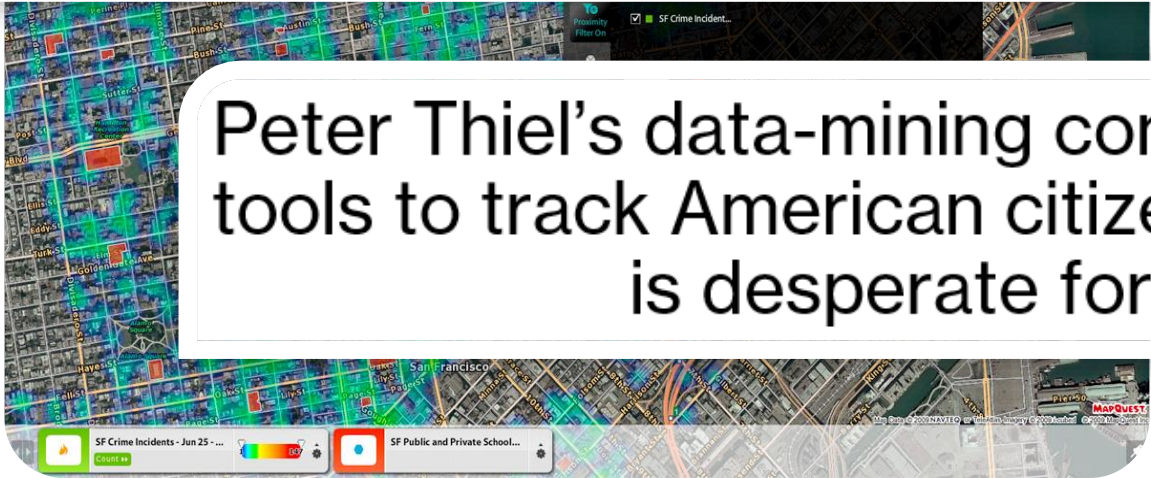
Venture  
Capital

"Turning Data  
into a Timeless  
Competitive  
Advantage"





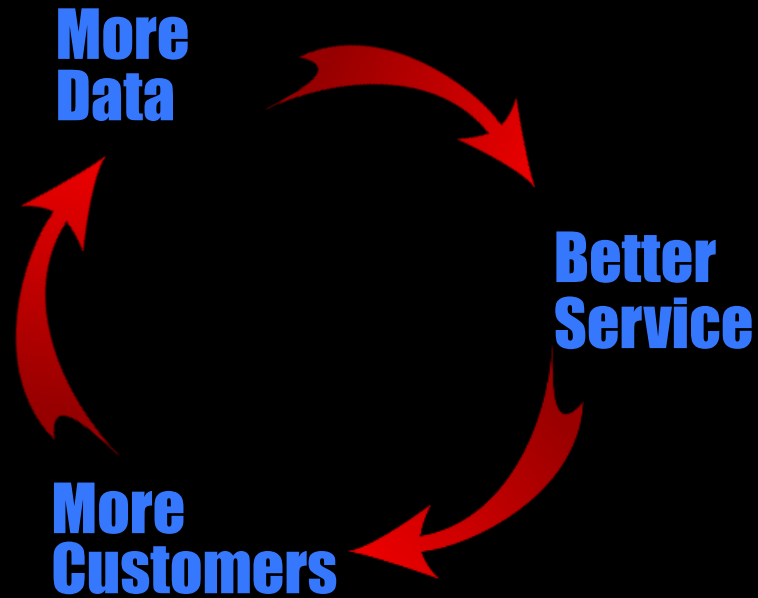
»Det er et firma med et meget dårligt ry blandt borgerretsorganisationer, fordi Palantirs systemer typisk bruges til håndtering af oplysninger om store grupper af ikke mistænkte borgere, altså masseovervågning. Det gør mig meget skeptisk overfor, hvad det er for et system, man ønsker at købe,« siger Jesper Lund, der er formand for IT-Politisk Forening, til Information.

A screenshot of the Palantir software interface showing a map of San Francisco with various data overlays. A legend at the bottom identifies 'SF Crime Incidents - Jun 25' and 'SF Public and Private School...'.

Peter Thiel's data-mining company is using War on Terror tools to track American citizens. The scary thing? Palantir is desperate for new customers.

As shown in the privacy breaches at Facebook and Cambridge Analytica, the pressure to monetize data at tech companies is ceaseless

