luxexecutivesummit 2018
Tokyo • October 17

Navigating the AI Adoption Minefield

Pitfalls, best practices, and developing your own AI roadmap

Presenter: Cosmin Laslau, Director of Research Products, Lux Research

Agenda

1. **Why you – yes, *you* – need to get dangerous on AI, fast**
2. Three pitfalls to avoid as you start your AI journey
3. Developing your AI roadmap

Audience poll:
Raise your hand if you are currently *leading* an AI project.

Or, if you are currently day-to-day ***involved*** **in an AI project**, raise your hand.

Within a few years, almost everyone in this room will start to work with AI. **You may even be in charge.**

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e.g., *"Help us use AI to develop products faster,"* or *"Find an AI partner for us,"* or…

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Real urgency here – where do we begin? What are the pitfalls?

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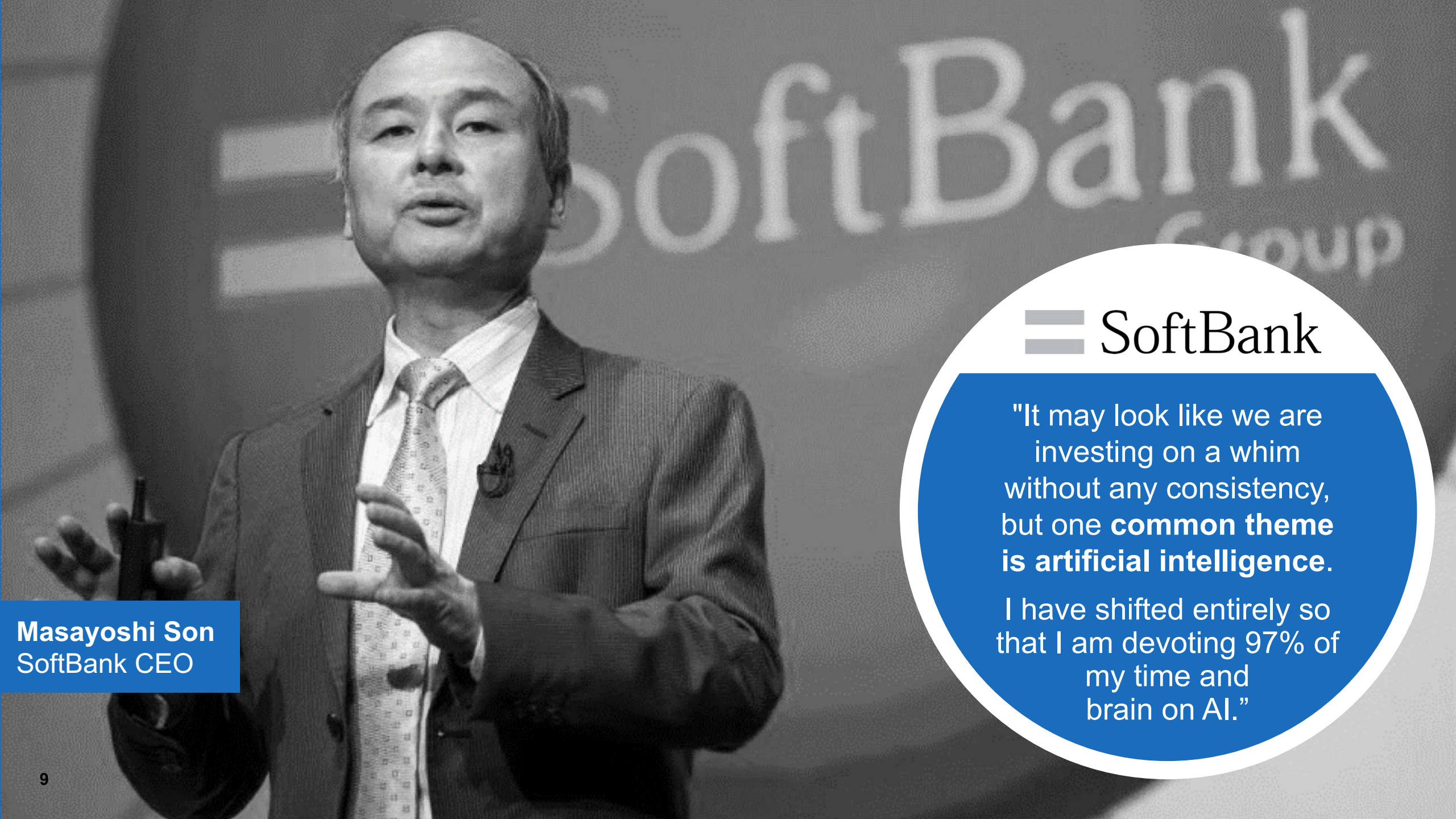
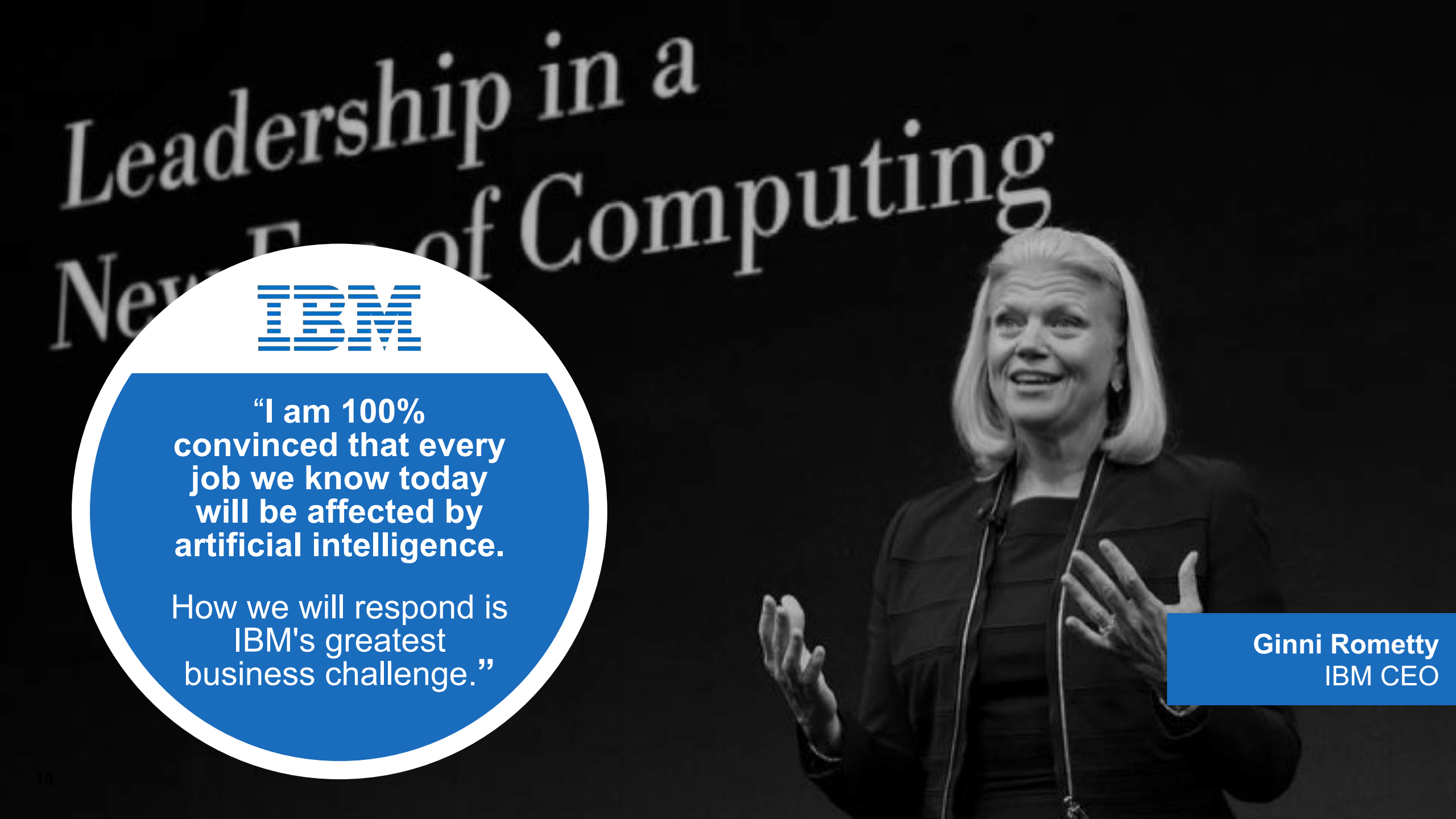


Masayoshi Son
SoftBank CEO

SoftBank

"It may look like we are investing on a whim without any consistency, but one **common theme is artificial intelligence**.

I have shifted entirely so that I am devoting 97% of my time and brain on AI."

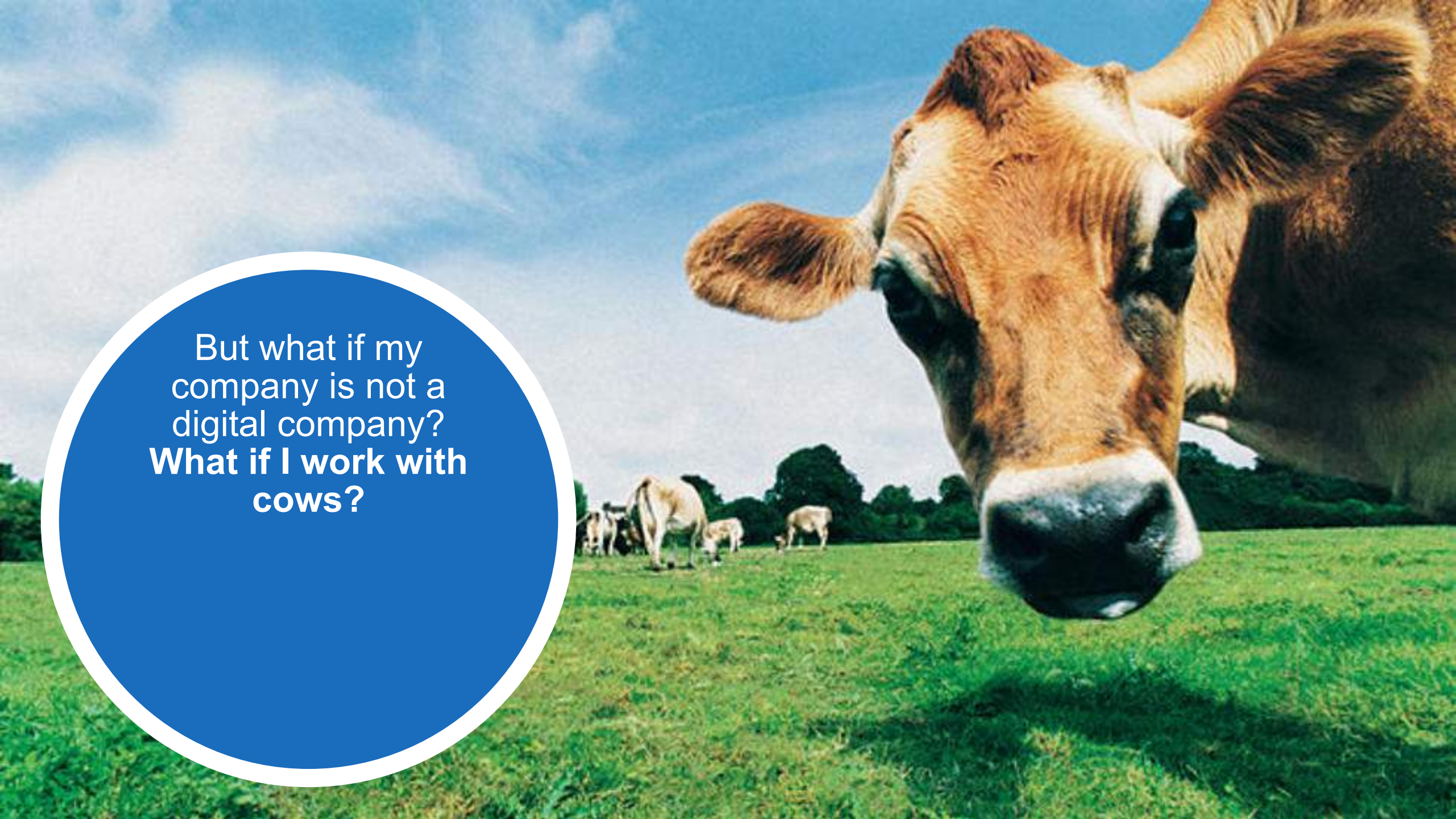


IBM

“I am 100% convinced that every job we know today will be affected by artificial intelligence.

How we will respond is IBM's greatest business challenge.”

Ginni Rometty
IBM CEO

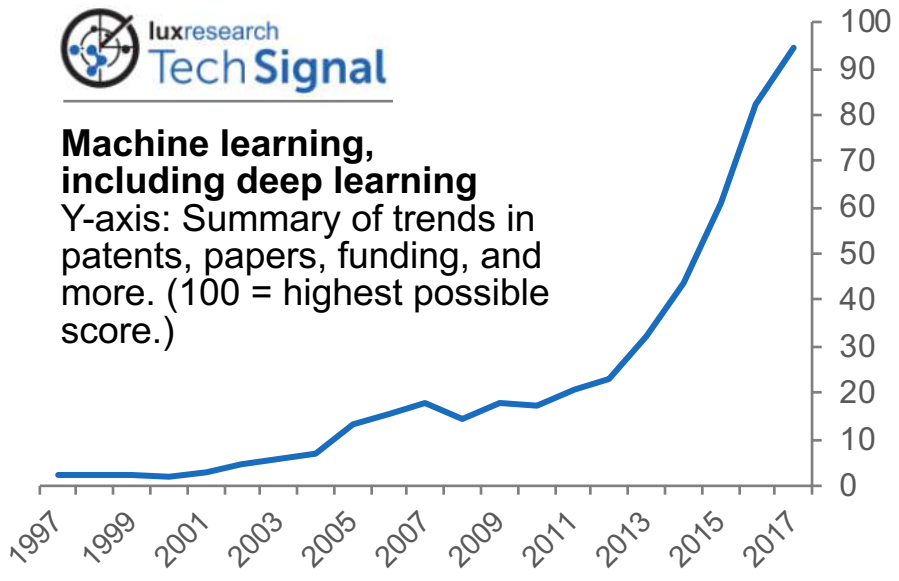

But what if my company is not a digital company?
What if I work with cows?

