

Financial institutions
Energy
Infrastructure, mining and commodities
Transport
Technology and innovation
Life sciences and healthcare



Artificial Intelligence: The future is now

Maya Medeiros, Partner
Nav Dhunay (Imaginea Energy)

January 31, 2018

*motion*2018
discussing what matters

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Speakers



Maya Medeiros

Partner

Norton Rose Fulbright

Toronto

Ms. Medeiros' practice focuses on the creation, protection, management, monetization and enforcement of intellectual property assets in Canada, the United States and around the world.



Success in creating AI could be the biggest event in the history of our civilisation. But it could also be the last, unless we learn how to avoid the risks. Alongside the benefits, AI will also bring dangers, like powerful autonomous weapons, or new ways for the few to oppress the many. It will bring great disruption to our economy.

Professor Stephen Hawking, quoted in Maya Oppenheim, *Stephen Hawking: Artificial Intelligence Could be the Greatest Disaster in Human History*, The Independent, 20 October 2016



What is AI?

What is the
impact on
Industry?

What are the
AI ethical
issues?

What are the
key AI legal
risks?

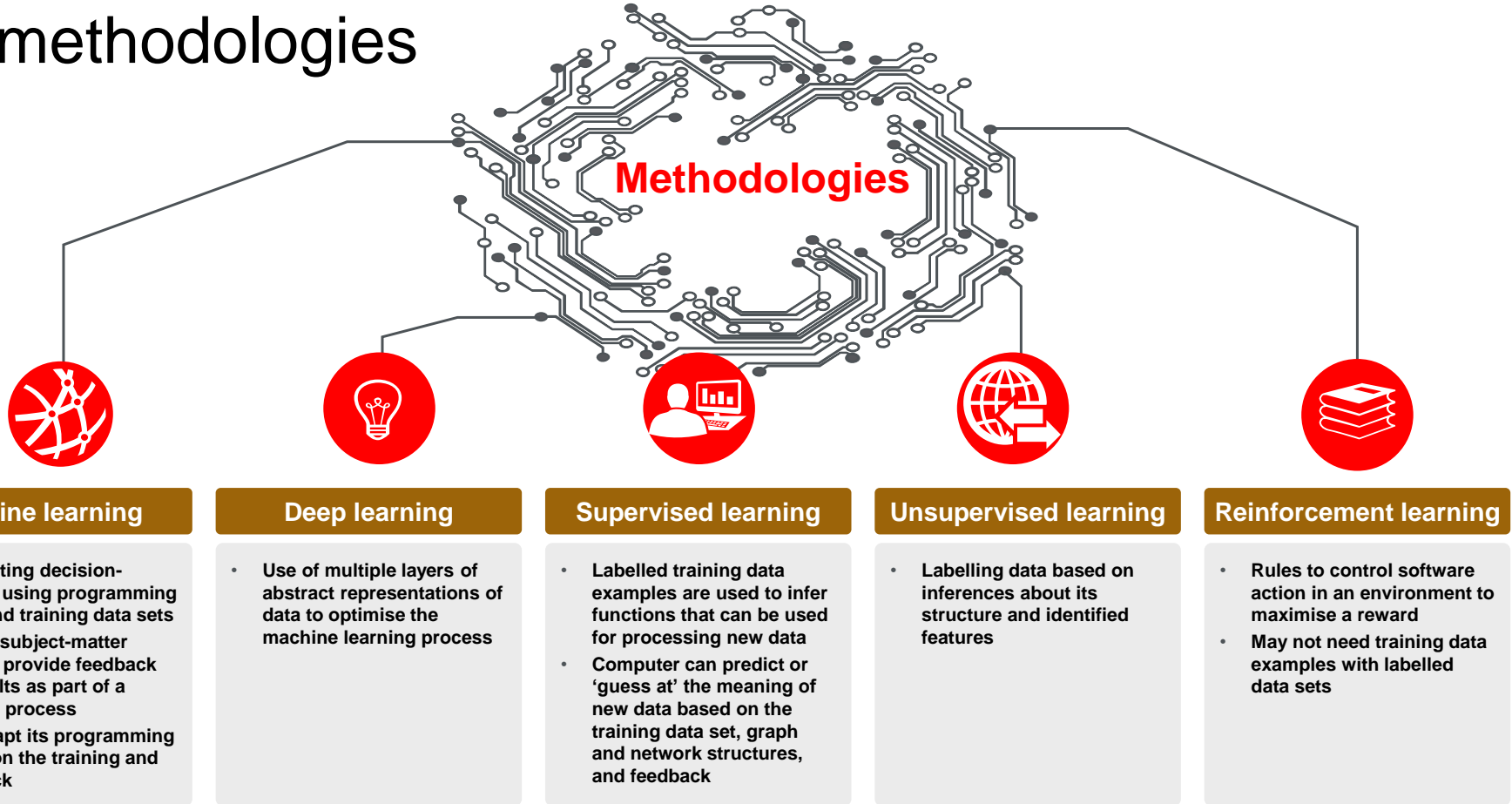




AI is a field of computer science that includes machine learning, natural language processing, speech processing, expert systems, robotics, and machine vision.



AI methodologies





The total global market for robots and artificial intelligence will reach US\$152.7bn by 2020, and estimates that the adoption of these technologies could improve productivity by 30% in some industries.

America Merrill Lynch



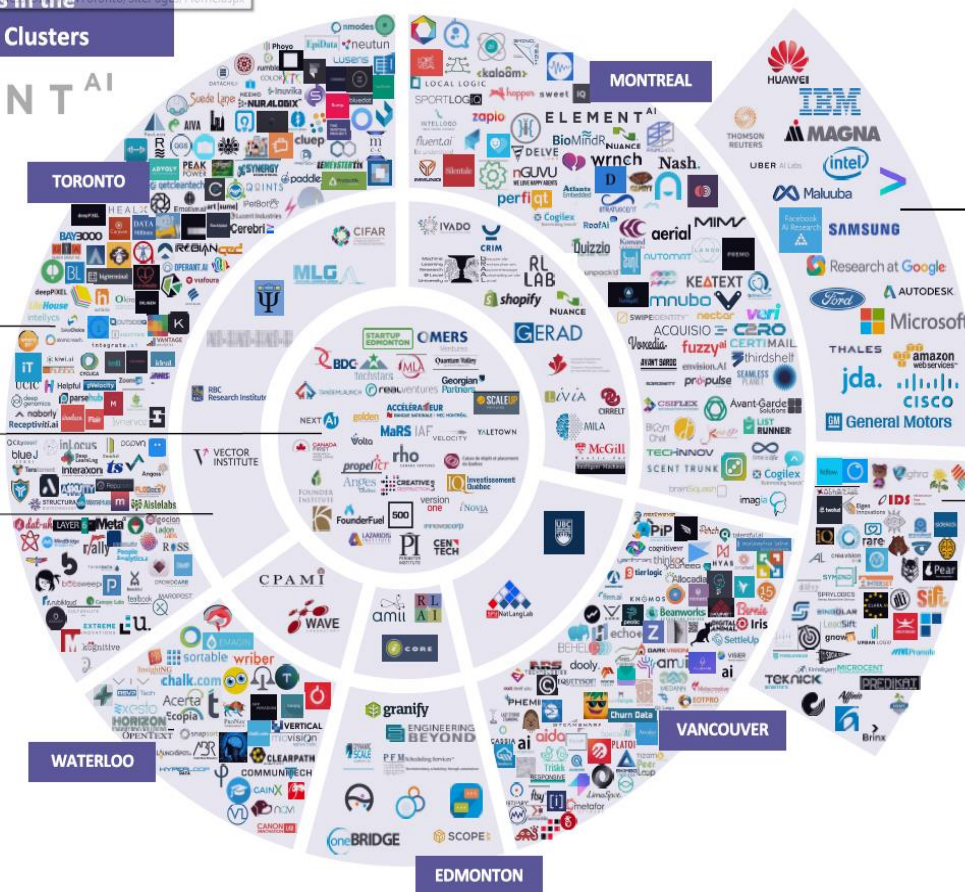
Canadian AI Clusters

ELEMENT AI

Startups & Enterprises

Incubators, accelerators
& VC (Pan-Canadian)

Research Labs



International players in
Canada (Pan-Canadian)

Startups & Enterprises
(Outside of cluster cities)