# Why this thirst for data?

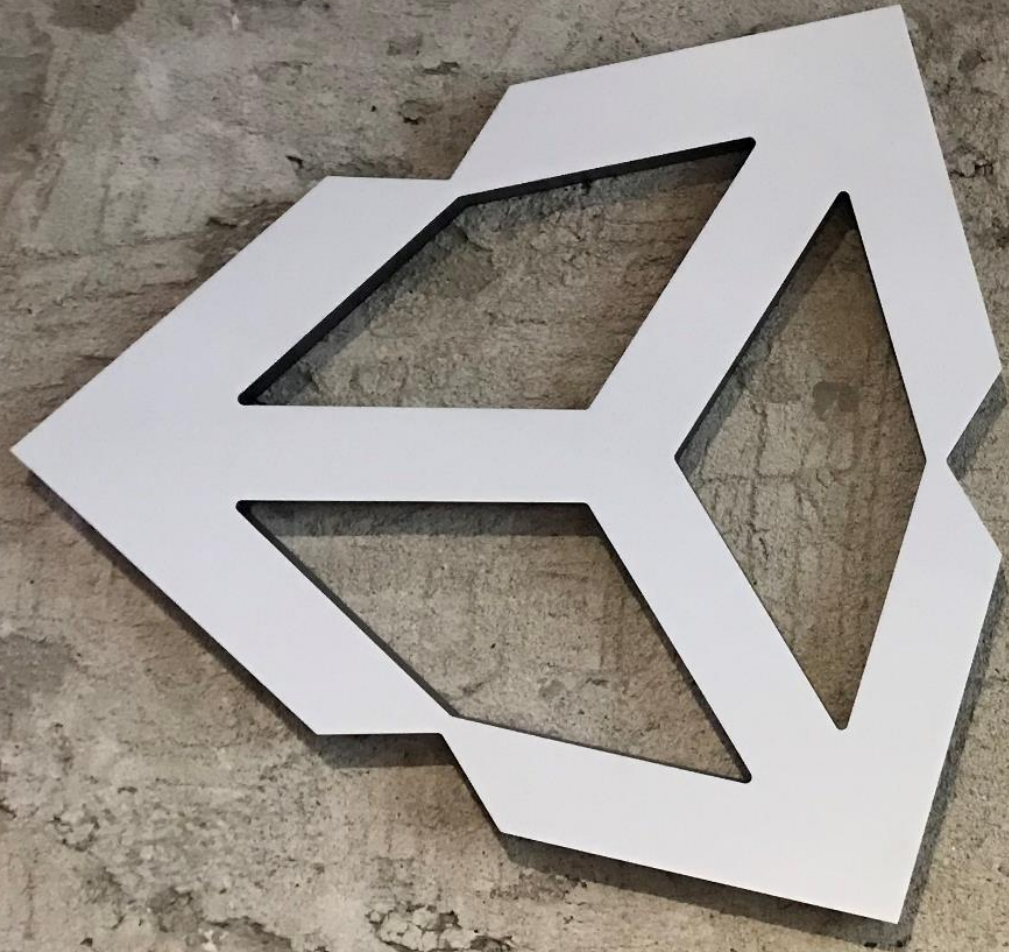


STAY AHEAD!

Google

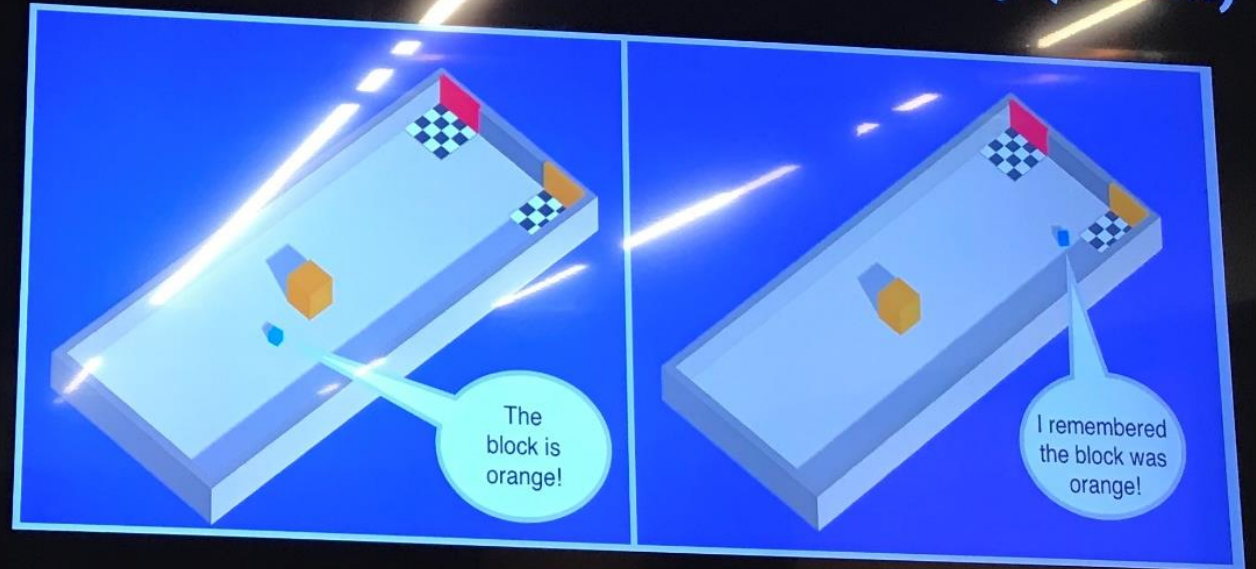


"Bringing AI to  
every Corner of  
your Organisation"



unity

# Enabling Long Short-Term Memory (LSTM)



# About Unity Technologies

- Real-time 3D Development Platform
- Game, AR/VR, film, automotive
- 60% of top 1,000 games
- On over 3 billion unique devices
- 1.5 billion monthly active players
- 2,000 employees with HQ in San Francisco

