

WIE KÜNSTLICHE INTELLIGENZ FÜR IHR UNTERNEHMEN SINN MACHT

Paul Hofmann

FH JOANNEUM | Institute Industrial Management
Werk-VI-Straße 46, 8605 Kapfenberg, AUSTRIA



CURRENT SITUATION

AGEING ASSETS



Underperforming asset utilization

SHRINKING WORKFORCE



2.4 M production jobs out of 16 M will not be filled in the USA in 2028

Source: Deloitte

MARGIN PRESSURE



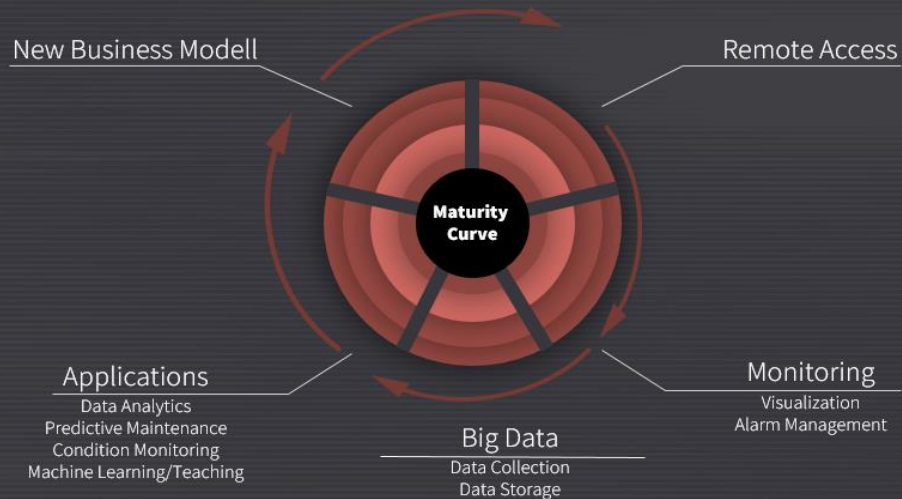
EBITDA declined from 11.2% in 2015 to 8.6% in 2018

Source: Forbes

SERVICES MATURITY MATRIX



AI/ML MATURITY CURVE



SMART ASSET BEISPIEL – KRANHERSTELLER

SMART SOFTWARE STATT TEURER SENSOREN

- ZIEL**
 Vorhersage der Alterung von Getriebeöl & Vermeidung von Schaden am Getriebe
- AUSGANGSLAGE**
 Verschiedene Hersteller, ~ 30 Parameter, Offline Labortests ~ 50 €
 Sensor für ~ 2000 €
- SF PLATTFORM**
 Daten: OPC UA & MQTT
 Datenmanagement mit inkrementeller Anpassung
 Basic Analytics von Viskosität, Permittivität, Durchlässigkeit, Feuchtigkeit, etc.
- ML & AI LÖSUNG**
SW statt teurer Ölalterungssensoren
ARIMA zur Vorhersage von Feuchtigkeit & Viskosität
Wavelets zur Vorhersage der Getriebealterung

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VALUE CREATION THROUGH AI & ML

LESS DOWNTIME



CBM
Benchmarking
Predictive
Maintenance

BETTER DESIGN



Overengineering
Design errors
Learn from
Better user
experience

BETTER SERVICE



Proactive Service
Less spare parts
Customer complaint
Remote installation
Root cause analysis

NEW BUSINESS MODELS



Automation
Pay per use

FROM SELLING TO SERVING



OUR MISSION

We design buildings as continuously evolving products to create the most exciting and affordable experience for all. We build for people and conserve the resources of our planet.

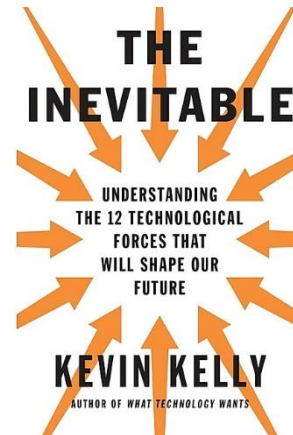
- / Products become services
 - Uber, Gropius, Kuenz, BASF,...

