

FORRESTER®

Artificial Intelligence: How Enterprises Can Crush It With Apache Spark

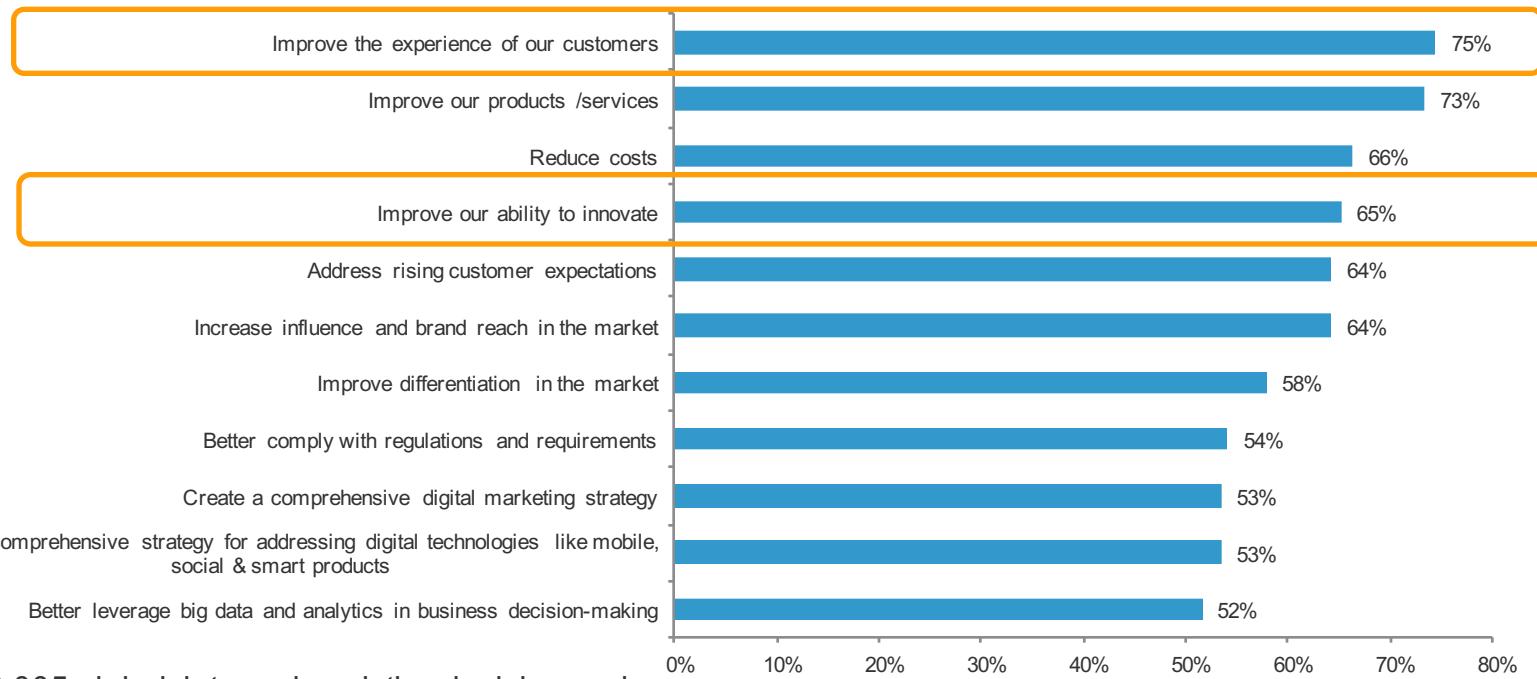
February 9, 2017

Mike Gualtieri, VP & Principal Analyst

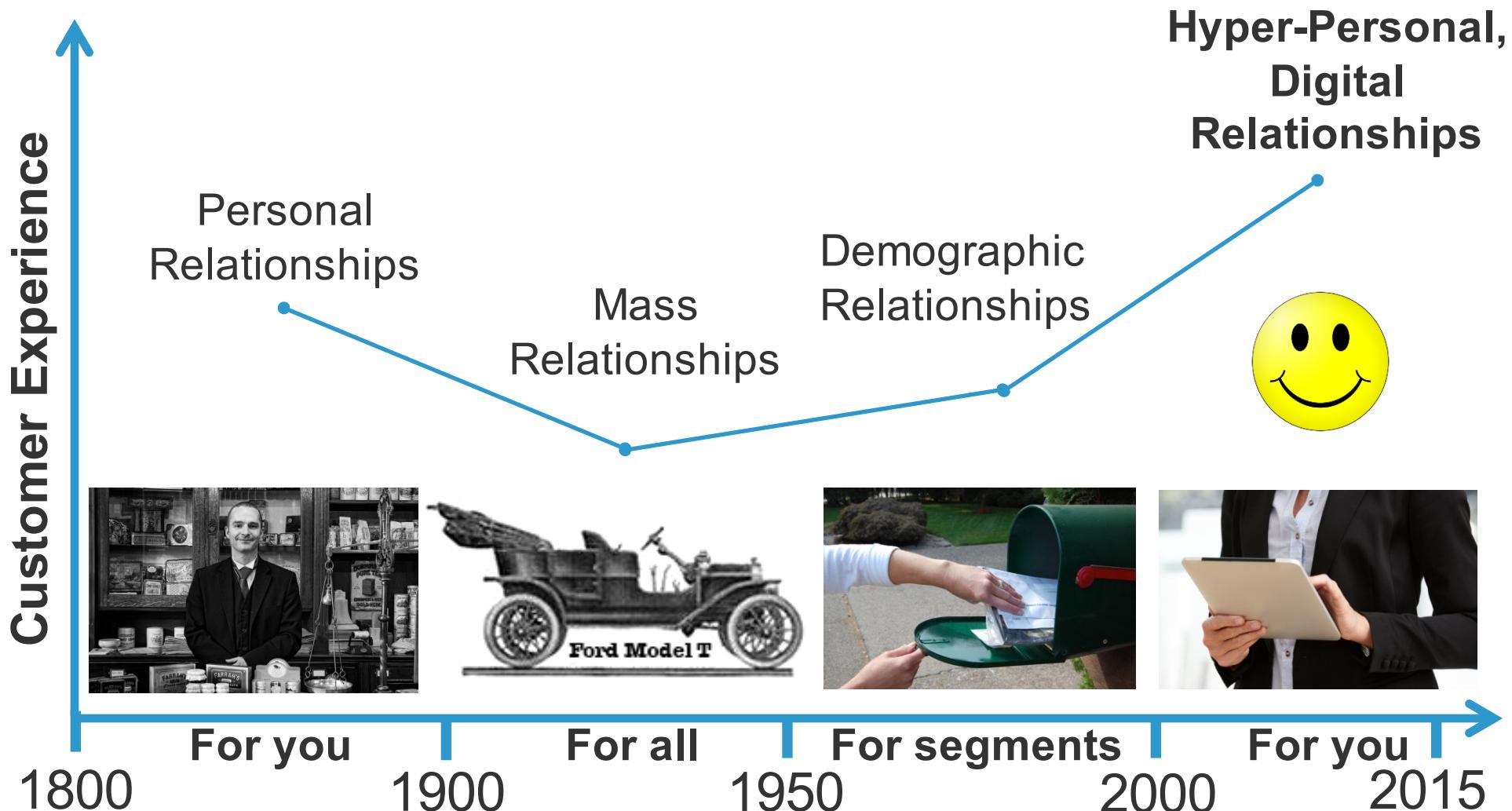
Twitter: @mgualtieri

#Priority

Customer experience and product innovation are top priorities.



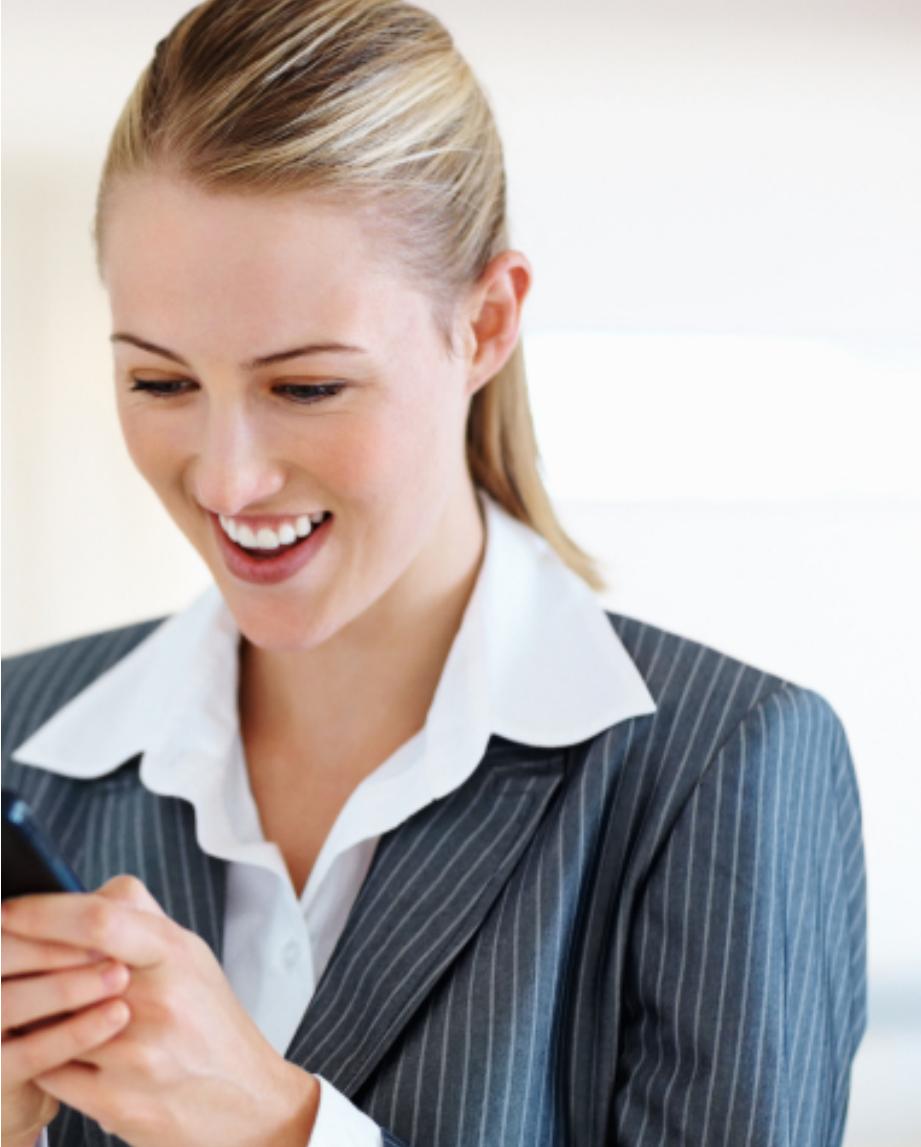
- › Base: 3,005 global data and analytics decision-makers
- › Source: Global Business Technographics Data And Analytics Online Survey



#Friends

A photograph from the movie "The Social Network". Two men are sitting on a couch in a dimly lit room. The man on the left, with long brown hair and a beard, is wearing a grey t-shirt with a graphic of a lion's head on it. He is smiling and pointing his right index finger towards the man on the right. The man on the right has curly brown hair and a mustache. He is wearing a light-colored suit jacket over a blue shirt and a patterned tie. He has a silver-toned wristwatch on his left wrist and is looking towards the camera with a neutral expression. The background shows a window with horizontal blinds and some decorative pillows on the couch.

