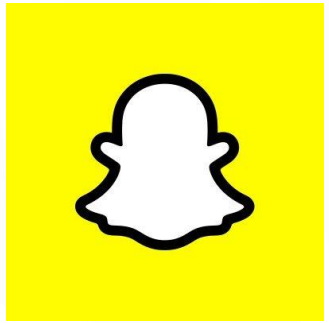
Artificial Intelligence: Good or Evil?

Philippe Herve
VP of Oil and Gas Solutions

“Most people overestimate what they can do in one year and underestimate what they can do in ten years.” *–Bill Gates*

Ten years ago, none of these things existed in the mainstream:

tinder



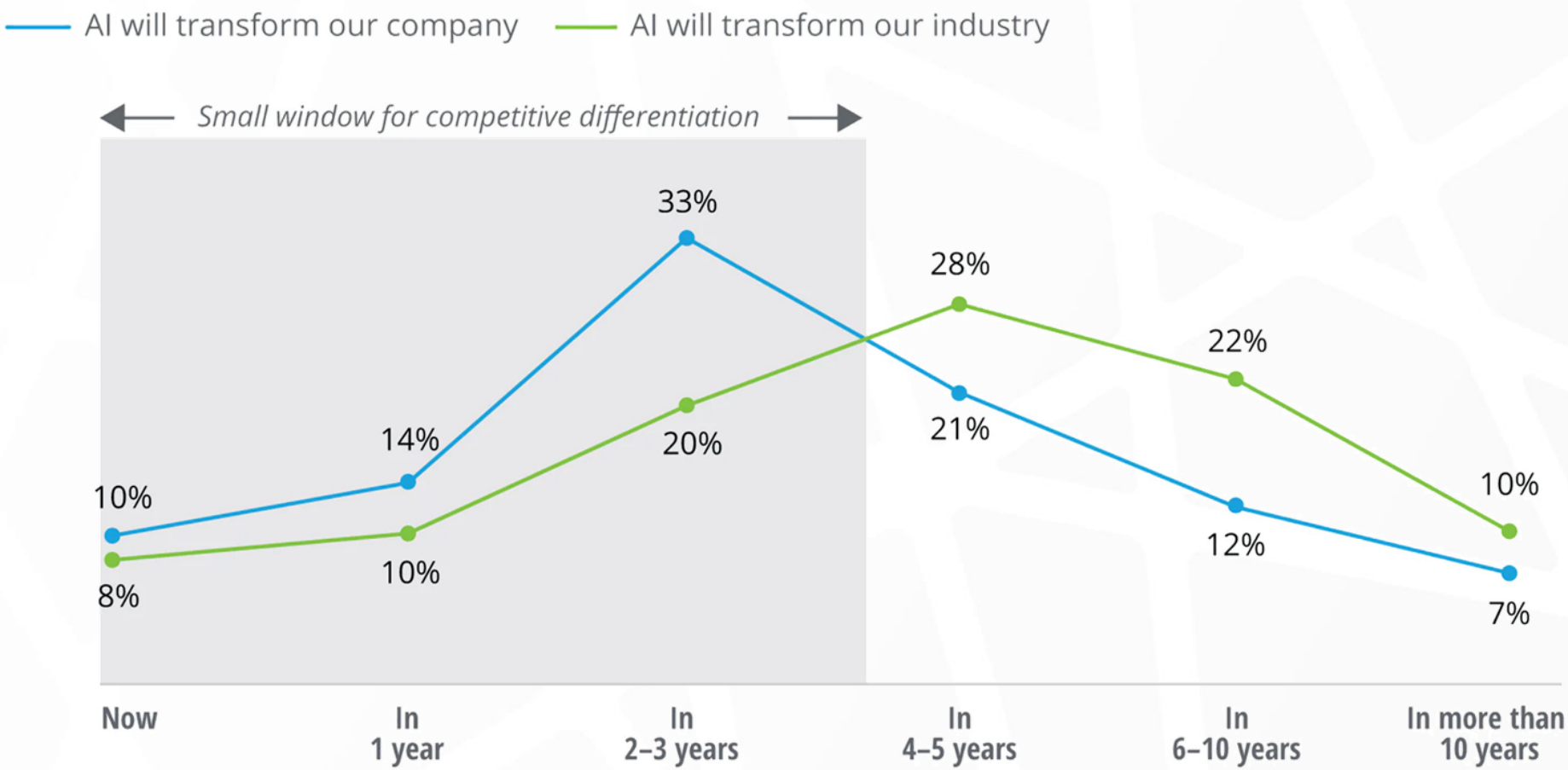
lyft

Artificial intelligence

4G

Technological disruption is coming faster than you think.

The Window for AI Differentiation is Closing



Source: Deloitte analysis based on Deloitte's "State of AI Enterprise, 2nd Edition" survey of 1,900 AI early adopters in seven countries. Note: Percentages may not add up to 100 due to a small number of respondents who answered, "Don't know." Copyright © 2019 Deloitte Development LLC. All rights reserved.

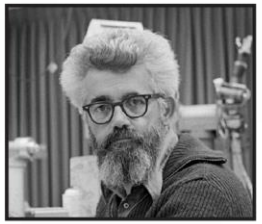
Basics of Artificial Intelligence

The History of Modern AI

AI 1.0

1950

In 1950, Alan Turing publishes “Computing Machinery and Intelligence,” a paper from which the Turing Test emerged.



1956

John McCarthy coins the term “Artificial Intelligence,” defining it as "the science and engineering of making intelligent machines."

AI 2.0

1980s

Rebirth of AI due to "expert systems," which are programs that answer questions or solves problems using logical rules.

AI 3.0

2000s

Deep learning, a family of machine learning methods based on learning data repre-sentations, breaks through.

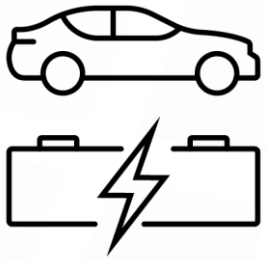
Why is AI 3.0 working?