→ *reduce risk*

- / Everything requires maintenance
 - Endless upgrades

- / Objects become partners

- / AI will help us to serve & improve
 - The Inevitable by Kevin Kelly





WHY SERVICES

/ More resilient

- 2008 -> 2009 55% less orders in manufacturing vs. 20% less for services

/ Hardware + software bigger market cap

- [Apple](#)
- Tesla: create value from generated data
- **> 5% of EBIT attributable to AI** - 22% of respondents in McKinsey [The state of AI in 2020](#)
- AI adoption is 24% within the product- or service-development & service-operations functions

/ Own product lifecycle → align design and maintenance

- Design maintenance issues out
- Closer to the customer → Understand how customer harvests value

/ Increased asset productivity

- Incentives are aligned

/ Solution locks competition out




SERVICES MATURITY MATRIX





EXAMPLE ROLLS ROYCE

- / Sell engine power per hour
 - \$1 engine → \$7 repair maintenance
 - / From data to value
 - Gather the data → add sensors & connectivity (satellite)
 - Create value with analytics, AI & ML
 - predictive maintenance & schedule optimization
 - / Design improvement → less failures
 - / Process enhancement → global scale
 - Offer engineer on premise
 - / Asset productivity 99,9% uptime
- 



SERVICES ROADMAP

/ Own the whole lifecycle

- parts and labor → temp, humidity and uptime
- From free to fee

/ Process enhancement

- Gather the data → add sensors & connectivity
- Create value with analytics, AI & ML
- predictive maintenance & (schedule optimization)