**Customers want and increasingly expect you
to know them as well as friends know them.**



Hyper-personal customer experiences must:

- **Learn** individual customer characteristics and behaviors
- **Predict** customer needs and desires in real-time
- **Adapt** applications to serve individual customers

~ 150

DUNBAR'S

The cognitive limit to the number of people with whom one can maintain stable social relationships (friends).

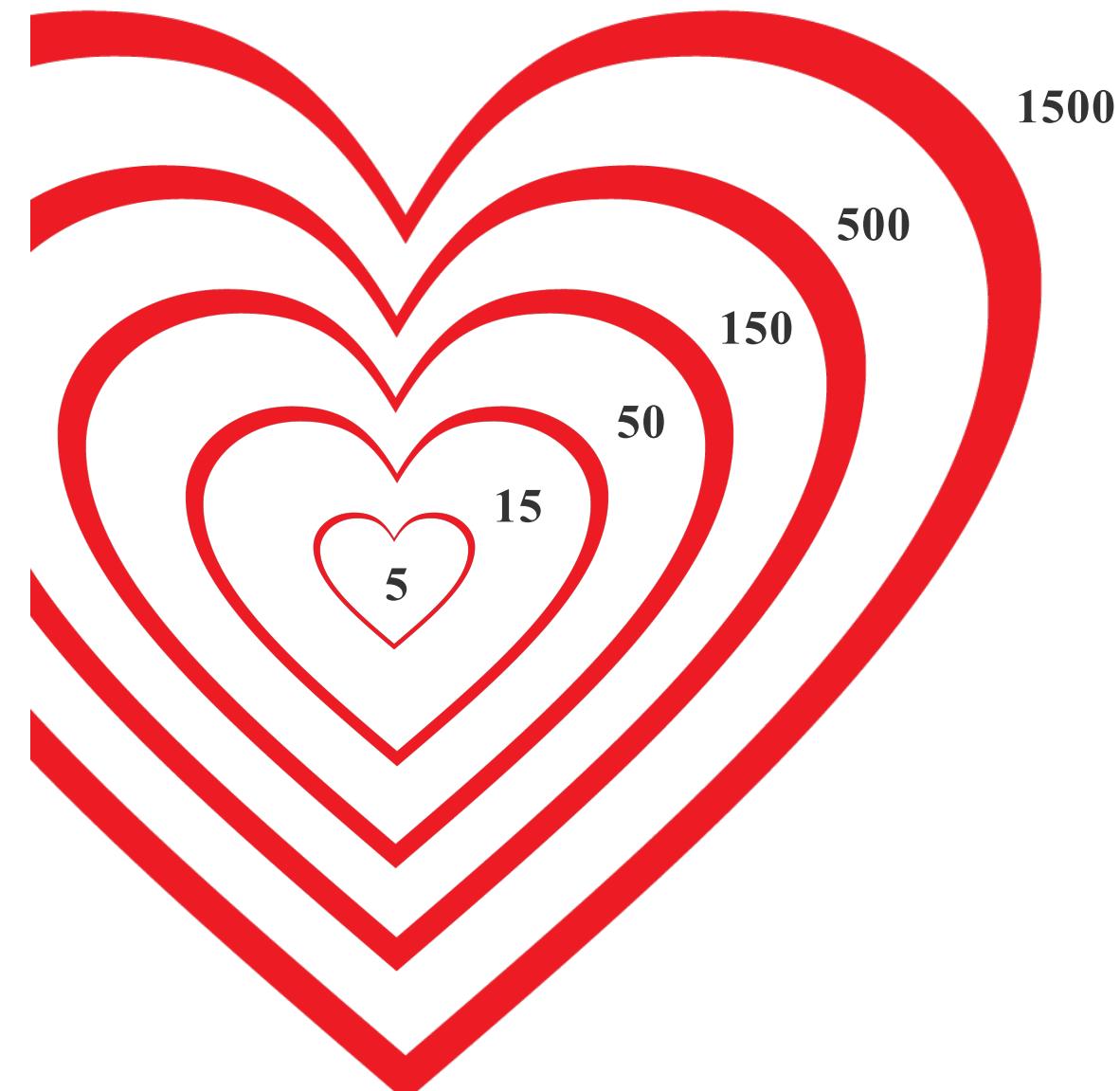
NUMBER



“We can only ever have 150 friends at most.”

Robin Dunbar

- University of Oxford, Head of the Social and Evolutionary Neuroscience Research



Who are the 5 people you care about the most?

- Our relationships form a hierarchically inclusive series of circles of increasing size but decreasing intensity.
- 150 is the limit on personalized, reciprocated relationships.
- 1,500 = limit on memory for faces.

#Customers

How many customers does your organization have?



Mercedes-Benz



25 million investors

6 million active customers

390 million visitors/month

1.8 vehicles per year

320 million citizens

#Quiz

Spark Summit Quiz

How well do you know this consumer?

- › Male
- › 35 years old
- › Single
- › Resides in New York City
- › Makes \$100,000 per year

What do you predict he would do if the bank accidentally transferred \$5,000 into his bank account?

- A. Give the money back
- B. Take the money and run



George Costanza

#AI

Enterprises that plan to invest in AI expect customer experience and business model benefits

"What are the biggest strategic/growth benefits AI will contribute to your organization?"
(Please select up to 3)



Base: 598 business and technology professionals

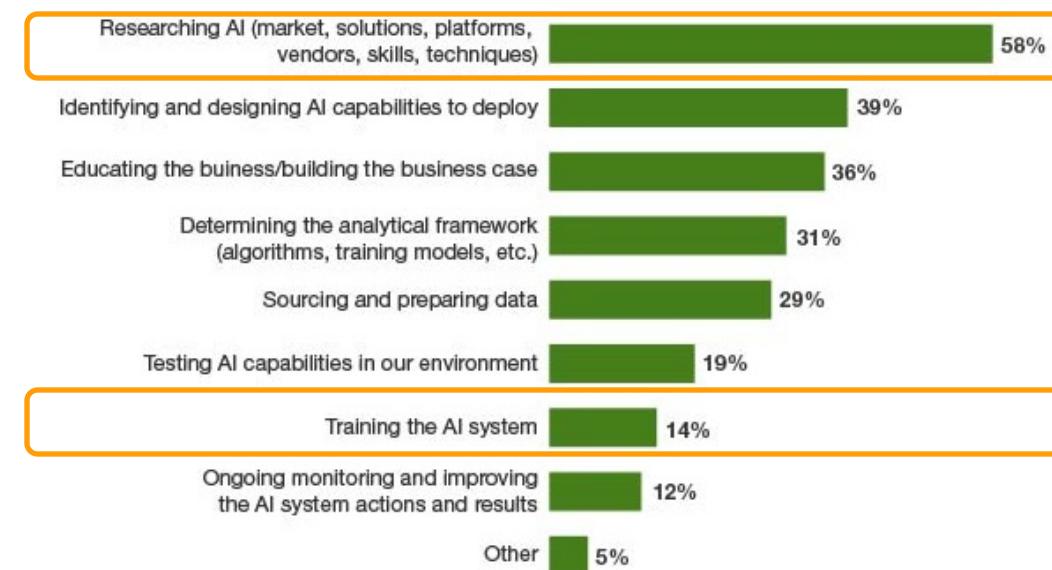
Source: Forrester's Q2 2016 Global State Of Artificial Intelligence Online Survey

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Artificial intelligence (AI) interest is high; adoption is nascent

"Where does your organization spend most of its time with AI systems?"
(Please select up to 3)



Base: 391 business and technology professionals

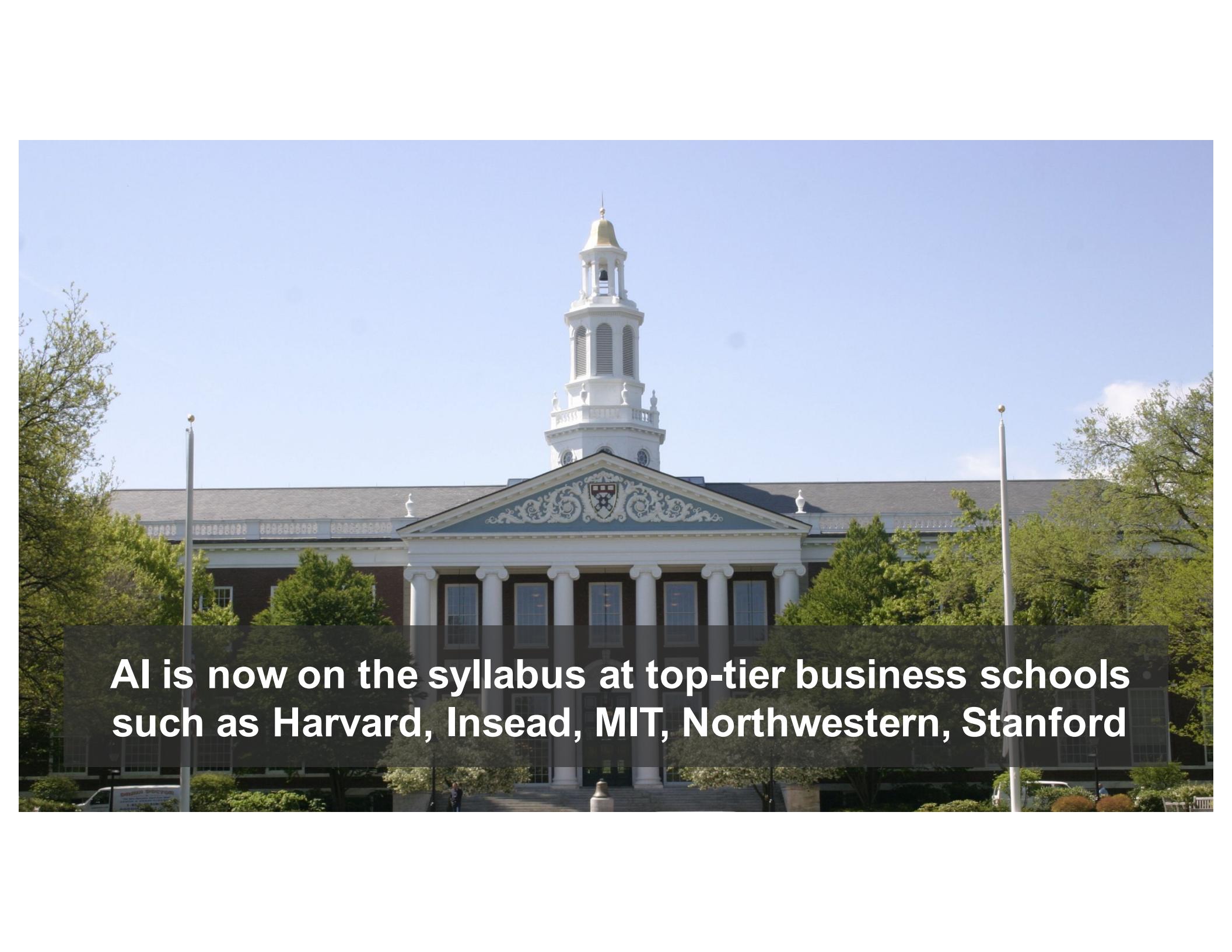
Note: 'Don't know' excluded from analysis