But what if my company is not a digital company? **What if I work with cows?**

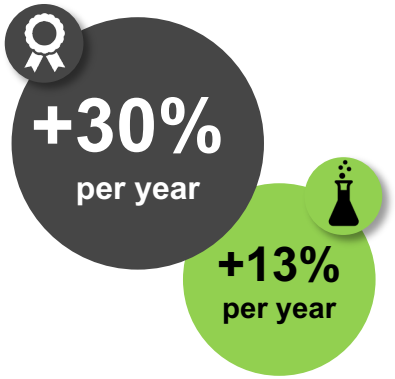
Got A.I? Facial recognition now works on cows, with goal of better milk

Cargill™ + cainthus

Beyond anecdotes: Here is what the world is turning its innovation attention to, as counted by patents, papers, and funding



We analyzed all of the world's patents, academic papers, and funding for thousands of topics, spanning the A-Z of materials to health to energy to digital.



Machine learning has had a remarkable rise: **patents up by 30% annually, and academic papers by 13%.**

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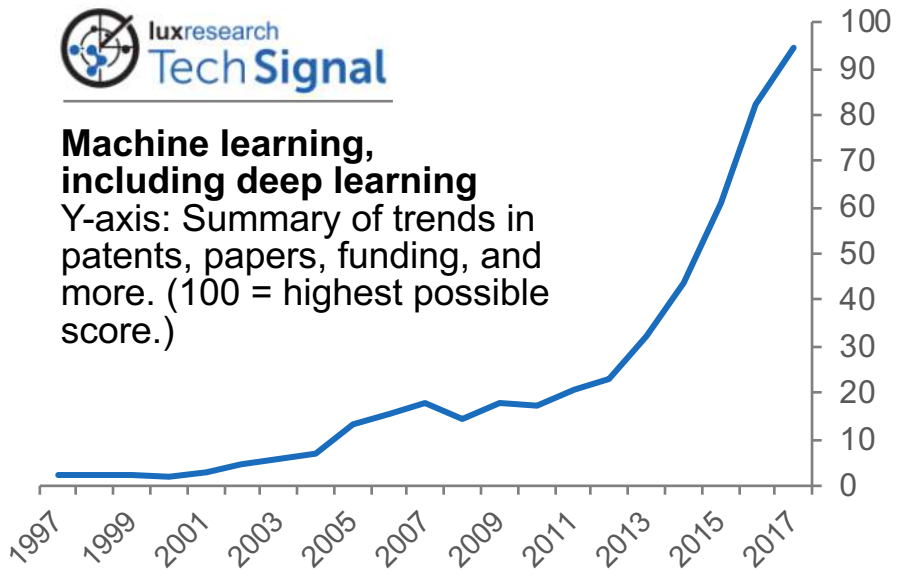

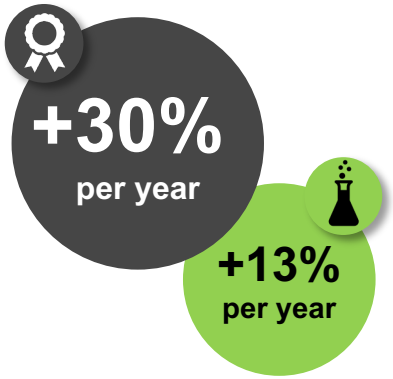

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AI dominates the leaderboard:

1. Neural networks
2. Deep learning
4. Data science
7. Labeled data
8. Artificial intelligence
9. Data lakes
15. Backpropagation
16. Classification models
17. Convolutional neural networks
20. Machine learning
24. Edge computing
29. Reinforcement learning

The 2-minute version of the AI landscape, for us to level-set.

(Grossly simplifying a very complex field.)

General AI: What media often focuses on, the idea of an AI that can do everything very well; not happening anytime soon.

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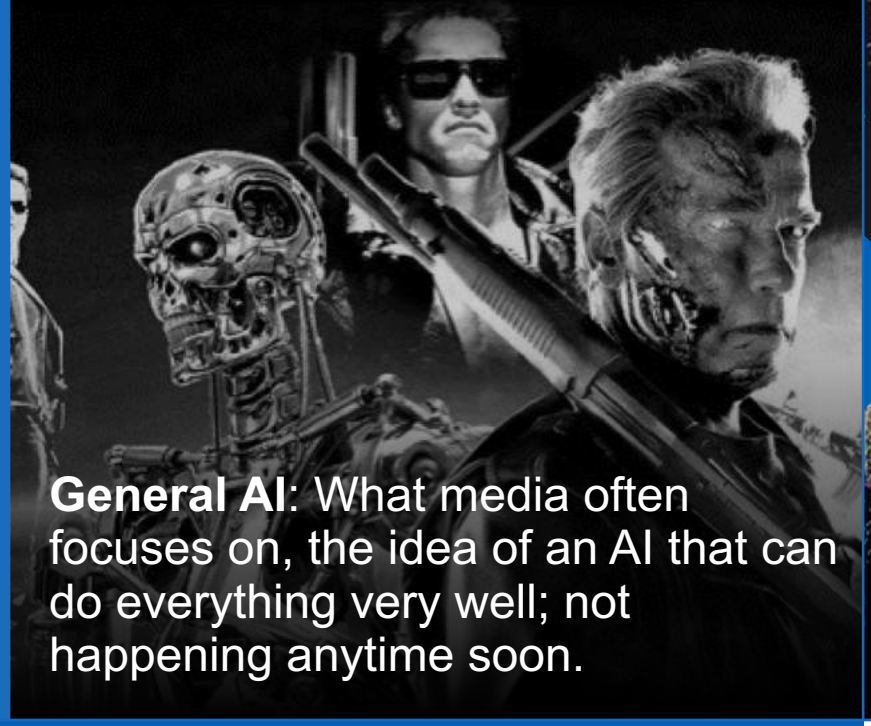

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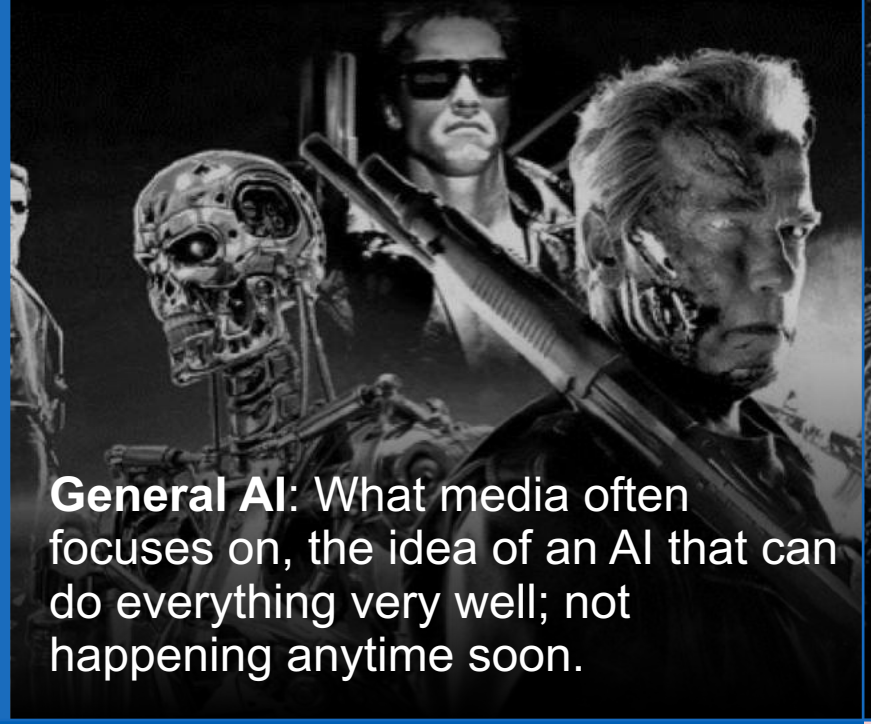

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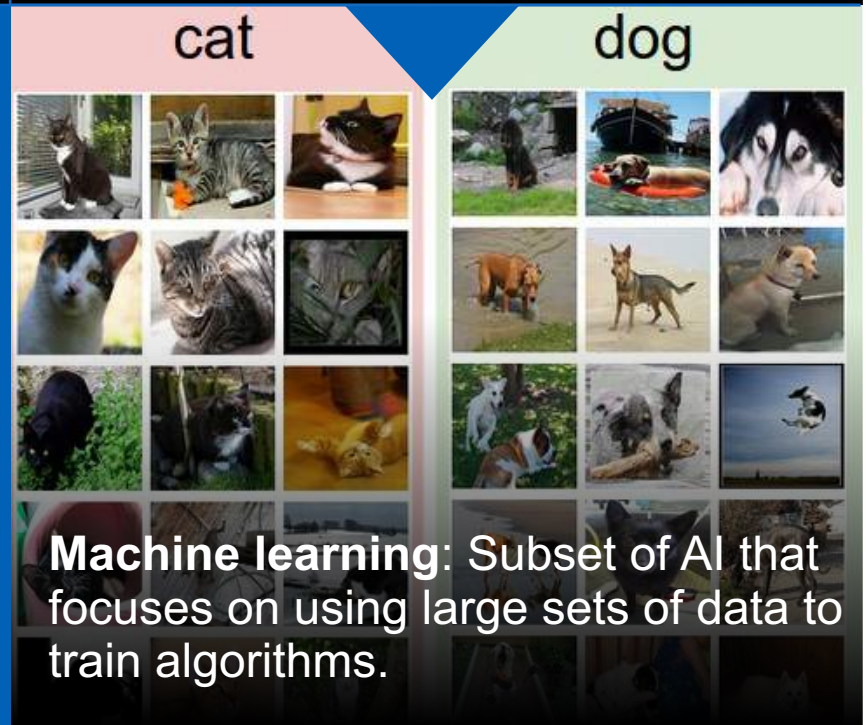
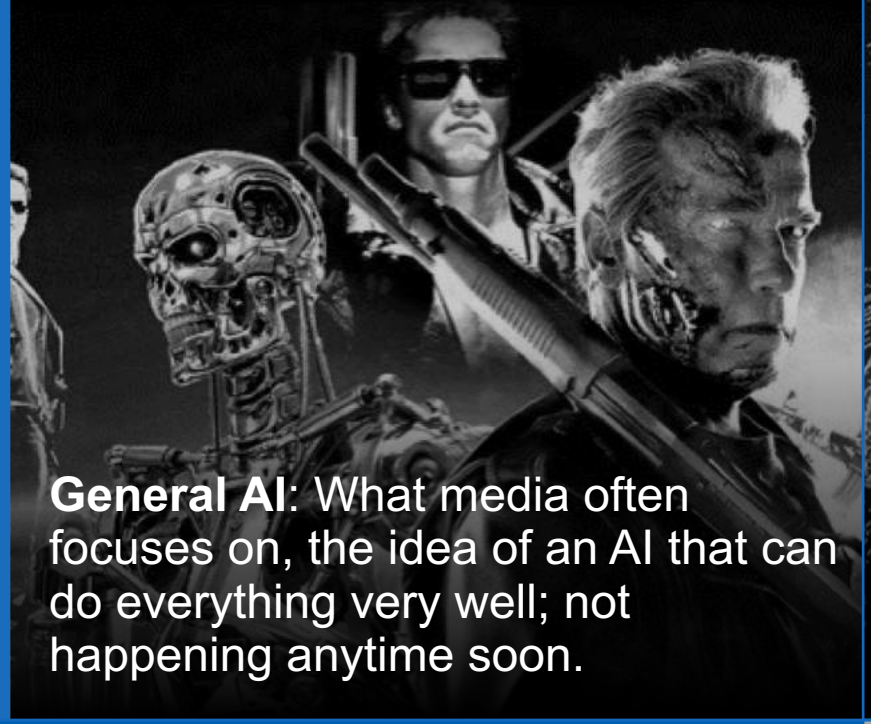


Machine learning: Subset of AI that focuses on using large sets of data to train algorithms.