Computing Power

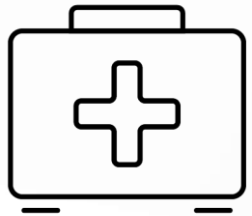
Abundance of Data

Algorithm & Research Breakthroughs

Success of AI 3.0

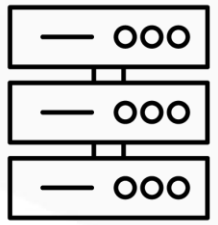


TESLA



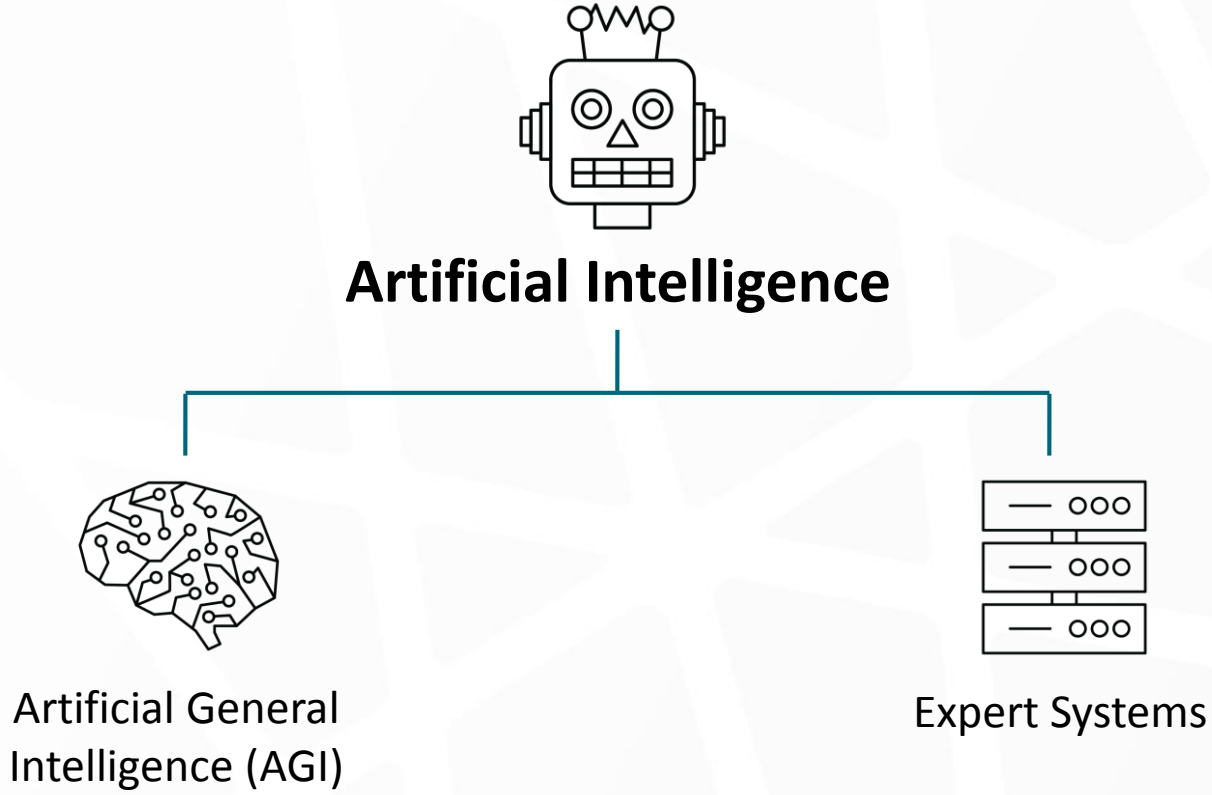
IBM Watson

sparkcognition™

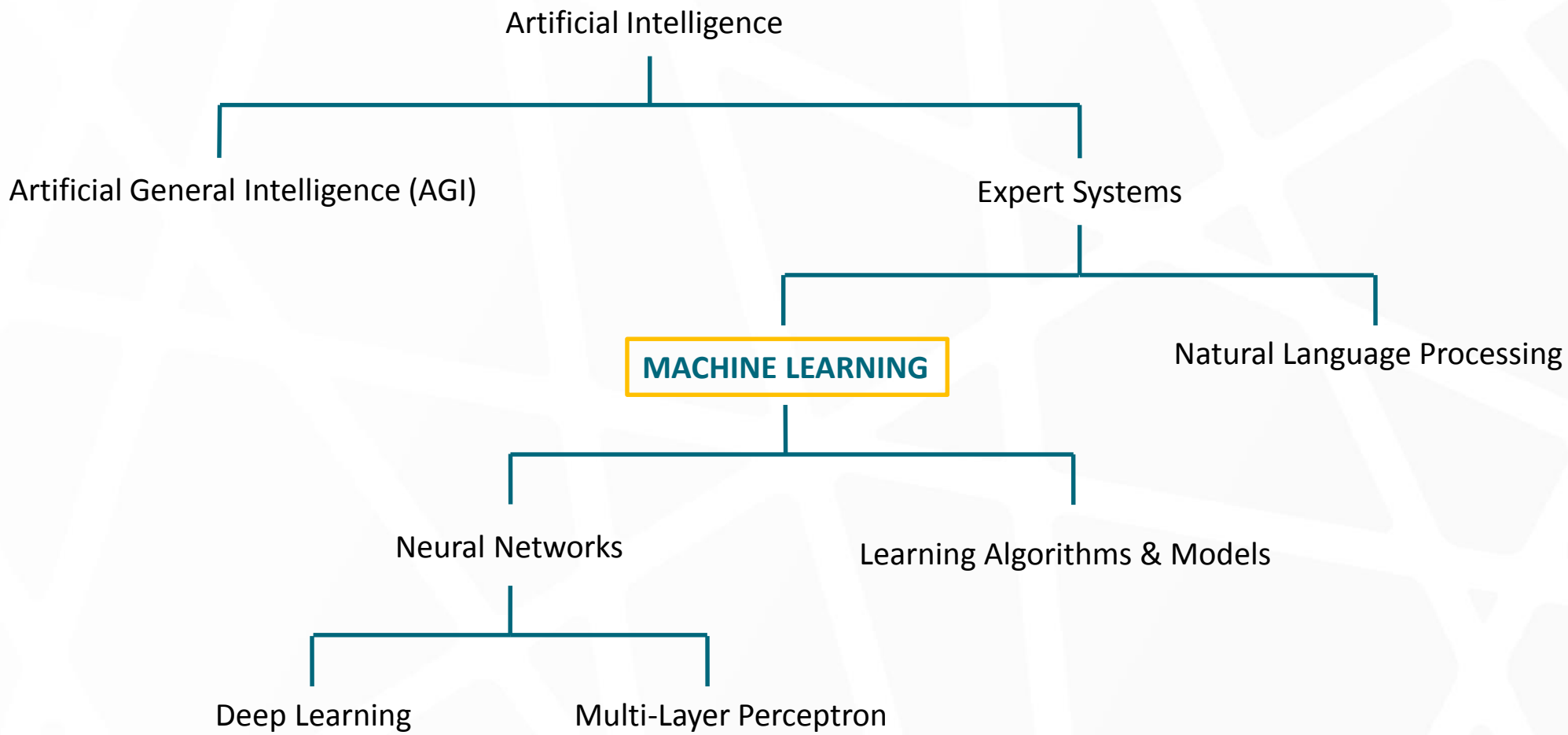


Google

Artificial Intelligence



AI vs. Machine Learning vs. Deep Learning



How Would You Write the Code

…to tell the difference between a banana, an apple, and grapes?

Bananas are Yellow

Apples are Red

Grapes are Green

Feed in Measurable Characteristics to an Algorithm

Height

Width

Color

Shape

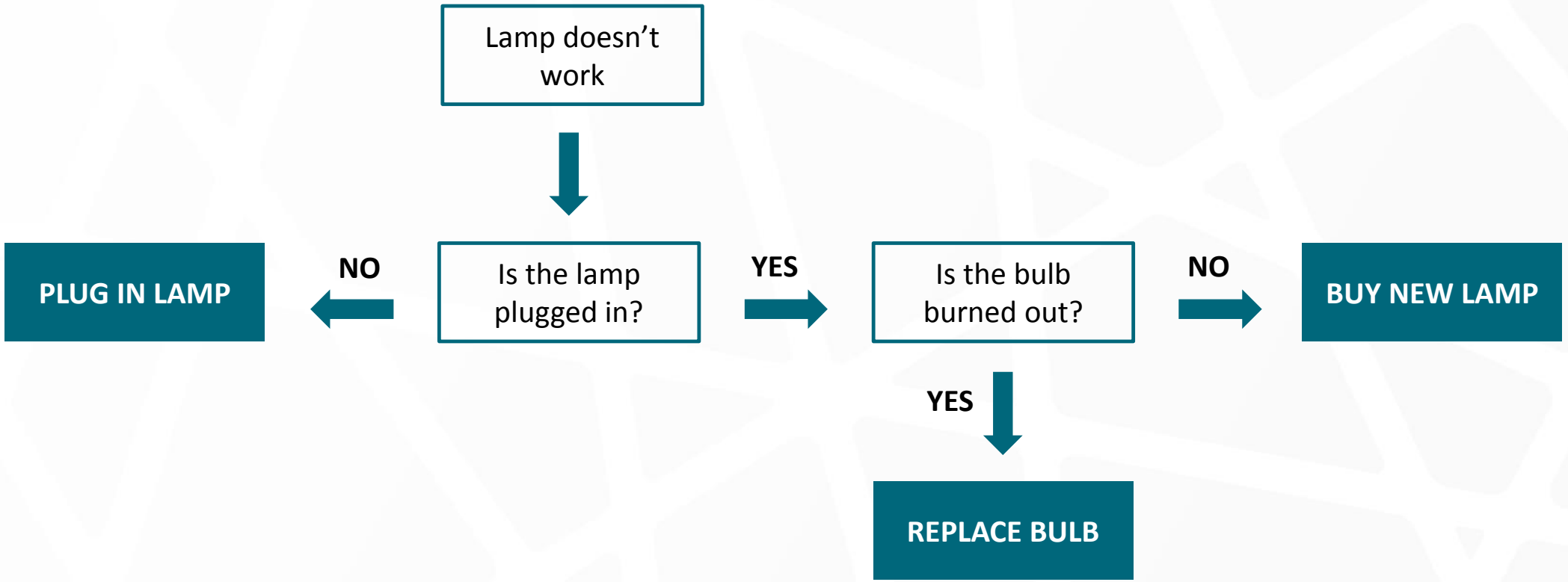
BANANA

APPLE

GRAPES

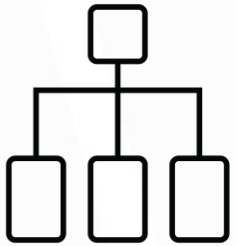
Let the algorithm define the relationships between the measurable characteristics and the fruit they embody

What Is an Algorithm?



What Is a Model?

INPUT DATA



ALGORITHM

MODEL

Models Automate the Enterprise

What is a model? *A representation of a complex process or system*

Identification of important trends and patterns

Ability to process big data and non-linearity

Ability to improve continuously over time

Ability to provide consistent predictive accuracy

Supervised vs. Unsupervised Machine Learning

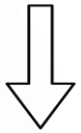
Unsupervised

Solving a given problem without a known desired outcome

Unsupervised Machine Learning Practices:

Clustering

Anomaly Detection

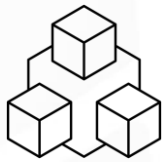


Dimensionality Reduction

Supervised

Solving a given problem with a known outcome

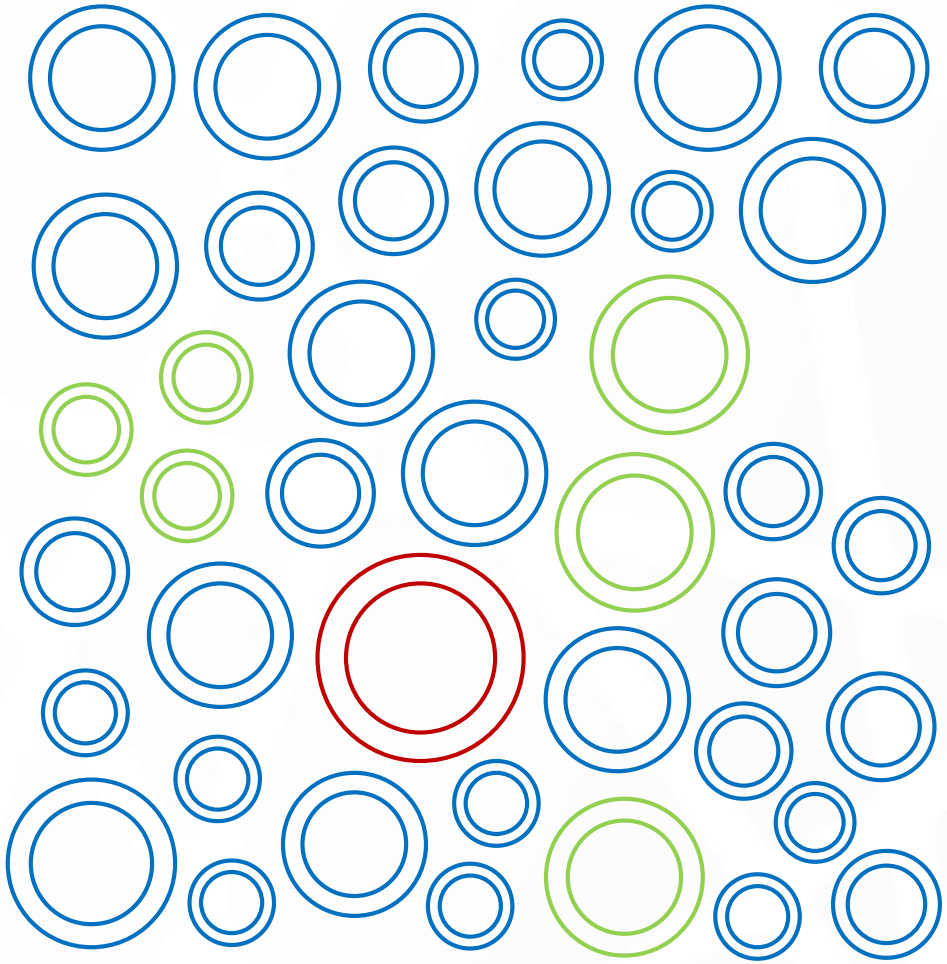
Supervised Machine Learning Practices:

