



Accelerating time to value with AI & Machine Learning using Microsoft Azure

THE DATA ANALYSIS BUREAU IS A DATA SCIENCE AND ENGINEERING INNOVATION COMPANY SPECIALISING IN MACHINE LEARNING

What: We take customers on their data and AI transformation journey by partnering to build innovative and ambitious data and machine learning systems

How: By combining data science, engineering, creative thinking, and commercial skills with the latest advances in machine learning technologies, open-source and academic research

Why: To be at the leading edge of the current technological revolution

SMARTER DATA, BETTER DECISIONS





What can we do for you?

EXAMPLE USE CASES TO EXPLORE



DIGITAL TWINS & IOT ANALYTICS

- Pipeline monitoring
- Preventative maintenance
- Smart grids & microgrids
- Grid operations, field service
- Asset performance as a service



SUPPLY CHAIN OPTIMISATION

- Trade monitoring, optimisation
- Retail mobile applications
- Vendor management
- Truck & delivery optimisation
- Demand forecasting



PREDICTIVE MAINTENANCE & MACHINE LEARNING

- Real-time anomaly detection
- Industrial safety
- Environment health & safety
- Time to failure prediction
- Anomaly detection
- Spoilage event prediction
- Tool wear detection



AI & CUSTOMER ANALYTICS

- Multi-channel engagement
- New product development
- Monitoring of acceptance rates
- Deep customer insights
- Competitive data
- Price optimisation

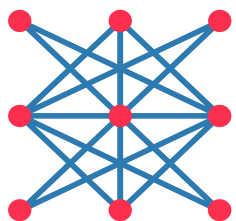
Here is just a few examples of how machine learning and data science can be applied in manufacturing. What we can do is dependent on your objectives and the data you have available and the data you can collect.



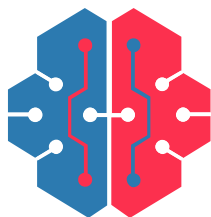


What do we do?

WE COMBINE TECHNICAL SKILL SETS TO DELIVER AN END TO END SOLUTION



DATA SCIENCE



MACHINE LEARNING



DATA ENGINEERING



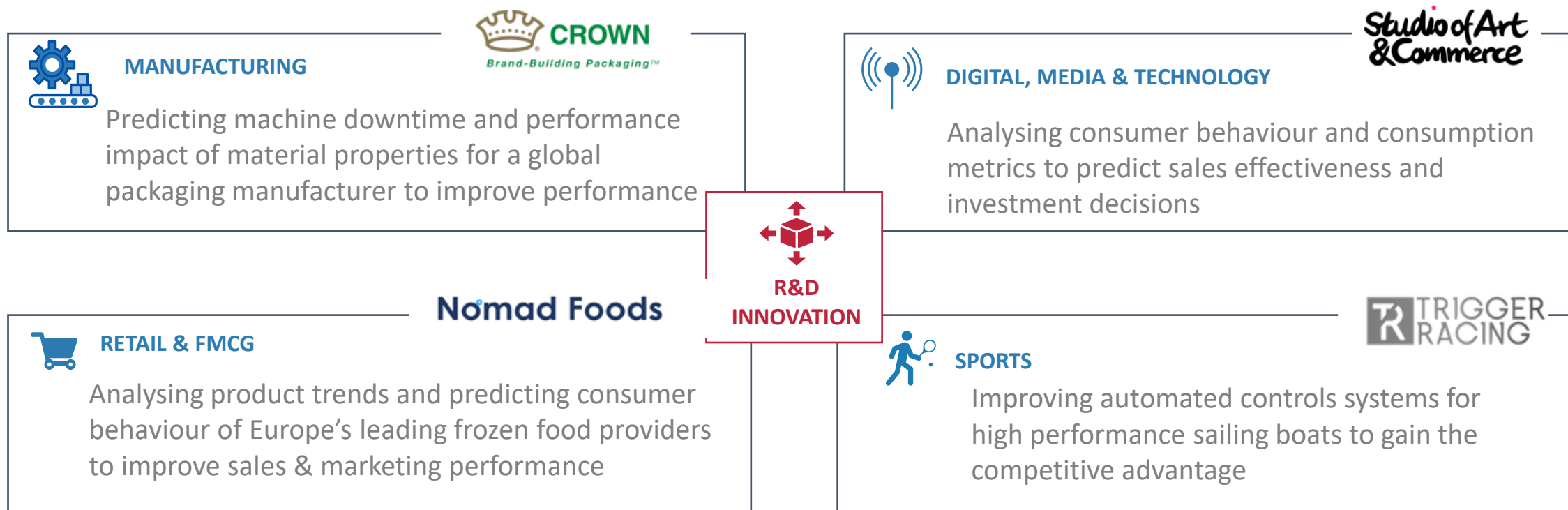
DATA ARCHITECTURE



DATA VISUALISATION

We apply a proven framework across industry to help our clients rapidly discover, build and run machine learning services that help their business grow.