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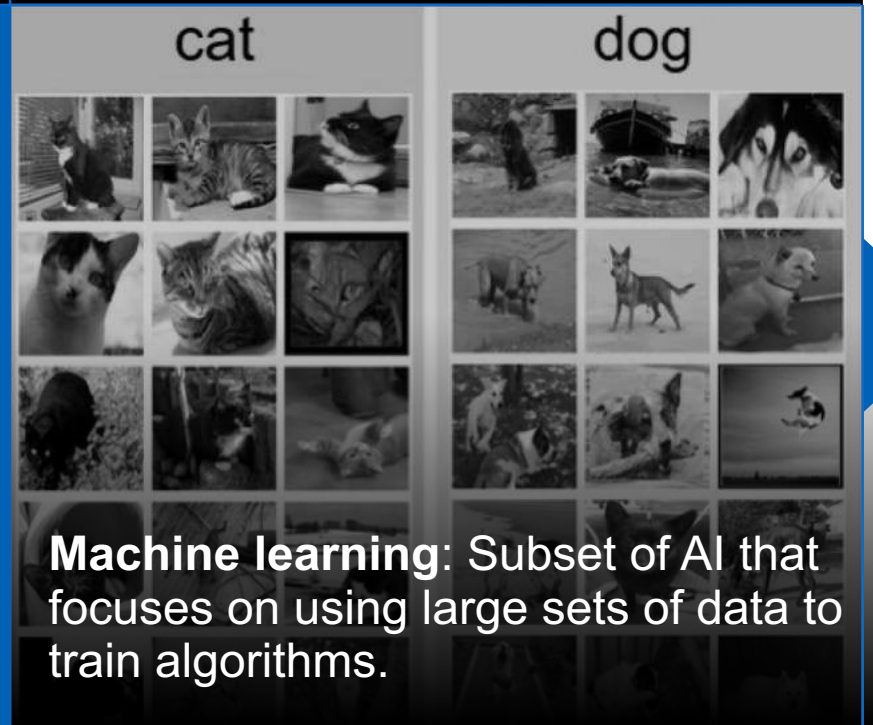

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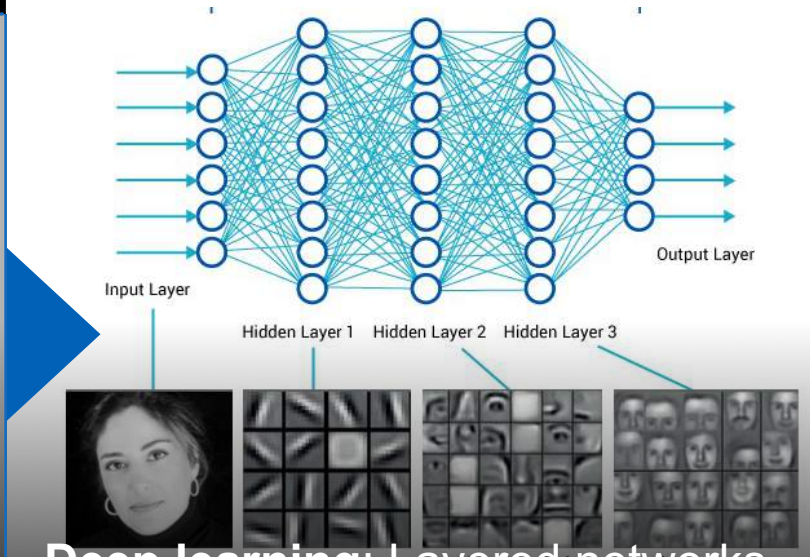
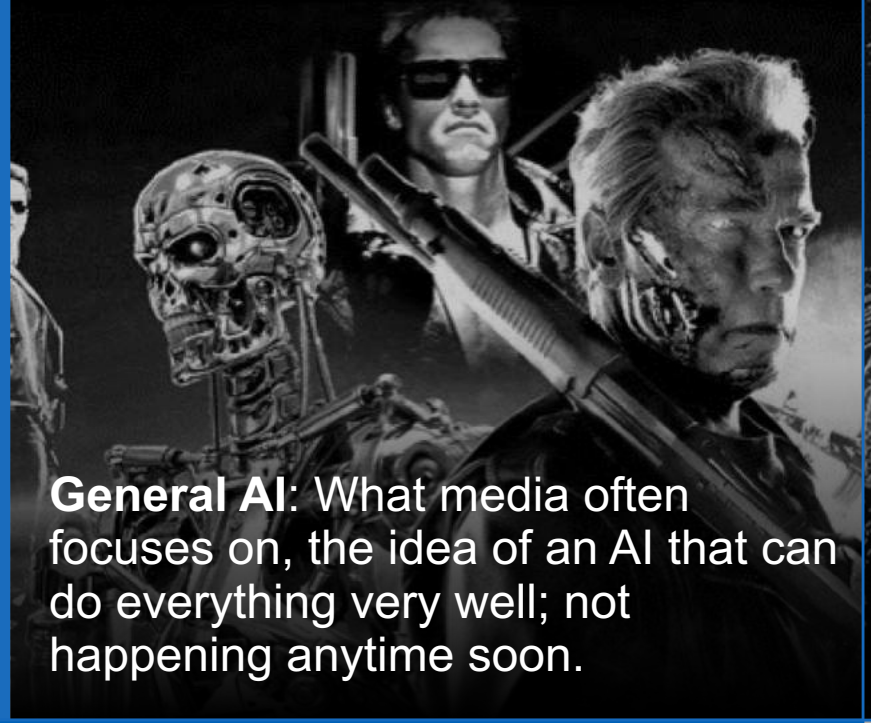


Deep learning: Layered networks that have achieved exceptional AI performance improvements.



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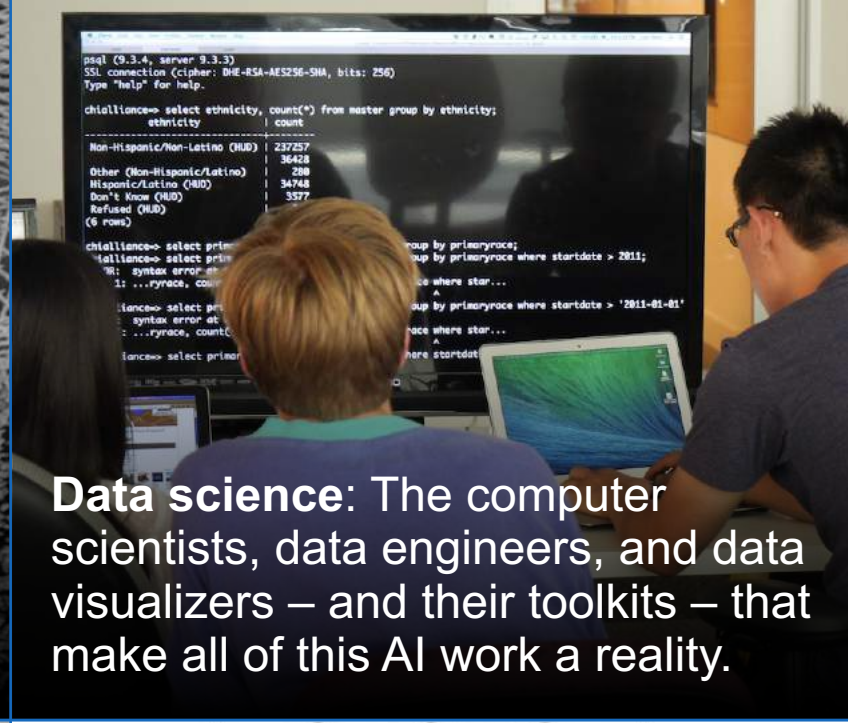

Data science: The computer scientists, data engineers, and data visualizers – and their toolkits – that make all of this AI work a reality.

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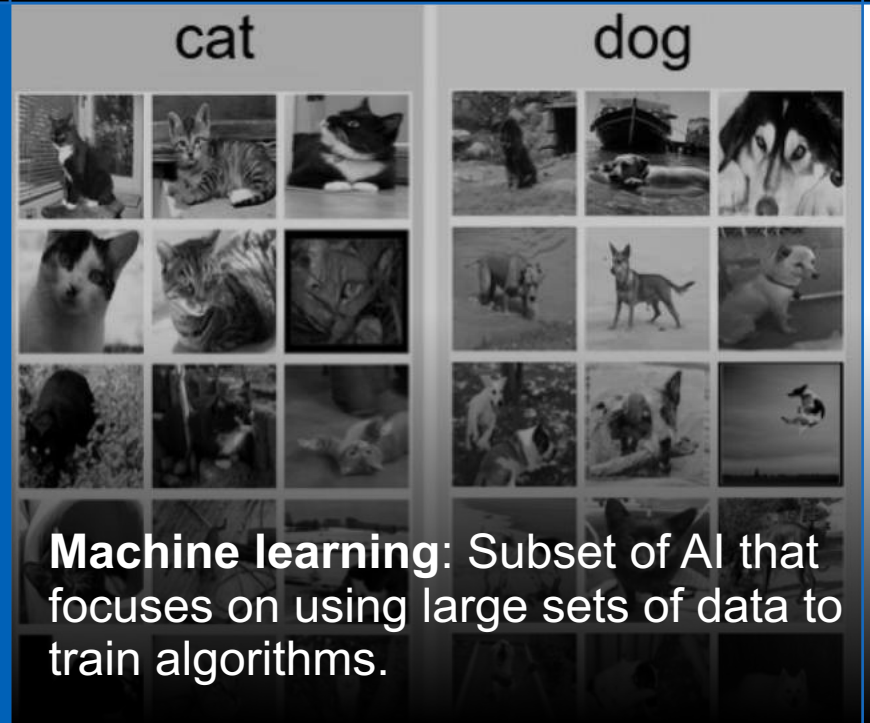

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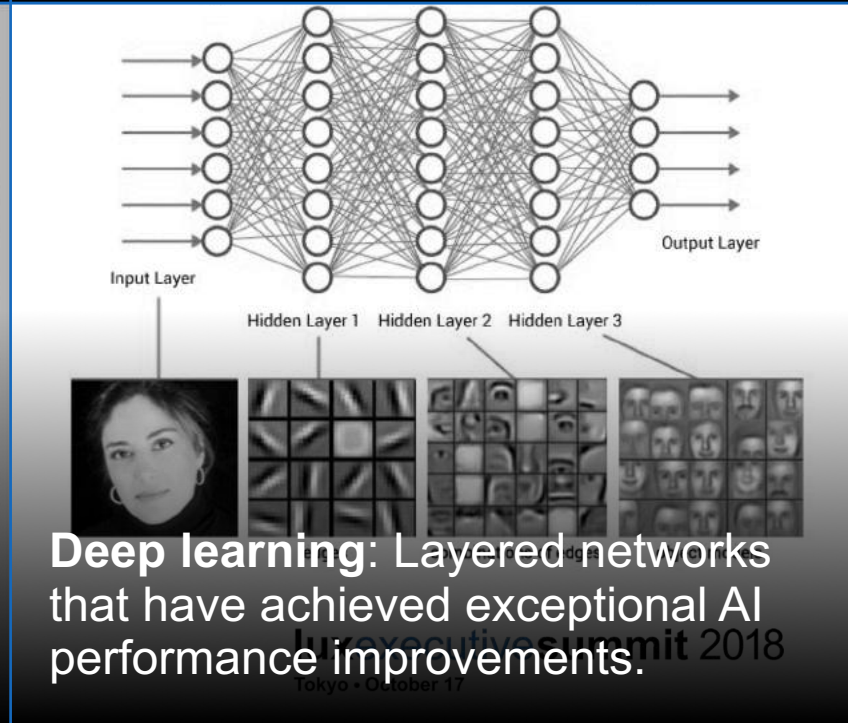

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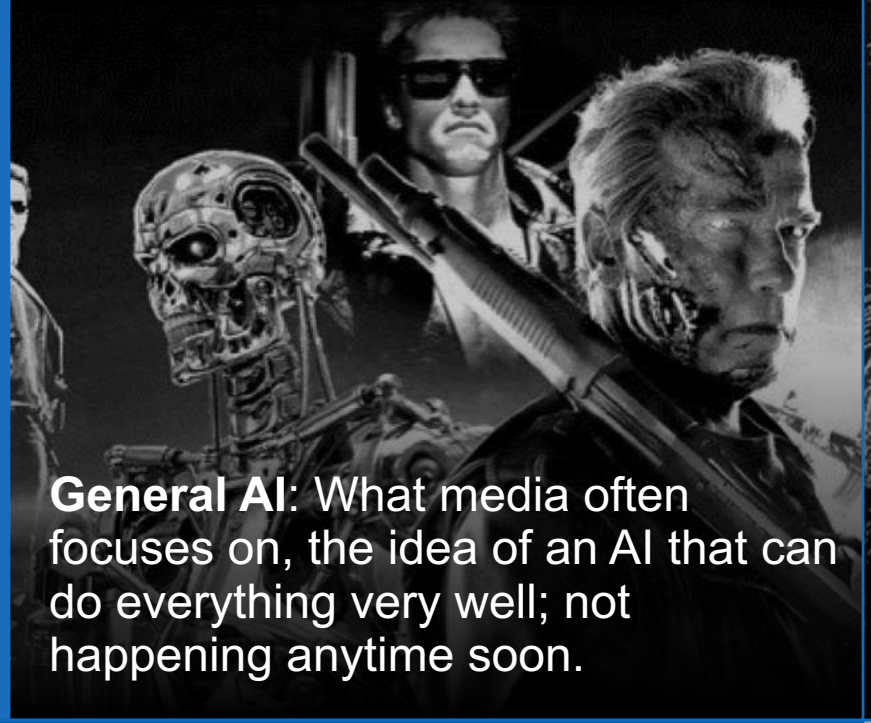

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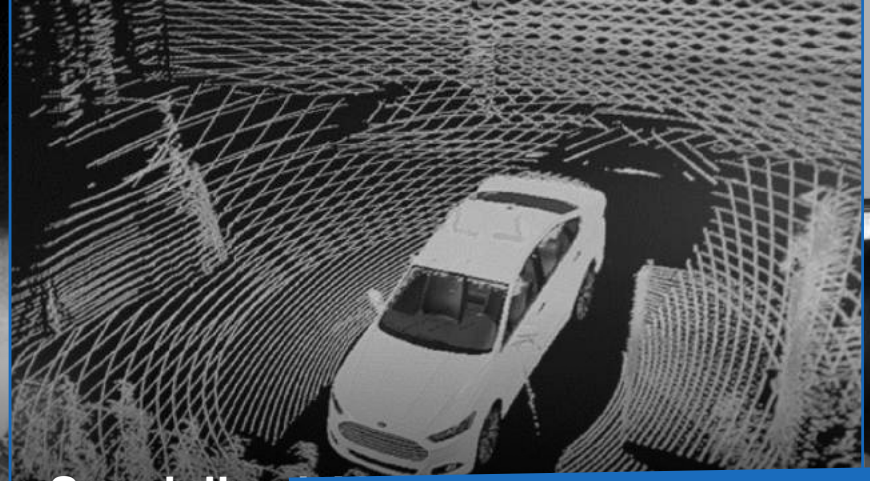