Source: Forrester's Q2 2016 Global State Of Artificial Intelligence Online Survey

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AI is now on the syllabus at top-tier business schools such as Harvard, Insead, MIT, Northwestern, Stanford



Mercedes-Benz

Martin Voigt

Senior Machine Learning Engineer
Machine Learning and
Predictive User Experience

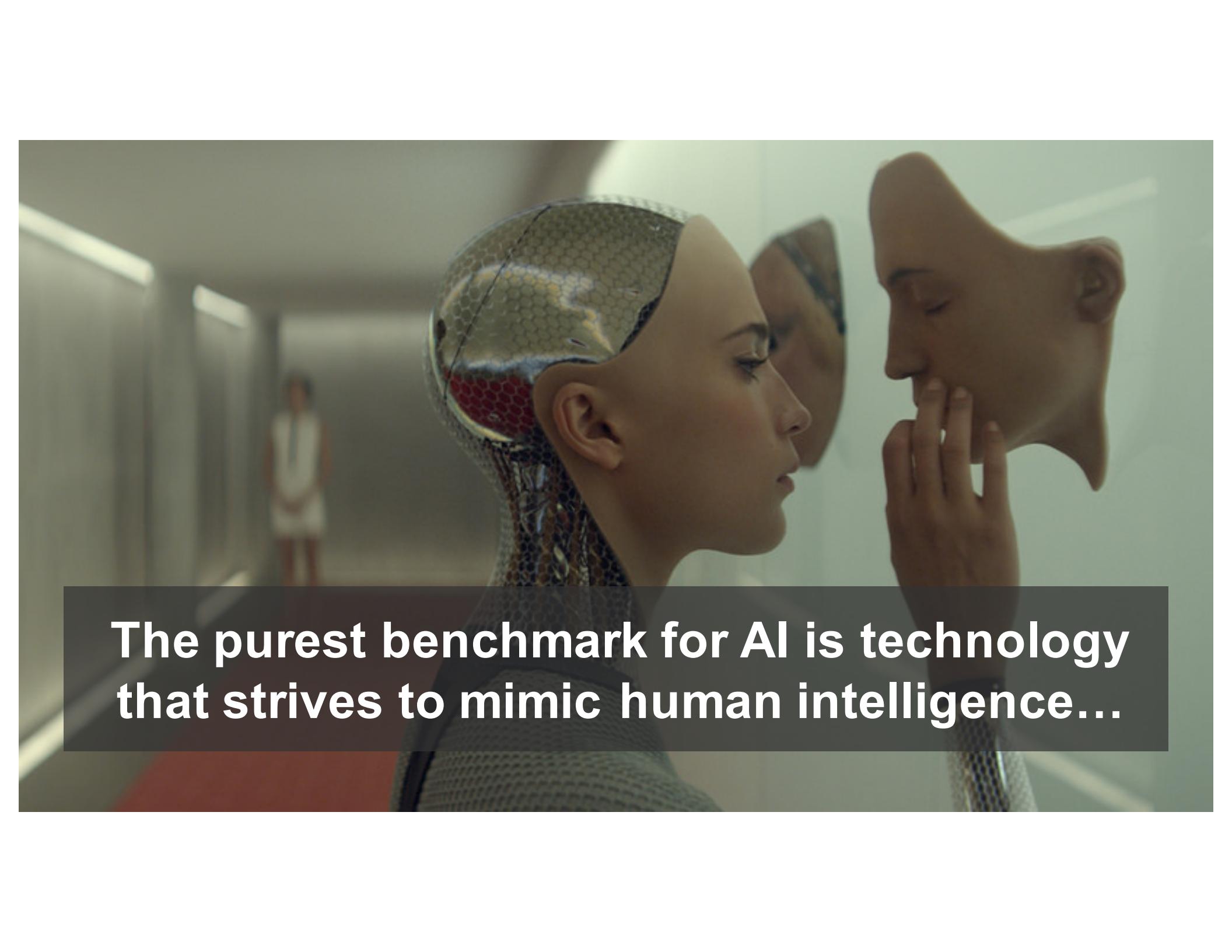
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#PureAI

A woman with a metallic, scaled head and neck is shown in profile, facing a man whose face is partially visible. She is touching his cheek with her hand. The background is a blurred indoor setting.

**The purest benchmark for AI is technology
that strives to mimic human intelligence...**



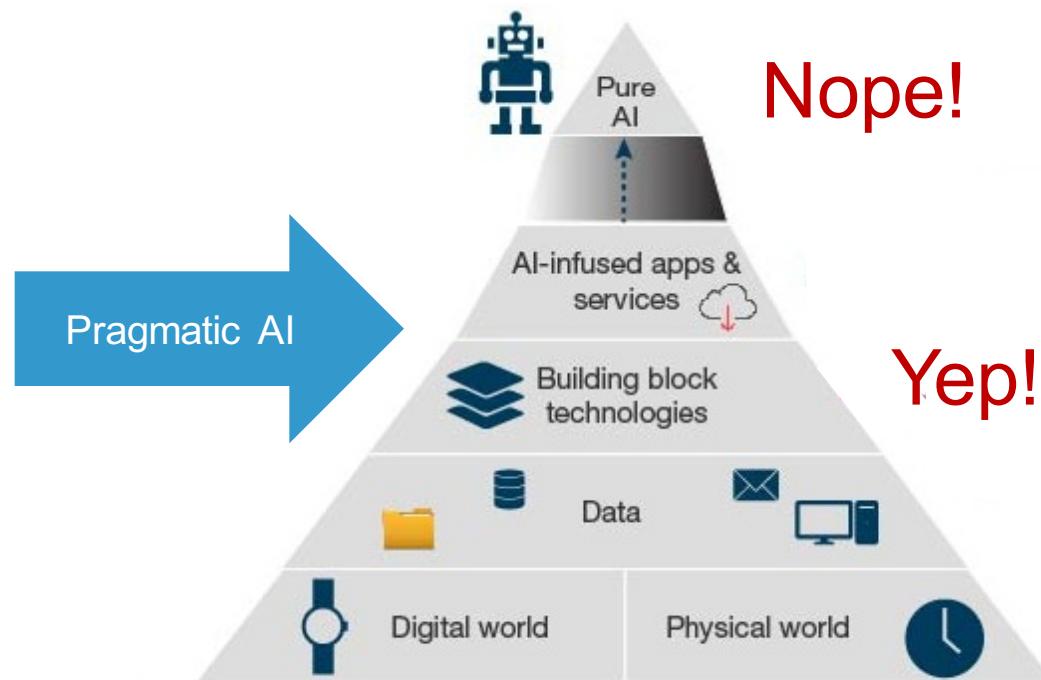
“ . . . within a generation, the problem of creating ‘artificial intelligence’ will substantially be solved.” (1967)

Marvin Minsky (1927-2016)

Co-founder of MIT’s AI Laboratory in 1959

#PragmaticAI

Enterprises can use AI building blocks today to add a modicum of intelligence to apps