STARTUP & ENTERPRISE COUNT PER LOCATION

195+	TORONTO
100+	VANCOUVER
90+	MONTREAL
50+	WATERLOO-KITCHENER
10+	EDMONTON
60+	ALL OTHERS

2017-06-11
For updates see jqgagne.ai

CANADIAN AI STARTUP LANDSCAPE

LAST UPDATED - NOV 2017 - vBETA

accenture
#AIPOSSIBLE

TECHNOLOGIES

KNOWLEDGE GRAPH & DEEP REASONING

nextwave hubba tuxy atomic reach knitt

S3R3NITY OPERANT.AI DDIQ

SENSOR PROCESSING & OTHER

thinkox xesio lusens STRATUSCENT

cognitivev Aerial SHMCONTROLS nectar

MACHINE LEARNING & ANALYTICS

ELEMENT AI WATRHUB blueJ DATACHILI SalesChoice

viafoura CUMUL8 Komand Cityzeen

parsehub BLANC LABS SPORTLOGIQ miovision

STEAMSHARP DIVERGENCE LANDB naborly xtract

COMPUTER VISION

TinEye twentybn

ENGINEERING BEYOND Savormetrics

wrnch Genetec CERO

CLEARPATH Ecopia

ARFRONT visiona

AUDIO & TEXT PROCESSING

LYREBIRD Metacreative

wriber CERTIMAIL UCIC

Nash. DILIGEN deepPIXEL

REVA Tech yactraq

LEXIX fluent.ai

ENTERPRISE

MARKETING

inLocus clivra LAYER 6 shoelace CERTIMAIL

tier logic Aislelabs contiq ACQUISIO

Canopy Labs AUTOMAT LOCAL LOGIC mnubo AIVA

StackAdapt granify dooly. Allocadia voxmedia

envision.ai sortable sweet IQ limespot

rubikloud mmoder mindand thirdshelf Staff

HR & PRODUCTIVITY

tealbook Receptiviti amui

Talenthub NEMO

nGUV Knockri ideal

Ladon Labs Peer Loop

ANALYTICS & ML

ai Deep Learning Angoss

FAIMDATA GAINX

ASKUTY InsightNG

fuzzy VANTAGE wysdom

ACCOUNTING & OTHER

DILIGEN DELVE

CUSTOMER SERVICE

WYSDOM AI aida

Silentale KEATEXT

deepPIXEL

FINTECH

TRADING & INVESTMENTS

SMART MONEY Spectral

EQUITYSOFT

[R] F FRONTIER

PERSONAL & OTHER

Wealthsimple MyPlanMap

PERFIQT finn.ai

Hubdoc SettleUp

MARKET & INSIGHTS

CASSIA RESEARCH bigterminal

EOTPRO peoic AP

PHEMI

INSURANCE & FRAUD

DDIQ JAUNTIN

INDUSTRIAL

OIL & GAS

DARKVISION PLATOI

oneBRIDGE

INFRASTRUCTURE

EMAGIN

MANUFACTURING

nectar Acerta zapio

CSIFLEX HORIZON

PERSONAL

SHOP & ENTERTAIN

hubba drop

AKIMBO

Bernie Suede Lane

SEAMLESS PLANET hopper

ASSISTANT

NEXIWAIVE

carpy

Pip deepPIXEL

Zoom.ai HOMIGO

wherego Iglocion

EDUCATION

chalk Tutuzzio ECHOO

HEALTHCARE

DIAGNOSTICS

CYCLICA healx

NURALOGIX

zenxmed deep genomics

ASSISTANT

Awake TIIP

LIST RUNNER

MONITOR

neutun kiwi.ai

BioMindR MEDANN

RESEARCH

Cogilex

STRUCTURA

COGNITIVECHEM Meta

Disclaimer: Categorization is directional only. Based on an analysis of 228 Canadian companies by Accenture internal research.

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PRESS RELEASES

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Landis+Gyr+
manage energy better

Artificial intelligence to control the power grid in Riedholz

Together with the Canton of Solothurn, the four companies Adaptricity, AEK, Alpiq, and Landis+Gyr are investigating how the energy flow in a power distribution grid can be optimised and controlled through artificial intelligence in the town of Riedholz. The findings will minimise investments in costly grid expansion and decrease electricity costs. The SoloGrid project is being promoted by the Swiss Federal Office of Energy as a lighthouse project, and supported financially by the Canton of Solothurn.



TAG: DEMAND RESPONSE

Artificial Intelligence seen as a key technology to enable better balancing of UK's energy market

5th January 2017 Awards, News Advanced Algorithmic Platform, artificial intelligence, cloud service, demand response, energy, Heriot-Watt University, machine learning, National Grid, portfolio of storage assets

HUFFPOST

THE SUNDAY TIMES

AdChoices

Oilprice.com, Contributor
The Number One Source For Oil And Energy News

Artificial Intelligence Is Crucial For The Energy Industry

05/16/2017 10:54 am ET

Energy sector

Energy trading

- AI will optimize energy trading
- Pilot energy trading platforms using distributed ledger technologies are already emerging
- Financial institutions are piloting commodity trading platforms
- Next logical step will be to use machine learning to predict trends and autonomously execute transactions

Facility operation and maintenance

- Self-learning weather forecasting models are already being used to predict output from solar and wind power plants
- Machine vision will be used to facilitate onsite maintenance checks in conjunction with drone technology

Distributed energy resources

- Machine learning will assist with the integration of variable generation, and could optimize participation as demand-side response
- Upside Energy is developing algorithms for grid prediction and demand response portfolio management

Utilities

- AI will facilitate automated trading and consumer tariff switching, making virtual power plants possible
- AI will be able to optimize smart appliances (and other demand-side response), energy storage, and distributed energy sources

Infrastructure, mining and commodities sector



Infrastructure, mining and commodities sector (cont'd)

Precision agriculture

- AI is being used to target fertilizers to specific fields and crops, using drone technology

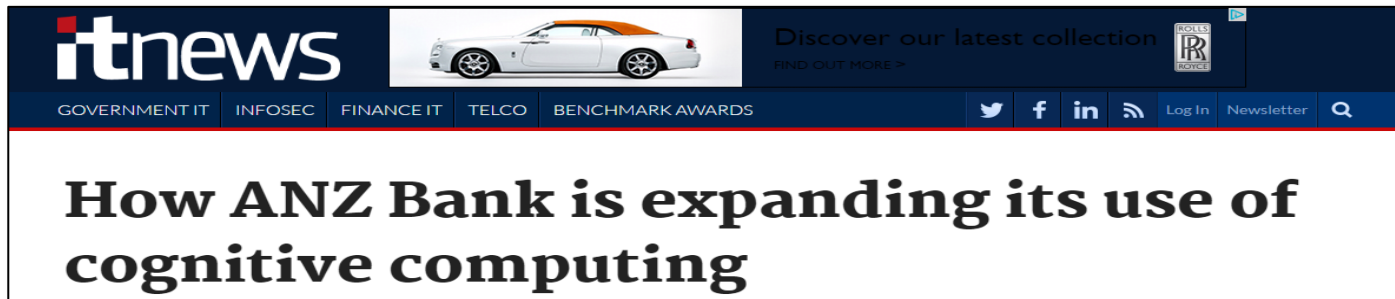
Waste management

- Processes using AI are emerging that can be used to enhance sustainability in the waste sub-sector (including recycling), particularly in relation to 'smart cities'
- AI may be used in waste collection, including driverless rubbish collection vehicles

Mining

- Autonomous drills and haulage (trucks and trains), managed by operators many miles away in central control centres
- Robotics and sensor-based ore sorting, including automated real-time mixing of aggregates from multiple mines
- Drones for exploration, surveys, and mine operations
- Big data analysis for more accurate prediction of mine locations

Financial institutions sector



The screenshot shows the ITNews website. The header features the 'itnews' logo on the left, a white sports car with an orange roof on the right, and a navigation bar with categories: GOVERNMENT IT, INFOSEC, FINANCE IT, TELCO, and BENCHMARK AWARDS. Social media icons for Twitter, Facebook, LinkedIn, and RSS are also present, along with 'Log In' and 'Newsletter' links. The main article headline reads: **How ANZ Bank is expanding its use of cognitive computing**.