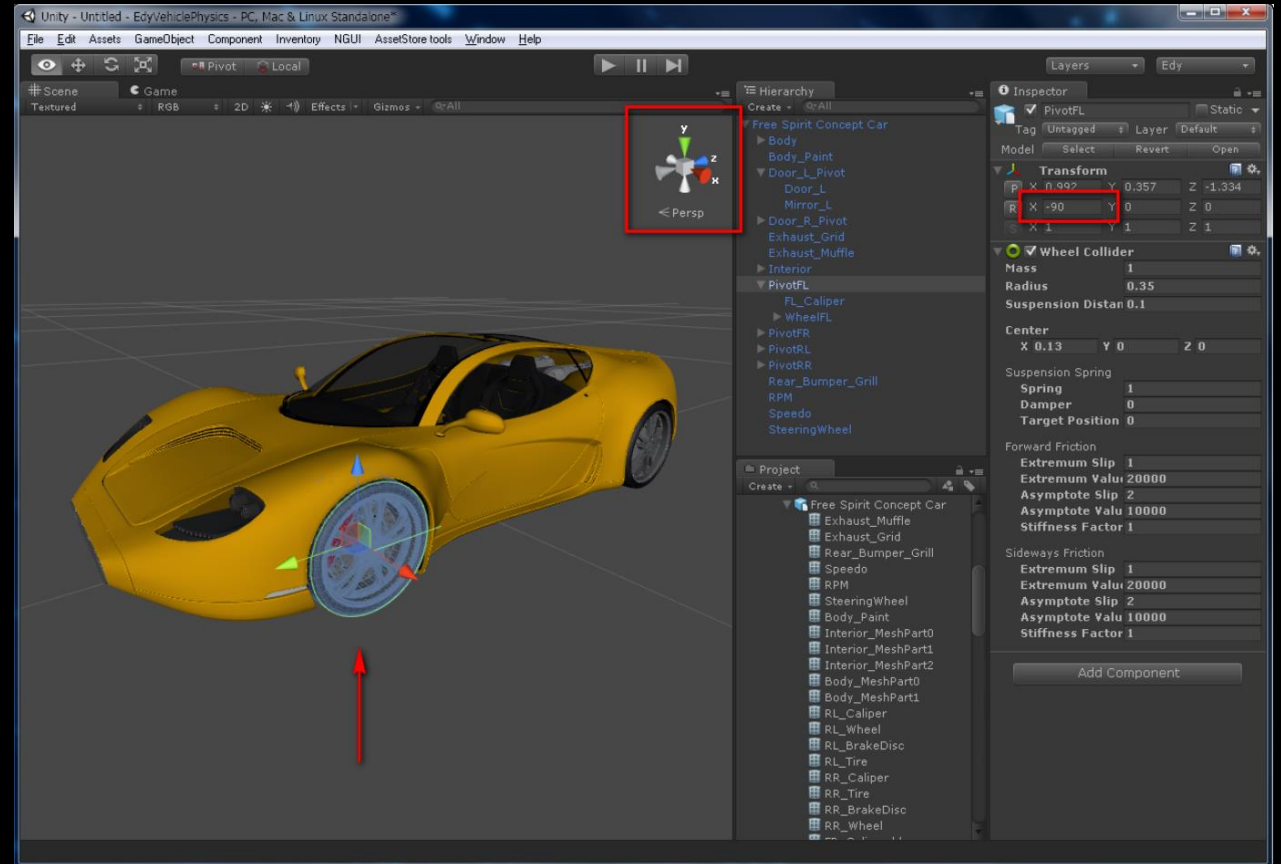


# UNITY 3D: One Game Engine to Rule Them All

**Before:** 3D objects from AUTODESK  
-> UNITY (games)

**Future:** 3D engine in AUTODESK ->  
simulate physics in real time and  
realistically directly in AUTODESK

Will AUTODESK be able to make  
designs in the future based on  
machine learning from thousands  
of previous designs and physical  
laws?



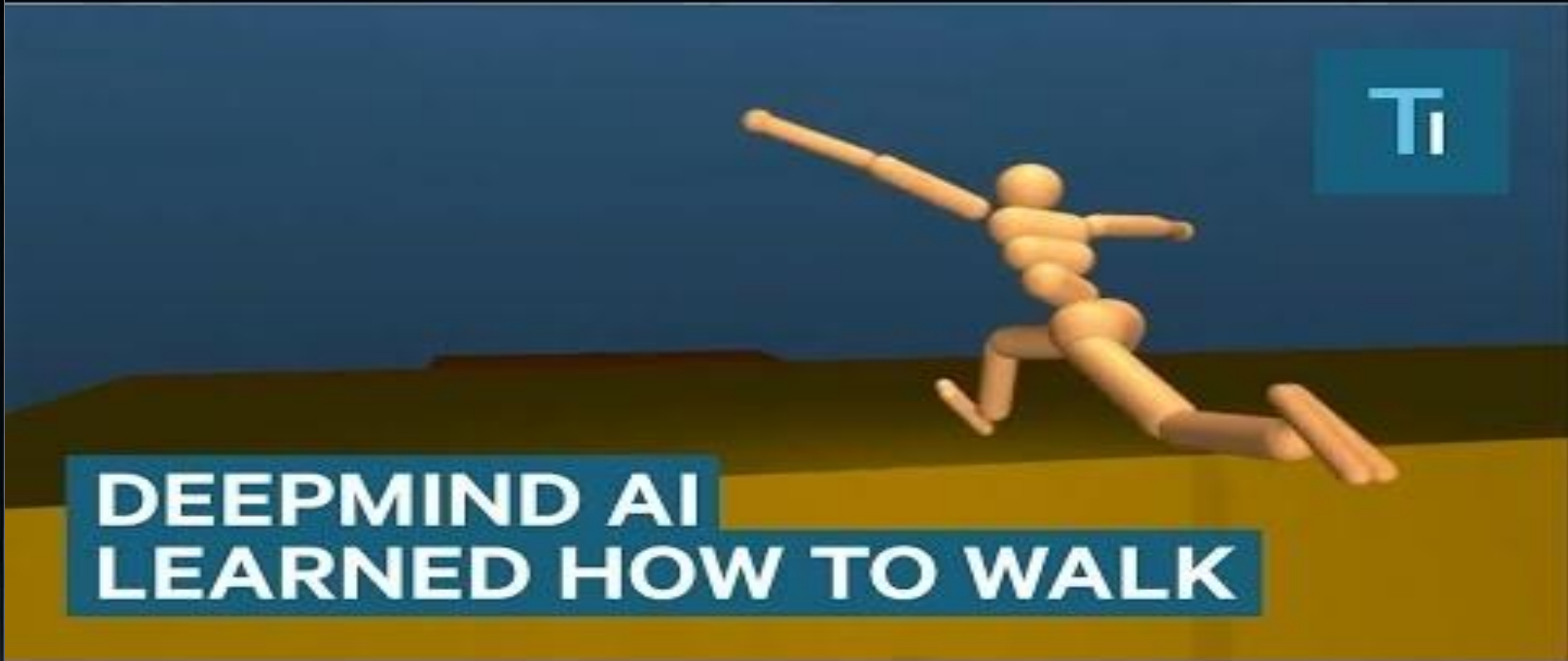


So how does AI work?