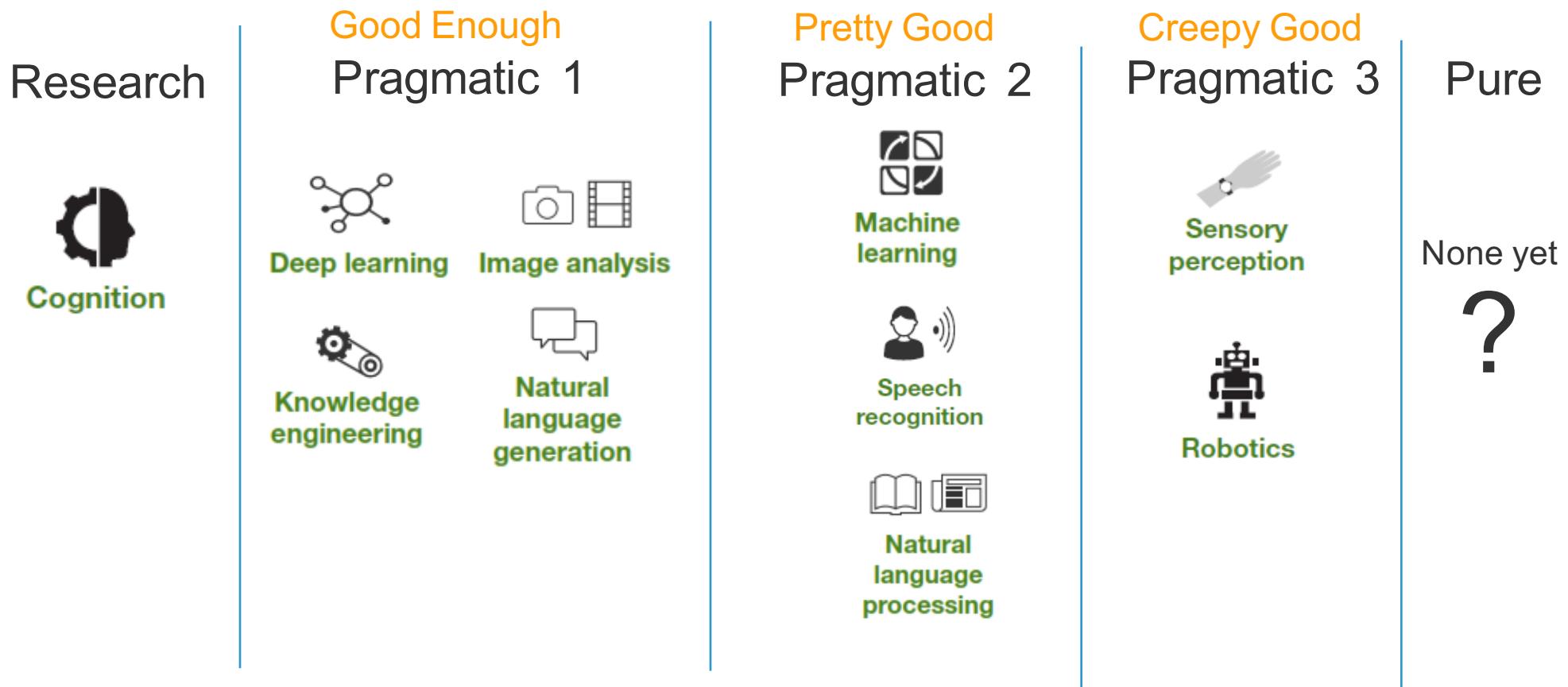


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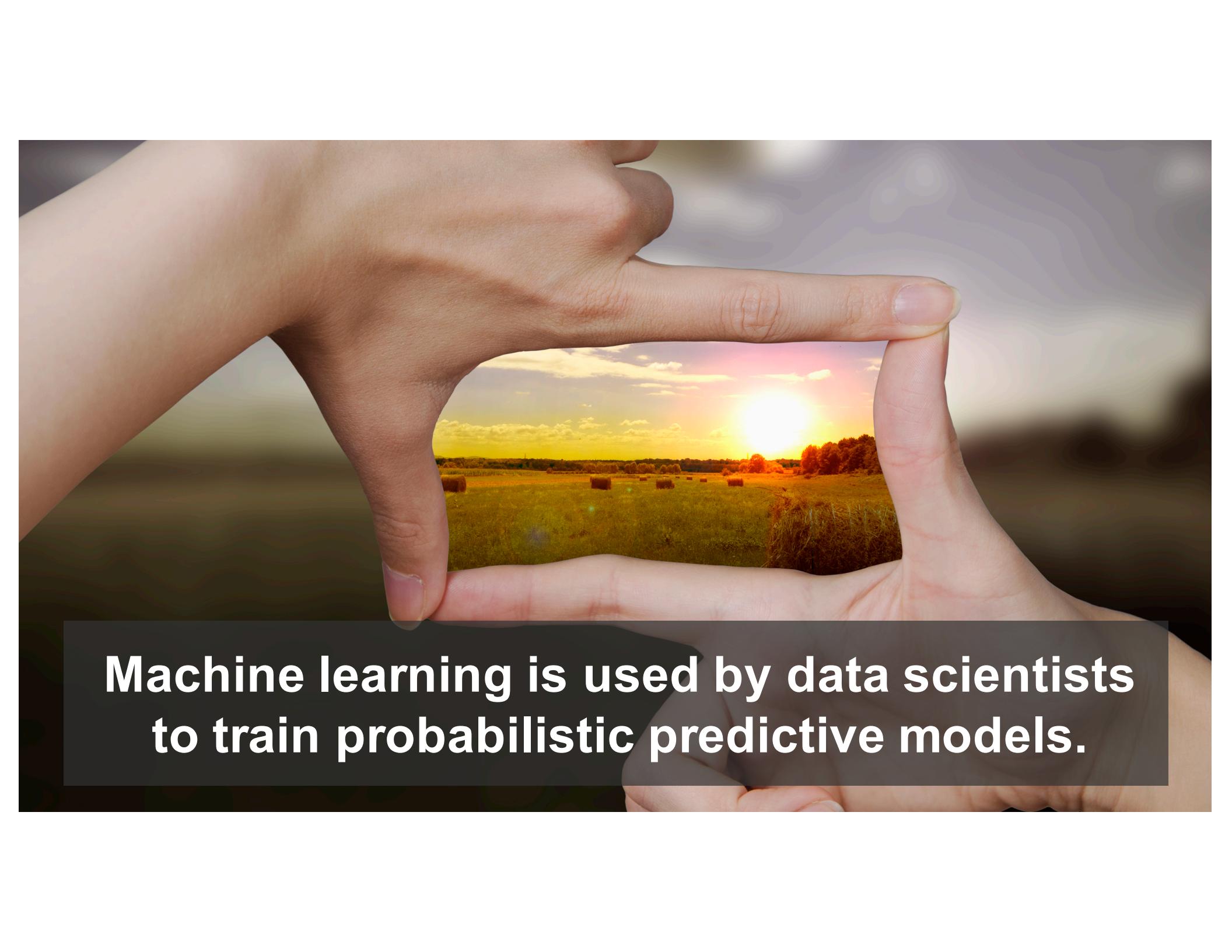
Source: Forrester Research, Inc. Unauthorized reproduction, citation, or distribution prohibited.

#BuildingBlocks

Use one or more of these AI building block technologies to build a modicum of intelligence in your apps.



#ML

A photograph of a person's hands framing a sunset over a field. The hands are positioned to create a circular frame around a landscape where the sun is setting behind a line of trees, casting a warm glow over a field with hay bales.

**Machine learning is used by data scientists
to train probabilistic predictive models.**



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Unique for You

Michael, we think you might enjoy:

Die Hard

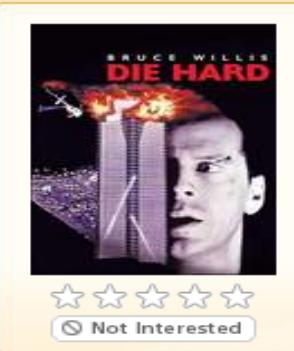
Our best guess for you 4.7



Customer average rating 4.1



[Add DVD](#)



YOUR RECENT ACTIVITY

05/18 We shipped The Wire: Season 1: Disc 1

SUGGESTIONS FOR YOU

You have [new suggestions](#) in Movies You'll ❤

Critically-acclaimed Violent Sci-Fi & Fantasy

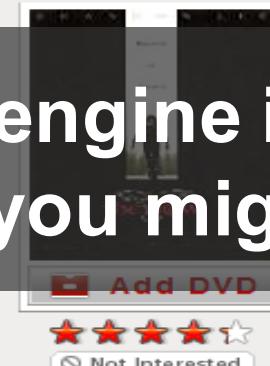
Your taste preferences
created this row.

Critically-acclaimed
Sci-Fi & Fantasy
Violent

Pan's Labyrinth



The Crow



28 Days Later



Alien: Collector's E



A recommendation engine is a finely tuned prediction about what you might enjoy watching.

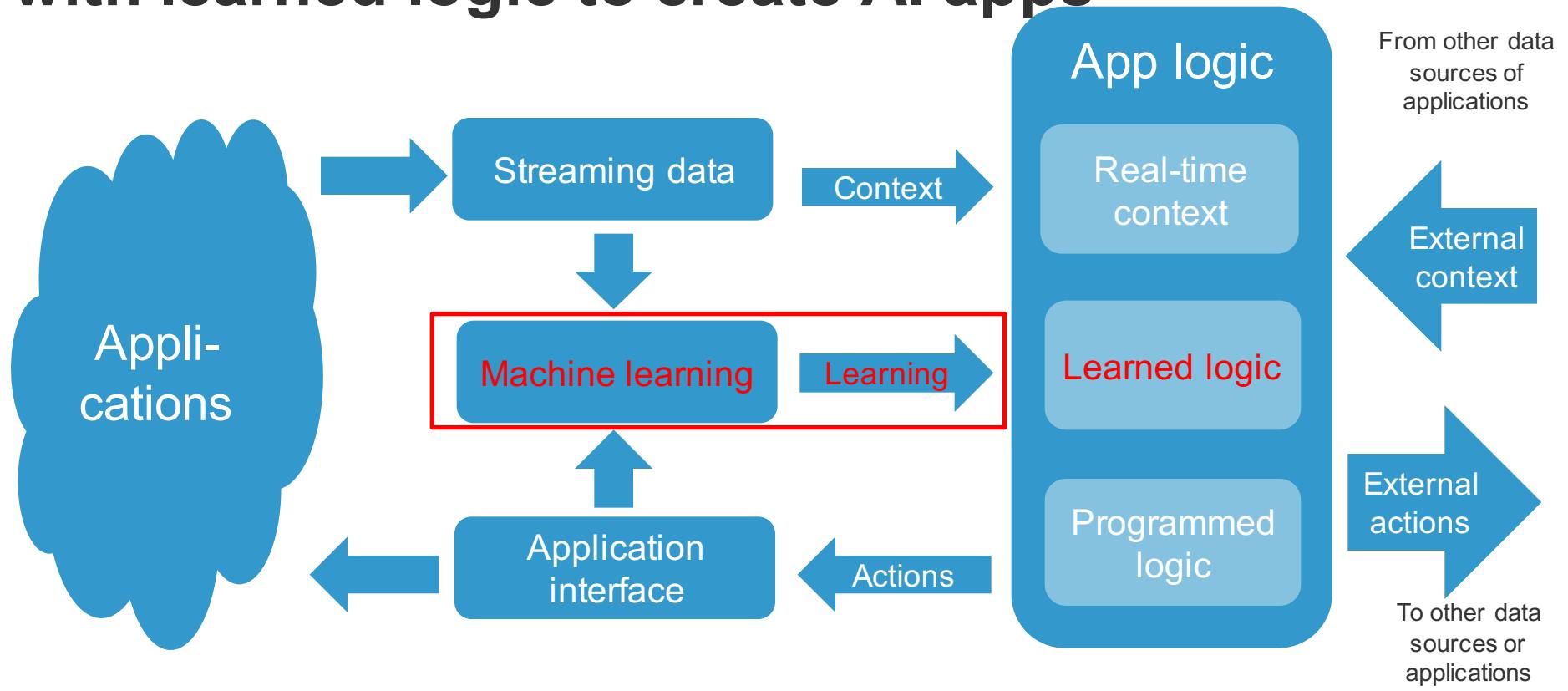
A photograph of a middle-aged man with grey hair, wearing a black tuxedo and a bow tie, sitting in a dark leather armchair. He is holding a glass of whisky in his right hand and has his left leg propped up. He is smiling slightly. The background consists of dark wood paneling and a green marble wall.

Leading financial services firm uses machine learning to predict clients' portfolio actions.

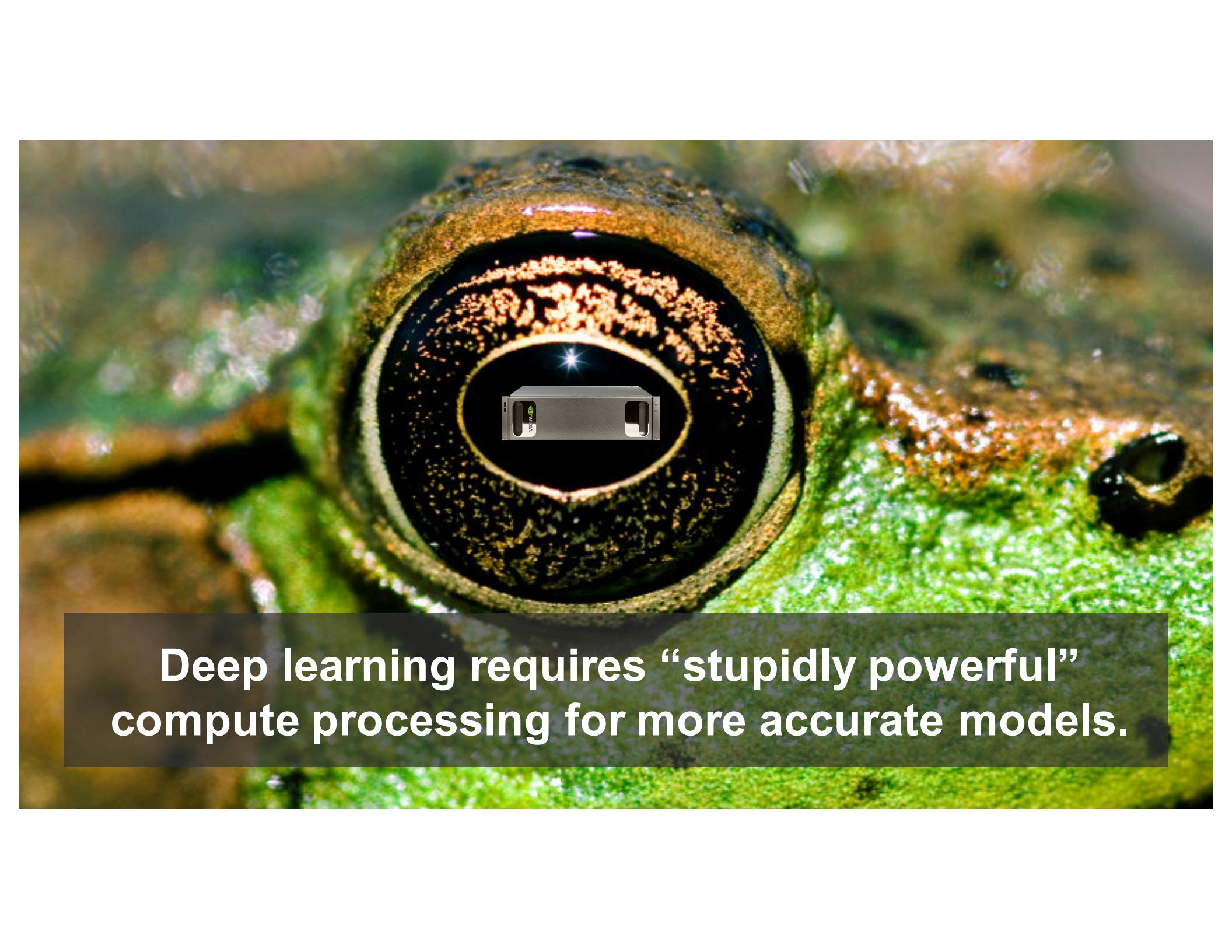


InteractiveTel AI listens in real-time to 200,000 minutes of car buyer conversation per month at a large dealership.