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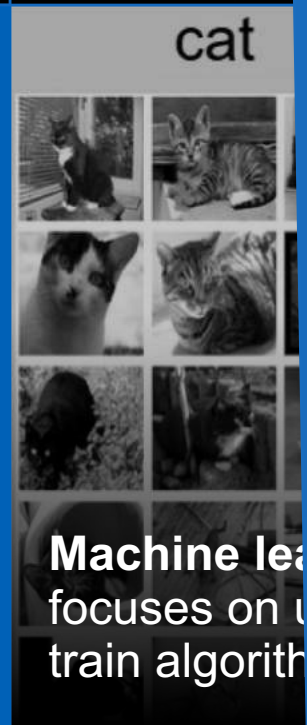
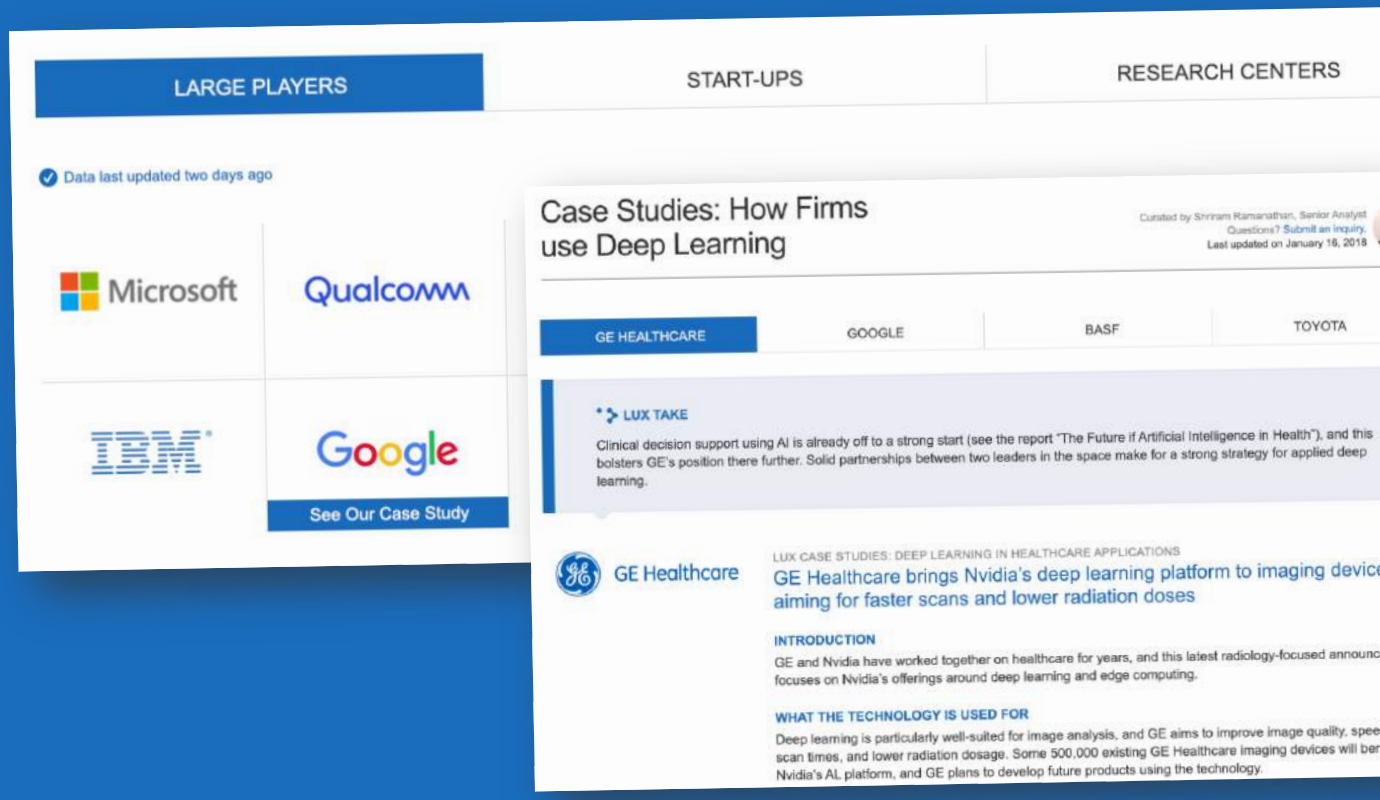


Machine lea focuses on u train algorith

Want more details? Check out our Tech Pages on **Deep Learning, Computer Vision, Edge Computing**, and more.



State of AI for many:
"Nobody in the department had a clue how to properly buy, field, and implement AI."

– Organization that spends billions on software

Why?
"There is no 'black box' that delivers the AI system [we need], at least not now. Key elements have to be put together."

That deer in the headlights moment is coming: **“Can you lead this new AI project for us?”**

We need to get good at managing AI deployments, fast. Let’s start with some common pitfalls.

Agenda

1 | Why you – yes, *you* – need to get dangerous on AI, fast

2 | **Three pitfalls to avoid as you start your AI journey**

3 | Developing your AI roadmap

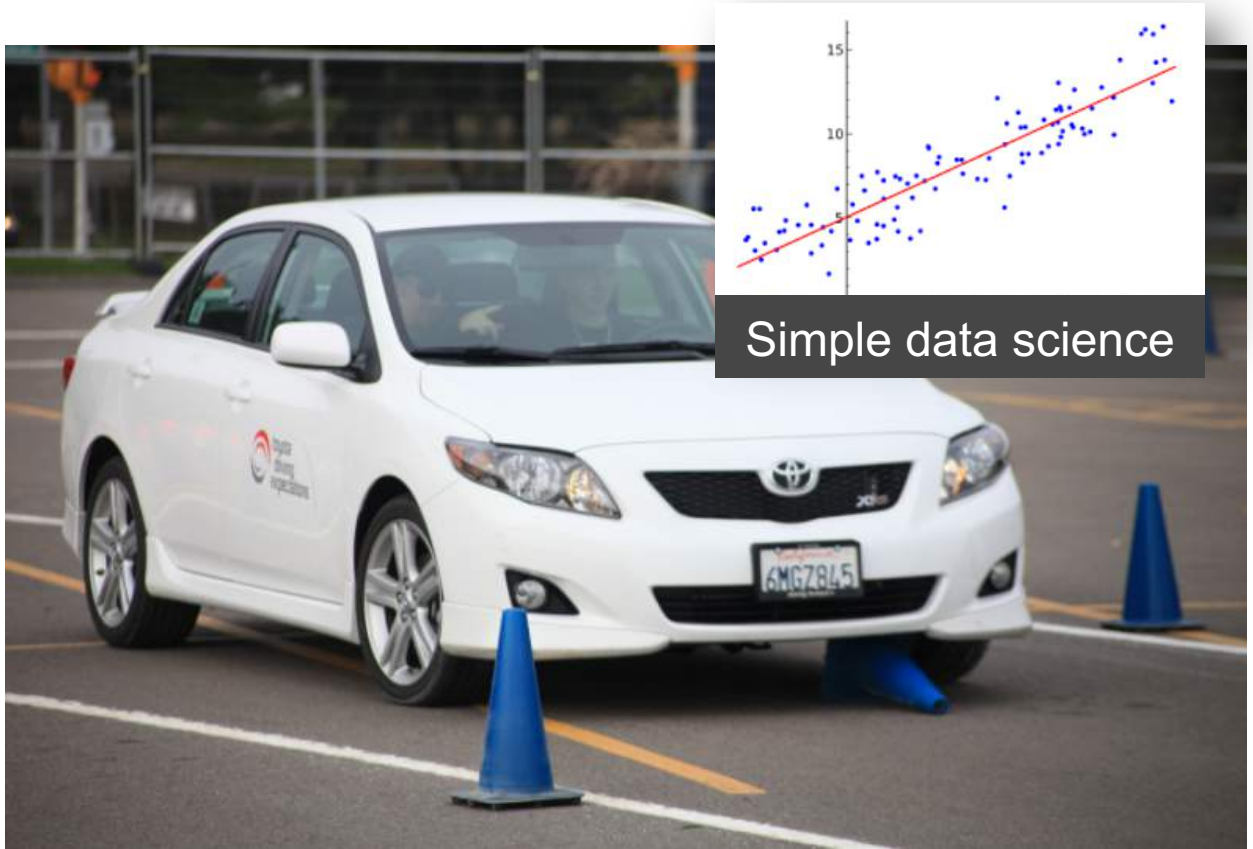
Be careful which
flavor of AI you jump into.

What AI do we pick?
“Deep learning performs great, let’s start there.”

Pitfall #1: You likely don't need the most advanced AI to start; foundational data science is more important, and useful

Applied data science is incredibly useful – and about as friendly and easy to start as a Toyota Corolla.

- Deep learning can be much higher performance (think F1 car), but also inscrutable and requires immense talent to do well.



Simple data science

Deep learning

1. Start with data science fundamentals

QUESTEK® INNOVATIONS LLC

Design high-performance alloys – like ultra-high strength steels for **SpaceX** – using materials property databases and predictive models.

Founded **1996**.

LUX TAKE

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Multiscale modeling using 300+ distinct pieces of simulation software, for metals, composites, coatings, like **Metso Minerals** for wear resistance in mining.

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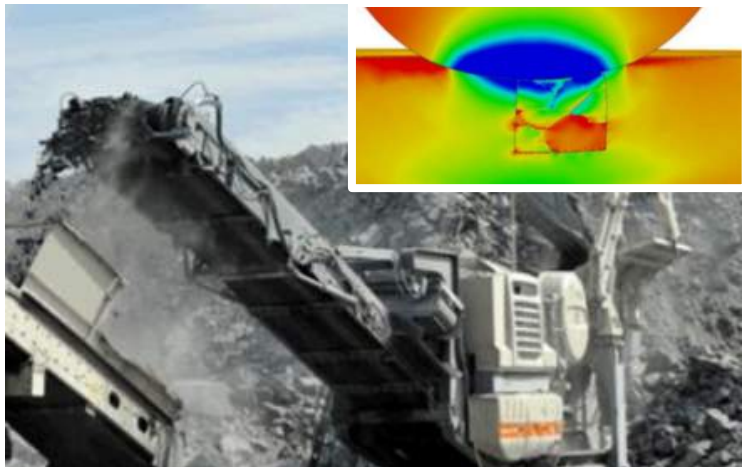

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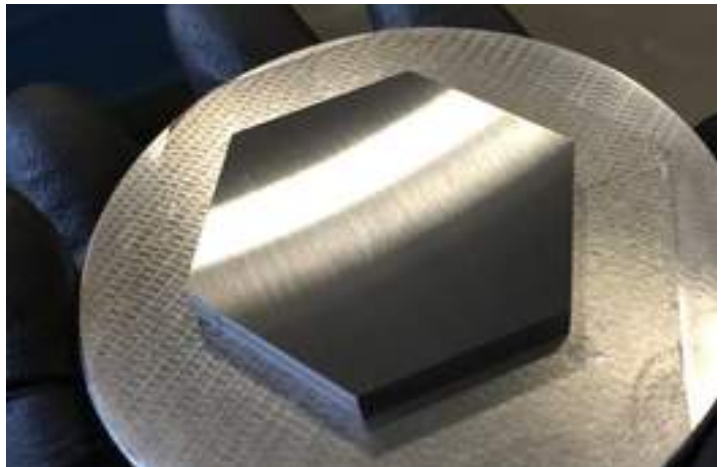
lumiant

Machine-learning-powered materials discovery platform, including for lightweight composites.

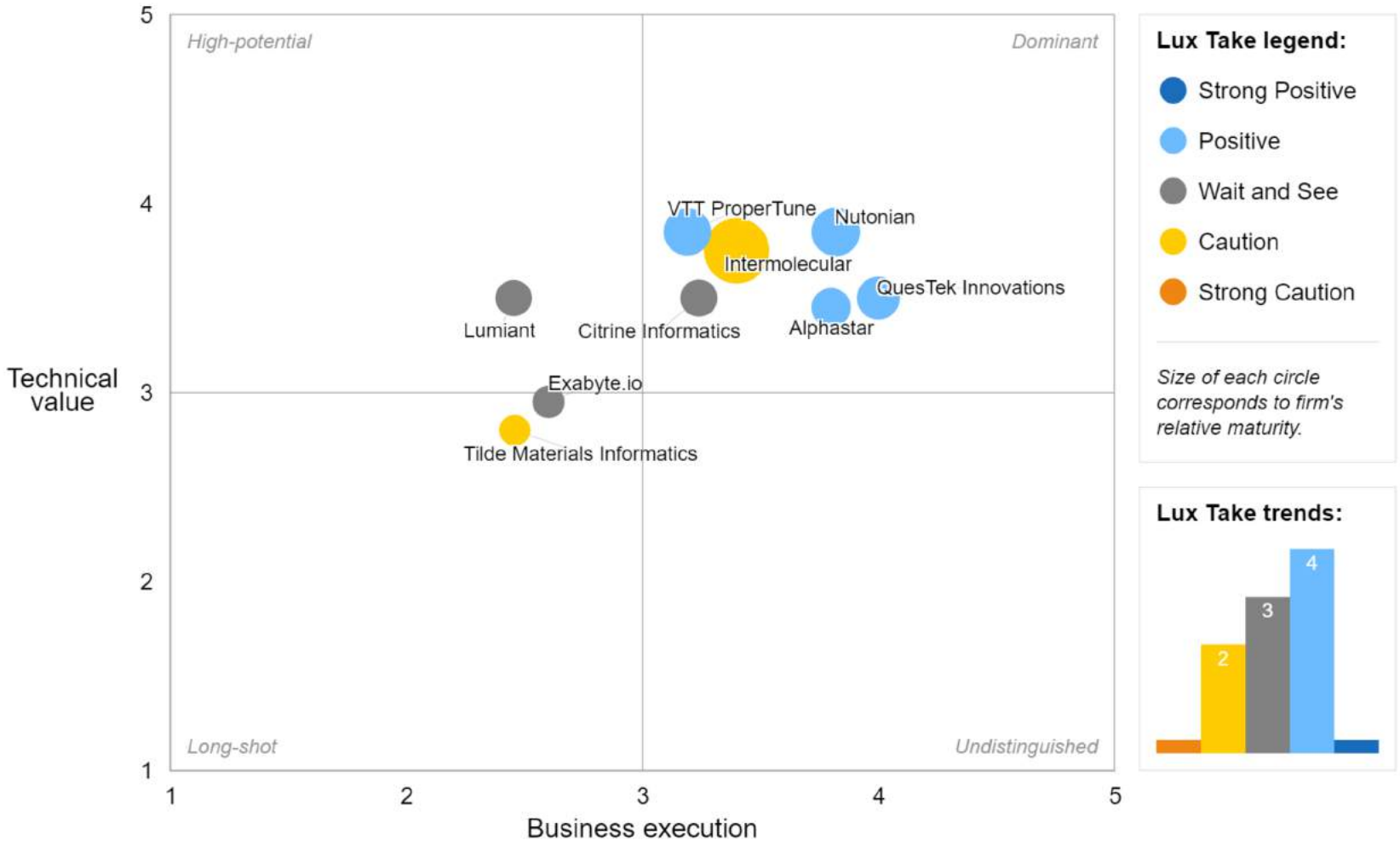
Founded **2011**.