Deutsche Bank launches maxblue robo-advisor

AnlageFinder robo-advisor for experienced and first-time investors / development in cooperation with fintech fincite / maxblue app for mobile securities trading



The screenshot shows the Financial Times website. The header includes a menu icon, a search icon, and the 'FINANCIAL TIMES' logo. Below the header is a navigation bar with categories: HOME, WORLD, UK, COMPANIES, MARKETS, OPINION, WORK & CAREERS, and LIFE & ARTS. The main article headline reads: **FCA prepares for the march of 'robo advisers'**. A sub-headline below it states: 'Watchdog eases way for free online providers to offer help for smaller investors'. There is also a 'Robo-advice' tag and a '+ Add to myFT' button.

Financial institutions sector (cont'd)



Robo advisors

- **Online wealth management services:** provide automated, algorithmic portfolio management or investment recommendations
- **Particular focus for regulators:** UK's Financial Conduct Authority has set high standards for robo-advisors
- **Deutsche Bank:** is reported as "having launched AnglageFinder, a robo-advisory service that asks customers about their investment objectives, terms and risk appetite and puts together customised asset allocations based on their responses"



Consumer finance

- **Australia's ANZ Group:** is reported as having used IBM's Watson AI computer "as a tool for financial advisors to use as they liaise with customers"
- **ANZ trained Watson:** by loading it with information including product disclosure statements, market data, financial statements and terms and conditions of its wealth products
- **Data sets:** ANZ narrowed down to a thousands-long list of questions what customers were likely to ask their advisors and created a thesaurus to help Watson understand non-standard terminology that might be used in a client query

Life sciences and healthcare sector

Google is going to develop a surgeon robot with Johnson & Johnson

Posted on Monday March 30th, 2015 by Alain Clapaud



A release of the US giant Johnson & Johnson comes to reveal: specializing in medical accessories, subsidiary Ethicon will work with Google in the field of robotics. The two partners will work on the development of a new Robotics platform. A platform that will give birth to robots dedicated to surgery. An electric shock on a medical Robotics market down growth. Despite optimistic forecasts from analysts, the market stagnates,

DeepMind Health

Home About Working with the NHS For Patients Data & Security Transparency & Independent Reviewers FAQs

Helping clinicians get patients from test to treatment, faster

We set up DeepMind Health to put the UK's most advanced technology at the service of patients, nurses and doctors.

of this market.

HOME SERVICES NEWS EDUCATION ABOUT US

Search

Your.MD, World's First AI Personal Health Assistant now Available on Global Messaging Services

Your.MD increases accessibility through integration with Slack and Telegram

February 04, 2016 11:00 AM Eastern Standard Time

LONDON--(BUSINESS WIRE)--Your.MD, the only personal health assistant that harnesses Artificial Intelligence (AI), is now available to users on global messenger platforms for the first time.

Life sciences and healthcare sector (cont'd)

Regulatory issues?

Big data analytics

- **Google's DeepMind Health Project and IBM Watson for Oncology** are leveraging Big Data analytics to detect and diagnose disease and provide personalised treatment plans
- **Microsoft** is reported as having launched Project Hanover with the Knight Cancer Institute to develop AI to personalize drug prescriptions for patients, using machine learning to understand how a tumour is reacting to treatments

Predicted outcomes

- **Veterans Affairs** (U.S.) is reported as having used AI to predict medical complications and treat combat wounds, leading to better healing and lower medical costs

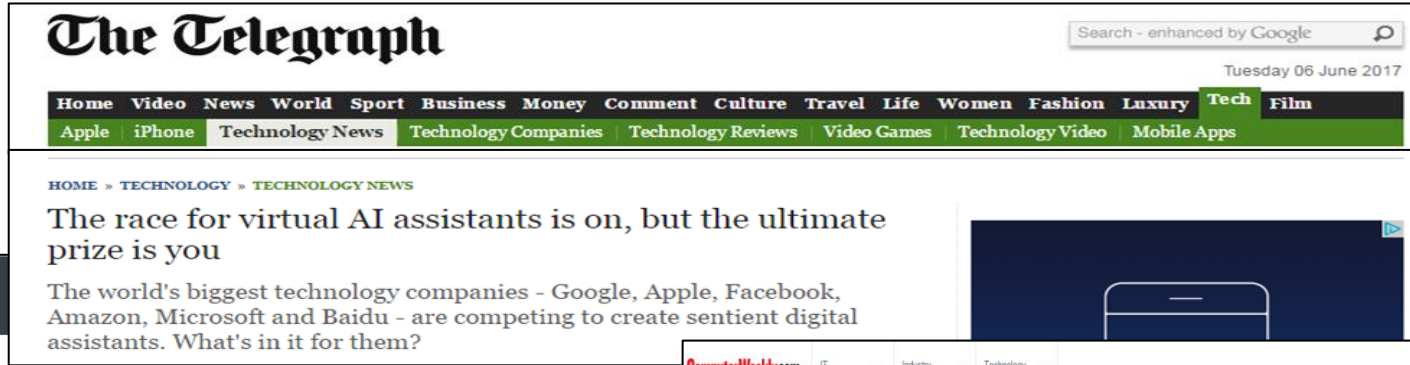
Virtual doctors and nurses

- **University of Essex and the UK's National Health Service** are reported as developing automated online doctors to treat patients which would save millions of pounds per year in health care costs
- **Your.MD** has developed a 'personal health assistant' which offers users personalized advice about their medical complaints, taking into account the user's symptoms, and then matching these against a 'map' of clinical data

Robotic assisted surgery

- **Google** is developing with Ethicon (a division of Johnson & Johnson) a robotics-assisted surgical platform to develop improved healthcare delivery in operating theatres
- These 'surgical robots' are intended to give operators greater control and accuracy than is possible by hand, minimising trauma and scarring, and enabling quicker post-surgical healing

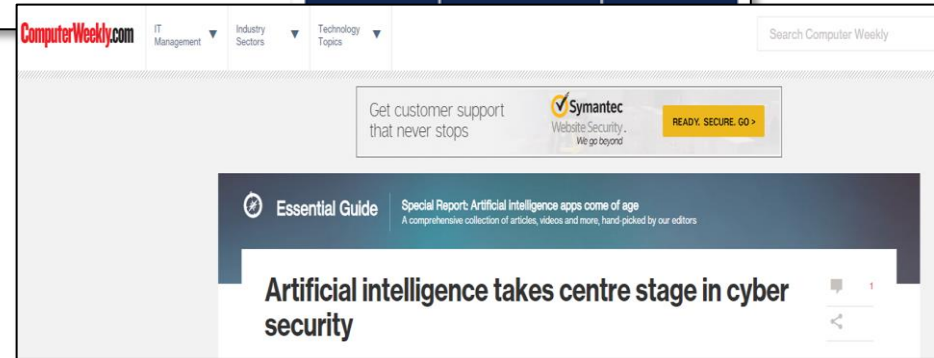
Technology and innovation sector



Intel on the outside

The rise of artificial intelligence is creating new variety in the chip market, and trouble for Intel

The success of Nvidia and its new computing chip signals rapid change in IT architecture



Technology and innovation sector (cont'd)

- **Mobile assistants:** tech giants are competing to develop the dominant mobile AI assistant for consumers
- **Cyber security:** AI used to predict malware and report anomalies