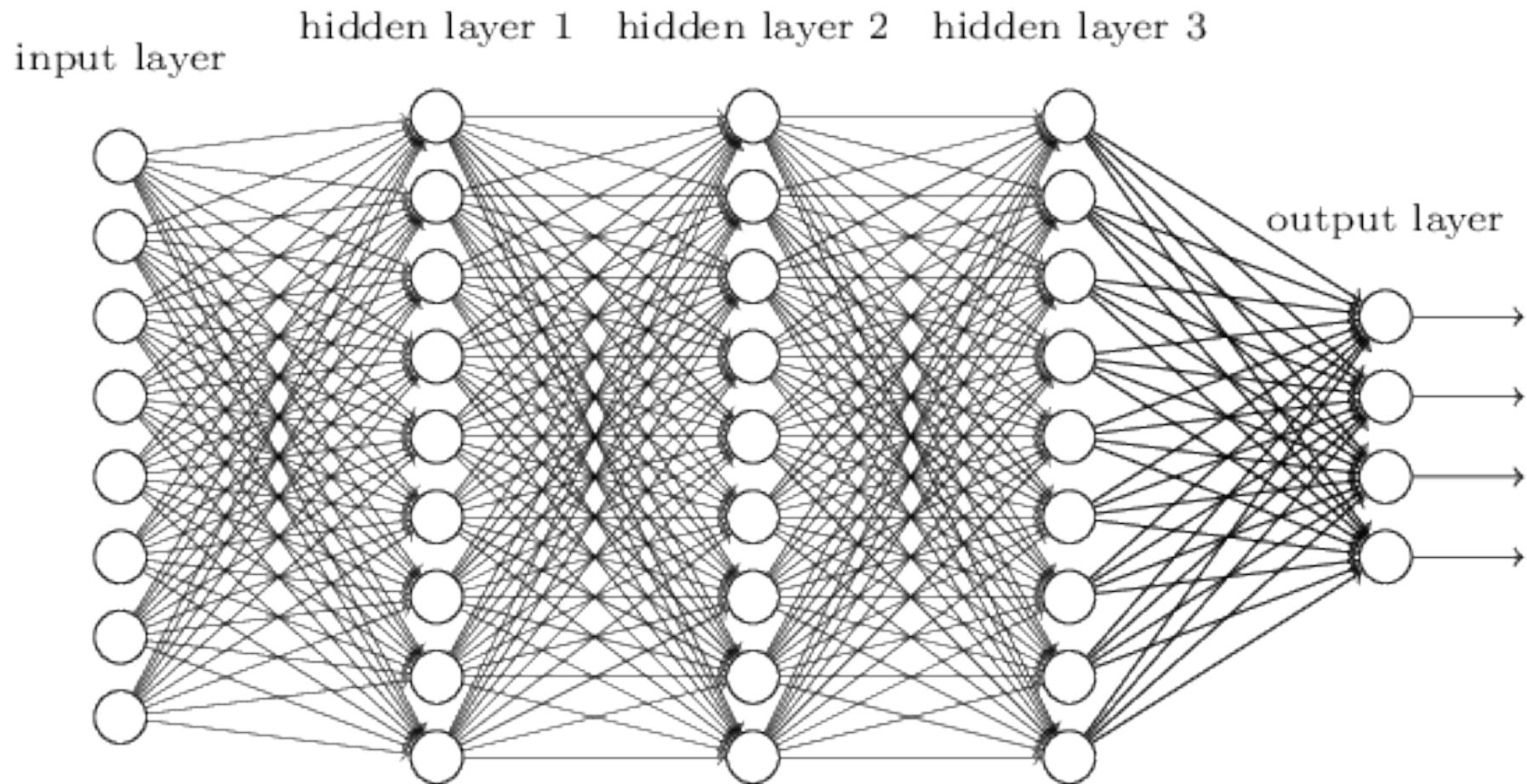
Machine learning augments programmed logic with learned logic to create AI apps



#GoDeep



Deep learning requires “stupidly powerful”
compute processing for more accurate models.



Deep learning open source libraries are available now

- › Caffé
- › Deeplearningforj
- › MxNet
- › OpenAI
- › Theano
- › Tensorflow
- › Torch

X

Landmarks

Faces

Labels

Colors

Safe Search

JSON Response



HooverDam.jpg

Motorcycle

93%

Car

88%

Vehicle

84%

Motorcycling

83%

Bicycle

71%

Mountain

60%

Automobile Make

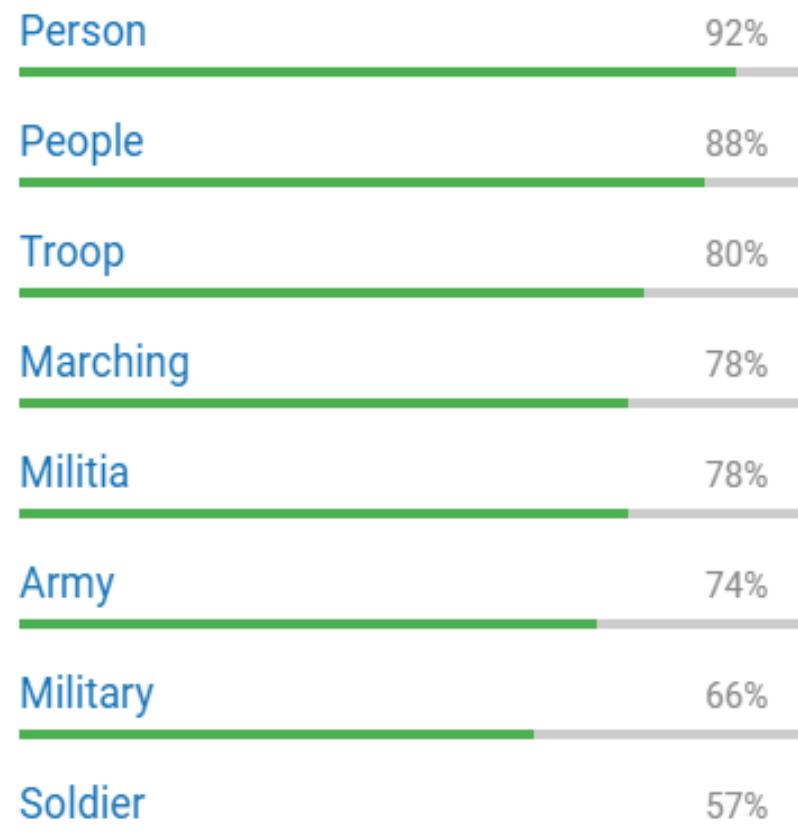
57%

Travel

50%

[Faces](#)[Labels](#)[Colors](#)[Safe Search](#)[JSON Response](#)