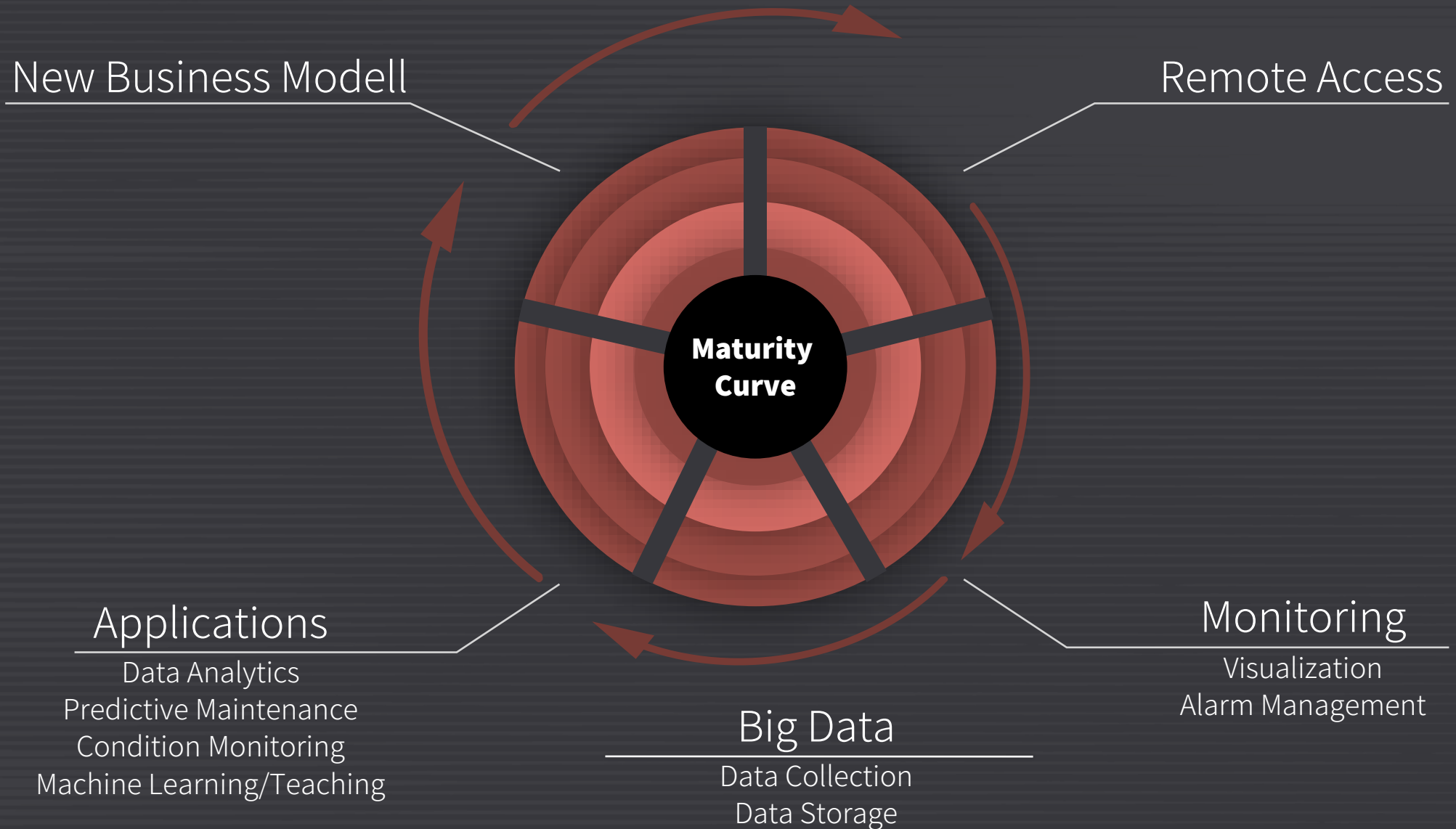
/ Increased asset productivity

- Offer engineer on prem

/ From data to value

- Sensors, AI and ML
- 

AI/ML MATURITY CURVE



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SF PLATTFORM

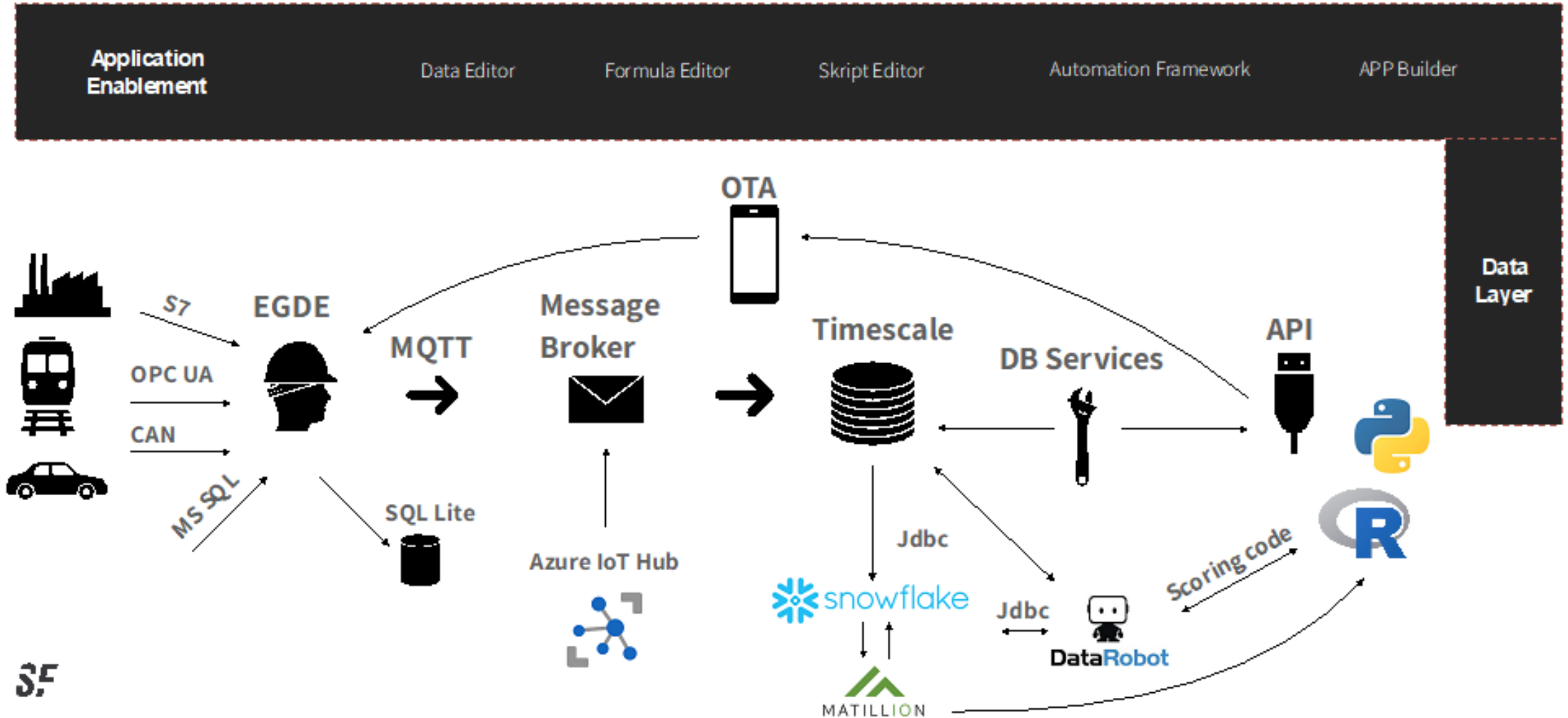
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4