LUX TAKE

Wait And See



Materials informatics companies leading in our Lux Innovation Grid are not AI-based, *yet*



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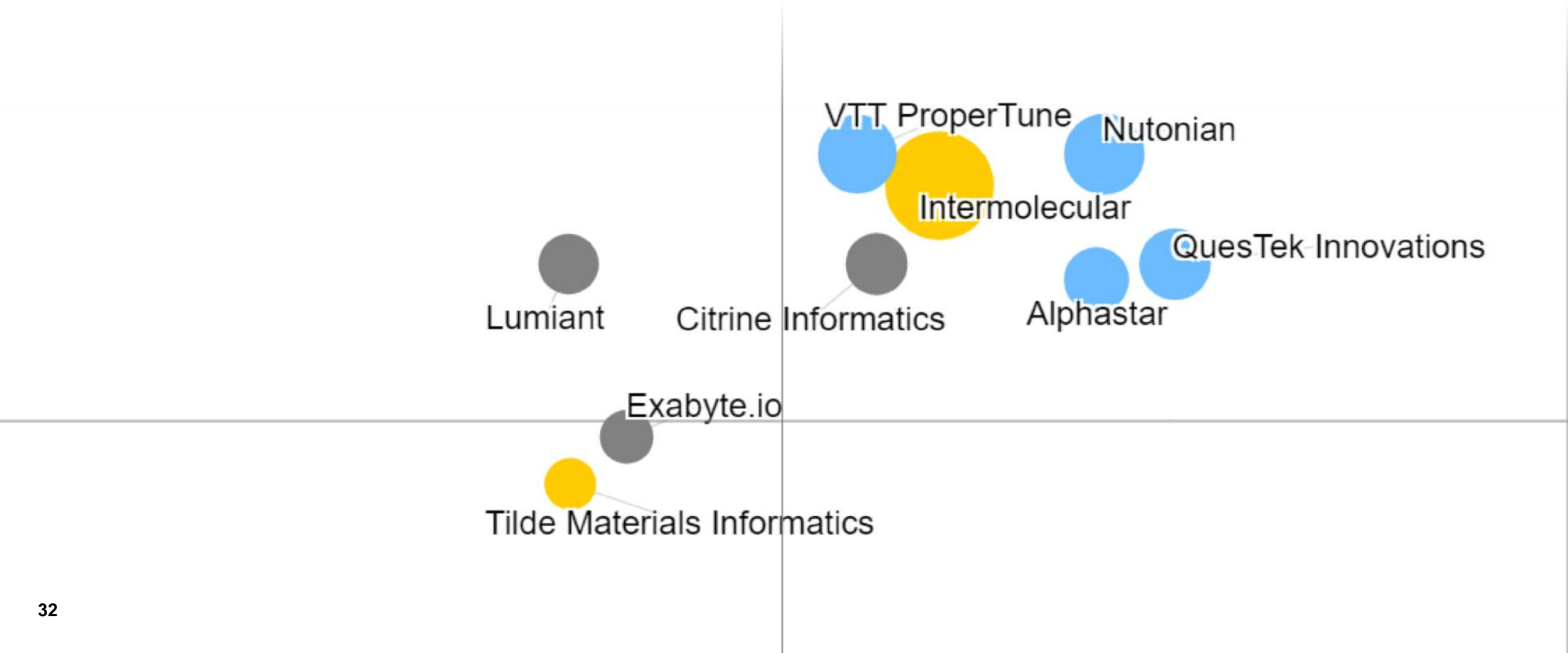

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Nutonian

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Alphastar

Exabyte.io

Tilde Materials Informatics

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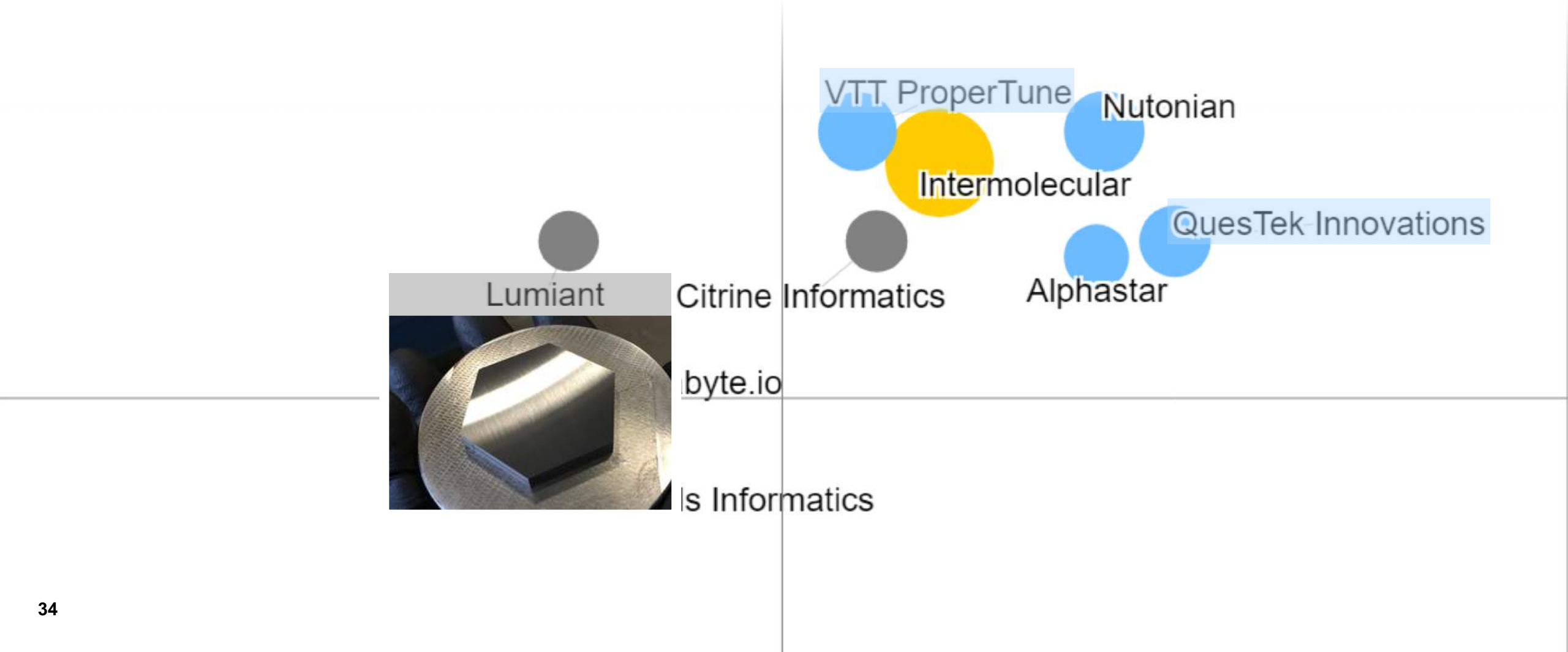

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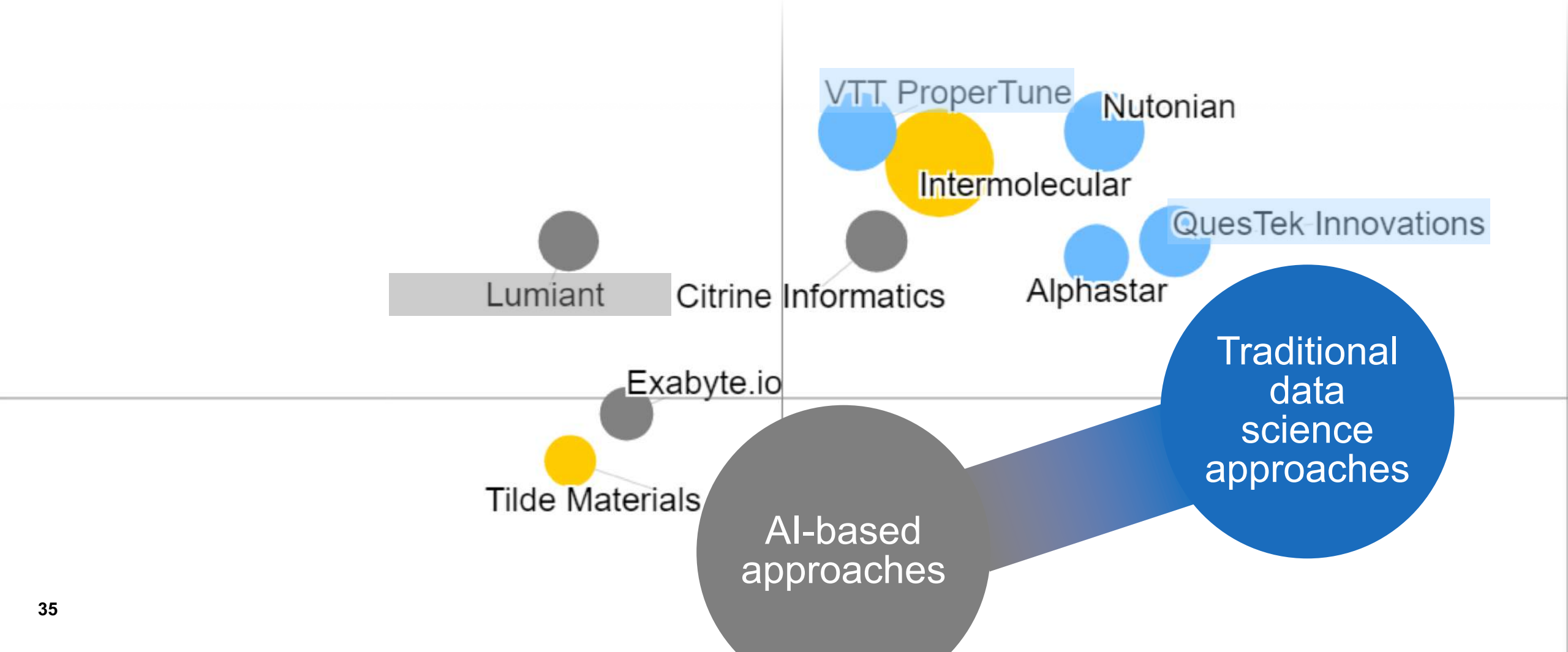

Independent AI is
not smart enough yet.


'Like A God,' Google A.I. Beats Human Champ Of Notoriously Complex Go Game
npr
AlphaGo
Google DeepMind
vs
Lee Sedol

Google Photos

BUSINESS INSIDER

The photo-sharing service uses AI to suggest users edited or enhanced versions of photos they've uploaded. You might get a stylised filter, you might get an animation or you may get a panorama.


engadget
Alexa is randomly laughing, and it's creepy as hell
Gavin Hightower
@GavinHightower
Lying in bed about to fall asleep when Alexa on my Amazon Echo Dot lets out a very loud and creepy laugh... there's a good chance I get murdered tonight.
12:46 AM - Feb 26, 2018
9,377
2,064 people are talking about this


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Microsoft's chatbots keep turning racist
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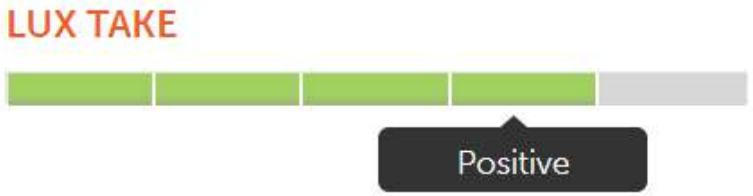
Human-in-the-loop systems, and getting AI to explain its results



Via develops **predictive maintenance** software using machine learning and causal analytics for electricity grid infrastructure.

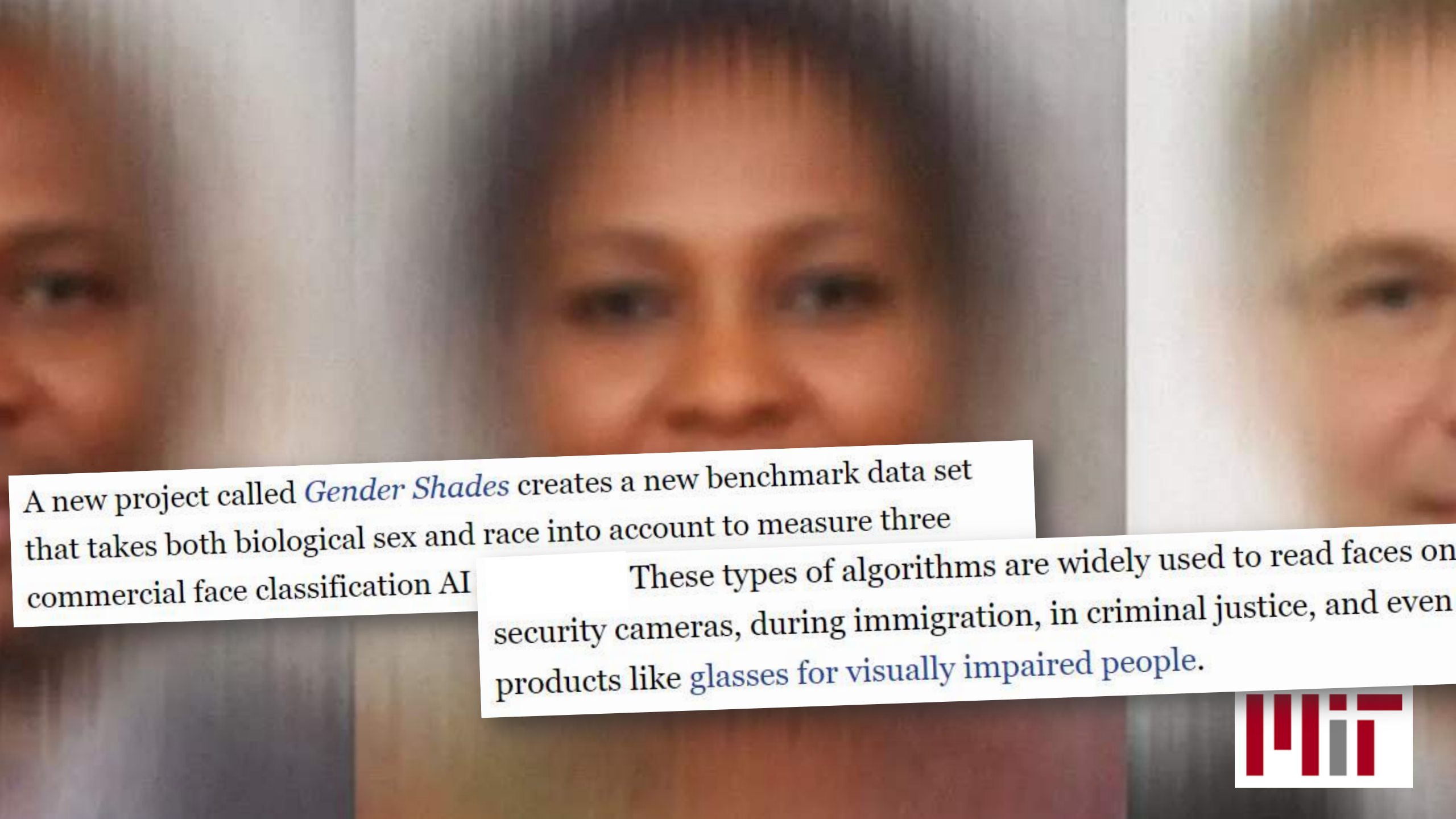
- Partners include Japan's TEPCO power company.