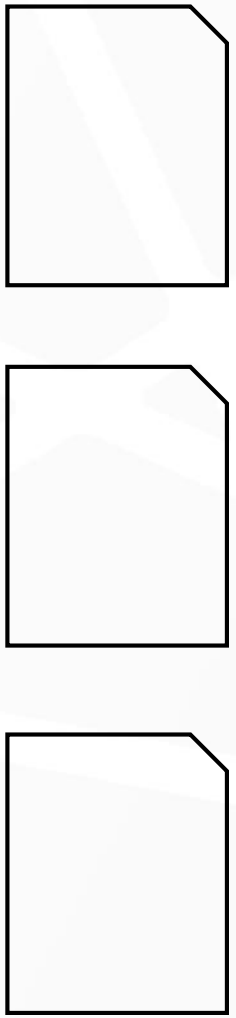


Classification

Regression

Unsupervised Learning



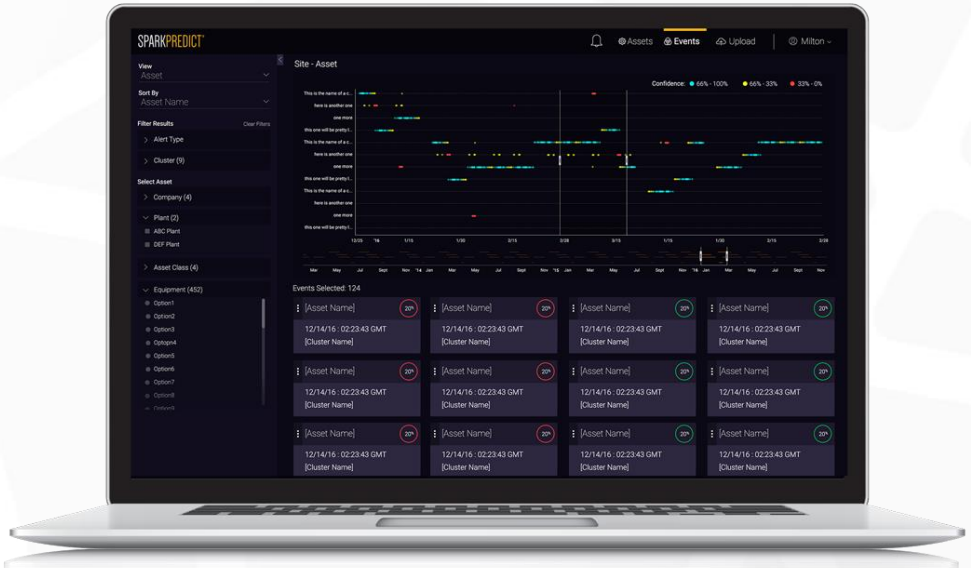


Case study: Predicting turbine failures with machine learning

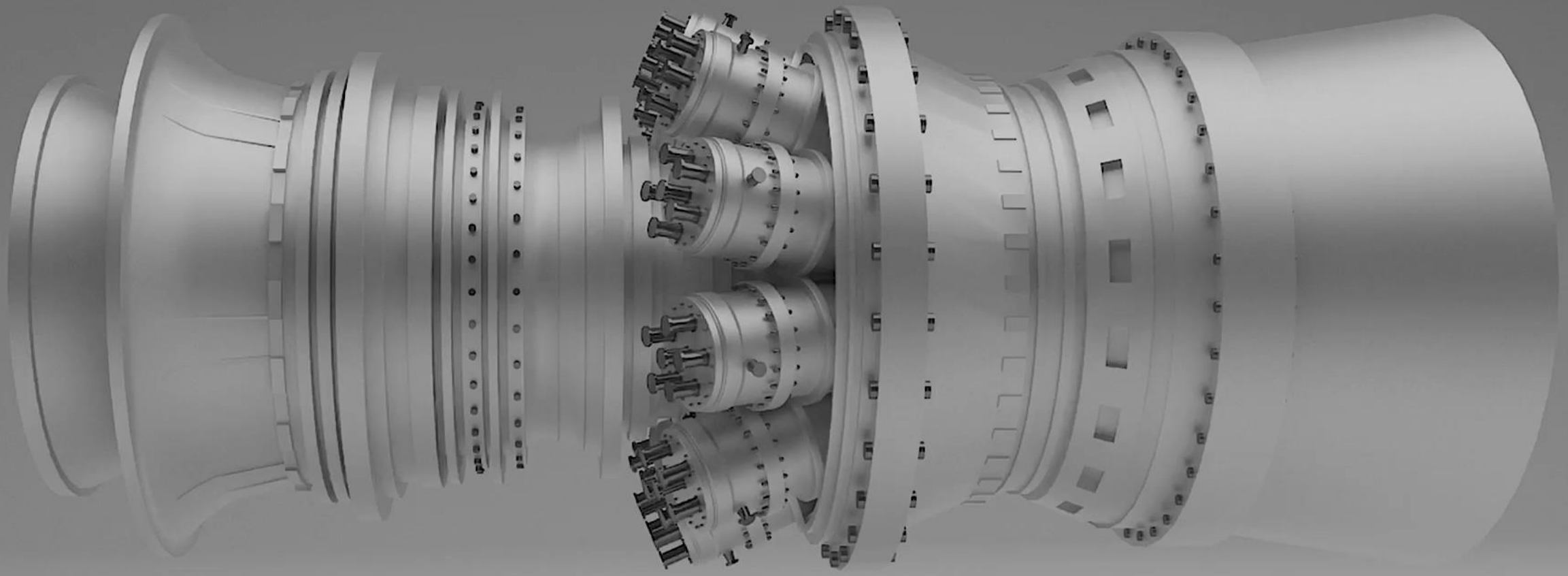
Why did this utility invest in AI and machine learning?

- Managing risk of the unknown
- Desire for new capabilities
- Desire to take productivity to new levels
- Limited SME experience for the utility and the OEM