WE HAVE PROVEN OUR APPROACH ACROSS INDUSTRY & TRANSFER TOOLS AND TECHNIQUES TO IMPROVE EACH BUSINESS



What we can do is dependent on your objectives and the data you have available and the data you can collect. Data is data at the end of the day, and we can use it in different ways dependent on the use case.



CANVOLUTION: PREDICTION OF SPOILAGE AND FAILURE EVENTS IN GLOBAL CAN MANUFACTURING

Hypothesis

Spoilage is caused and correlated to differences in material properties, production line states, tooling etc.

Model

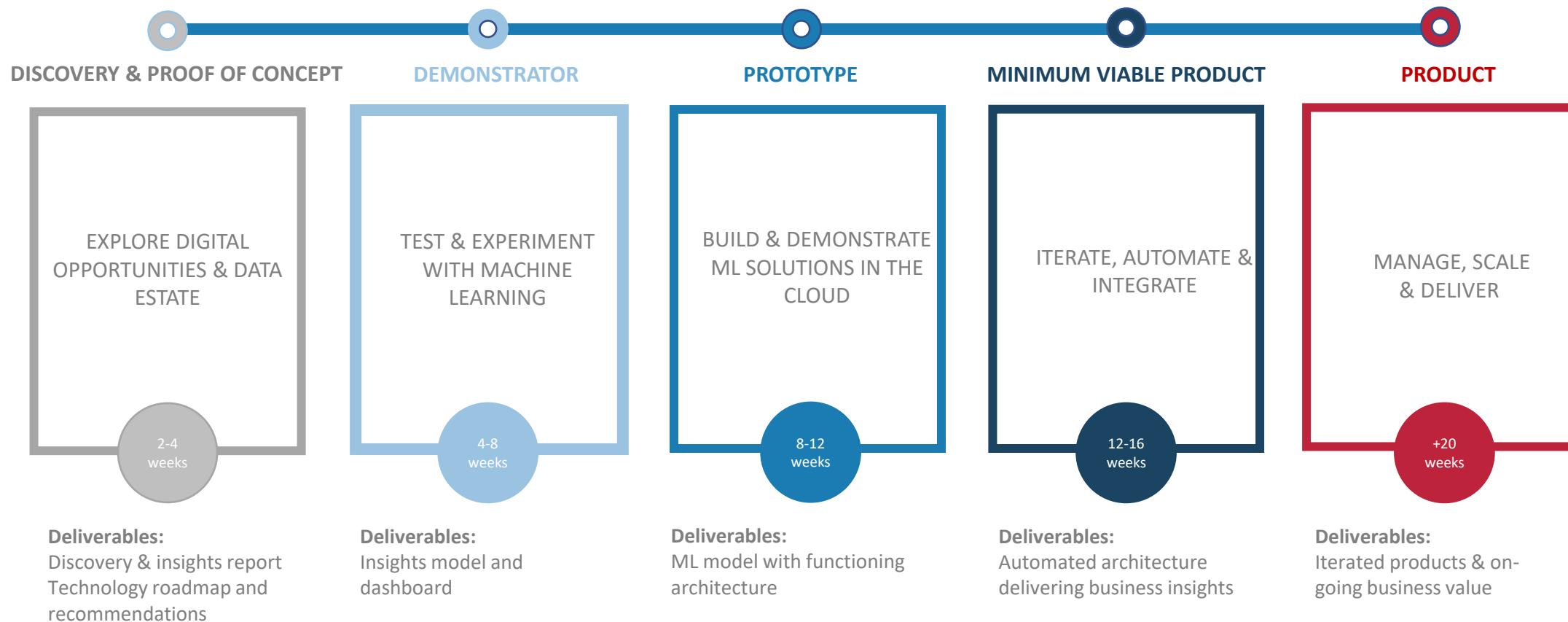
Supervised machine learning to predict spoilage based on material properties, production line state, etc.

TARGETING 5% OF SPOILAGE EVENTS TO INCREASE REVENUE PER LINE BY +£3M

Innovate UK



WE PROVIDE AN END-TO-END SERVICE, DESIGNED TO TAKE YOU SEAMLESSLY FROM IDEATION TO PRODUCT





A COLLABORATIVE MODEL FOR INNOVATION: NOT SIMPLE OUTSOURCING

- Collaboration in integrated teams
- Develop new ideas for client
- Opportunities for co-investment in products and IP



TEACHING AI TO SAIL

A winning edge: a challenge that fewer people have survived, completed and won than have walked on the moon.