To *preemptively* take down infrastructure that seems to be working well, AI must convince humans of need:

- **Offer potential reasons to explain <u>why</u> the equipment is going to fail.**

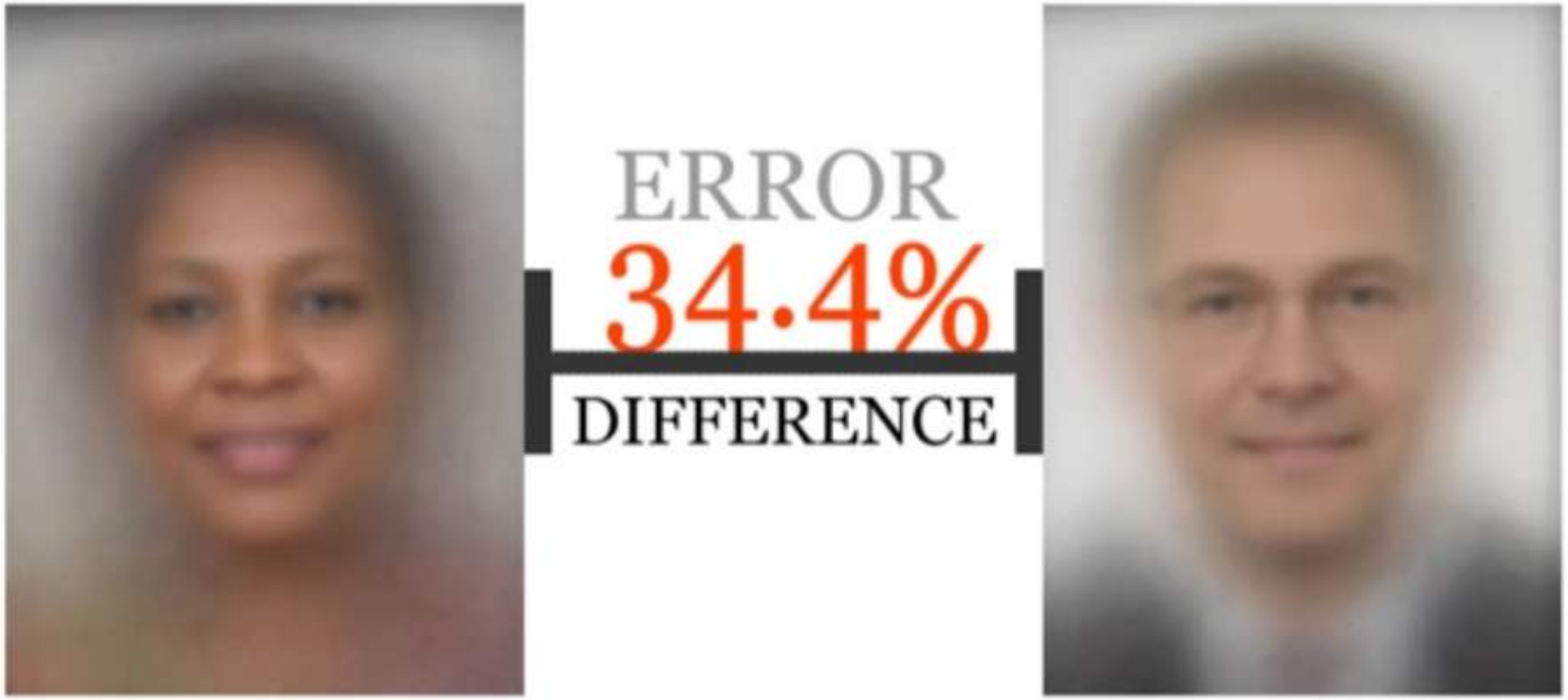
TEPCO Power Grid

Be vigilant against biasing your AI.

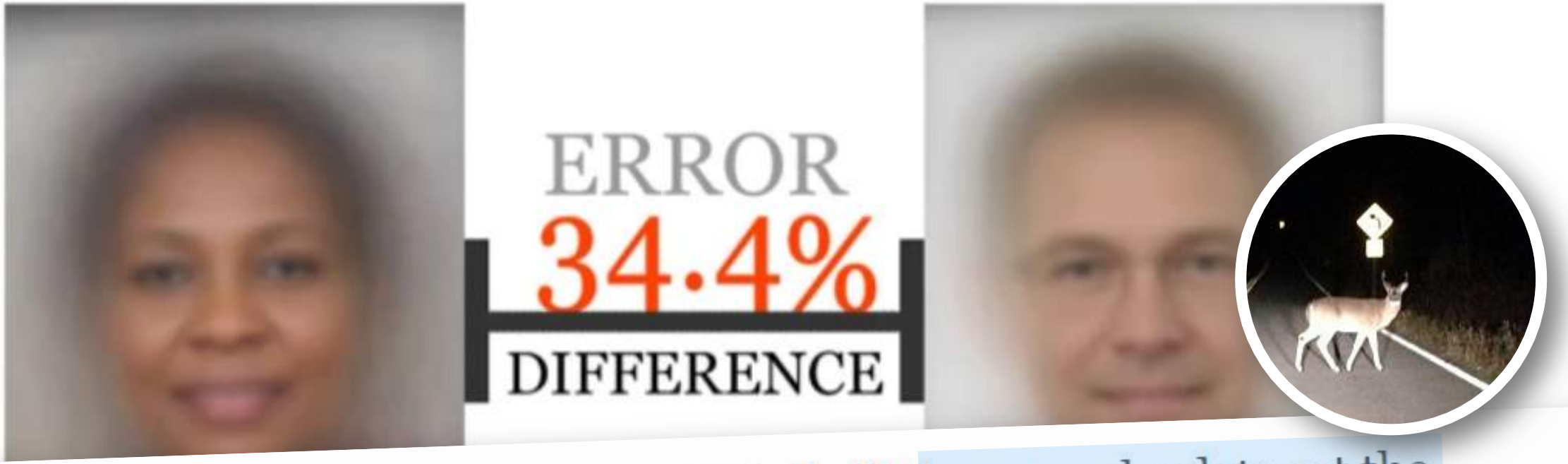


A new project called *Gender Shades* creates a new benchmark data set that takes both biological sex and race into account to measure three commercial face classification AI

These types of algorithms are widely used to read faces on security cameras, during immigration, in criminal justice, and even products like glasses for visually impaired people.


ERROR
34.4%
DIFFERENCE

Why does something like this happen? Typically because the data set the AI was trained on had far more light-skinned male faces, and light-skinned faces in general. It's bias at work.



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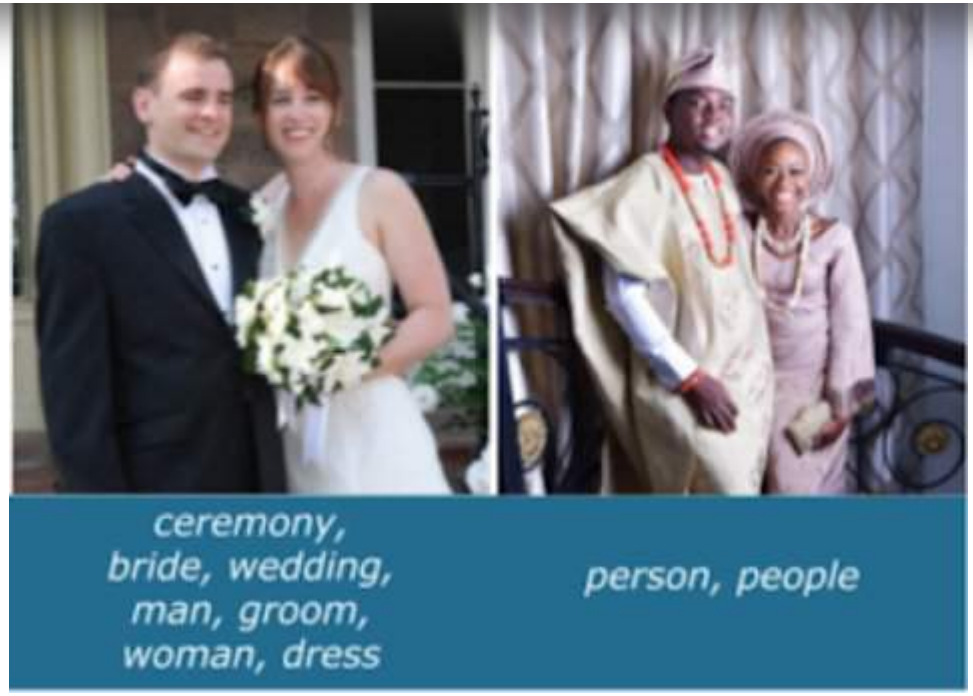
Google AI

Introducing the Inclusive Images Competition

Thursday, September 6, 2018



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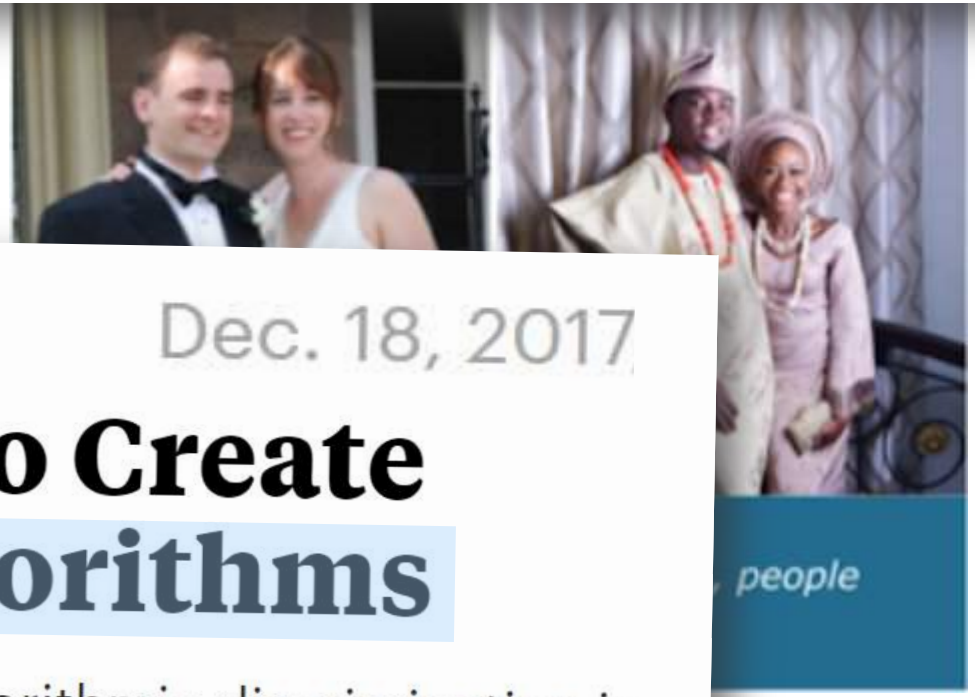


MACHINE BIAS

Dec. 18, 2017

New York City Moves to Create Accountability for Algorithms

[...] passed the country's first bill to address algorithmic discrimination in city government.

Regardless of your business application, bias in AI needs to be systematically guarded against

Watch out for **availability bias** (assuming that a narrow set of available data is representative of system behavior), and **confirmation bias** (tending to filter out data that do not fit our expectations).

Numerate

LUX TAKE

AI platform for designing drug-like molecules for hard-to-target diseases. **Incorporates statistical models in order to effectively handle bias (like publication bias for example).**

For many of these AI pitfalls, work remains ongoing. We won't solve it all today.

But what best practices *can* we talk about today?

Agenda

1. Why you – yes, *you* – need to get dangerous on AI, fast
2. Three pitfalls to avoid as you start your AI journey
3. **Developing your AI roadmap**

Get buy-in from your CEO,
but remain agile and iterate quickly
to show some return on investment.

It starts at the very top

Akio Toyoda's strategy is *"to be attacking and defending at the same time"*. Recent moves:

Started a **$100 million Toyota AI Ventures** fund.

Started a **$1 billion, 5-year effort via Toyota Research Institute** that includes machine learning.