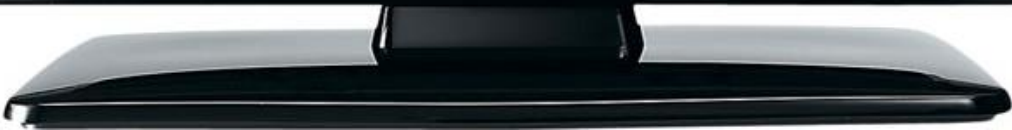
And how mature is the technology?

REGZA

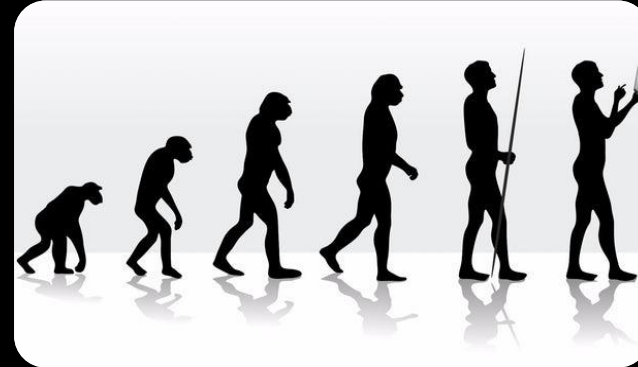
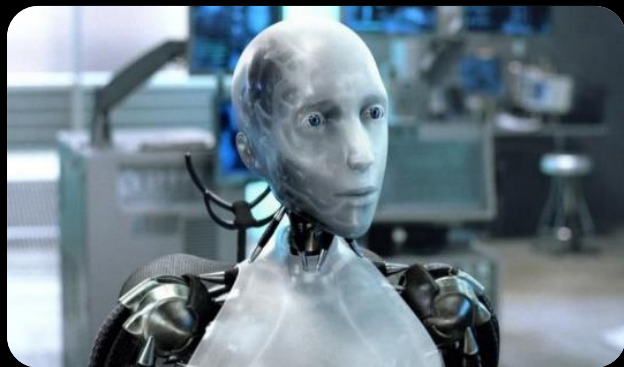


**DEEPMIND AI  
LEARNED HOW TO WALK**

TOSHIBA

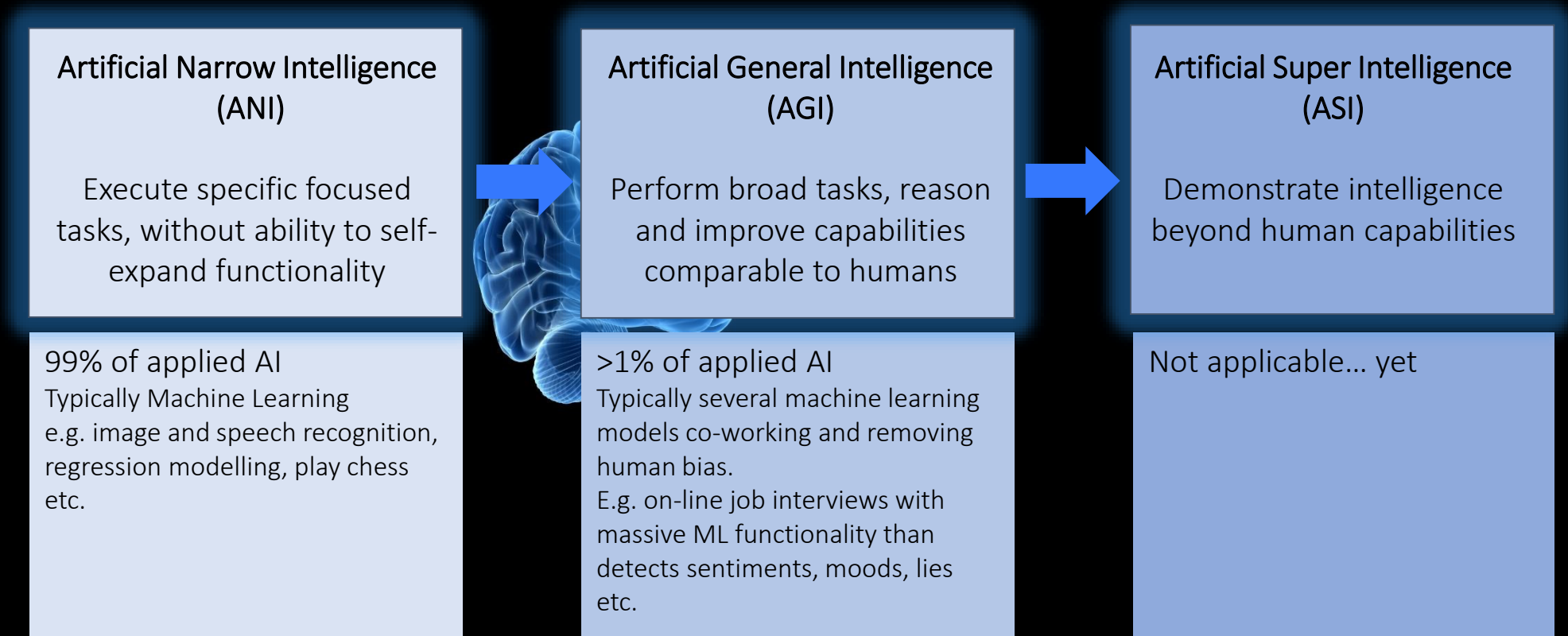


# Machine learning resembles Human learning



# So how widespread is AI today?

## AI stages:



Even narrow AI can struggle...