Microsoft

Imperial College
London



DEEP REINFORCEMENT LEARNING AND RECURRENT NEURAL NETS FOR AUTOPILOT CONTROL

BACKGROUND

High performance ocean racing boats have a wealth of real time IoT data.

Sailors optimise and manage the performance of the boat as they race single handed non-stop around the world.

Automated autopilot steers for 98% of the race but are only 80% as effective as a human.

There was only a 2% difference in time between the last winner of the Vendee Globe.

SOLUTION

Discovery study to assess the available data and how to effect the autopilot performance.

Demonstrator of different machine learning & deep learning approaches and simulation models to assess effectiveness.

Proof of Concept development of cutting edge deep learning solution.

- Leveraging the latest deep learning frameworks,
- Distributed and edge computing, and,
- machine learning development technologies.

BENEFITS

Optimised, industrial automation of the autopilot to deliver the Vendee Globe winning advantage.

Enabling the racing boat to drive optimally, adapting to new conditions and improve power consumption to move faster.

Intelligent control to improve hardware life and durability through route optimisation, reducing hardware stress and failure, enabling budget to be allocated to other race components.



How to get started?

MACHINE LEARNING TRANSFORMATION FRAMEWORK



1



DESIGN & FEASIBILITY STUDY + EXPLORATORY DATA ANALYSIS

Identify key insights for an analytical study, leveraging analyses and data mining with unsupervised ML/basic statistical model to validate possible ML concepts.

2



DATA & ARCHITECTURE AUDIT

Assess existing data and architecture against suitability for purpose and design additional architecture to enable your ML development

3



MACHINE LEARNING DEVELOPMENT

Rapidly prototype and experiment with ML models using an agile development cycle to validate and test ML models to take into production.

4



DATA ENGINEERING & ARCHITECTURE

Integrate data sources and additional architecture, automated cleaning, processing, and feature engineering on client-side architecture

5



BI & VISUALISATION

Deploy interactive analytical dashboards to present key business intelligence and machine learning insights



How to find out more?

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HELPING A **SUPER-MATERIAL MANUFACTURER** TO SUSTAIN COMPETITIVE EDGE BY ACCELERATING INNOVATION

COMPANY PROFILE

A high-end innovation researcher and manufacturer of advanced super-materials

BACKGROUND

In its research and innovation, the client has been using traditional long-established R&D process. It includes a long-chain human formed hypotheses and reductive experiments, slowing the innovation. This is a common problem for such industries as pharmaceuticals, bio-tech and materials.

The client asked T-DAB to apply data science and machine learning as a way to bring efficiencies to their innovation cycle through greater insight and automation of the hypothesis creation.

SOLUTION

Instead of having a human forming a hypothesis, T-DAB developed an ML algorithm that learned relationships between desired properties of the final product and the composition of features and process of obtaining this product. The algorithm looked at all previous experiments conducted by the company and learned which features and processes exactly led to the development of products. With this ML algorithm the company was able to run confirmatory tests instead of previously practised try-and-error experiments. The result from the confirmatory tests feeds back to the algorithm, therefore constantly updating and developing it.





PREDICTION OF SPOILAGE AND FAILURE EVENTS IN THE MANUFACTURING CHAIN FOR A LEADING PACKAGING MANUFACTURER



BACKGROUND

A global manufacturing company was looking to bring predictive analytics to its packaging production line. In particular, they were keen to understand how machine learning could be applied to reduce machine downtime and spoilage from production errors.

SOLUTION

T-DAB initially used one years worth of data to use machine learning to firstly mine the dataset for key influential features from an initial list of 64, and then apply machine learning to predict spoilage and tool failure events within future time periods. Included were machine state, output quality, tool life and operational data.

T-DAB first carried out a data audit, cleaning, and wrangling exercise, followed by feature engineering. Machine learning experimentation was carried out in R.

The end result was that a number of ML algorithms were produced able to predict spoilage and tool failure events to a degree of accuracy significant enough (>80%) to have real world impacts on operational processes in reducing spoilage and downtime.

BENEFITS

Through the presentation of predictions of spoilage event categories through an easy to understand, interactive UI, machine operators were able to intervene earlier in order to reduce the probability of spoilage. Models not only gave early warning of future spoilage levels, but were also used to return to the user more optimal machine settings than the standard settings, in order to minimise spoilage.