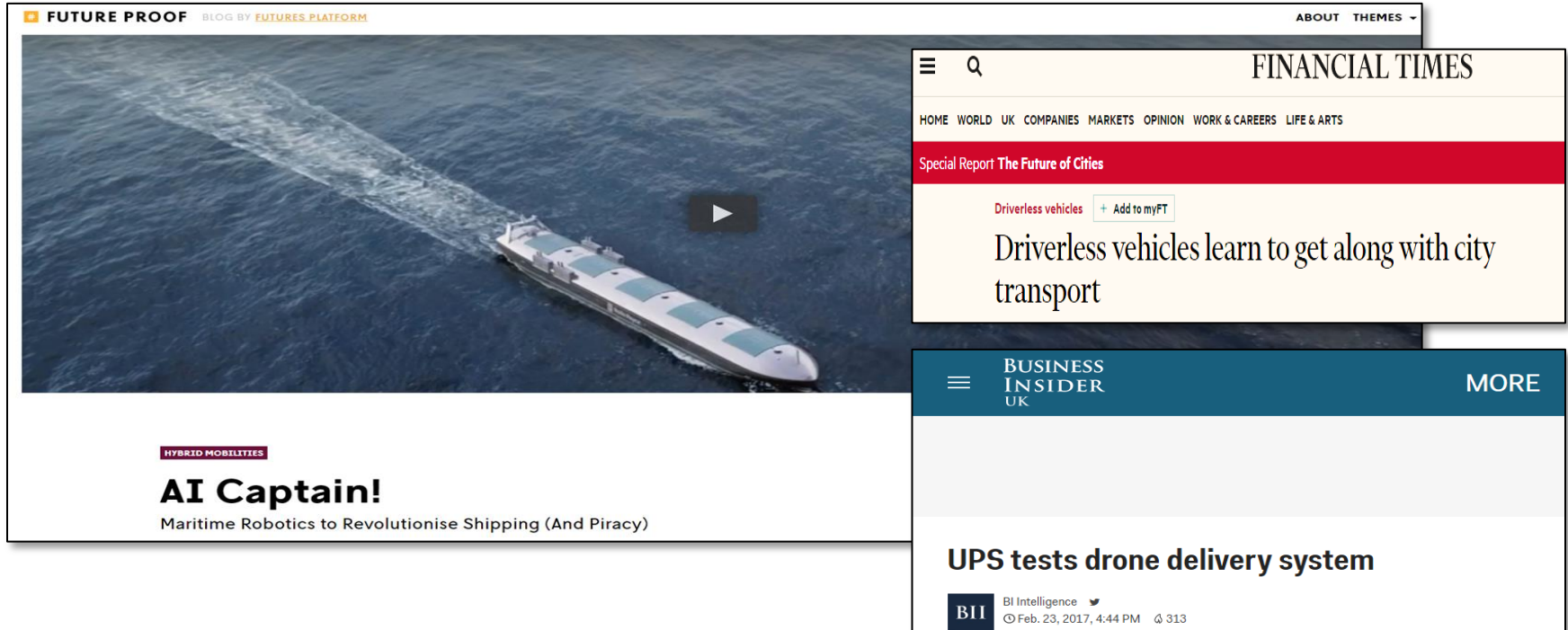
Technology and Innovation sector businesses can use AI to reconstitute their own business models - by, for example, automating customer support or gaining customer insight. There are also huge opportunities for them to develop and sell AI solutions to other businesses.



Mike Rebeiro, Head of Technology and Innovation, Norton Rose Fulbright

- **Intelligent sales:** silicon chip manufacturer uses AI to segment customers into groups with similar needs and buying patterns
- **Augmented governance:** the board of global tech giant uses AI as a 'co-pilot' to improve board decision-making

Transport sector



Transport sector (cont'd)

Shipping	<ul style="list-style-type: none">• Unmanned ships to operate autonomously (with remote human monitoring)• Shipping businesses are considering using AI to analyse market conditions to forecast more accurately (and price for) market movements
Unmanned aerial vehicles (UAVs)	<ul style="list-style-type: none">• Manufacturers of UAVs for the military are considering ways to use AI-enabled UAVs to respond actively and intelligently to battlefield and environmental scenarios• Major logistics businesses and retailers also wish to deploy fleets of UAVs for autonomous deliveries
Rail	<ul style="list-style-type: none">• Driverless trains• Nightly engineering work on Hong Kong's subway system is scheduled and managed by an AI program designed to use human knowledge taken from a variety of experts and to comply with all local regulations
Road	<ul style="list-style-type: none">• Autonomous (driverless) vehicles are currently being trialled in many countries

What are the AI ethical issues?



For AI to be accepted for use in a given market (for example, by achieving sufficient end user uptake), as a matter of commercial reality the use of AI will need to be perceived by the participants in that market as meeting certain minimum ethical standards. What these are will vary according to the type of AI at issue and the relevant sector in which it is deployed.



Ethical AI requires ...



**Human rights/
values**

Transparency

Accountability

Toolkit

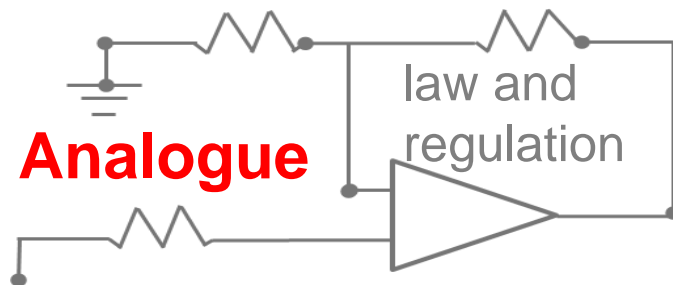
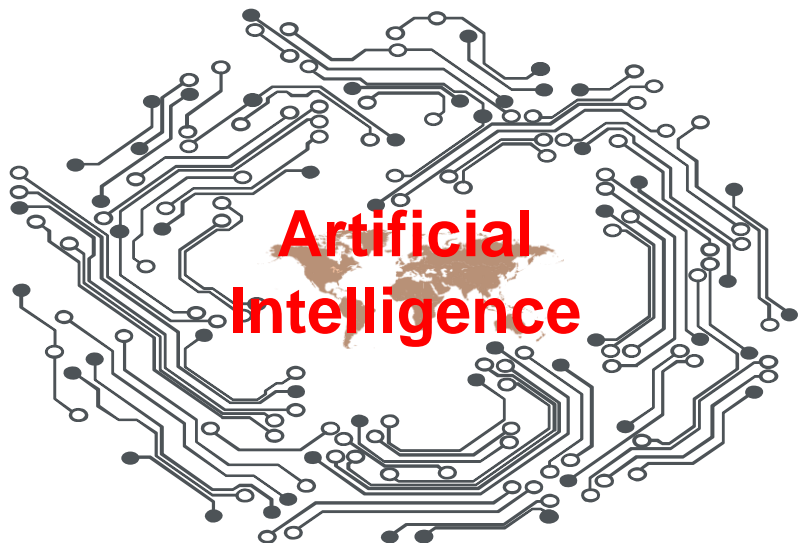