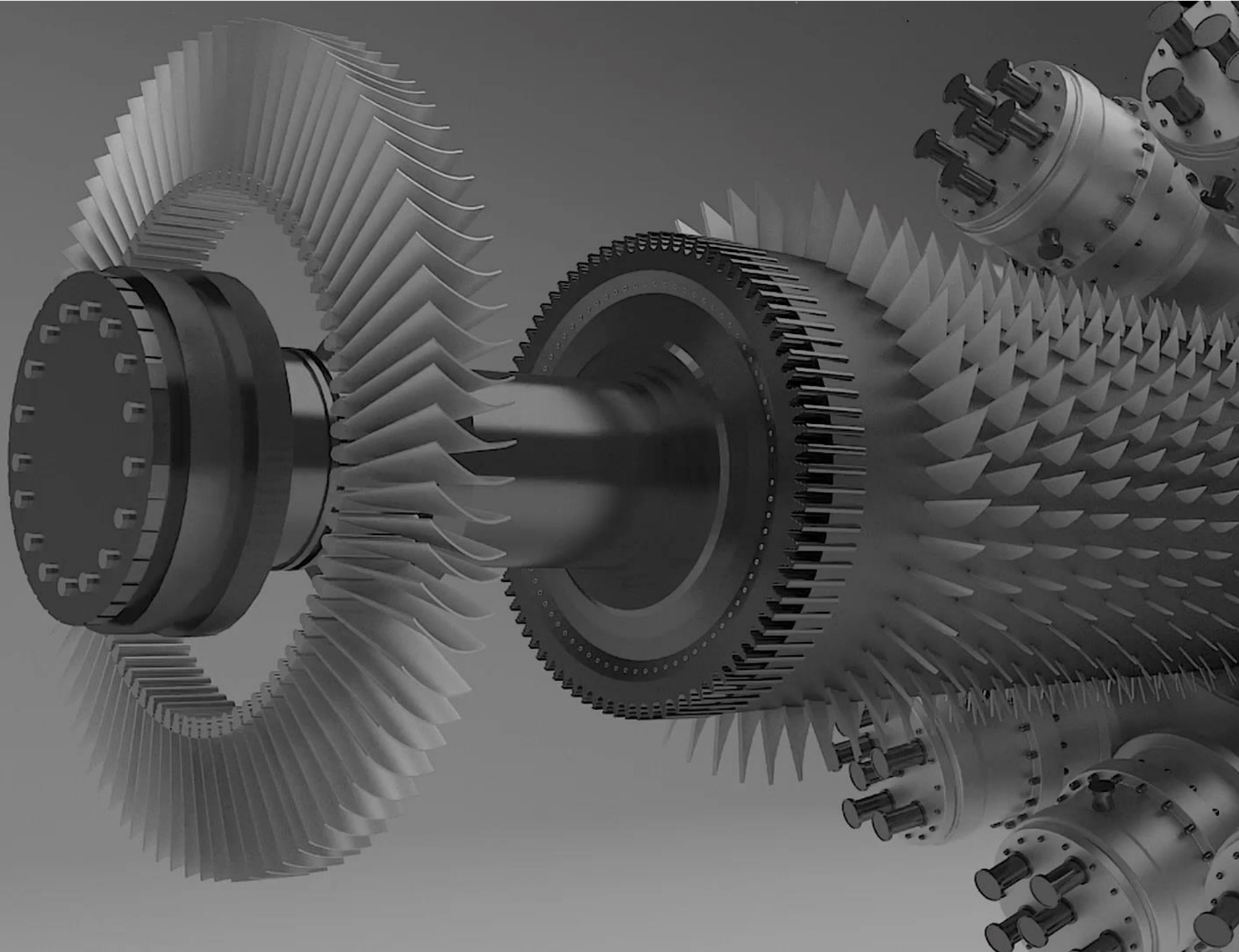
SPARKPREDICT®



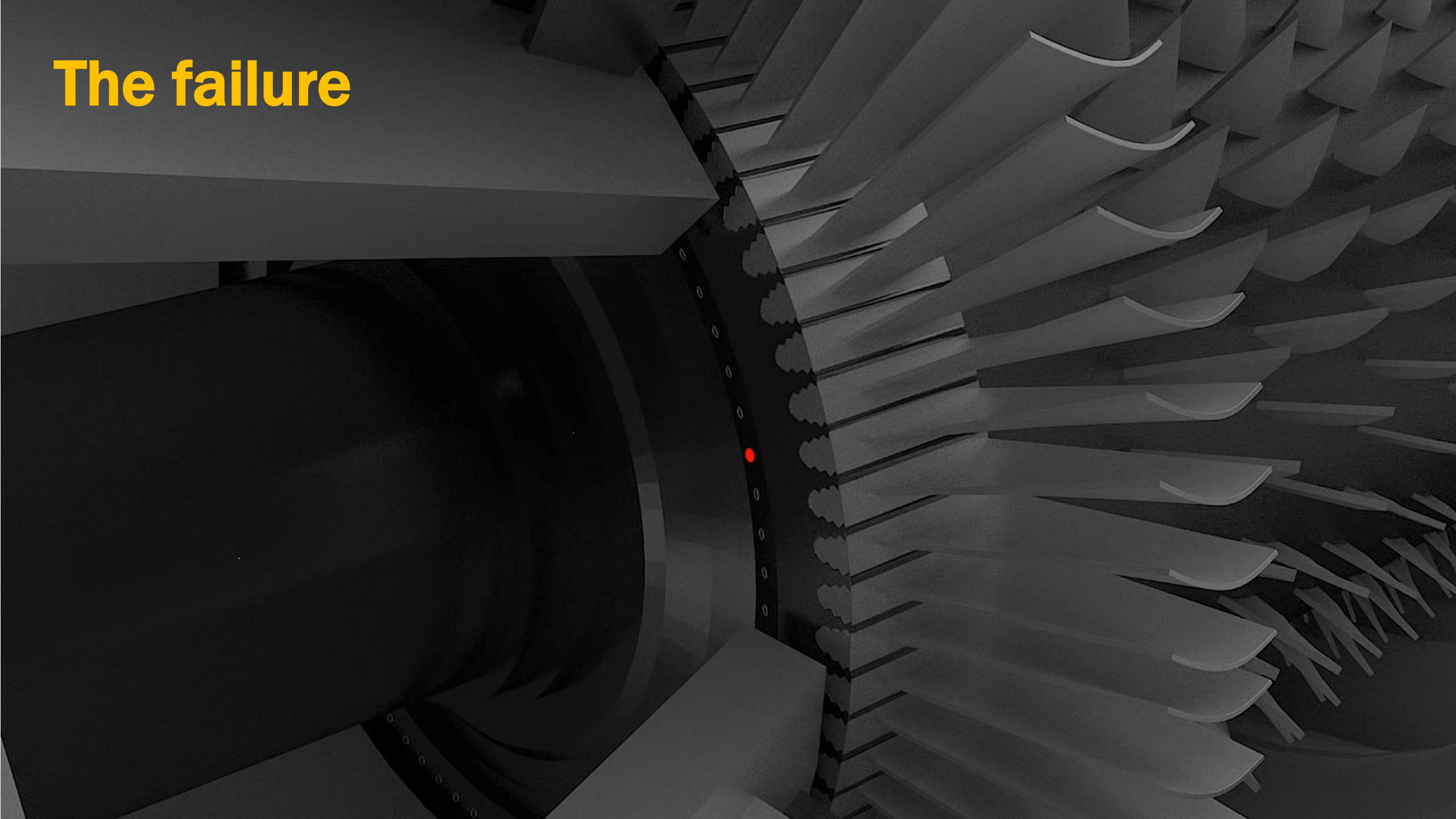
The failure



The failure

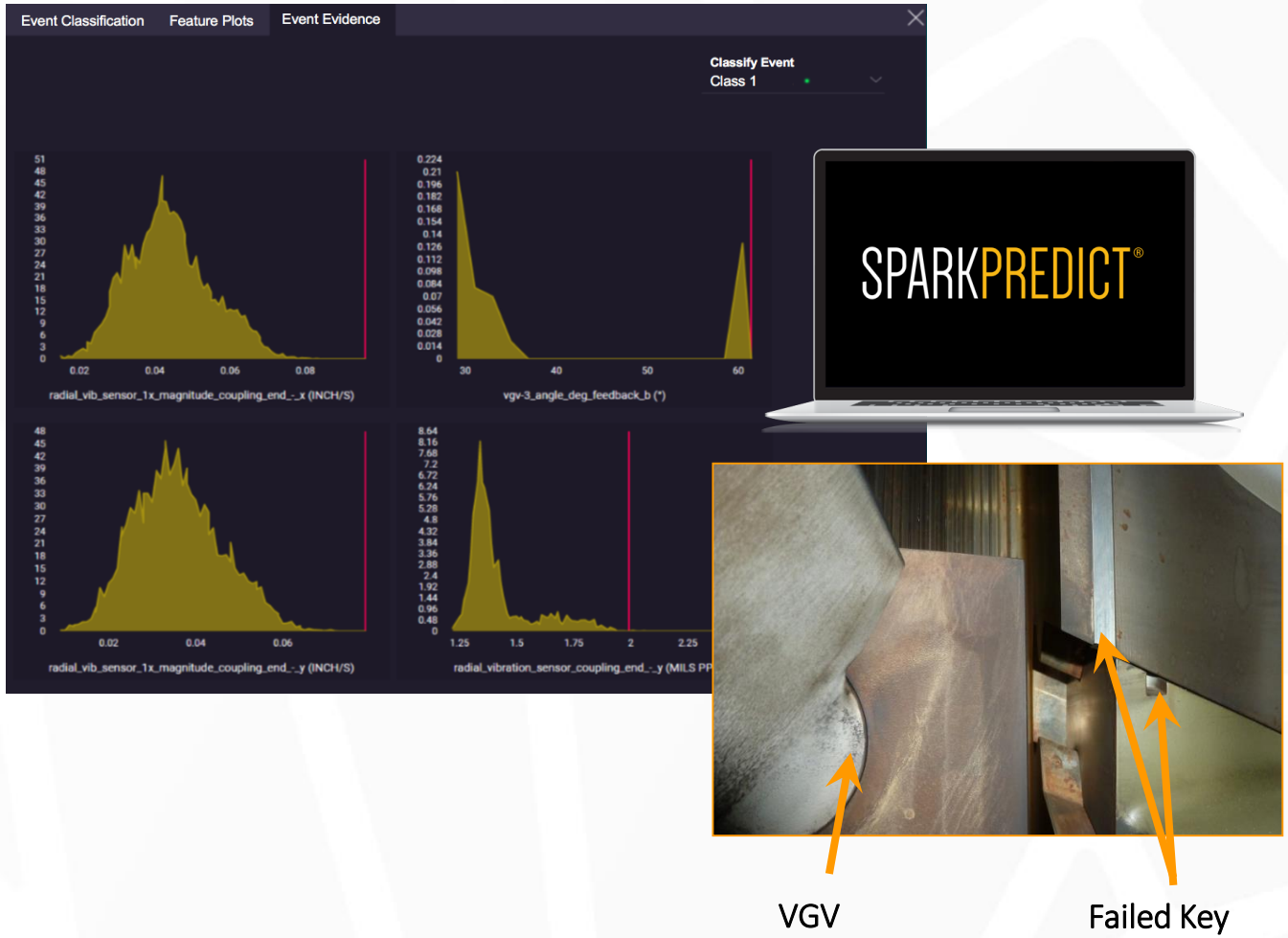


The failure

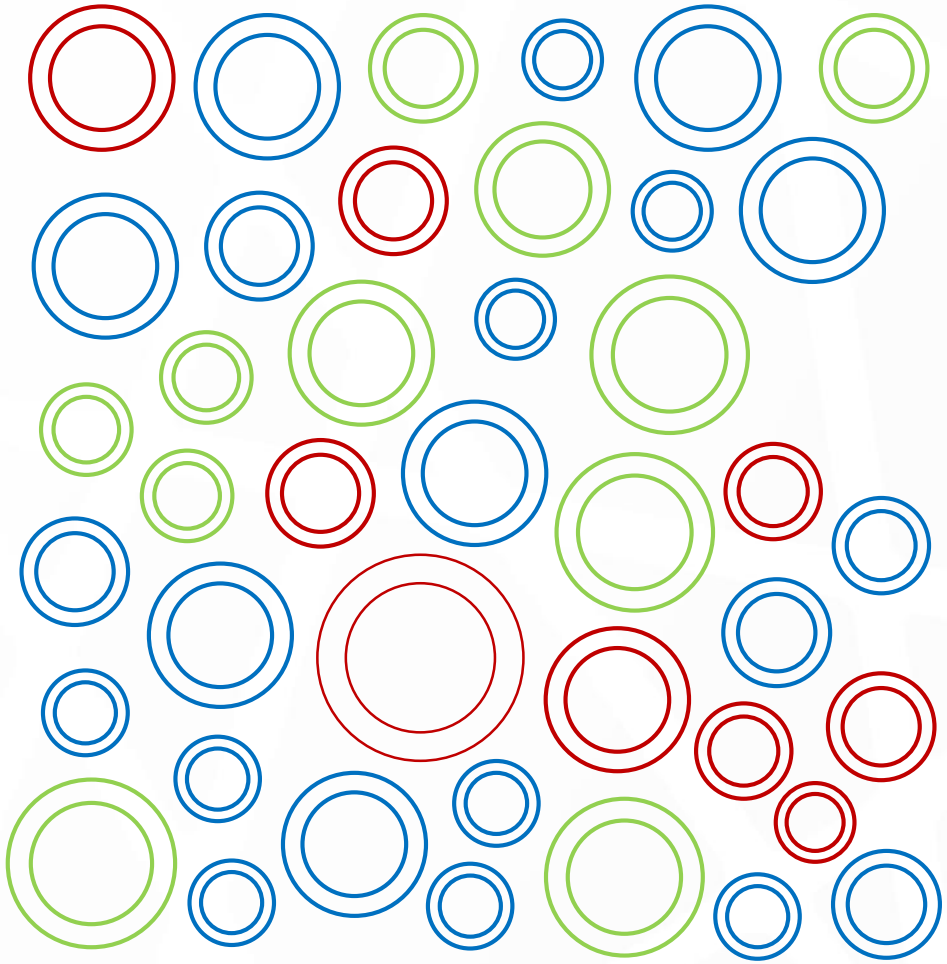


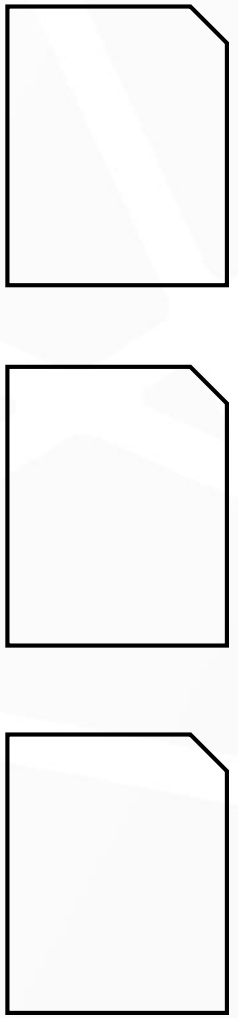
How did machine learning deliver?