Akio Toyoda
Toyota CEO

Gill Pratt
Toyota Research Institute CEO

It starts at the very top

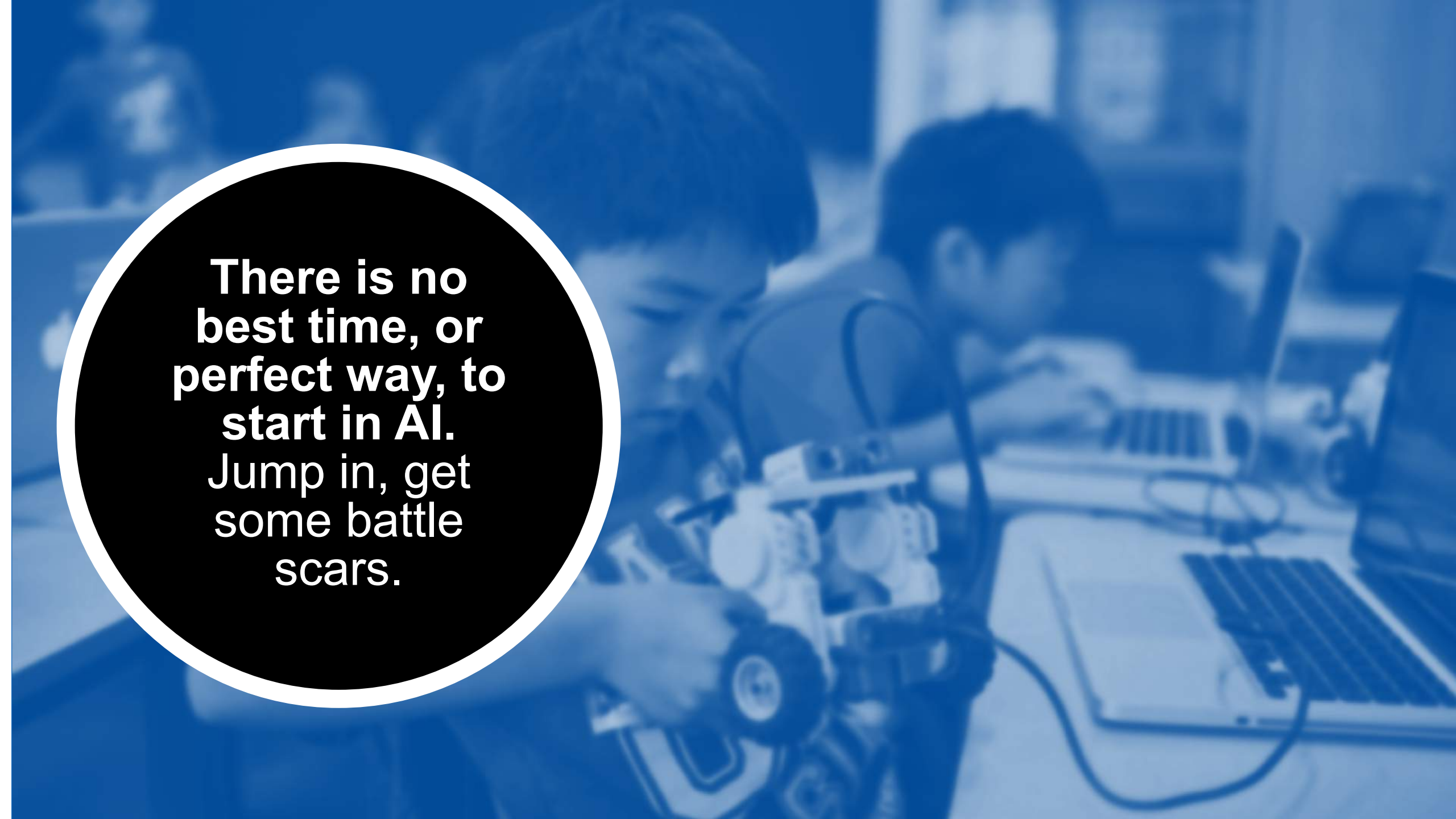
In speaking about digital transformation, including AI and data analytics, Siemens CEO exemplified this, saying:
“There are two choices: either be a part of it and shape it, or wait, and be transformed by others.”

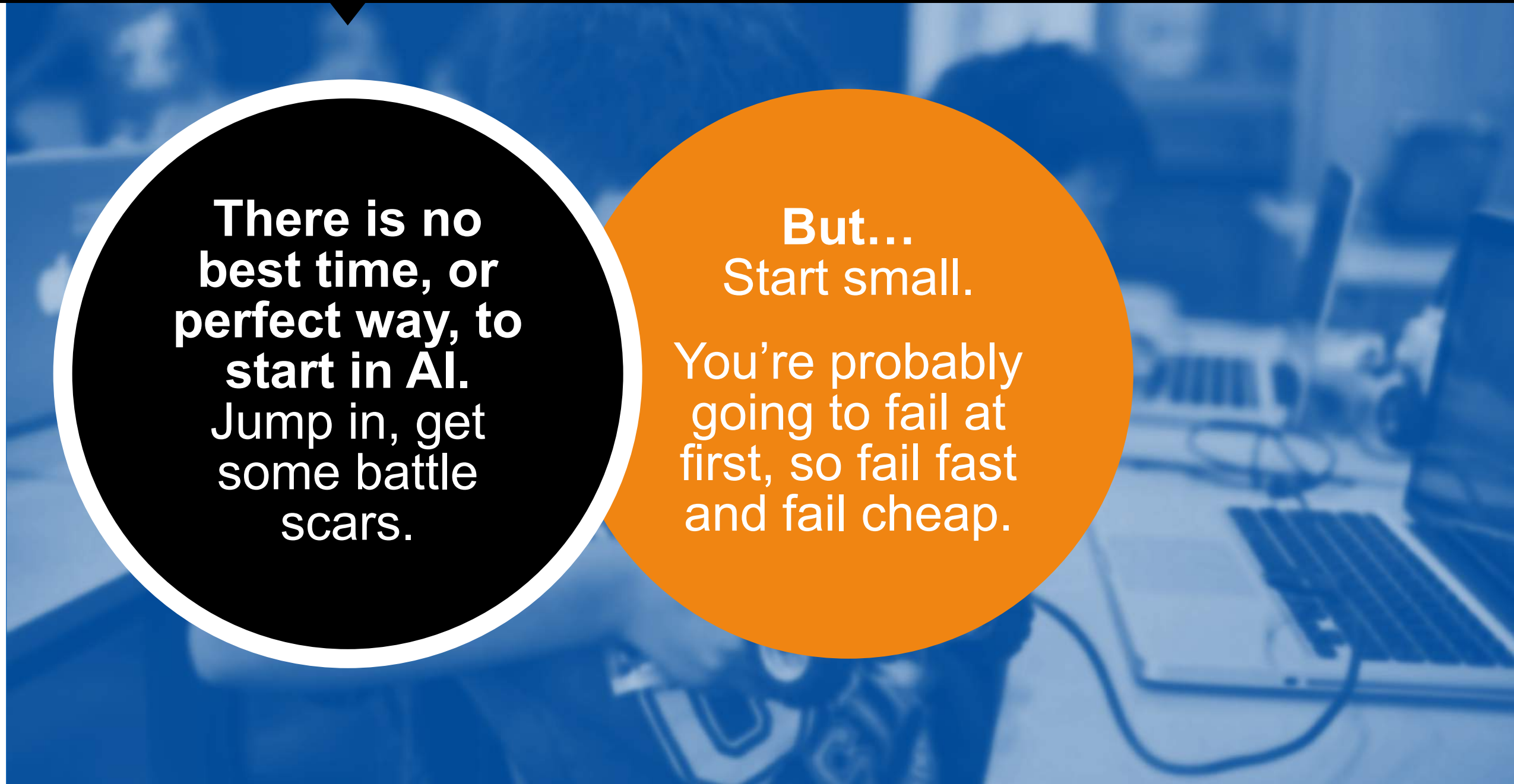
Joe Kaeser
Siemens CEO

It starts at the very top

If your CEO does is not personally pushing for AI, you may have to **start small and prove return on investment.**

Joe Kaeser
Siemens CEO


There is no best time, or perfect way, to start in AI.
Jump in, get some battle scars.



There is no best time, or perfect way, to start in AI.
Jump in, get some battle scars.

But…
Start small.

You're probably going to fail at first, so fail fast and fail cheap.

Cheaper than you think: Getting into deep learning machine vision for $249

Cheaper than you think: Getting into deep learning machine vision for $249

You will need to upskill
and expand your perspectives
to make the best of AI.

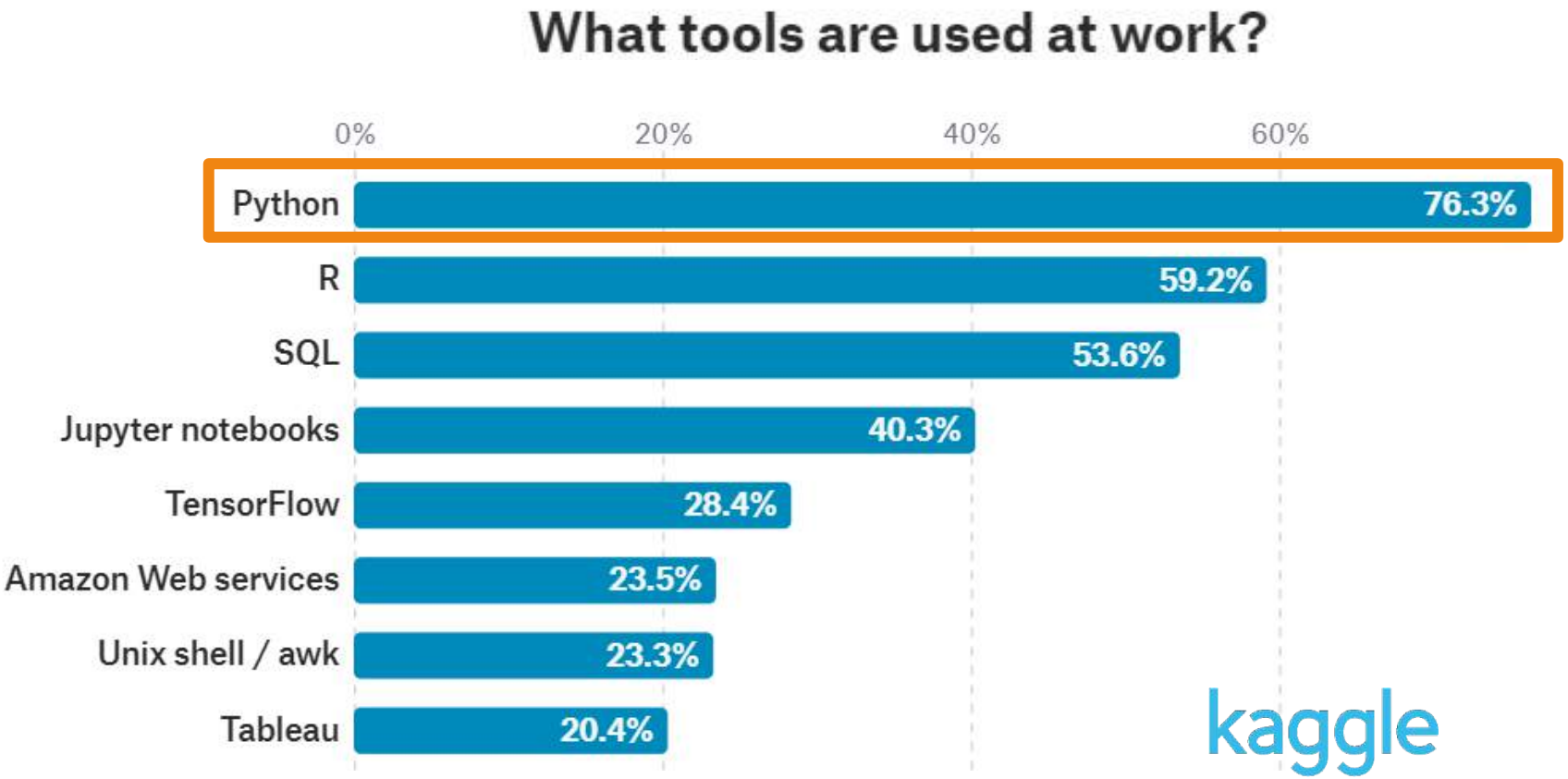
Python?

Python?

python™

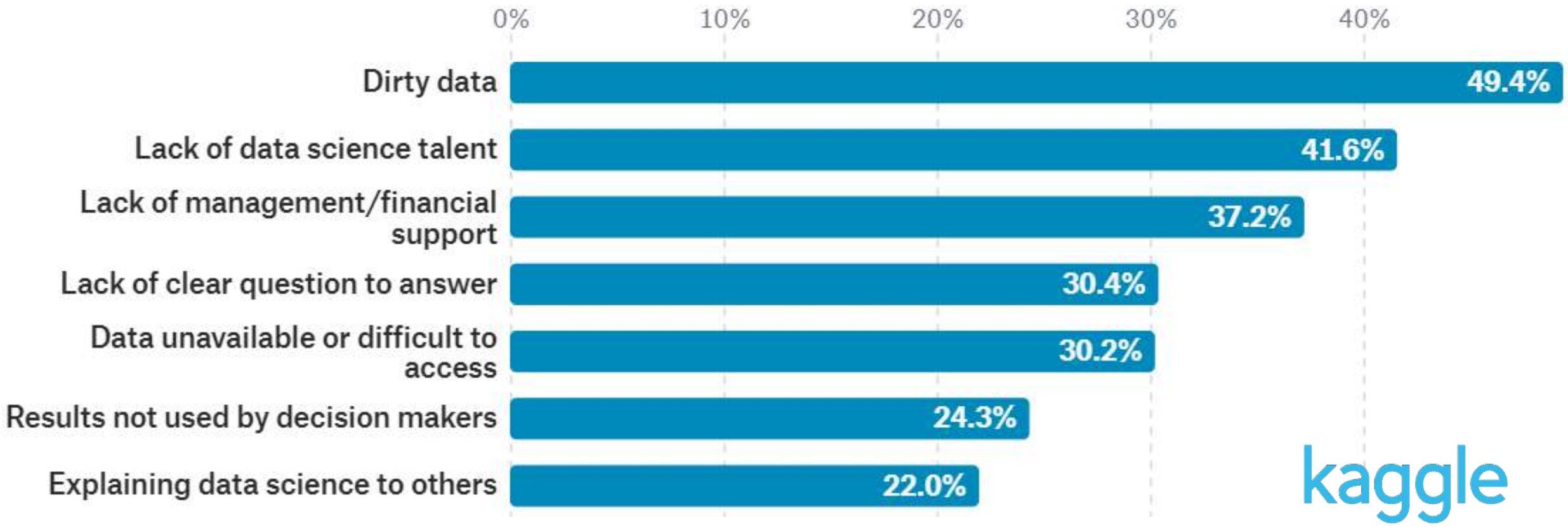
Python?

python™



kaggle

You do not personally have to learn to program, but do learn the ecosystem's challenges: What barriers are faced at work?