Unmask

Process

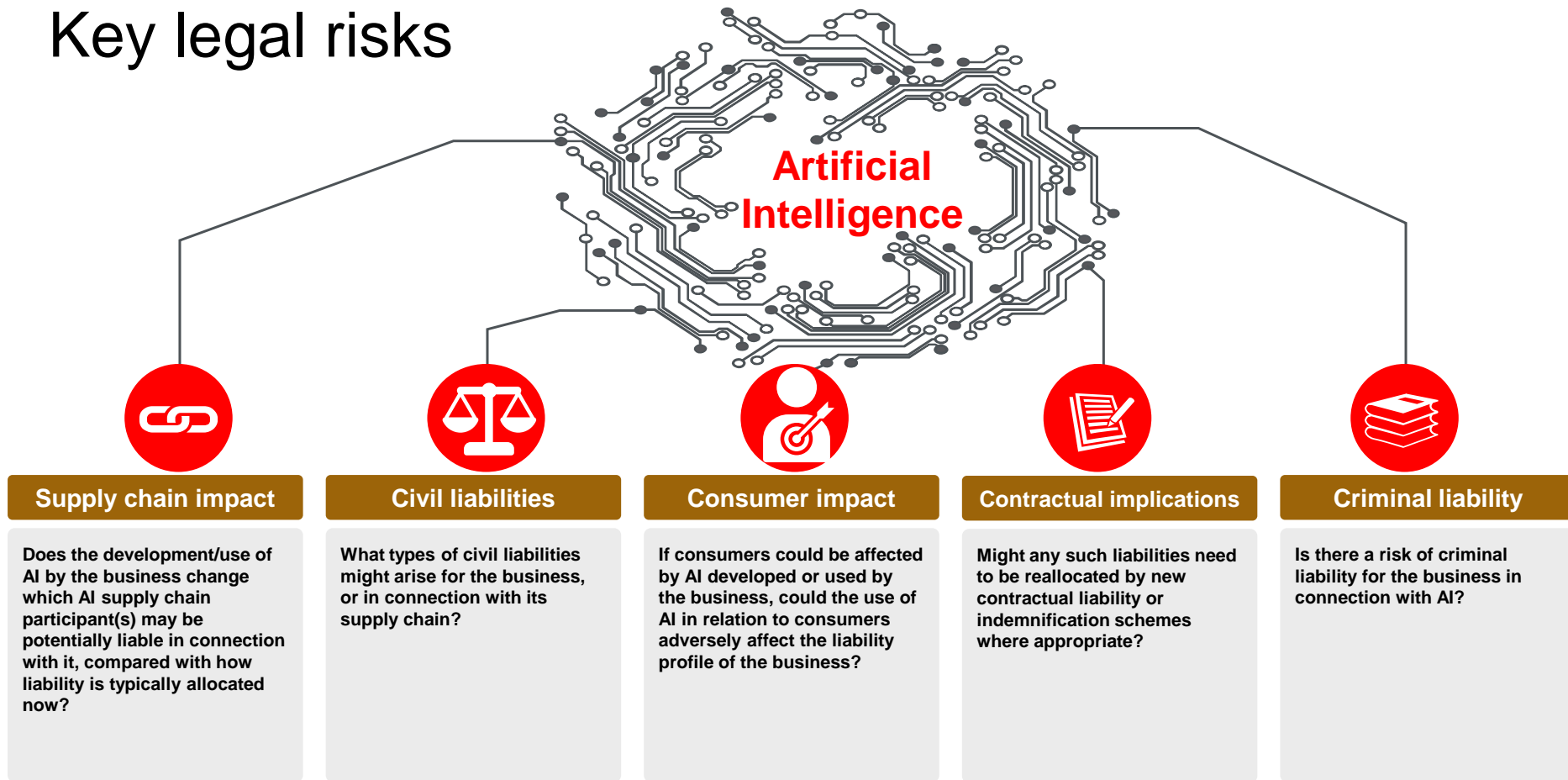
Validation

What are the key AI legal risks?

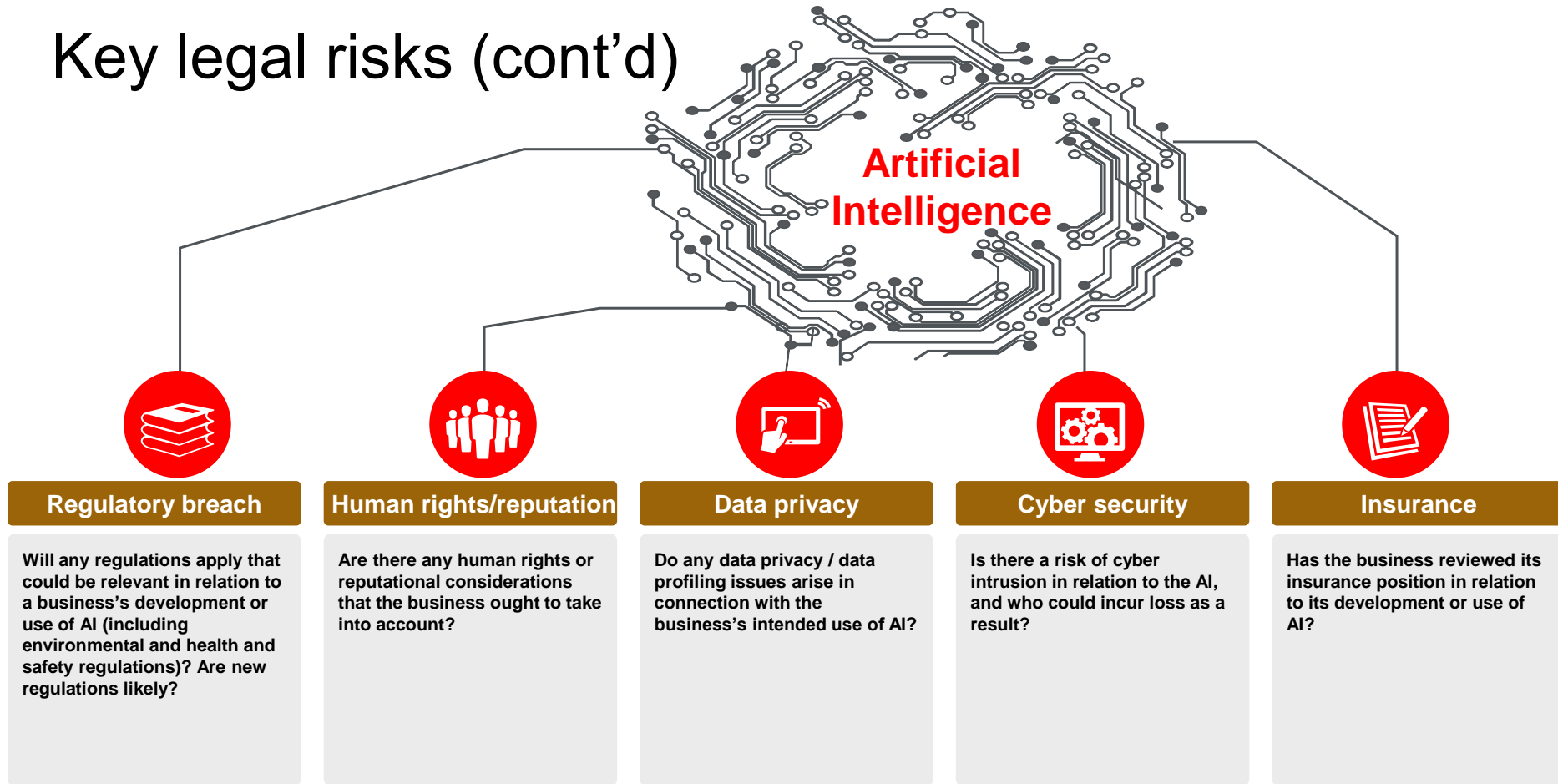


**We are entering into an AI digital era
governed by analogue law and
regulation**

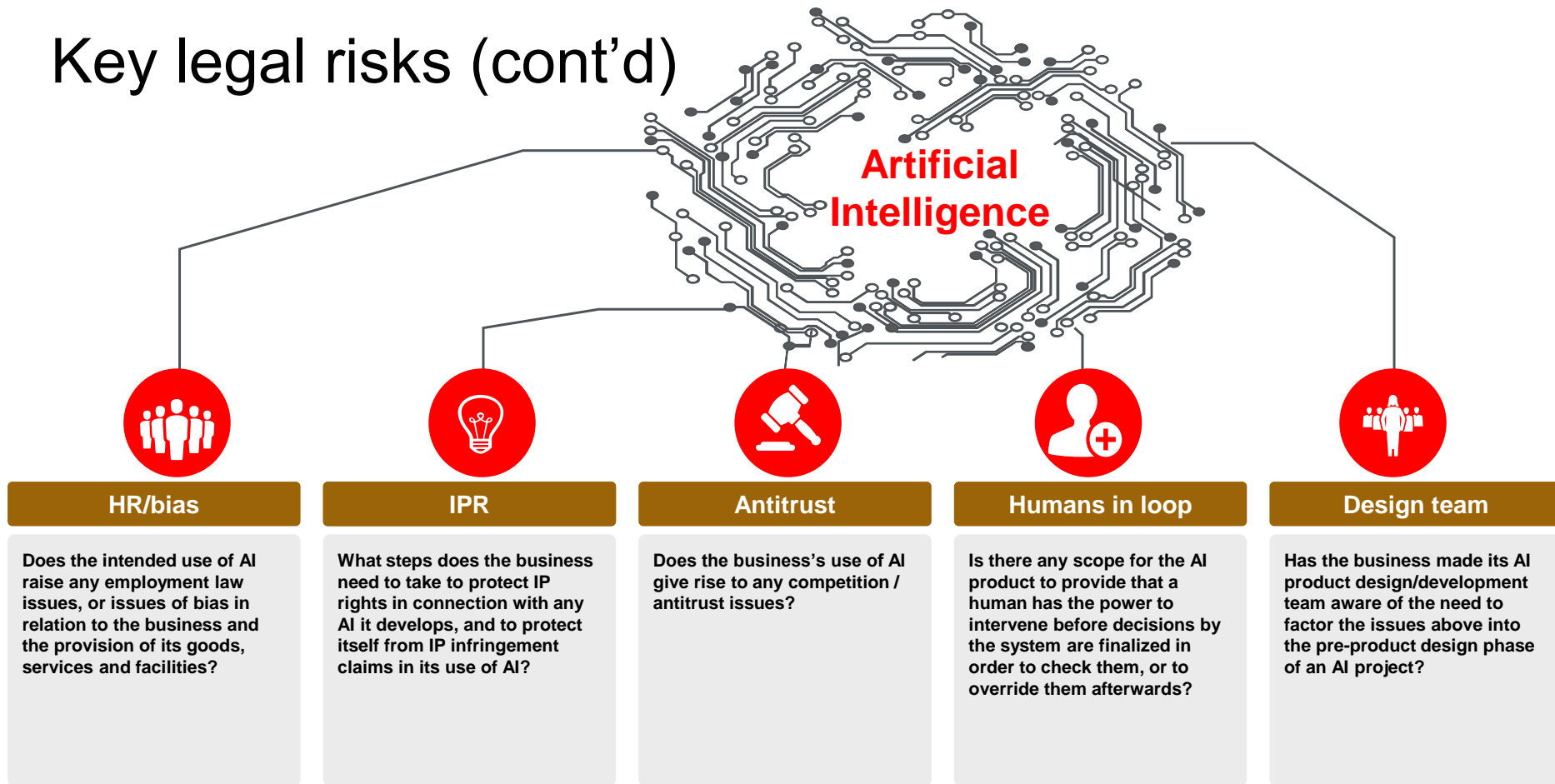
Key legal risks



Key legal risks (cont'd)