- Detected anomaly with one month lead time
- APR and **other monitoring methods did not detect it**
- Identified never-before-seen issue
- Correctly pointed to problem area of turbine (explainable AI)
- Failure was a manufacturing defect unlikely to occur again

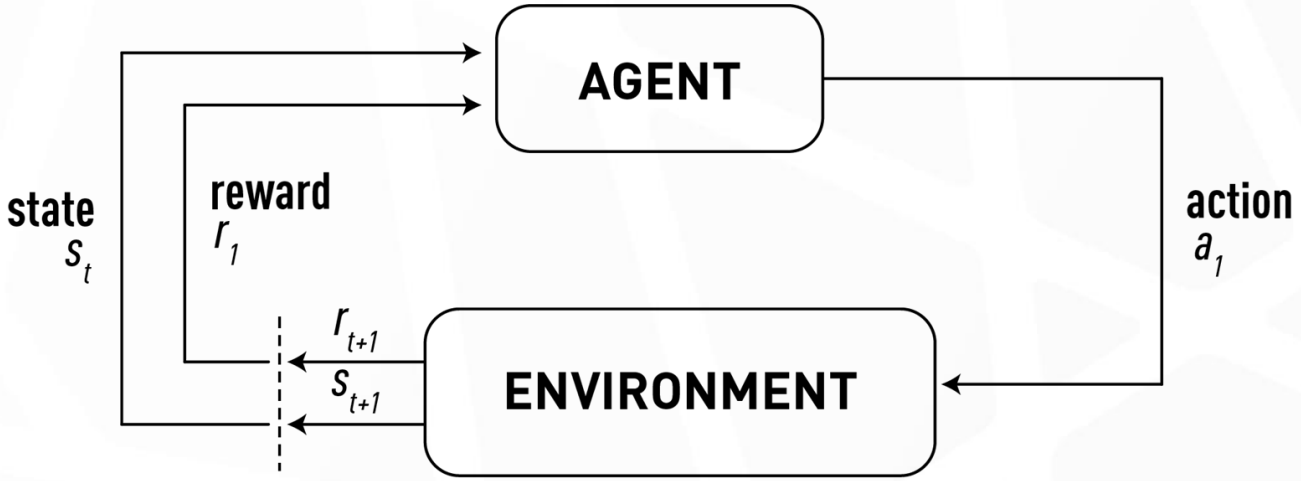


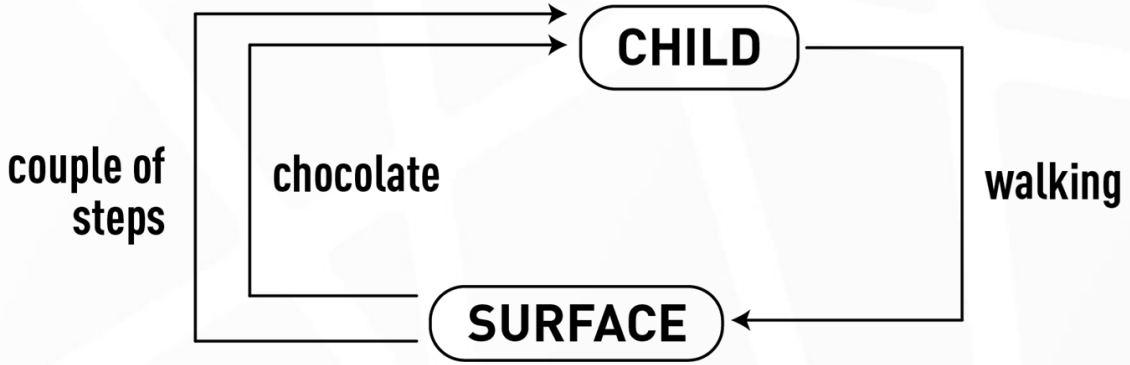
Supervised Learning



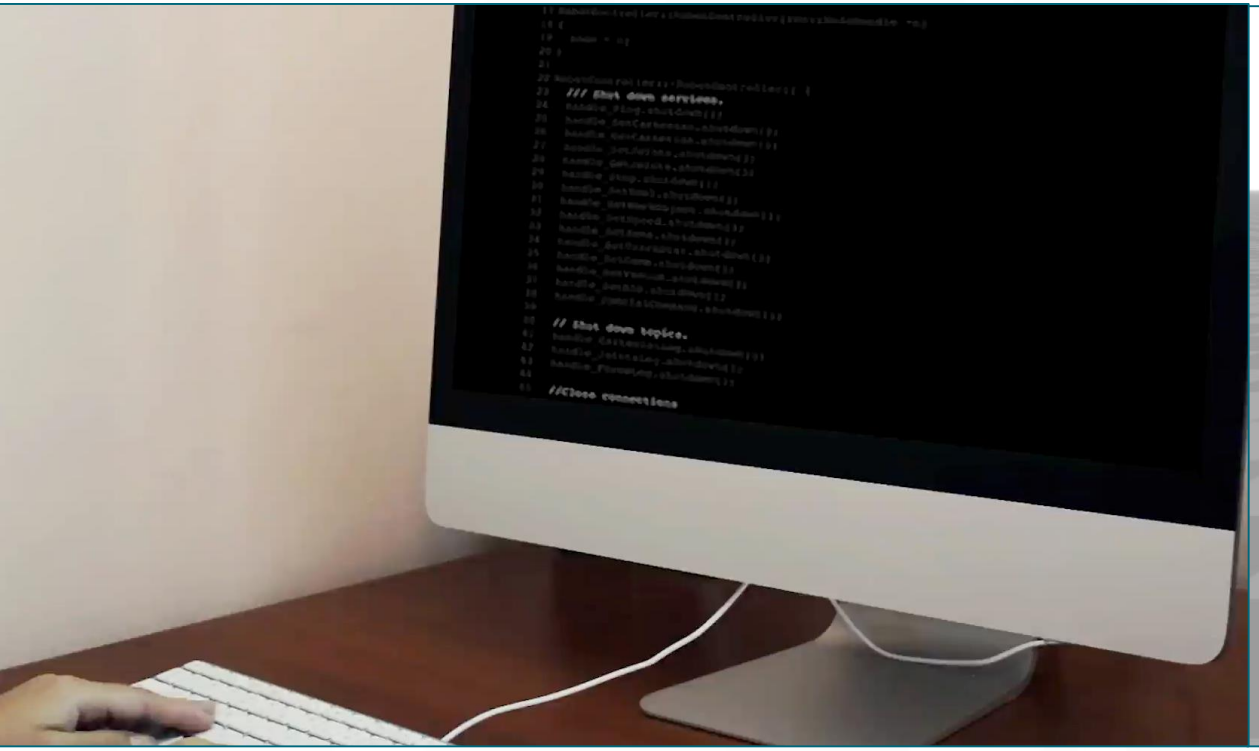


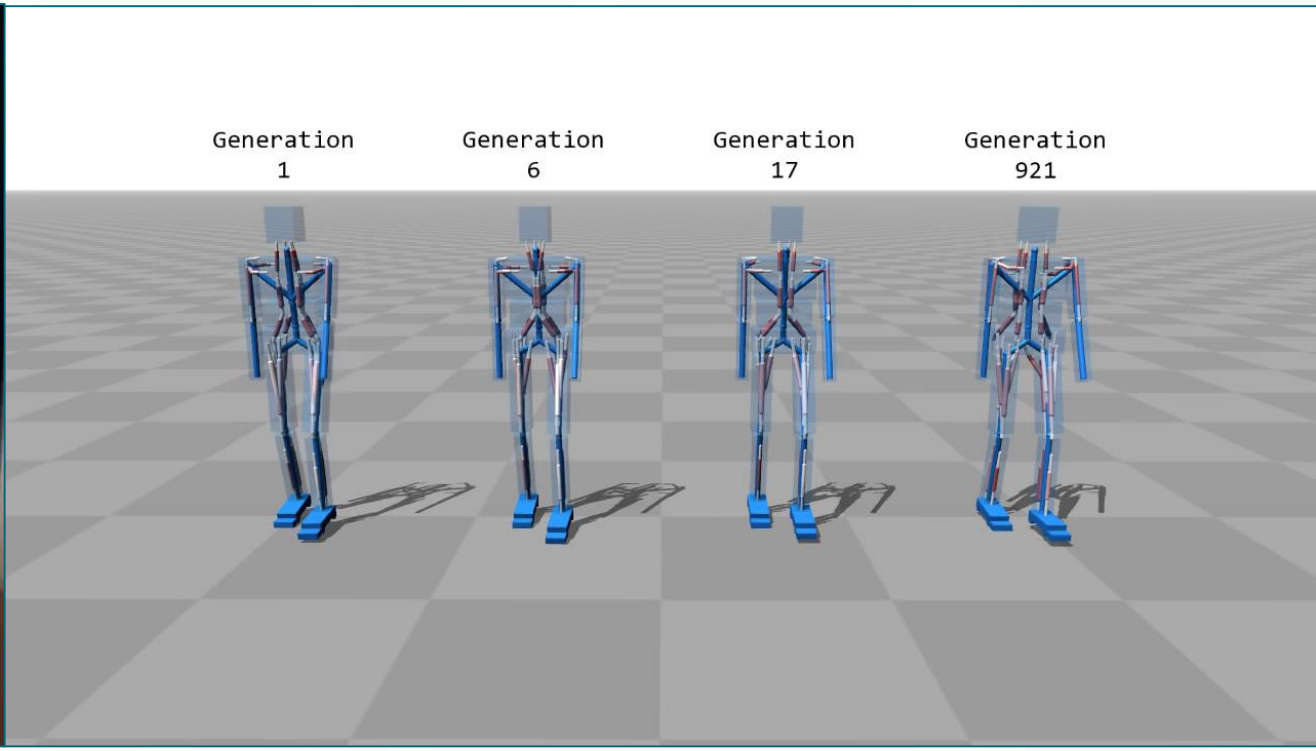
What Is Reinforcement Learning?