2016MinuteMan.jpg



X

Labels

Text

Colors

Safe Search

JSON Response



Prints_011.JPG

Flight

81%

Windsports

80%

Atmosphere Of Earth

78%

Sports

78%

Air Sports

78%

Toy

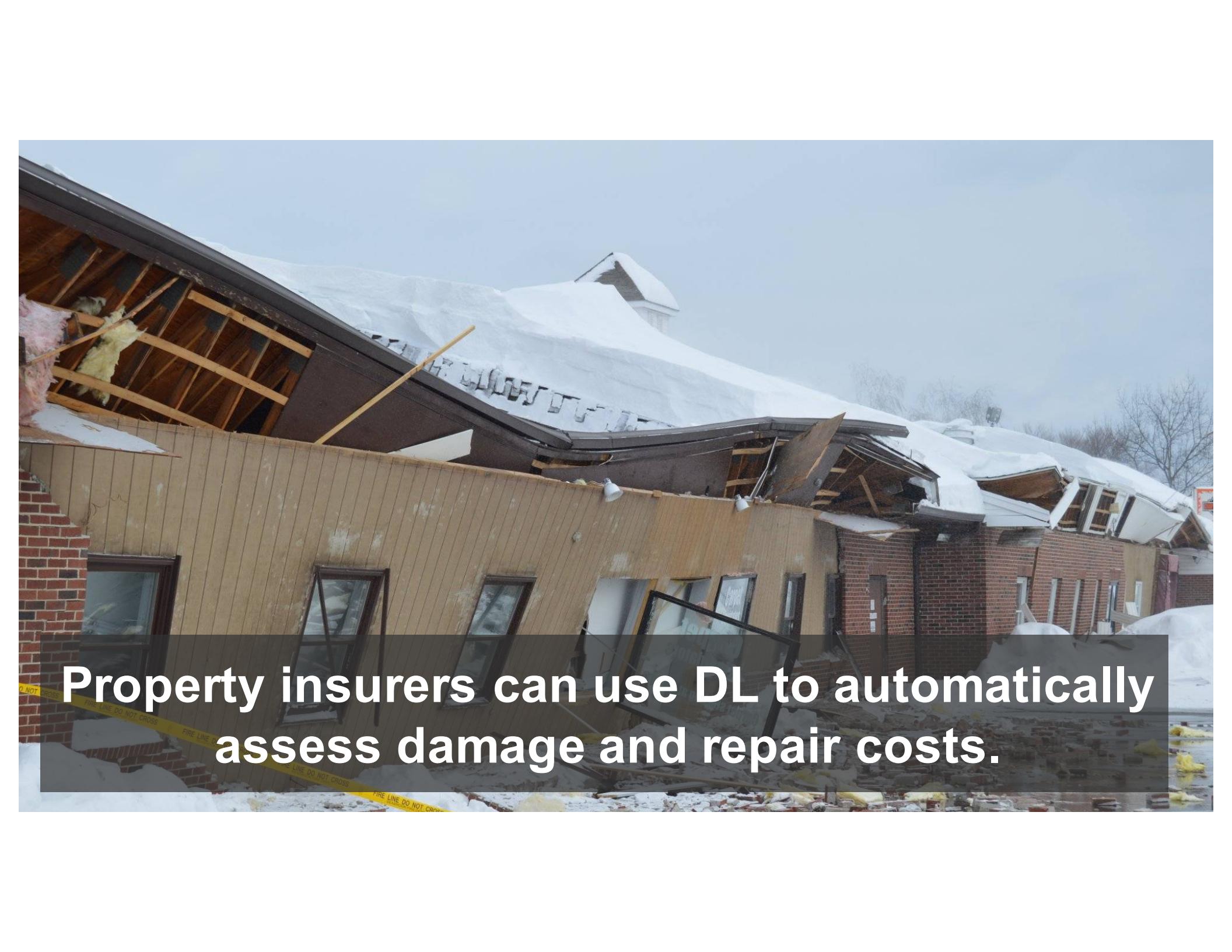
71%

Gliding

65%

Paragliding

64%

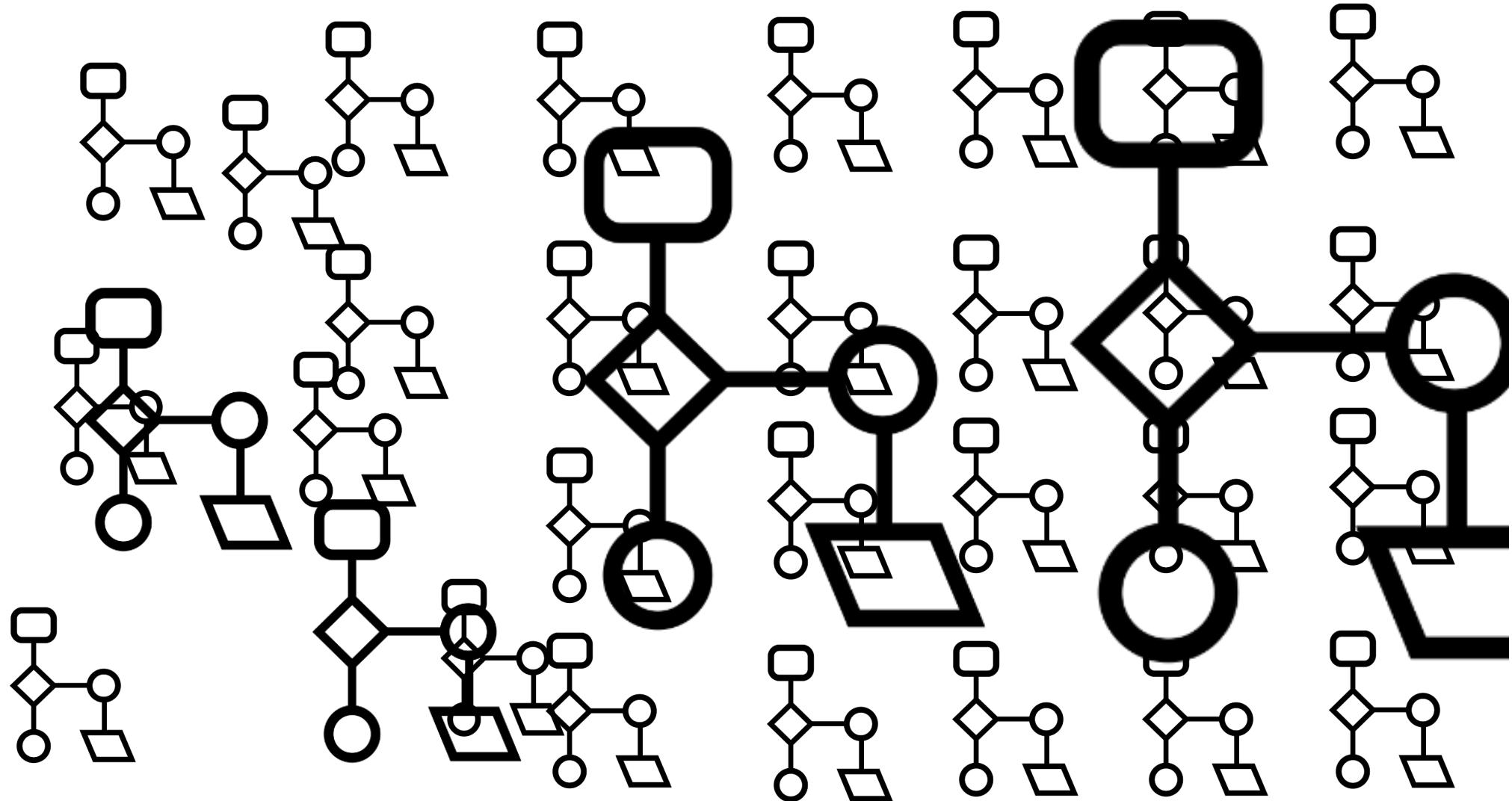


Property insurers can use DL to automatically assess damage and repair costs.

#



#Models

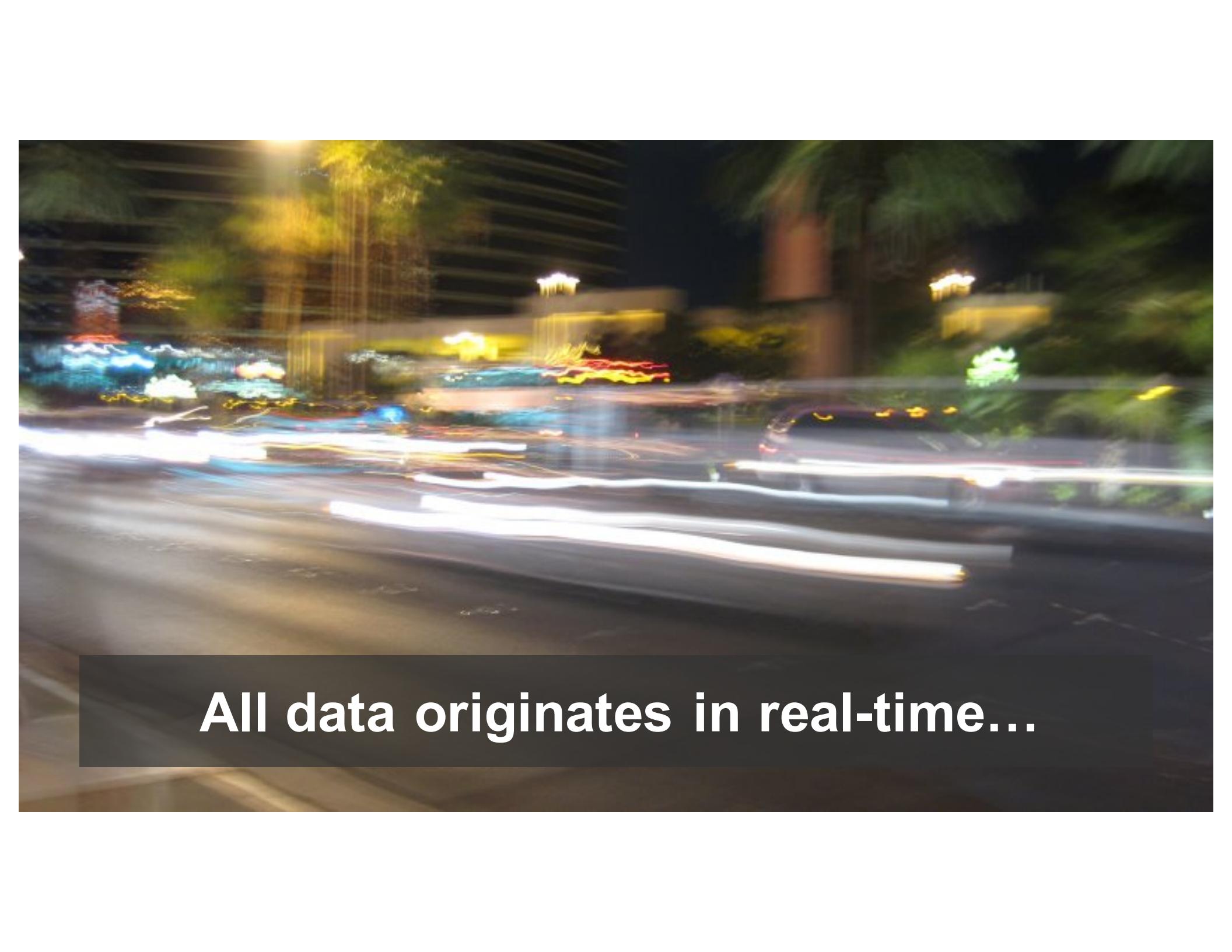


AI Models

10 characteristics + 10 behaviors + 10 needs =
30 AI models per customer

1 million customers x 30 models =
30 million AI models

#Data



All data originates in real-time...

A photograph of five large, cylindrical metal grain silos standing in a row. They have dark, ribbed bodies and light-colored, conical roofs. The silo on the far left has a small circular opening near its base. The background is a clear blue sky.

11000100011011001

IoT

01000110001101100

Transactions

0100010001101101

Customer Data

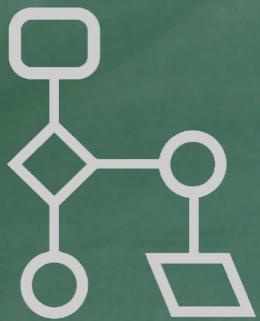
0100,

Everything

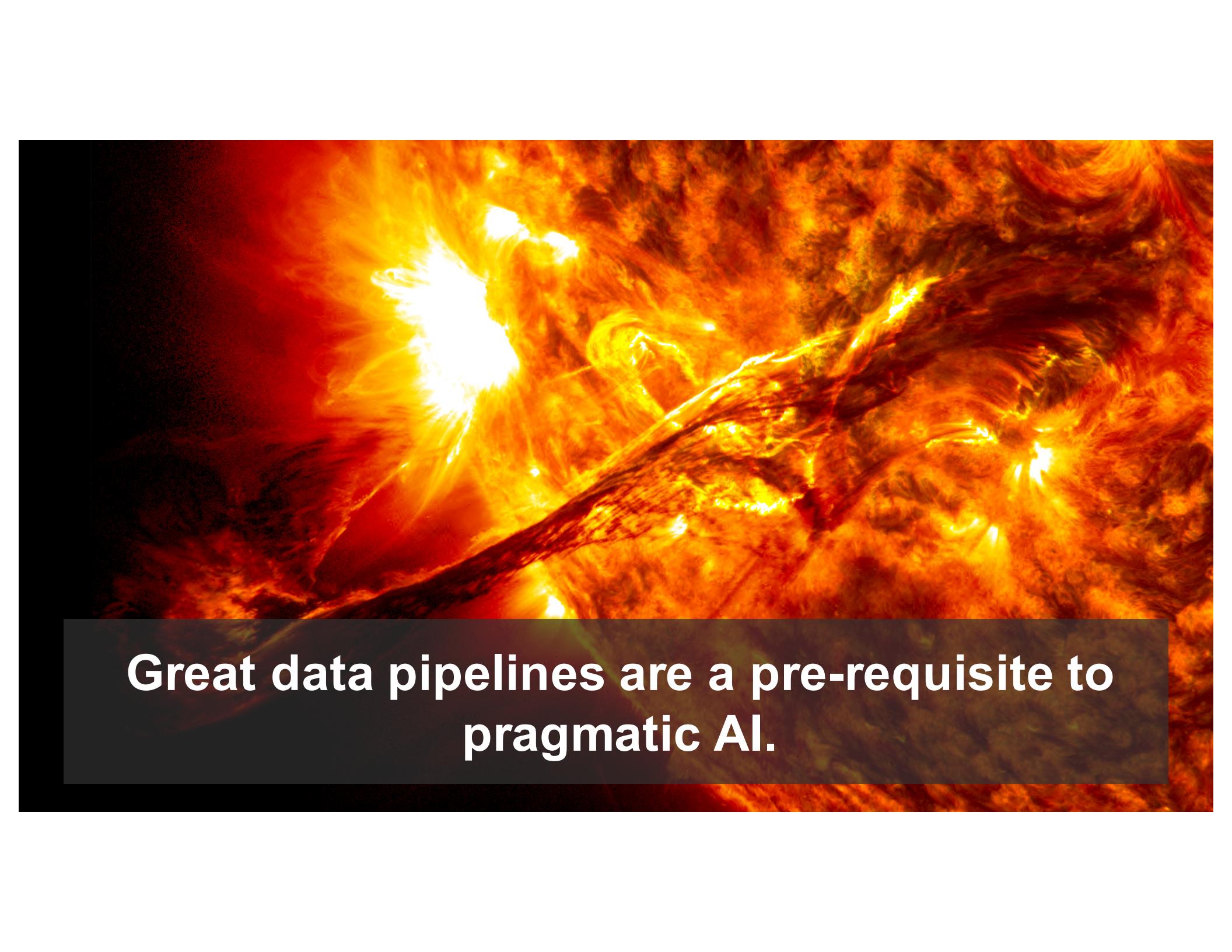
...but, traditional analytics to gain insights and build models is usually done much, much later.