The Chihuahua vs.  
Muffin challenge



# The Gaming Industry is leading AI development...

AI maturity



Kasparov loses Chess Match to IBM's Deep Blue computer



Google Deepmind's AlphaGo beats Lee Sedol



Google Deepmind's AlphaGo Zero crushes AlphaGo and every other opponent in just 40 days



Google Deepmind beats world's best players in Starcraft II



UNITY launches new challenge to combine several types of Machine Learning



"No scalable AI without solid data management"

"3D models of the future will be intelligent"

"AI today is mostly machine learning in a narrow application"

## Conclusions on PART 1

"Anything that can be automated will be automated"

"Most AI algorithms are open source/free, data is the asset you want to protect"

# PART 2

Application of AI in **COWI**

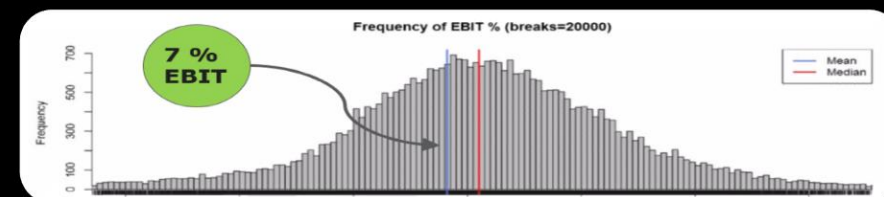


# The Application of Machine Learning – 3 cases:

Prediction of High Shallow Groundwater  
– Region Midt, DK



Prediction of Project performance  
based on ERP data – COWI internal

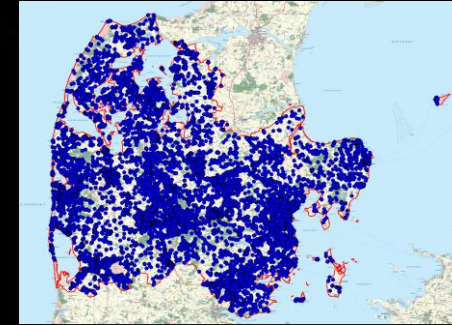


Match Making on Waste as a Resource  
– COWI DK and COWI NO



# Prediction of High Shallow Groundwater

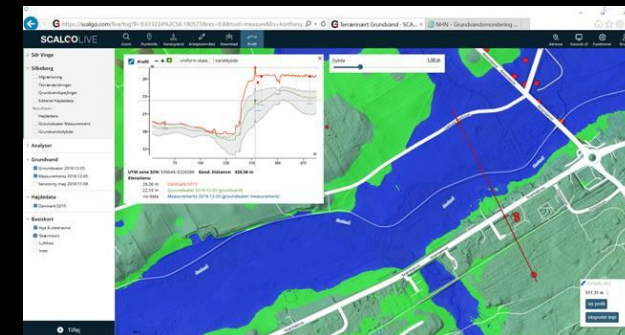
Water levels from +15.000 sampling points  
Heavy statistical computation/normalisation  
of data (COWI Connect platform)



Patterns in areas with data is used to  
predict water levels in areas with no  
data (Random Forrest ML)



Flooding prediction using a highly  
advanced 3D terrain flooding model  
(SCALGO LIVE)

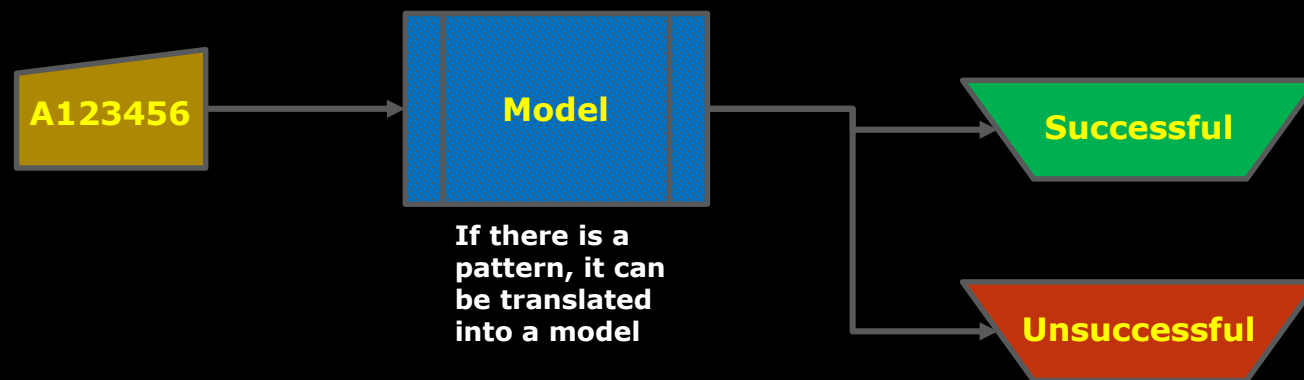


# Prediction of Project Performance based on ERP data

Is it possible to find a pattern identifying successful projects?

Log onto **amazon** : "Who you are and your previous purchase pattern tells us what books you like - so may we propose this new one?"