Key legal risks (cont'd)





imaginea|io

NAV DHUNAY

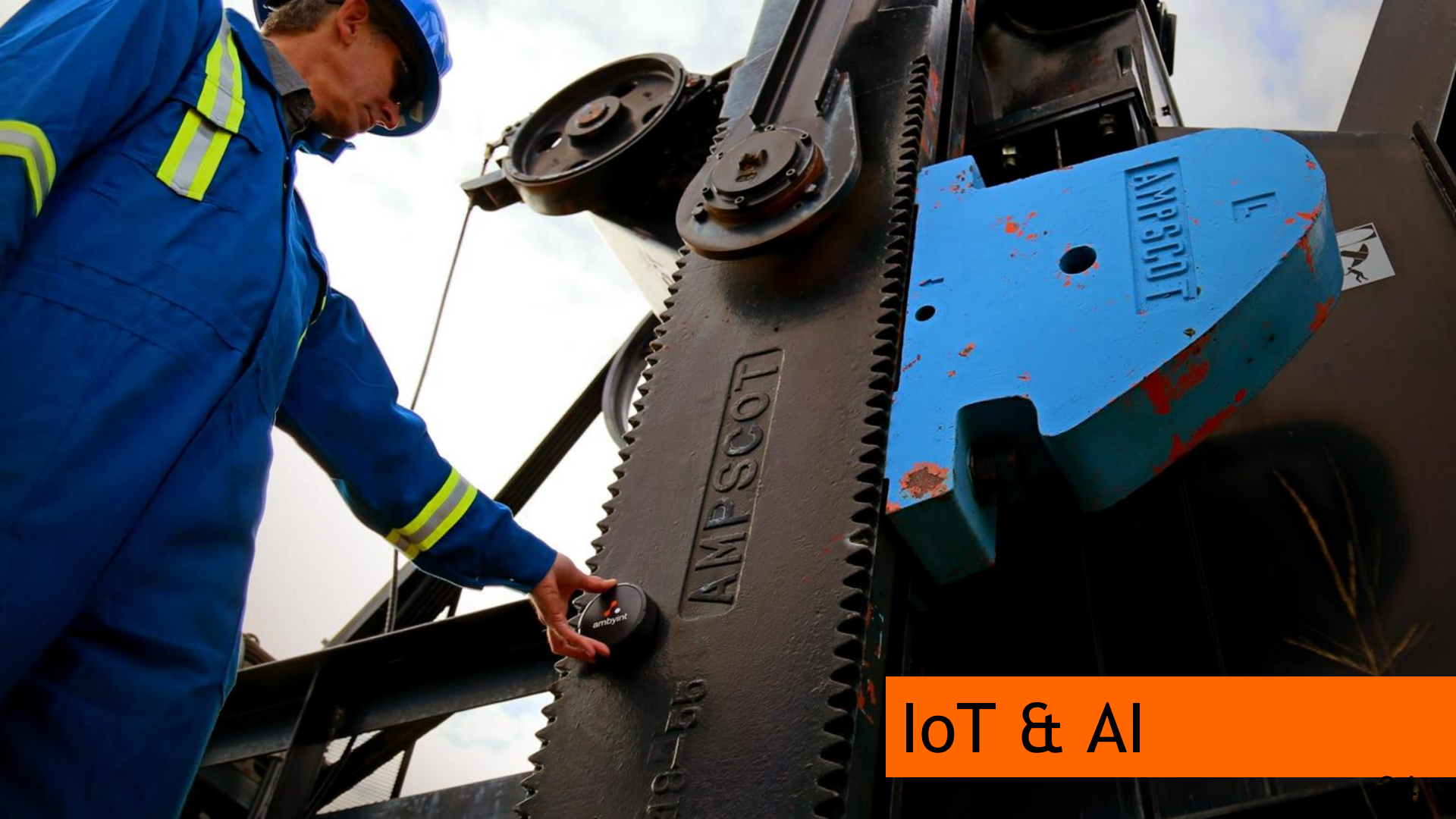
co-founder & chief technology officer



@ndhunay



THE PIVOT



IoT & AI



OIL WELLS THAT RUN THEMSELVES

EXCEPTIONAL FOUNDATION

10+

... years of data gathered from 1000+ wells

70/30

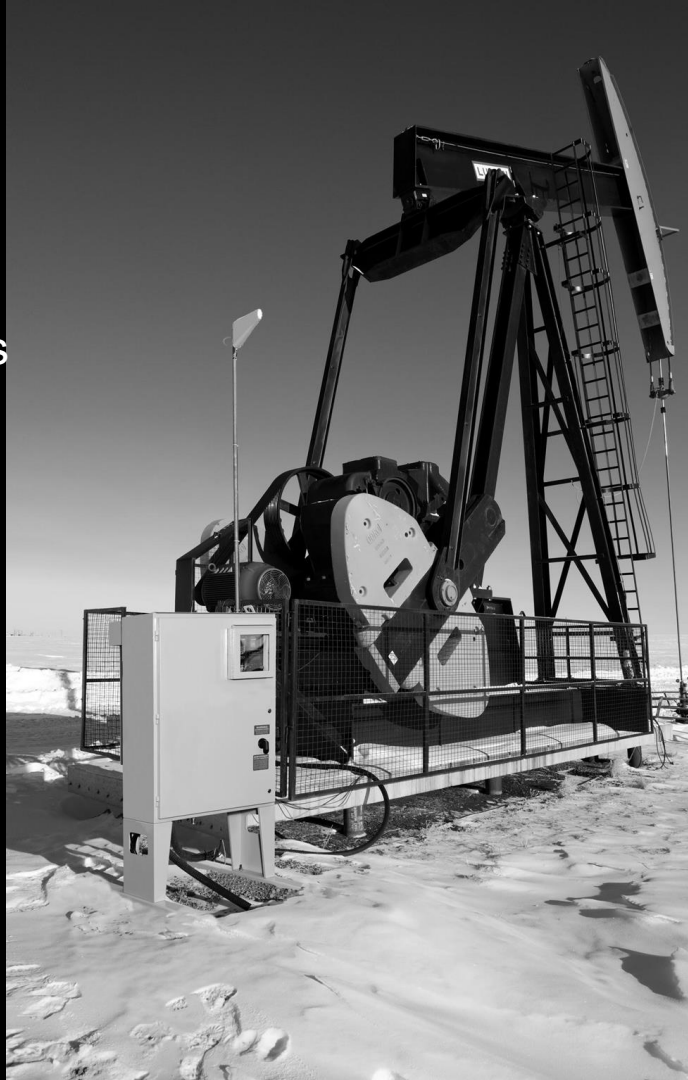
... percentage of horizontal / vertical wells
in data lake.