Millions of AI models...

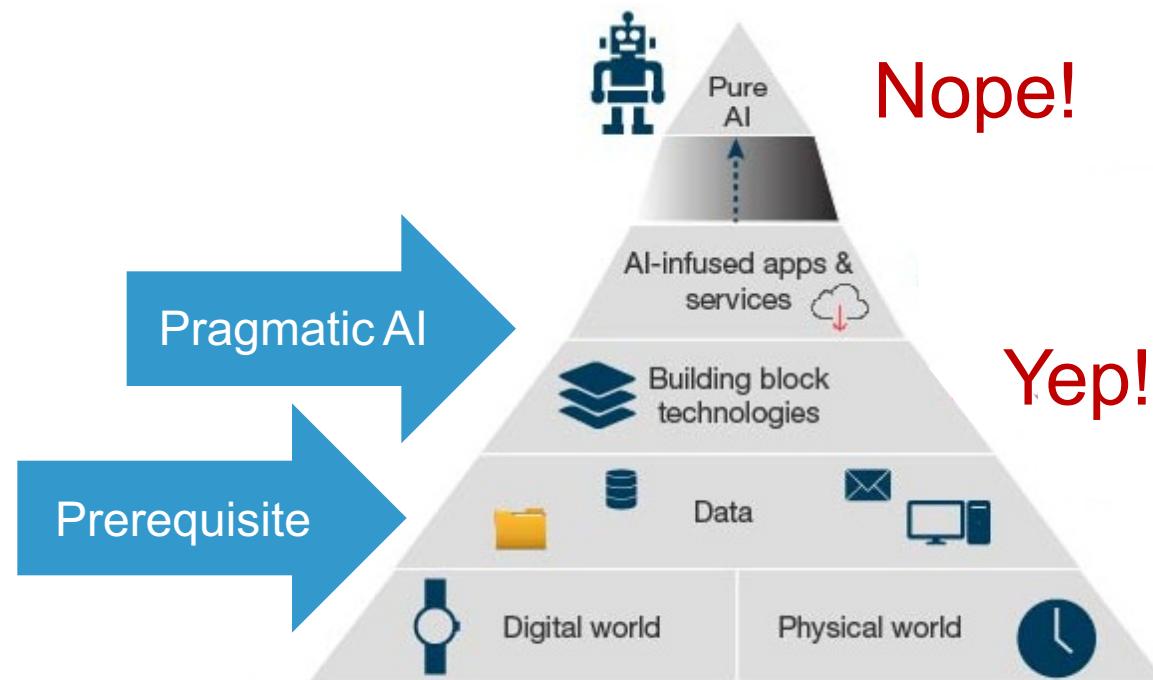


...updated continuously
with real-time data!



**Great data pipelines are a pre-requisite to
pragmatic AI.**

Enterprises can use AI building blocks today to add a modicum of intelligence to apps

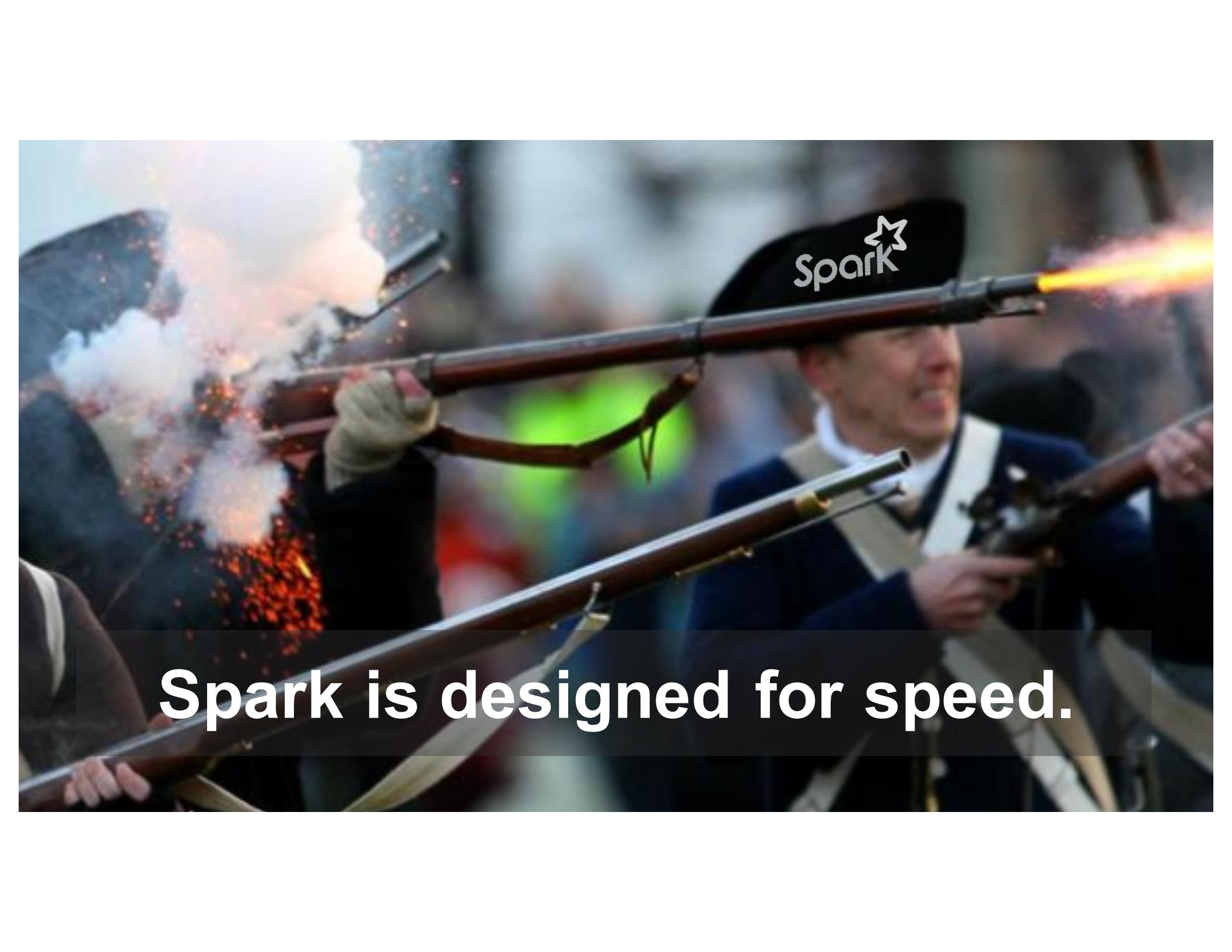


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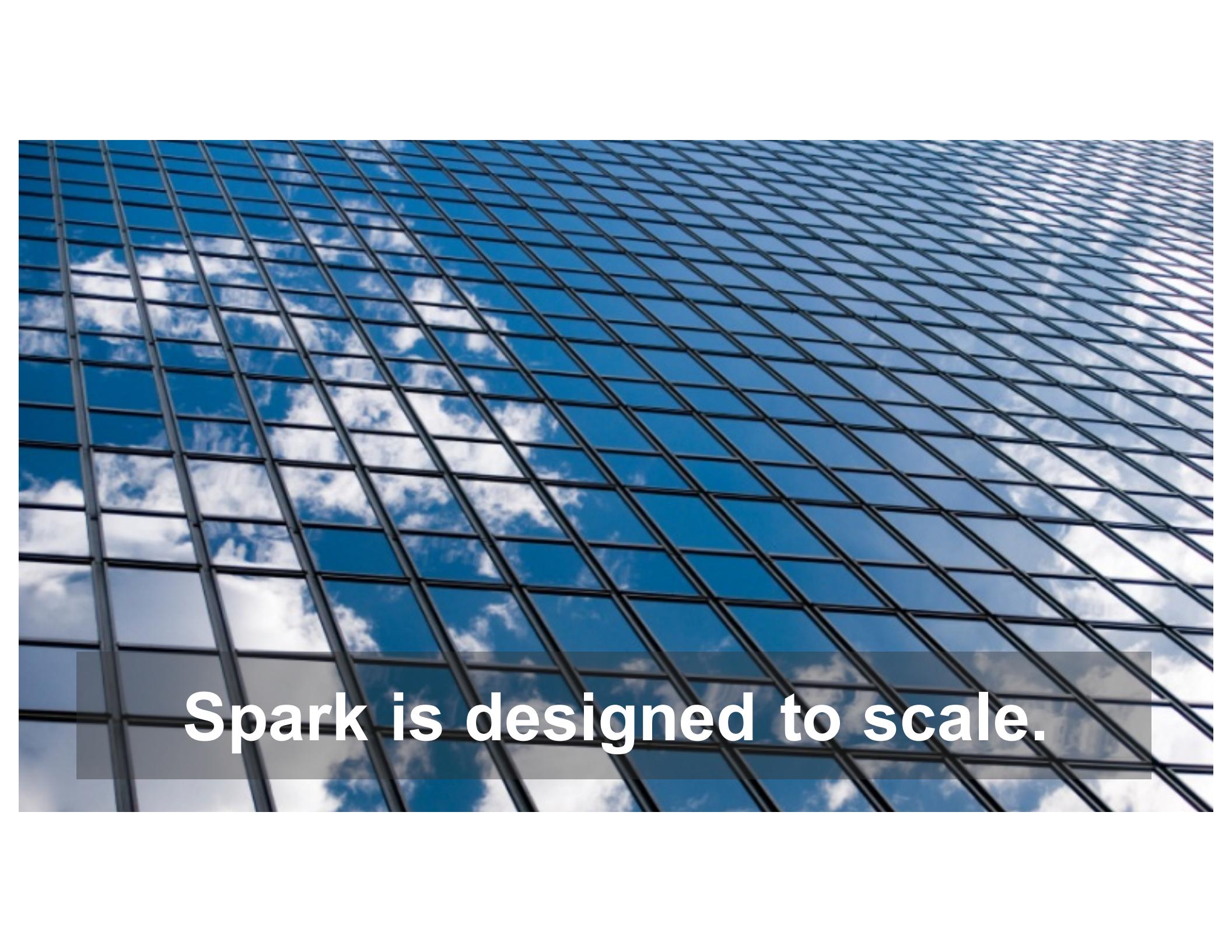
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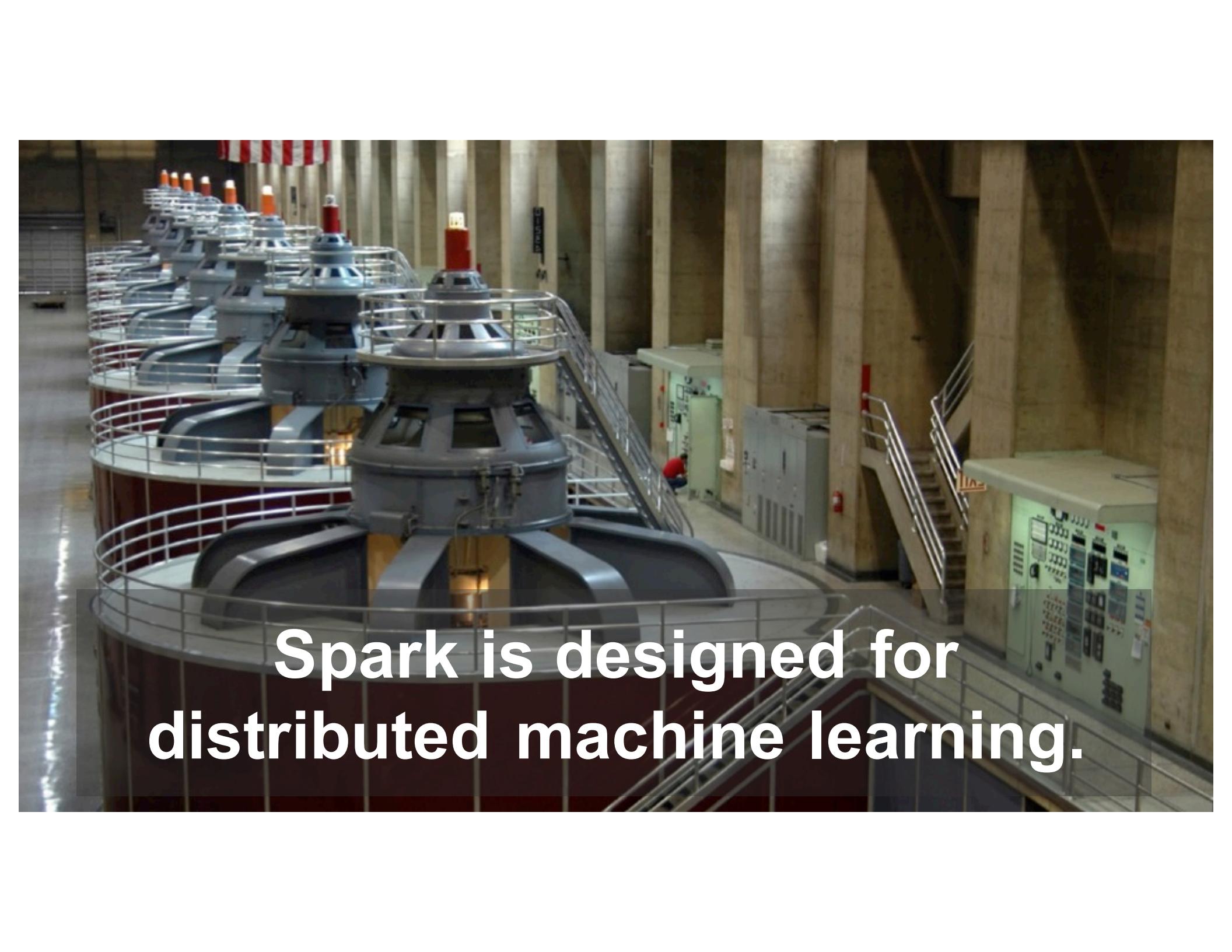