Reinforcement Learning: The path to Automation

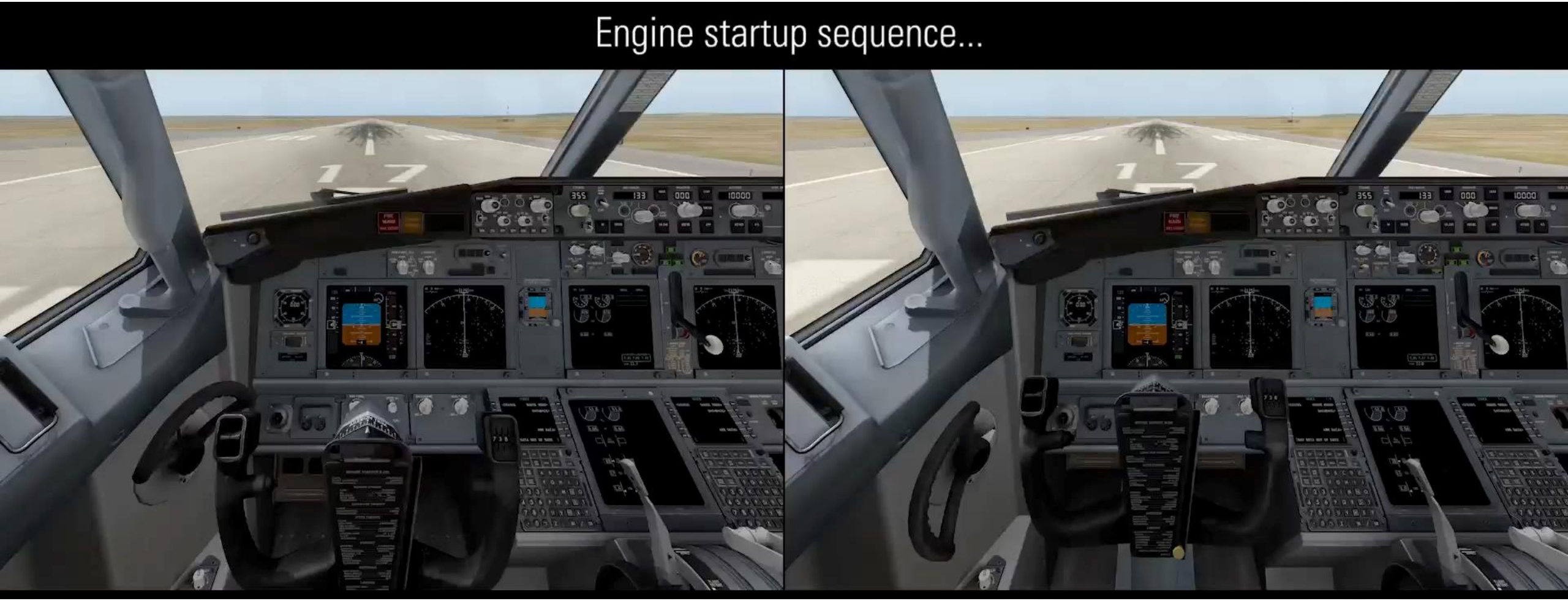




Explicit Instructions “If-Then-Else”

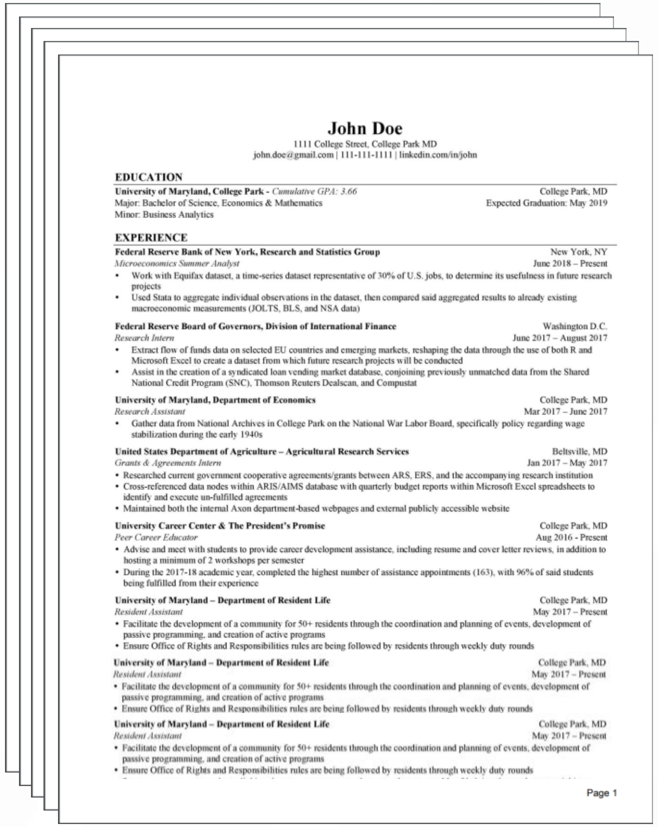
Genetic/Evolutionary Algorithms (AI Technique) Geijtenbeek et. al.

Safety through automation



Natural Language Processing

How Do Humans Analyze Natural Language Content



John Doe

1111 College Street, College Park MD
john.doe@gmail.com | 111-111-1111 | linkedin.com/in/john

EDUCATION

University of Maryland, College Park - *Cumulative GPA: 3.66* College Park, MD
Major: Bachelor of Science, Economics & Mathematics Expected Graduation: May 2019
Minor: Business Analytics

EXPERIENCE

Federal Reserve Bank of New York, Research and Statistics Group New York, NY
Microeconomics Summer Analyst June 2018 – Present
- Work with Equifax dataset, a time-series dataset representative of 30% of U.S. jobs, to determine its usefulness in future research projects
- Used Stata to aggregate individual observations in the dataset, then compared said aggregated results to already existing macroeconomic measurements (JOLTS, BLS, and NSA data)

Federal Reserve Board of Governors, Division of International Finance Washington D.C.
Research Intern June 2017 – August 2017
- Extract flow of funds data on selected EU countries and emerging markets, reshaping the data through the use of both R and Microsoft Excel to create a dataset from which future research projects will be conducted
- Assist in the creation of a syndicated loan vending market database, conjoining previously unmatched data from the Shared National Credit Program (SNC), Thomson Reuters Dealscan, and Compustat

University of Maryland, Department of Economics College Park, MD
Research Assistant Mar 2017 – June 2017
- Gather data from National Archives in College Park on the National War Labor Board, specifically policy regarding wage stabilization during the early 1940s

United States Department of Agriculture – Agricultural Research Services Beltsville, MD
Grants & Agreements Intern Jan 2017 – May 2017
- Researched current government cooperative agreements/grants between ARS, ERS, and the accompanying research institution
- Cross-referenced data nodes within ARIS/AIMS database with quarterly budget reports within Microsoft Excel spreadsheets to identify and execute un-fulfilled agreements
- Maintained both the internal Axon department-based webpages and external publicly accessible website

University Career Center & The President's Promise College Park, MD
Peer Career Educator Aug 2016 - Present
- Advise and meet with students to provide career development assistance, including resume and cover letter reviews, in addition to hosting a minimum of 2 workshops per semester
- During the 2017-18 academic year, completed the highest number of assistance appointments (163), with 96% of said students being fulfilled from their experience

University of Maryland – Department of Resident Life College Park, MD
Resident Assistant May 2017 – Present
- Facilitate the development of a community for 50+ residents through the coordination and planning of events, development of passive programming, and creation of active programs
- Ensure Office of Rights and Responsibilities rules are being followed by residents through weekly duty rounds

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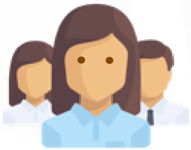
Page 1



Subject Matter Experts

Select Existing Information | **Extract** Information | **Categorize** Information

Content	Date	FileName	Candidate	Current Role	Org Fit
John Doe 1111 College Street, College Park …	02.05.2019	jd_resume.pdf	John Doe	Microecon..	Sales

*NLP Automates **Extraction** or **Categorization** of Information From Natural Language Content*

AI in Cybersecurity

Evolving Landscape: With the number of connected devices and new threats growing exponentially each year, machine scale is required to keep up with the evolving threat landscape

50B Number of connected devices that will need to be secured in 2020, up from 9B in 2012

50% Of connected devices will be IoT

95% Cyber attacks originate from the endpoint and propagate through the network

600M Number of new malicious threats created *last year* by hackers around the globe, up from 47M in 2010

325M

Ransomware payments were made from corporations to hackers in 2015

4x

Expected increase in ransomware payments in 2016

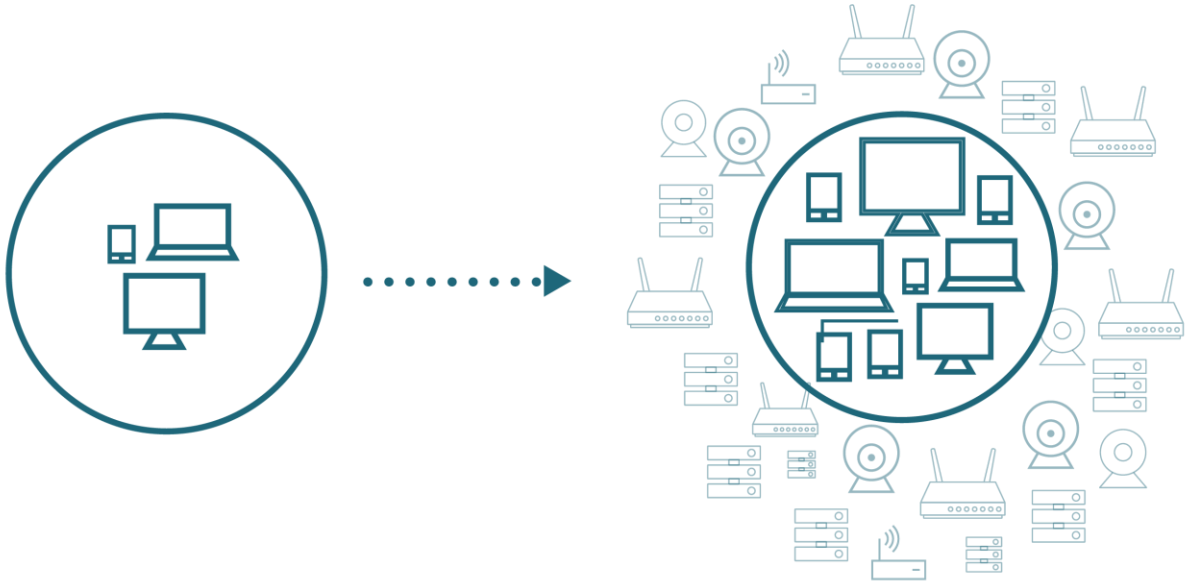
<25%

The initial detection rate of newly created malware by traditional (signature based) antivirus solutions

4 weeks

The time it takes most traditional antivirus vendors to detect a new virus

The signature-based approach to endpoint protection is broken. A new approach is needed to keep up with the evolving threat landscape.