Create a **COWI** project: "Who you are and the basic information you have registered for your project matches a pattern in Cockpit (ERP) that predicts the project to become successful (or not)"



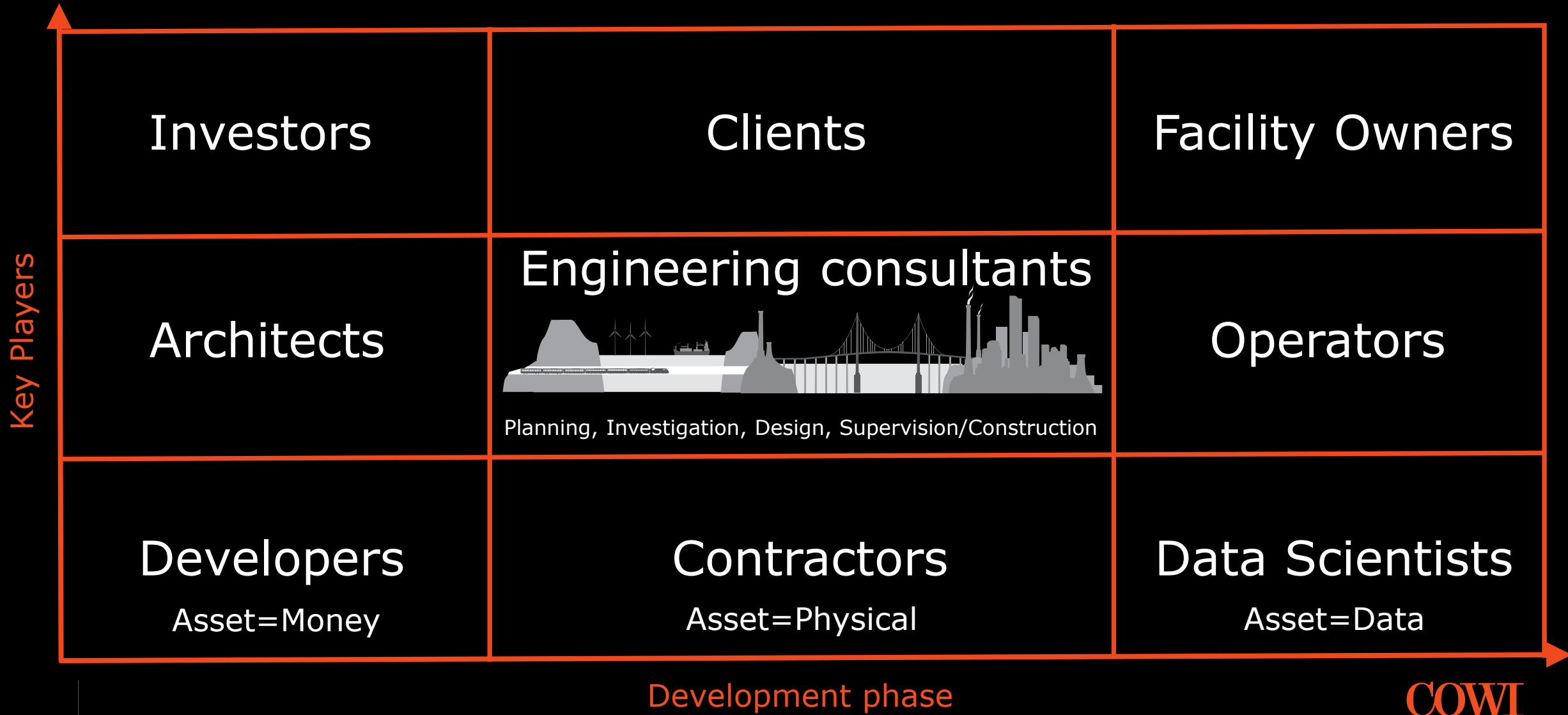
# Prediction of Project Performance based on ERP data



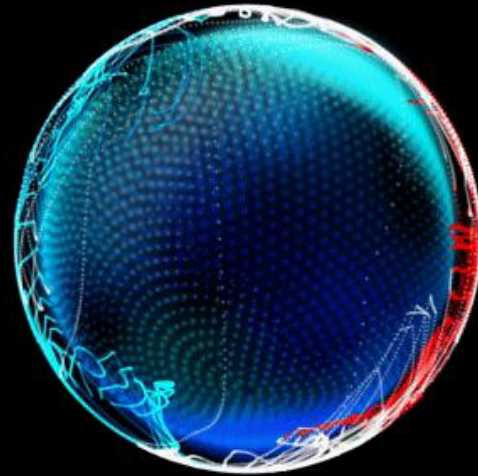
Using standard ML tools on 50.000 executed projects, we got a 75% prediction accuracy indicating that:

1. Who is **Project Manager** matters most
2. Who is **Customer** matters a lot
3. Which **COWI region** matters
4. Effect of the **degree of distributed work** is uncertain