ML & AI LÖSUNG

SW statt teurer Ölalterungssensoren
ARIMA zur Vorhersage von Feuchtigkeit & Viskosität
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EXAMPLE AI AND ML ARCHITECTURE



PAY PER ALCOHOL YIELD

UNDERSTAND PROCESS OF ALCOHOL FROM CORN

1

OBEJCTIV

Understand alcohol yield in detail to controll production process in order to sell alcohol yield instead of enyzme per kg

2

SITUATION

No deep understanding of customer production processes, yield varies by plant and no transparency into market demand

3

ACN AI PLATFORM

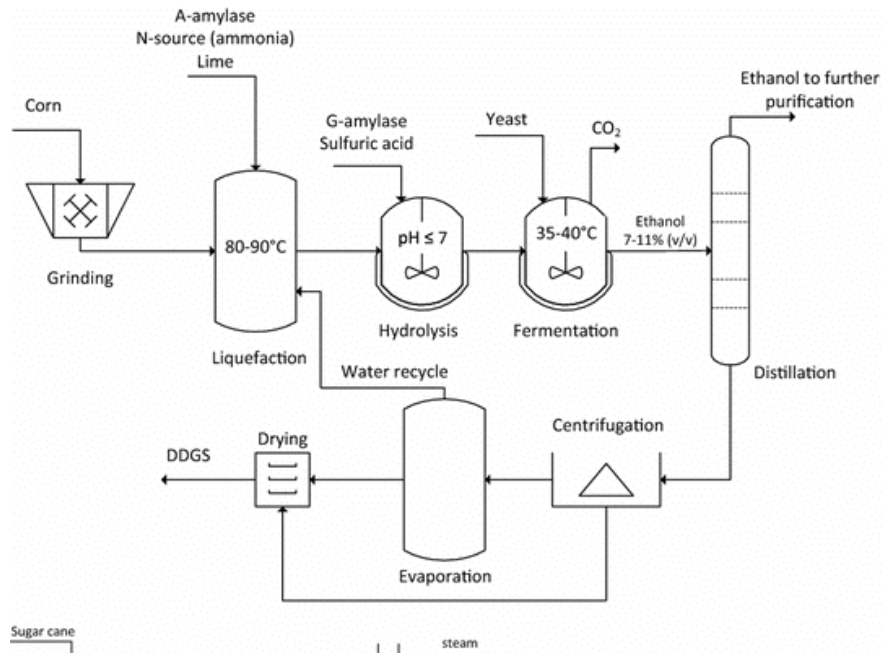
Collect data via MQTT and transmit into Cloud. Train operators on control tower and establish service hotline for second level support