Spark

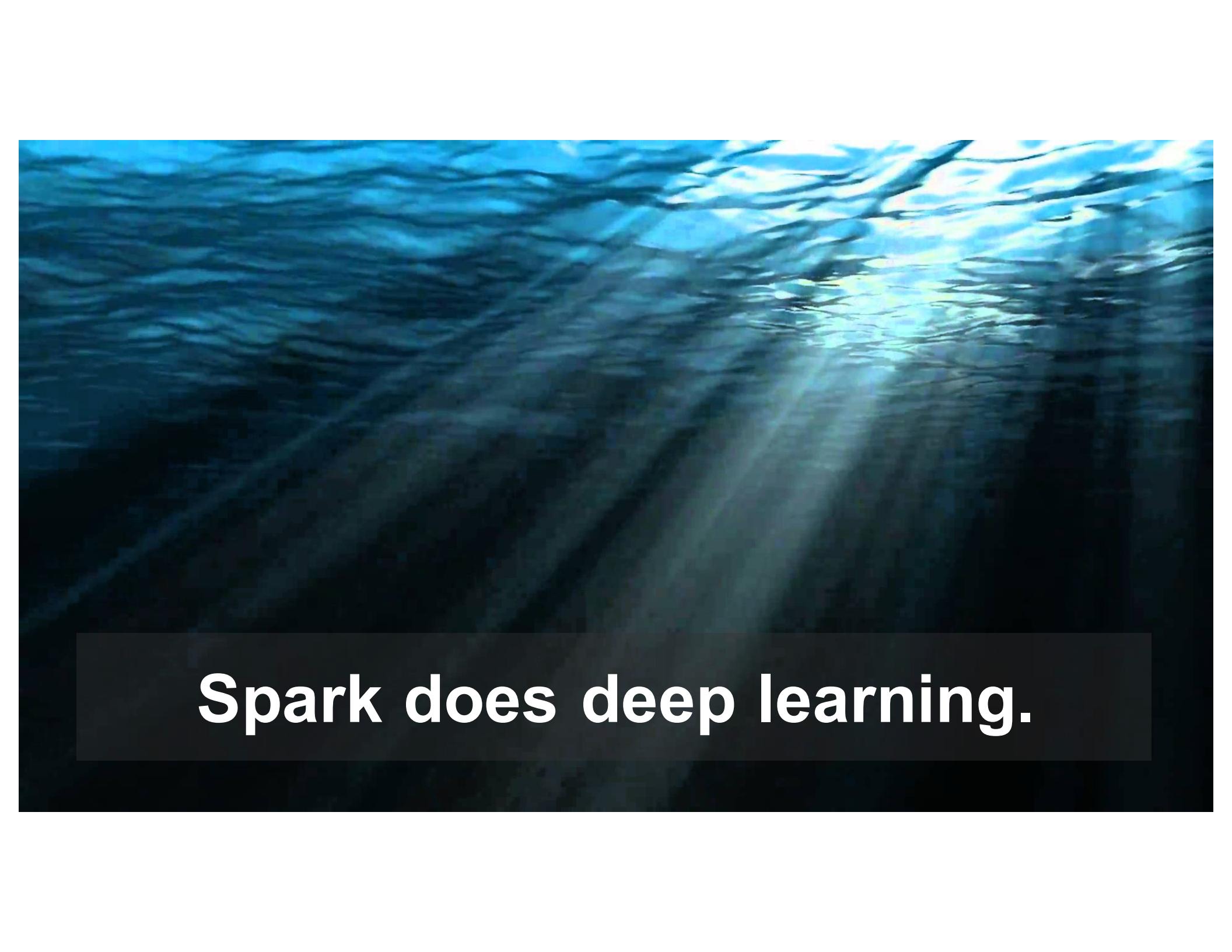
Spark is designed for speed.



Spark is designed to scale.

A photograph of a large industrial power plant interior. In the foreground, several massive turbines and generators are visible, arranged in a curved pattern. The machinery is made of stainless steel and has red and white safety railings. In the background, there are tall concrete pillars and a control room with a large array of control panels and monitors. A small figure of a person is visible near the base of one of the machines, highlighting their enormous size.

Spark is designed for
distributed machine learning.

A photograph of an underwater environment. Sunlight filters down from the surface in bright, glowing rays, creating a dramatic play of light and shadow. The water is a deep blue, with darker shades at the bottom transitioning to lighter, sunlit areas near the top.

Spark does deep learning.

cloudera®

IBM

context relevant™

bluedata™

STREAMANALYTIX

PURE STORAGE®
Hello Possible™

Qubole

CAZENA

data
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talend



MESOSPHERE

VERTICA

MEMSQL

StreamSets

2 σ TWO SIGMA

Bloomberg

MAPR®

lynx analytics

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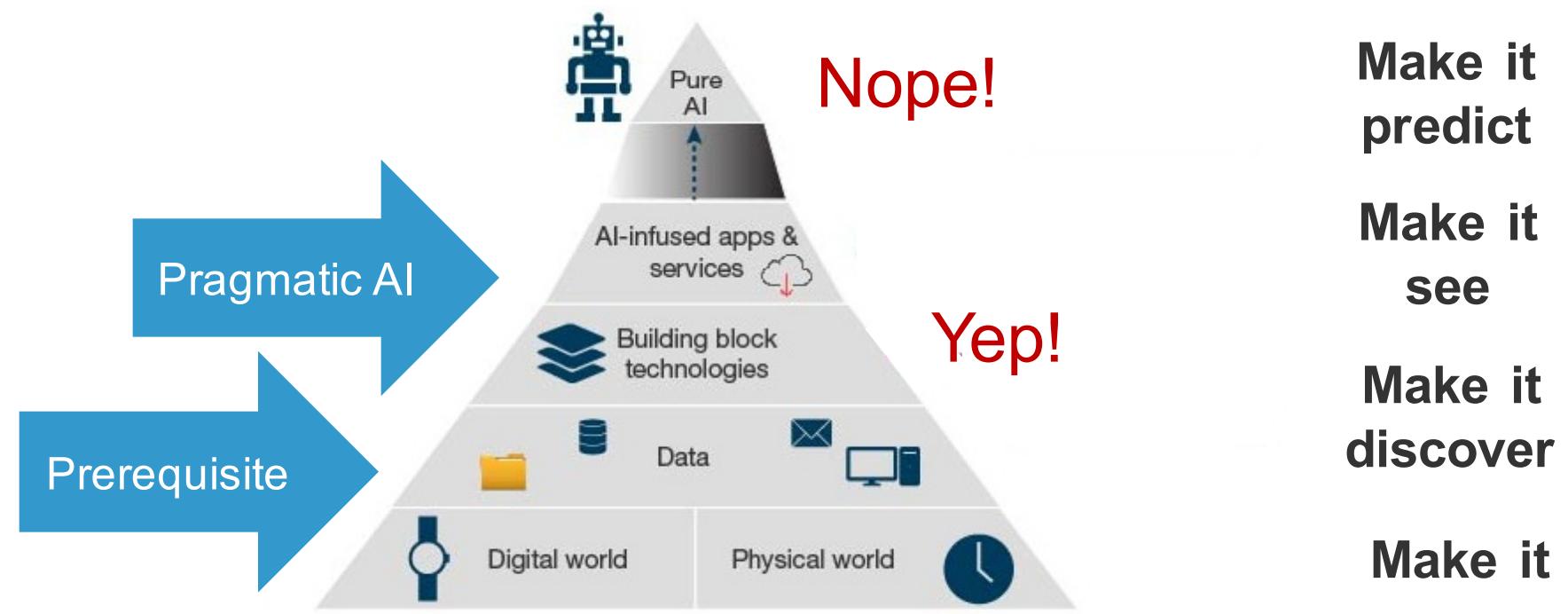
DOMINO
DATASCIENCE

algebraix®data

Spark has a vibrant ecosystem.

#Pragmatic

Pragmatic use cases can work today.



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#DoYourJob



Do your job...



Do your job...with Apache Spark!

Thank you



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