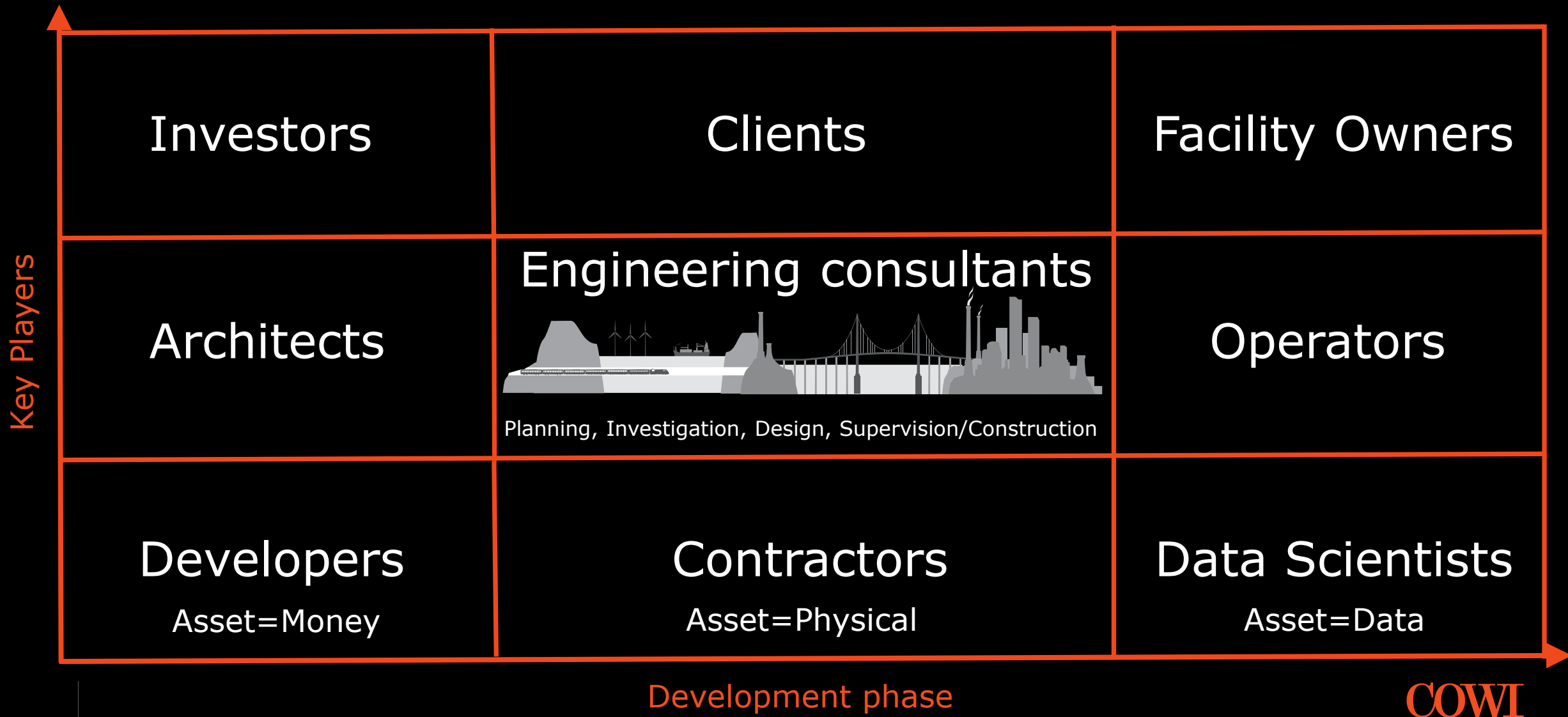
# The role of Engineering Consultants today



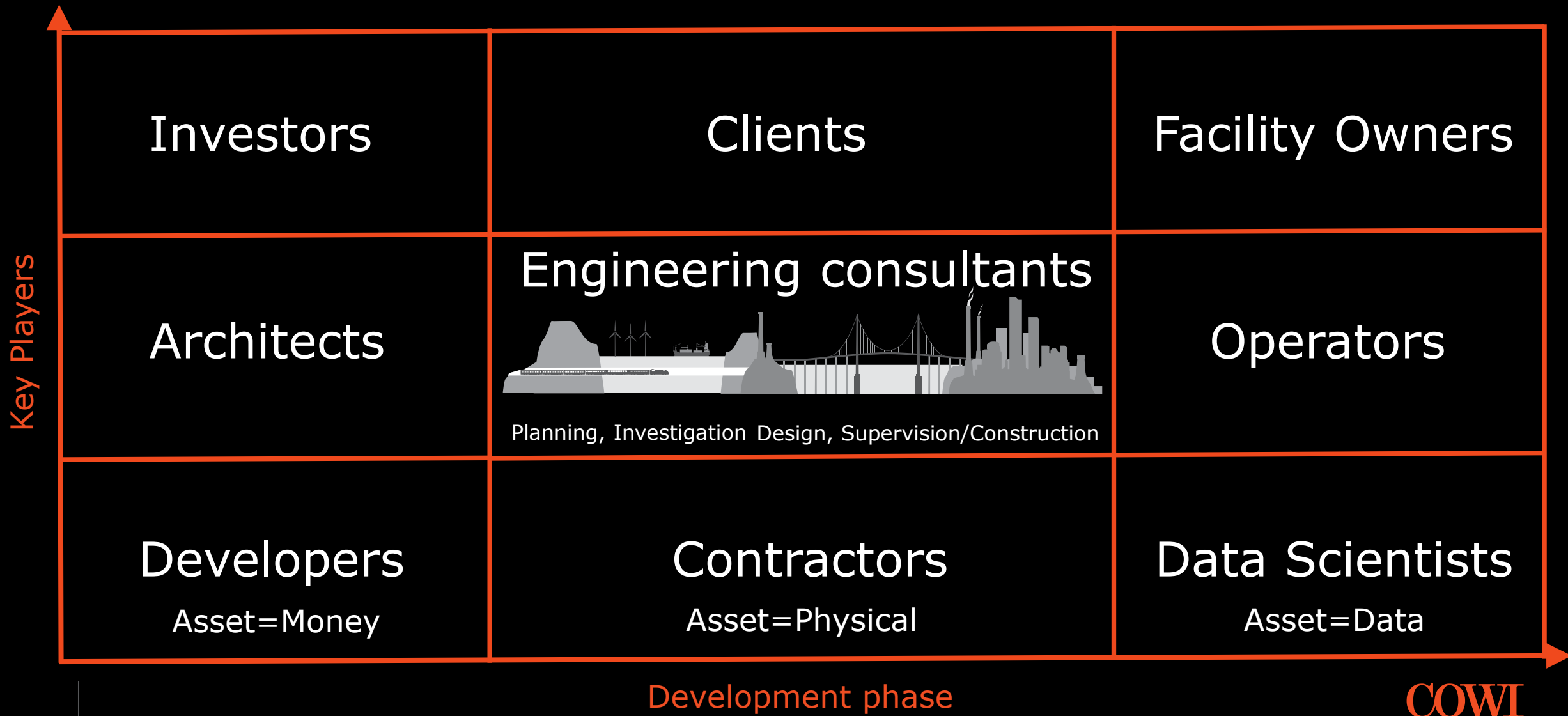
# What is The Future for Engineering Consultancy?