4

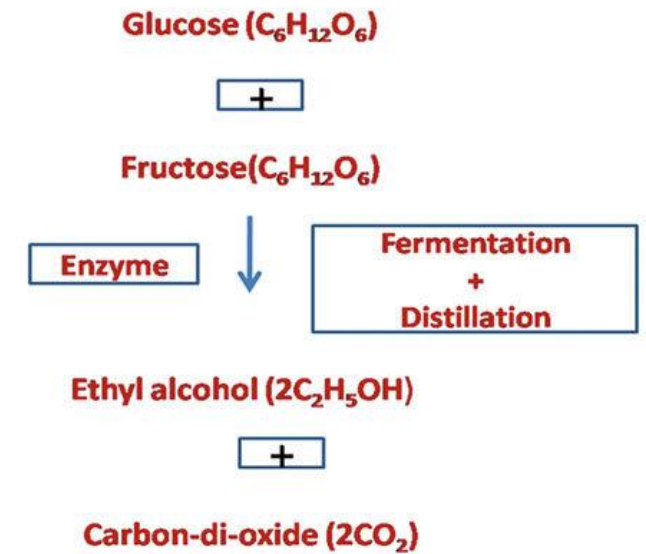
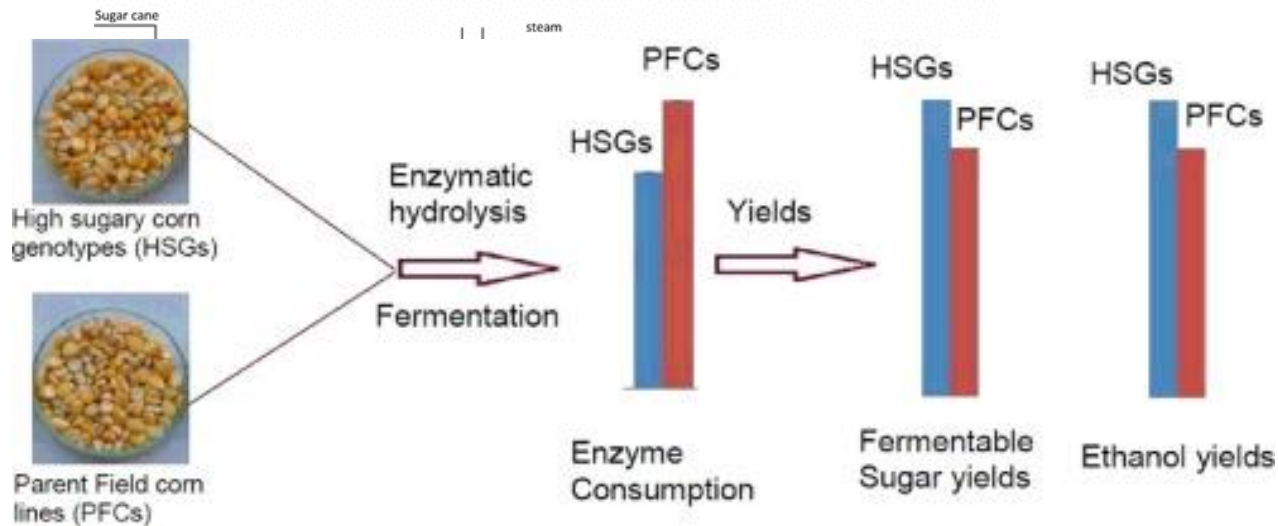
ML & AI SOLUTION

Establish a **pay per alcohol yield business model** Use genetic algorithm from DataRobot to solve geometric regression using about 200 machines.

CONTROL ALCOHOL YIELD

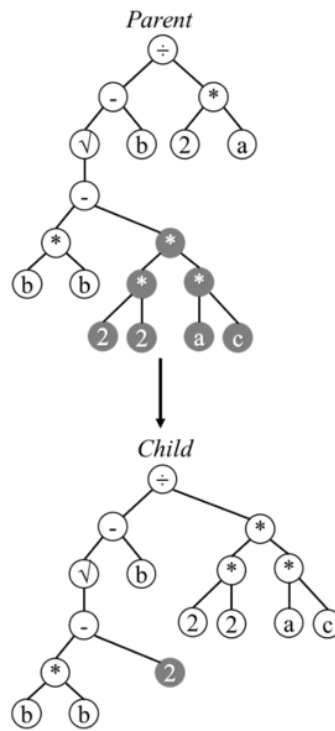
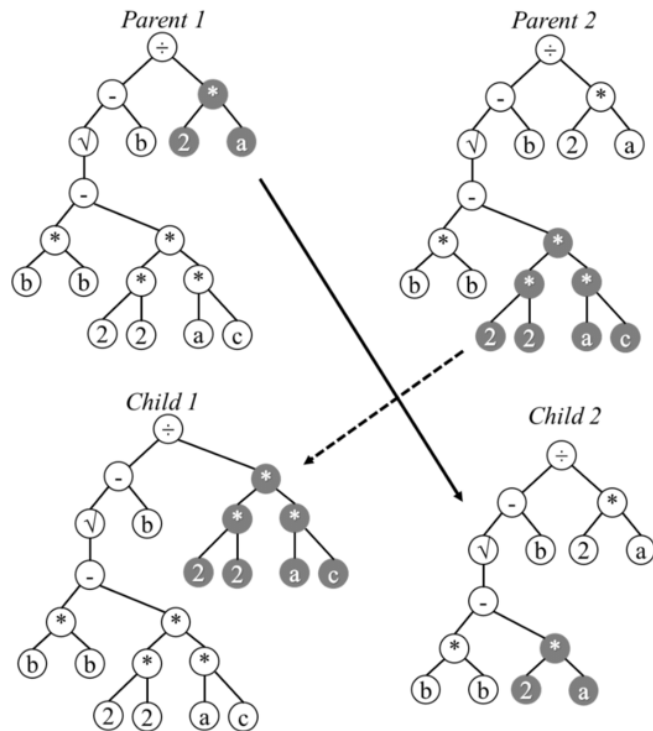
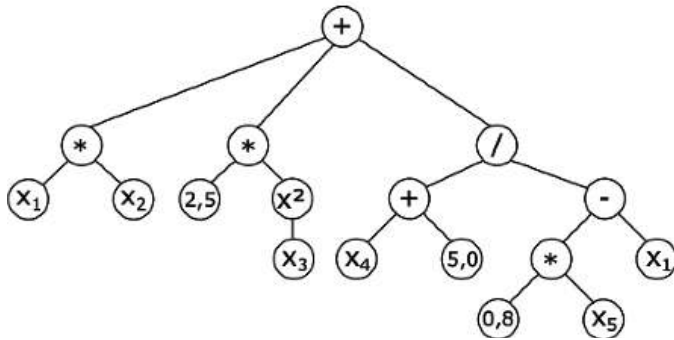