Traditional ***perimeter detection*** can no longer keep up with the greater number of outside connections in OT networks

Traditional ***endpoint detection*** can no longer keep up with the proliferation of new sensors and endpoints to guard

AI Can Solve Major Cybersecurity Problems

The average cost of a data breach has increased from $5M to $7.1M since 2017

Cyber threats are increasing in scale and complexity

*Zero-day attacks are **4x more likely** to compromise organizations*

Cybersecurity teams are overworked and understaffed

***75%** of ~1400 survey respondents think that their IT security function is understaffed*

Companies are not getting value from their investments

*Only **46% of EDR tools** are actively employed and used*

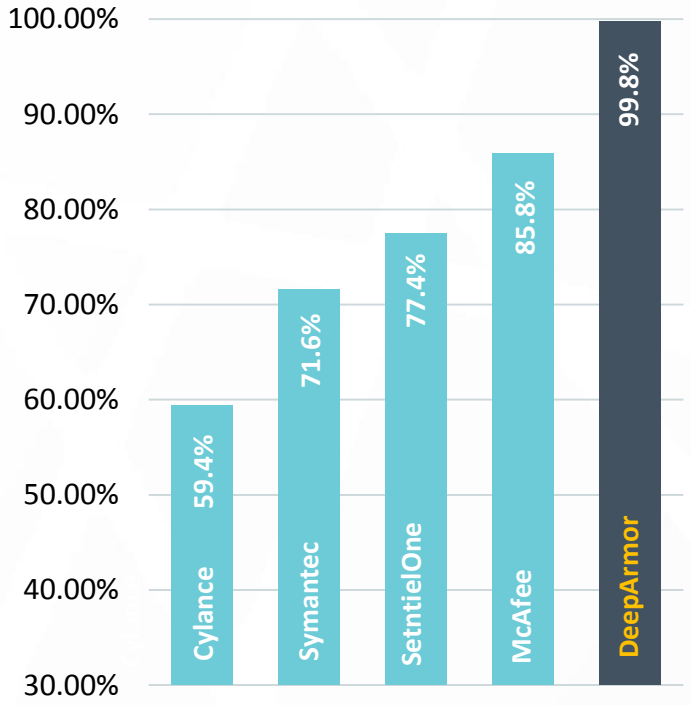
1,3: Ponemon Institute: The 2018 State of Endpoint Security Risk

2: 2018 DomainTools & Ponemon institute report

Why Artificial Intelligence?

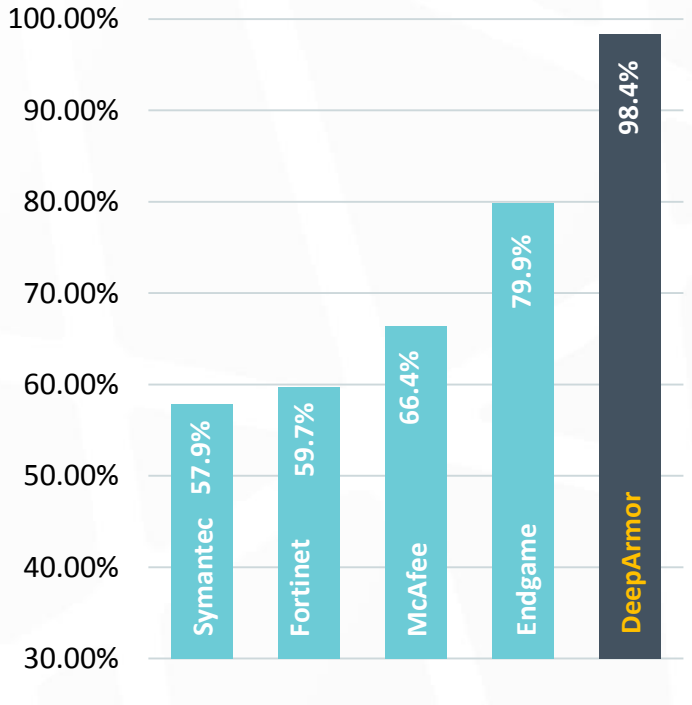
Industry-Leading Zero-day Detection

Windows



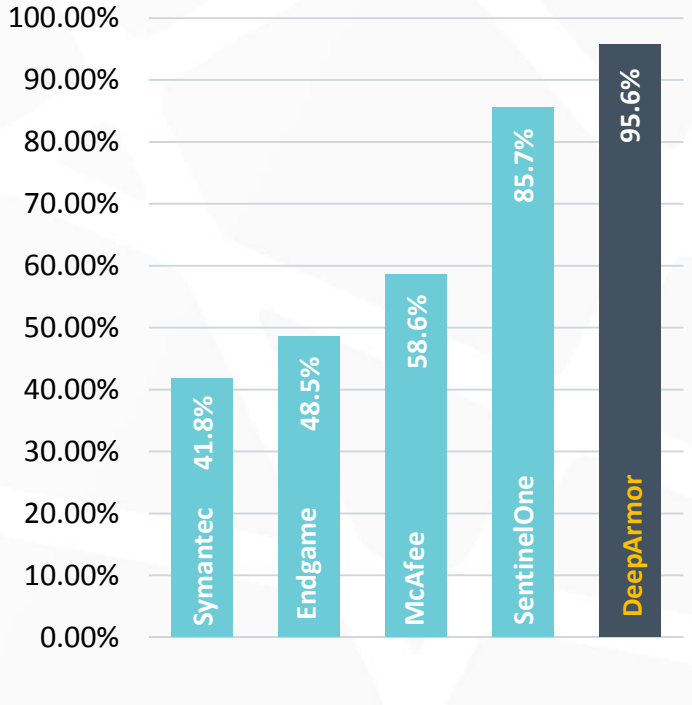
Zero-Day Malware Protection Testing

macOS



Zero-Day Malware Protection Testing

Office



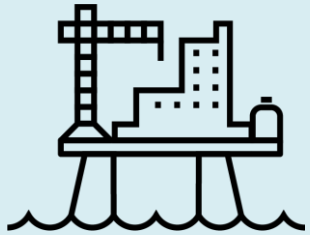
Zero-Day Document Protection Testing

0.1% False Positive Rate on NEW Cleanware

Case Studies for AI in Oil and Gas

Advanced Analytics Applications in the O&G Industry

UPSTREAM



OFFSHORE PLATFORM

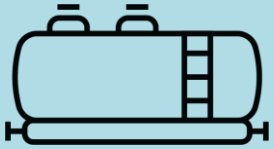
ONSHORE PUMP JACK

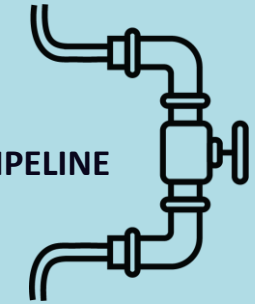
APPLICATIONS

- Reliability and Predictive Maintenance
- Maintenance Workflow Automation
- Drilling and Production Optimization
- Asset Protection
- Supply Chain and Capital Decision Support

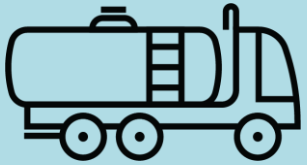
MIDSTREAM

PROCESS & STORAGE





PIPELINE



TRANSPORT

APPLICATIONS

- Transportation Optimization
- Pipeline Risk Assessment
- Storage Optimization

DOWNSTREAM

DISTRIBUTION

SALES | MARKETING | RETAIL

APPLICATIONS

- Reliability and Predictive Maintenance
- Demand Optimization
- Trade Optimization
- Price Optimization