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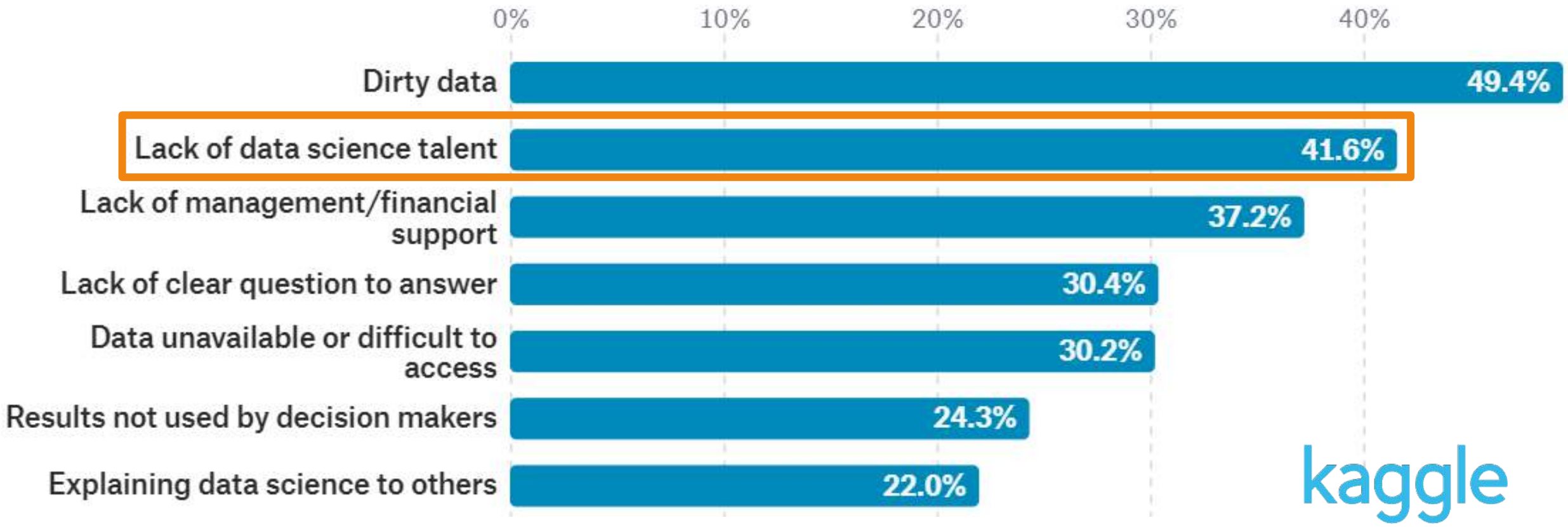
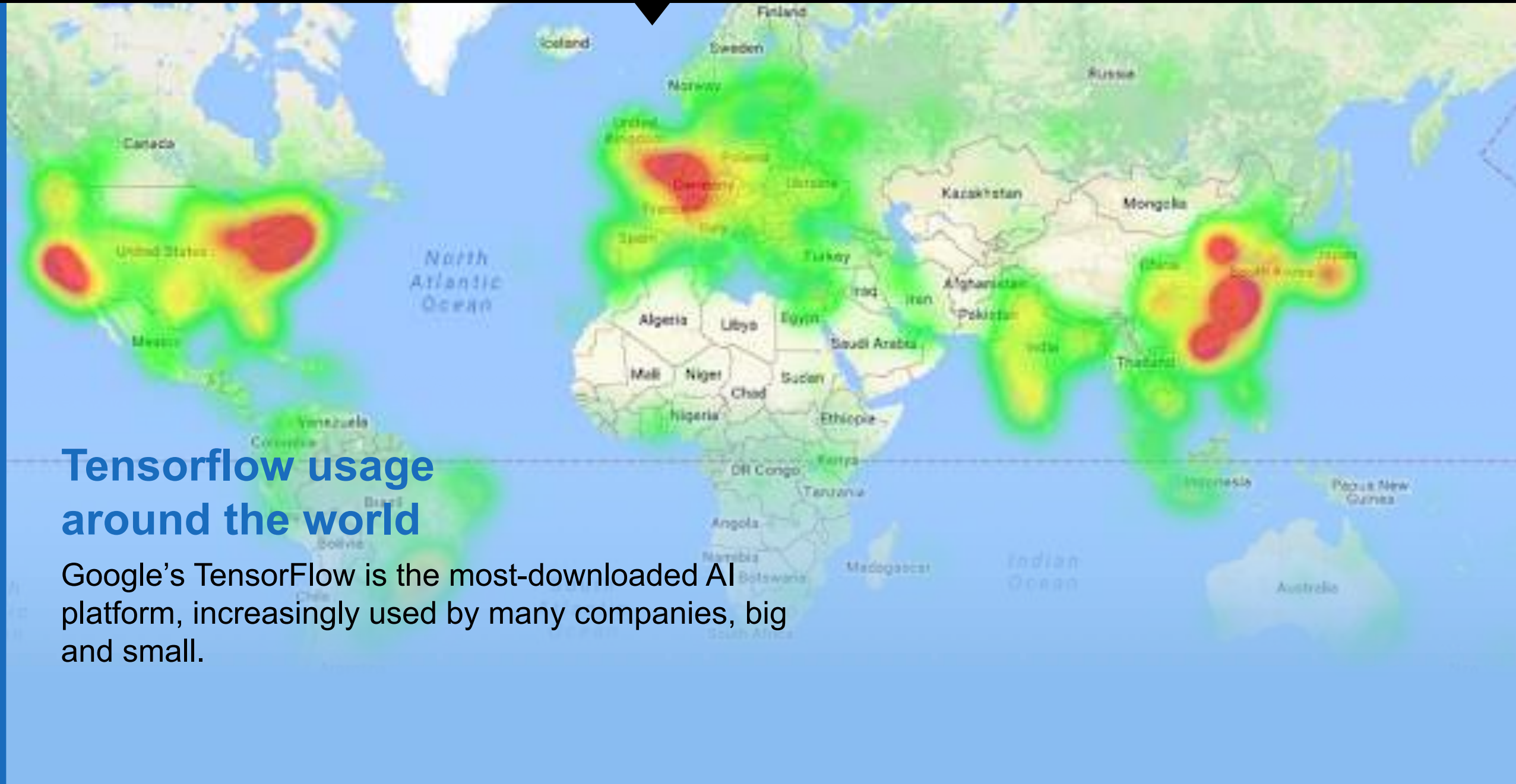




Tensorflow usage around the world

Google’s TensorFlow is the most-downloaded AI platform, increasingly used by many companies, big and small.

Tensorflow usage around the world

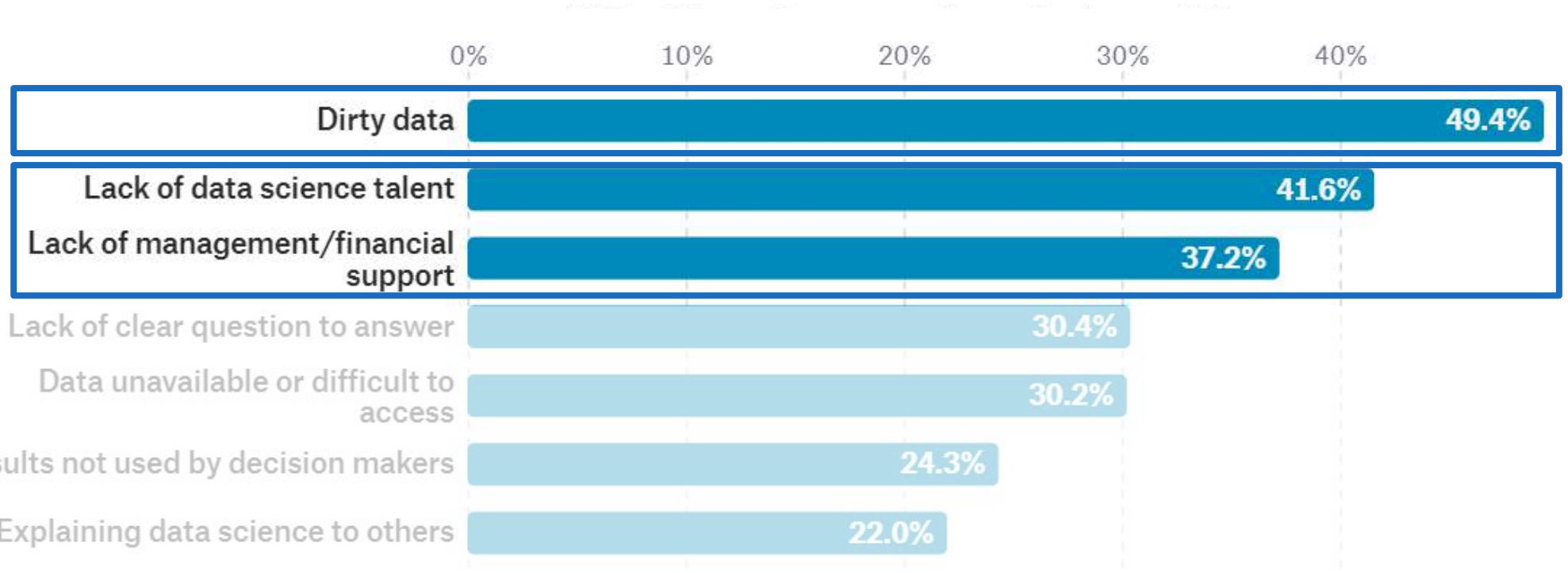
Google's TensorFlow is the most-downloaded AI platform, increasingly used by many companies, big and small. **Its boss, Fei-Fei Li, said this for the opening of Google's new China AI R&D center:**

"We want to work with the best AI talent, wherever that talent is."

Be paranoid about
embedding your AI teams
within real business challenges.

Hiring data scientists is hard.

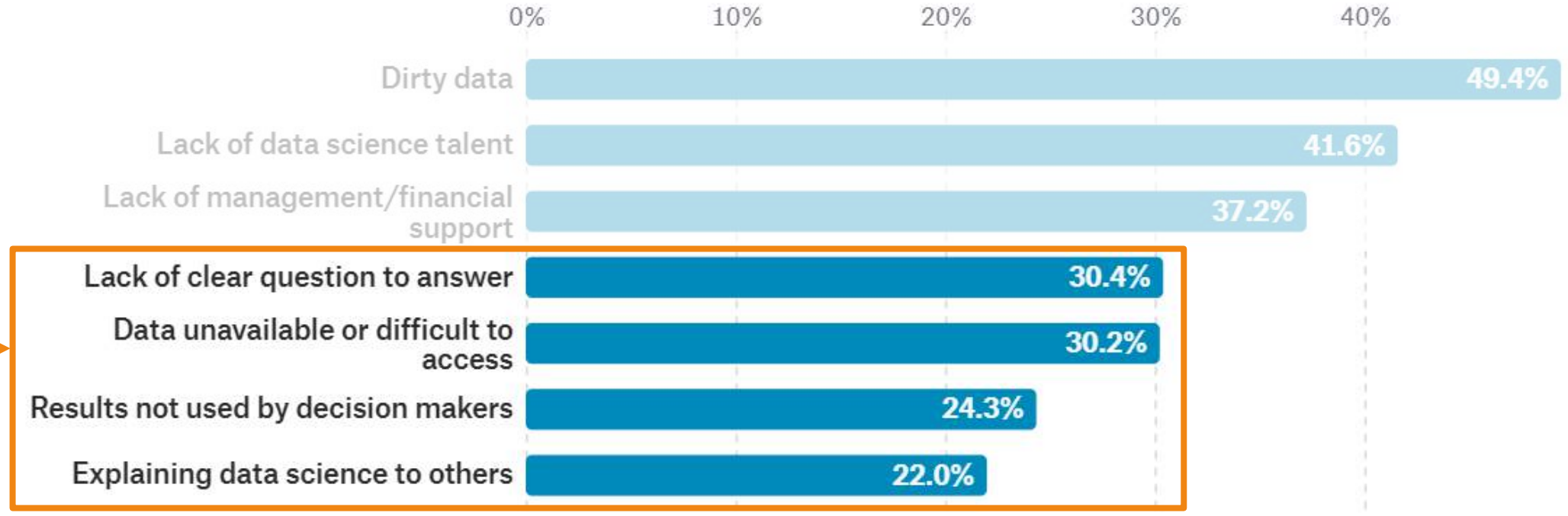
Hard, but obvious.



Hiring data scientists is hard.
Building effective, useful AI teams is even harder.

Hard, but obvious.

The kiss of death for AI efforts.



The classic trap is to hire a team of very smart and capable data scientists, seclude them, and hope that after 1-3 years they come back with an amazing innovation.

- This almost always fails.
- Don't just work on AI for AI's sake.

Avoiding silos is cliché, but a key for AI efforts. **Try to embed your data scientists.**

- Day in and day out, they need to talk to customers, so that *"what question am I answering"* is crystal clear.

Building *your* AI roadmap.

“AI is probably the most important thing humanity has ever worked on.”

- Sundar Pichai

Overhyped? Probably not.

Our generation – including **you** – will need to navigate the biggest disruption the world has ever seen.

But how do we start?

Putting it all together: A roadmap for your AI journey

Start with data science fundamentals.

Sync your AI efforts with your CEO's vision.

Upskill yourself, and look broadly.

Keep your AI team embedded, day in and day out.

"AI is probably the most important thing humanity has ever worked on."

2018

Post-2030

Fight against bias.

Supervise your AI closely.

Help your entire firm reskill and adapt.

2018 luxexecutivesummit

Tokyo • October 17

Thank you for joining us.

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