$$\text{Yield} = \frac{-PFC \pm \sqrt{PFC^2 - 4HSG * T^2}}{2HSG}$$



SYMBOLIC REGRESSION

$$f(x) = x_1x_2 + 2.5x_3^2 + \frac{x_4 + 5.0}{0.8x_5 - x_1}$$



- Random equations are generated to reproduce the data using [evolutionary search](#).

- Most of the equations do not fit but a few of the equations will fit the data better

→ used as the basis of a new round of several billion more equations until a sufficiently good fit is reached.

→ "invariant relationships" like [laws of nature](#)



FROM SELLING TO SERVING

/ Products become services

→ *reduce risk*

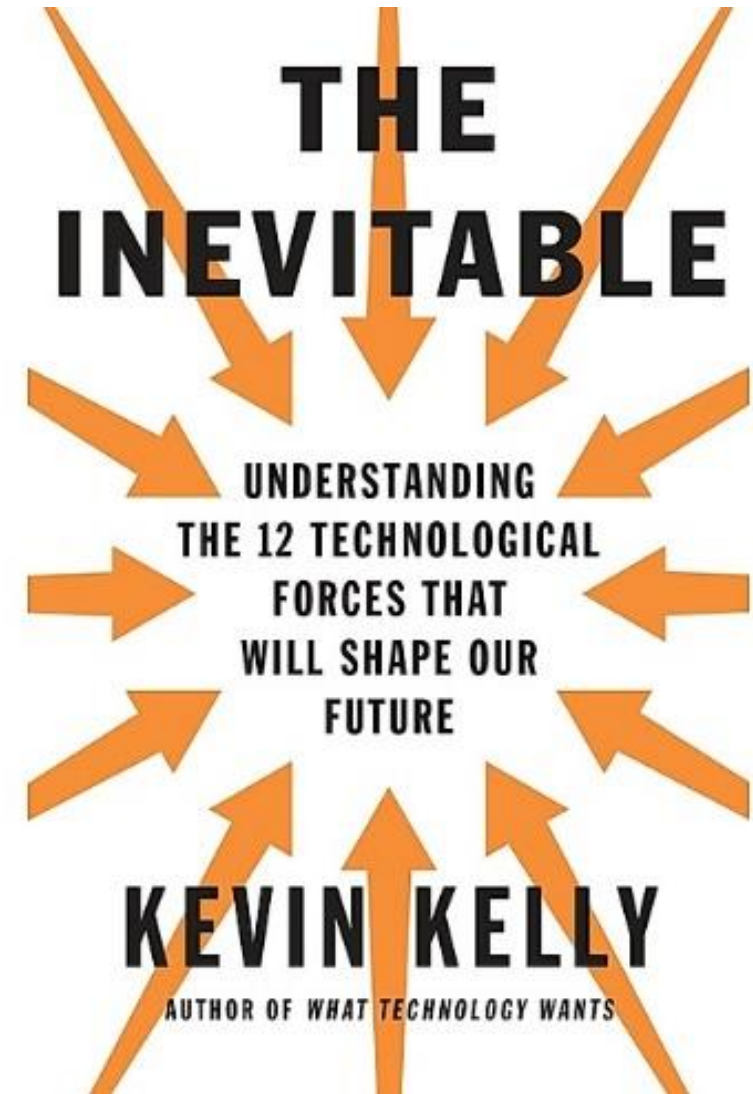
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EXAMPLE NIKE

/ What do own?

/ Say selling \$100 sneaker

- 60% margin
- 40% shoe → 10% COGS 30% design & marketing
- From data to value

What do Nike and retailer owe?

- Brand, POS and customer relationship

→ Move closer to customer

→ Hard to copy solution