5 ms

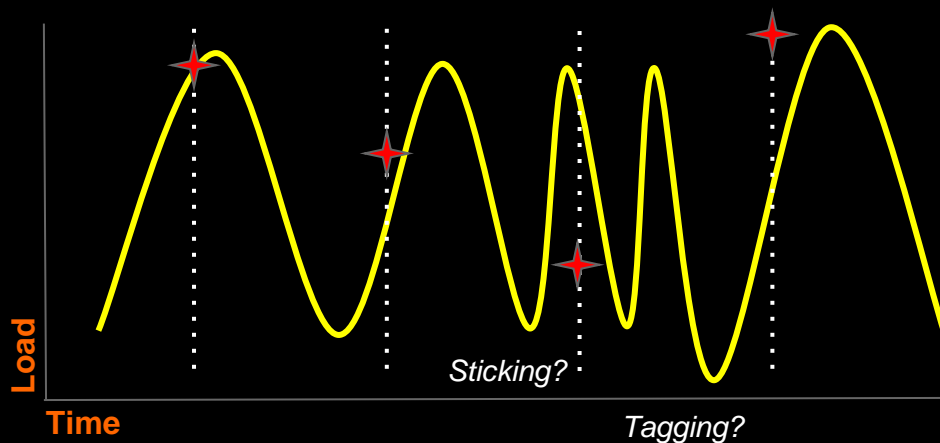
... sampling rate of high resolution data.

33M+

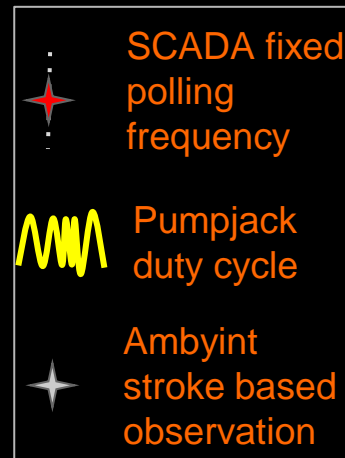
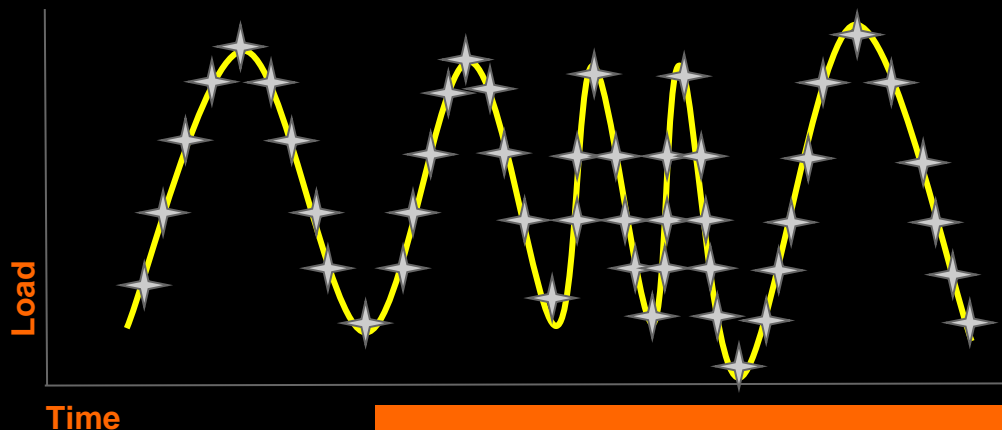
... dynamometer cards generated with
expert classification!



SCADA

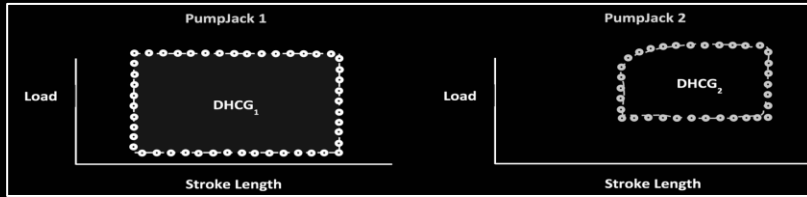


Ambyint

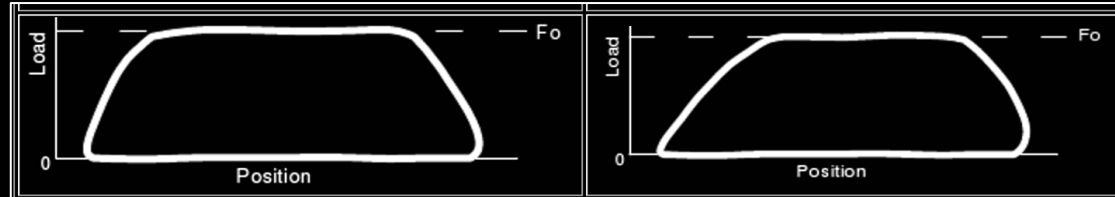


SCADA DATA LIMITATIONS

COGNITIVE CARD RECOGNITION

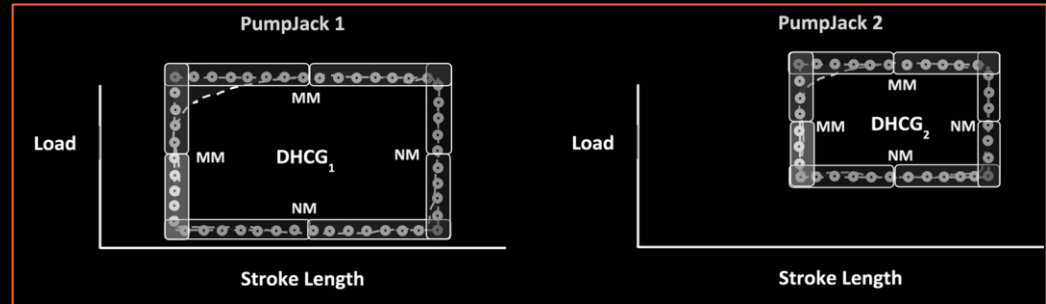


Visual pattern recognition
(traditional approach) diagnosis
systems are inherently flawed



Humans only see macro-level
changes, missing the subtle
details hidden due to poor
data quality or high friction

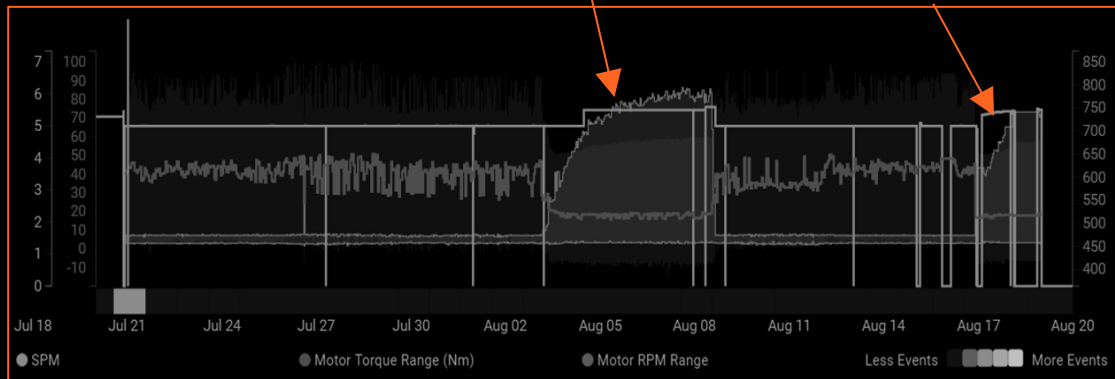
Ambynt data science utilizes
micro-pattern diagnosis +
expert-categorized data lake
to resolve this flaw



TORQUE BASED ANALYTICS

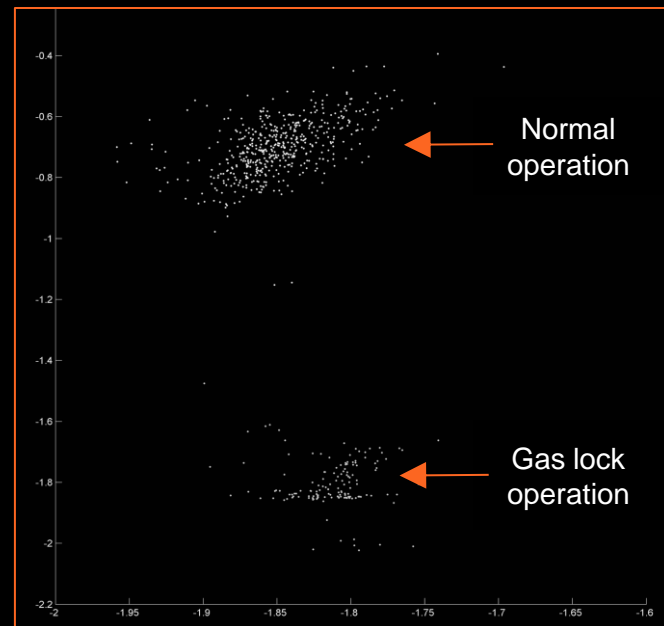
Teaching the machine to predict and diagnose gas lock in oil wells.