# Trend 1: Acquisition of Architect Companies

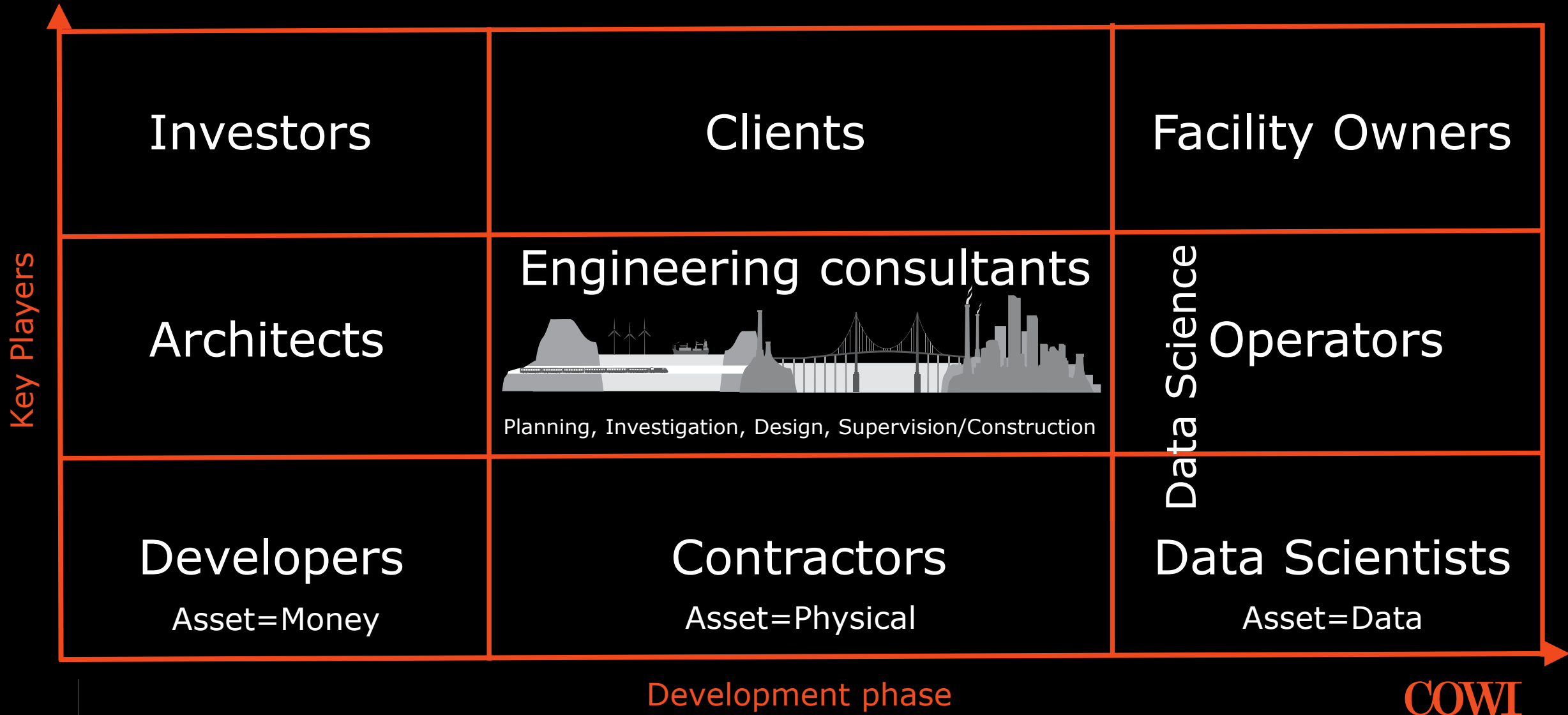


# Trend 2: Contractors take up Design and Supervision

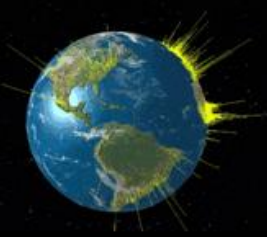




# Trend 3: Engineering Consultants acquire Data Science



# Digital Partnerships that will change the world of engineering...



The Digital Development  
is changing the Business  
Landscape...



... so we need to  
find new ways  
of moving forward

"Machine learning can compete with traditional modelling"

"Traditional Engineering Consultancy will be challenged by both Tech Companies and Management Consultants"

"Most Engineering Consultants are broadening their digital value chain"

## Conclusions on PART 2

"Data Science capabilities will be in demand – both internally and as consulting services"

"Digital partnerships between AUTODESK, ESRI and UNITY is going to change the E&C industry dramatically"

And remember...

No Industry...

No Organisation...

No Individual...

- will be left untouched by Artificial Intelligence



THANK YOU

And remember...

No Industry...

No Organisation...

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- will be left untouched by Artificial Intelligence



THANK YOU







**Machine Learning** is a lot like teenage sex...

Everybody talks about it.

Only some really know how to do it.

Everyone thinks everyone else is doing it.

So, everyone claims they are doing it.