Aker BP: Unmanned Production

RELIABILITY

TRANSFORMATIVE RESULTS

75% of Historical Failures Identified

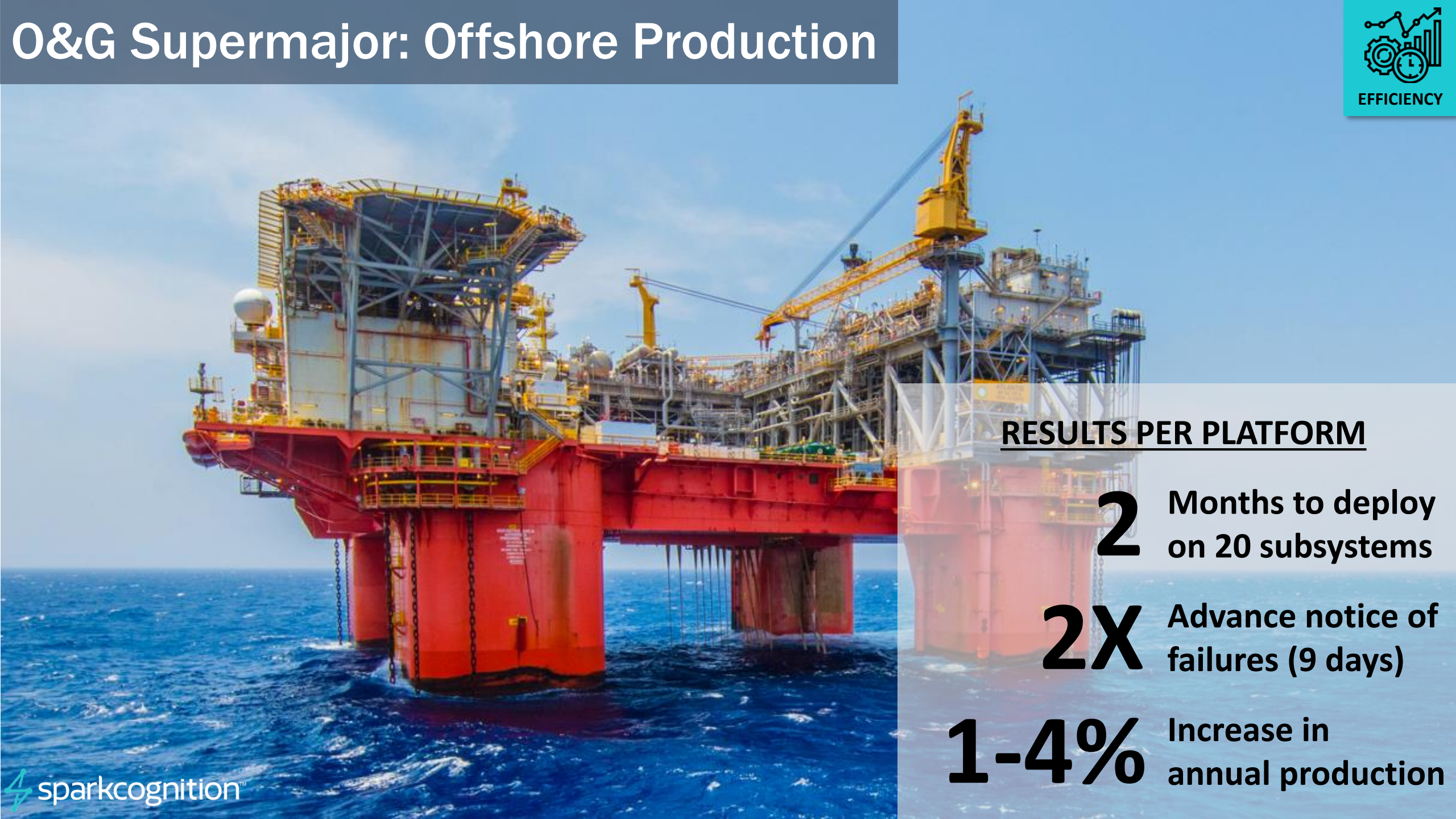
9-12 Days Advance Forewarning

2 Weeks from Data to Deployment

sparkcognition™

O&G Supermajor: Offshore Production

EFFICIENCY



RESULTS PER PLATFORM

2 Months to deploy on 20 subsystems

2X Advance notice of failures (9 days)

1-4% Increase in annual production

sparkcognition™

TEXMARK™ Refinery of the Future

SAFETY

"Refinery of the Future" Partners

sparkcognition™

Deloitte. | Hewlett Packard Enterprise | FLOWSERVE

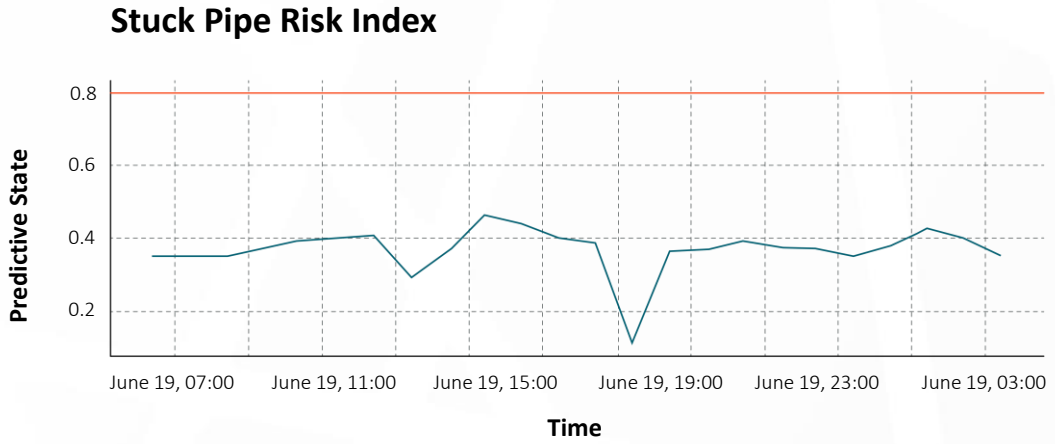
ptc | OSIsoft. | NATIONAL INSTRUMENTS™

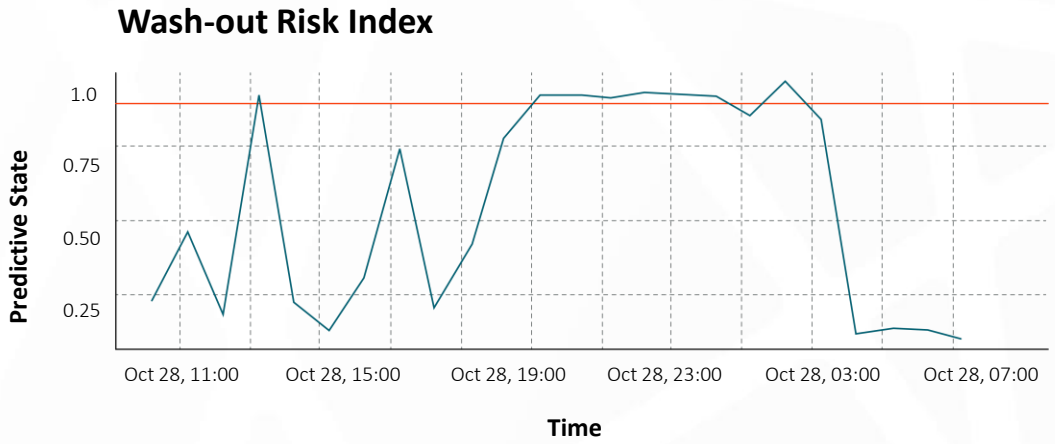
TRANSFORMATIVE RESULTS

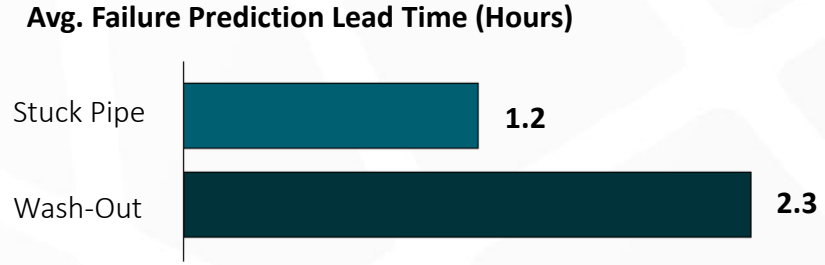
- Delivering predictability for critical pumps
- Improving refinery safety and product quality

sparkcognition™

Real-time drilling failure prediction







Use Case:

Improve well efficiency by reducing stuck pipe and drill string washout failures

Accuracy:

>90%, combined for misses and false positives

Benefits:

Provides timely (>1 hour) notice for preventive action

Automatically accounts for state of drill rig

Data:

Pressure, temperature, RPM, chemicals, flow rate, tubing material grade, wellbore temp, fluid density, composition etc.

Equipment make, supervisor experience etc.

Meanwhile
In Aerospace

SkyGrid

A Boeing, SparkCognition Company

Aerial Operating System

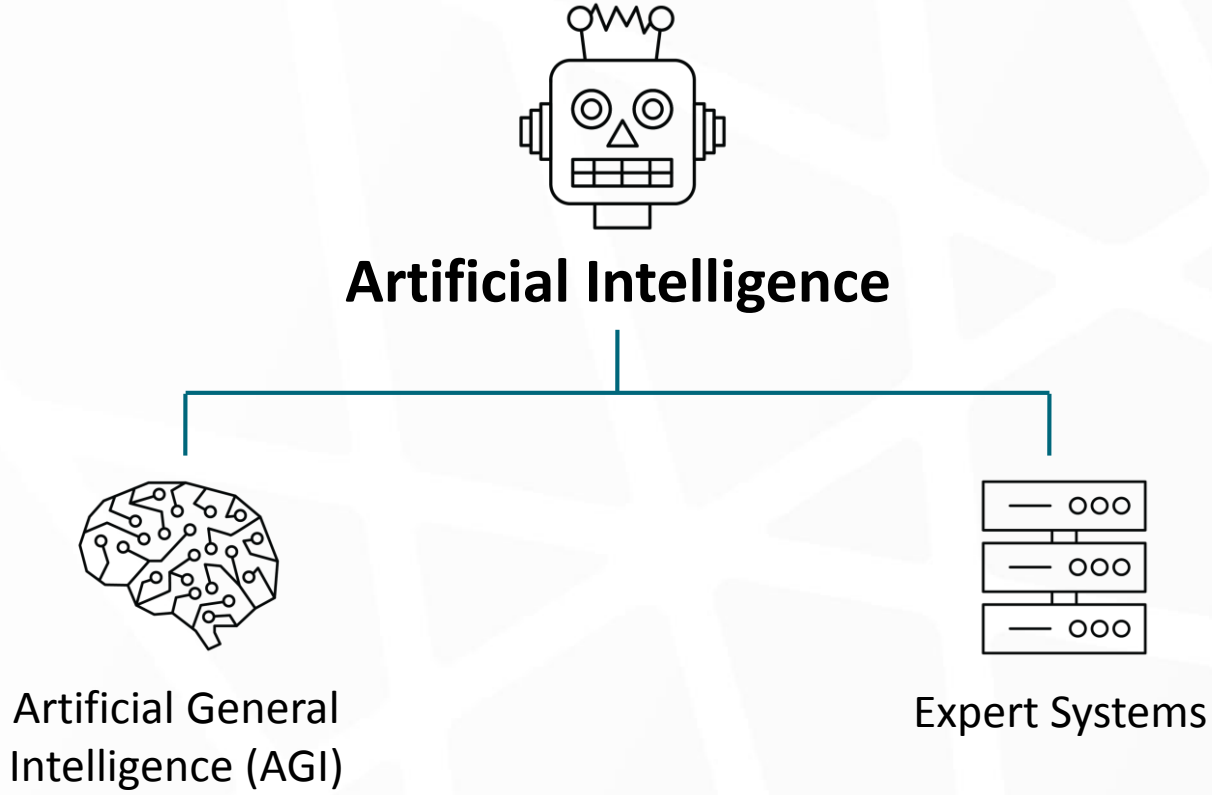
Autonomous Aircrafts

sparkcognition™

Artificial Intelligence: Good or Evil?

The Car: Good or Evil?

Artificial Intelligence



I trust Humanity

I am Optimistic.
AI will positively transform our world.

Questions?

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