Ambyint screenshot

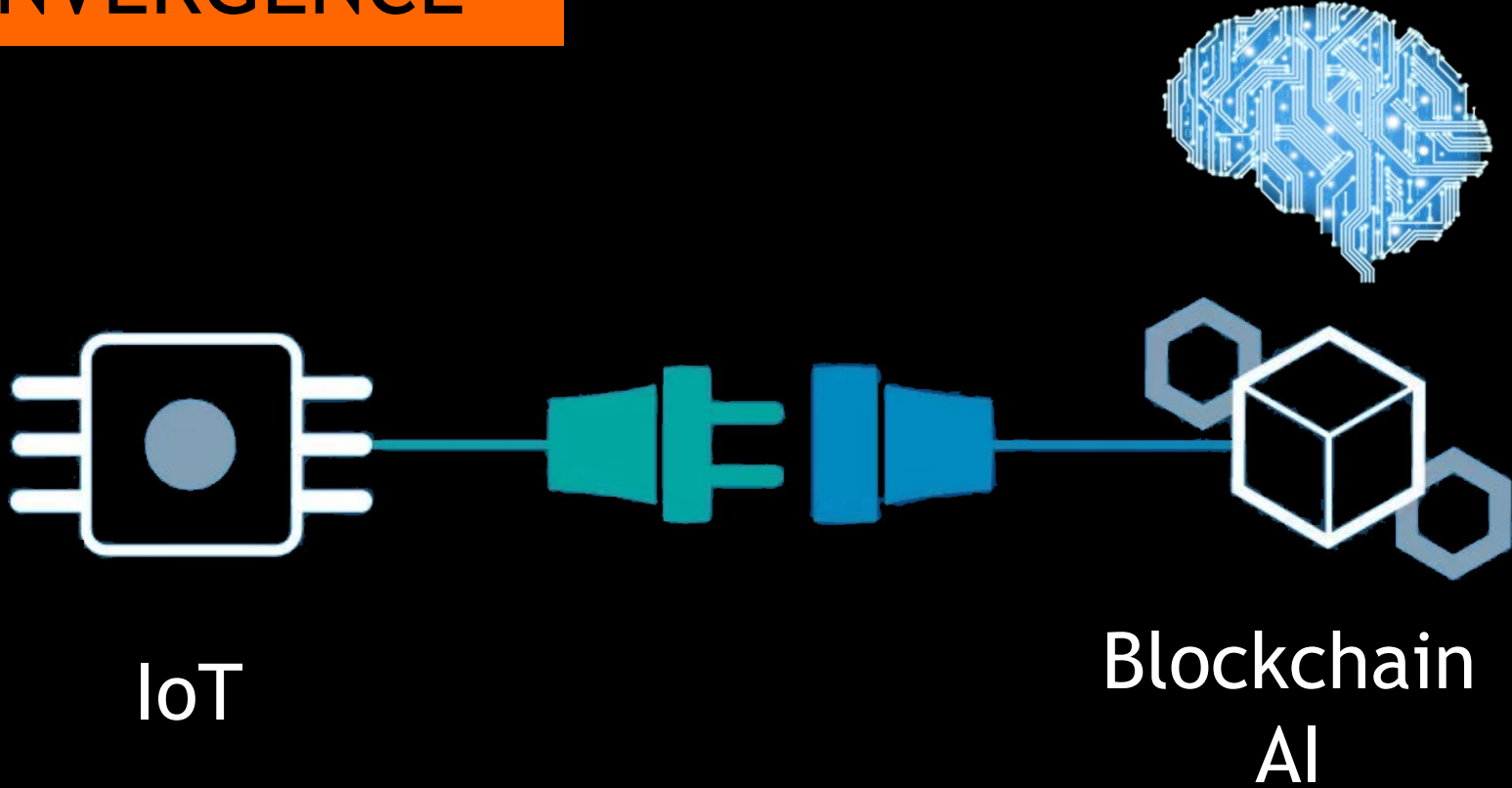


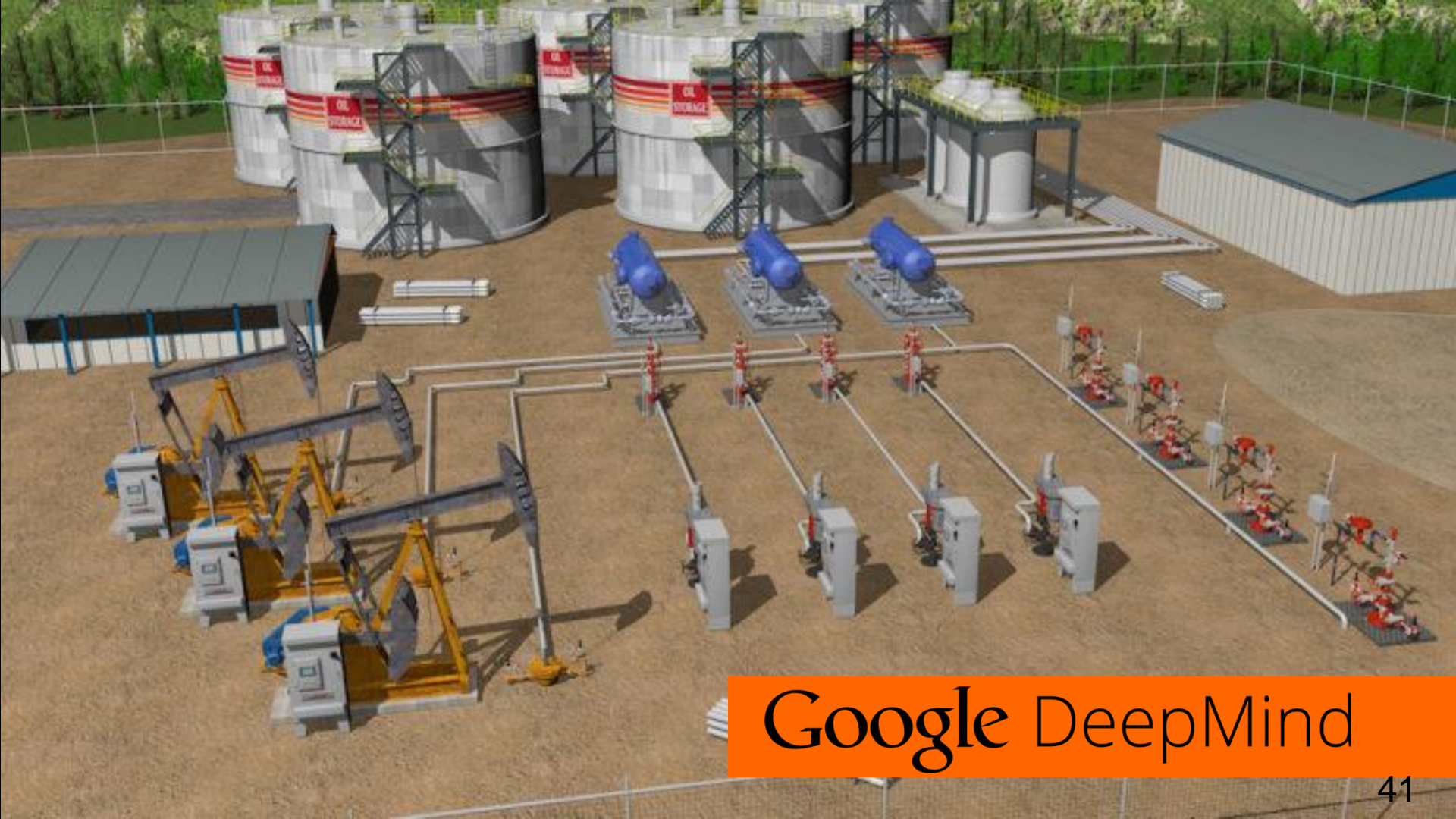
Operator calculating 1-3 month paybacks

Ambyint pattern recognition



CONVERGENCE





Google DeepMind



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*motion*2018
discussing what matters

 NORTON ROSE FULBRIGHT