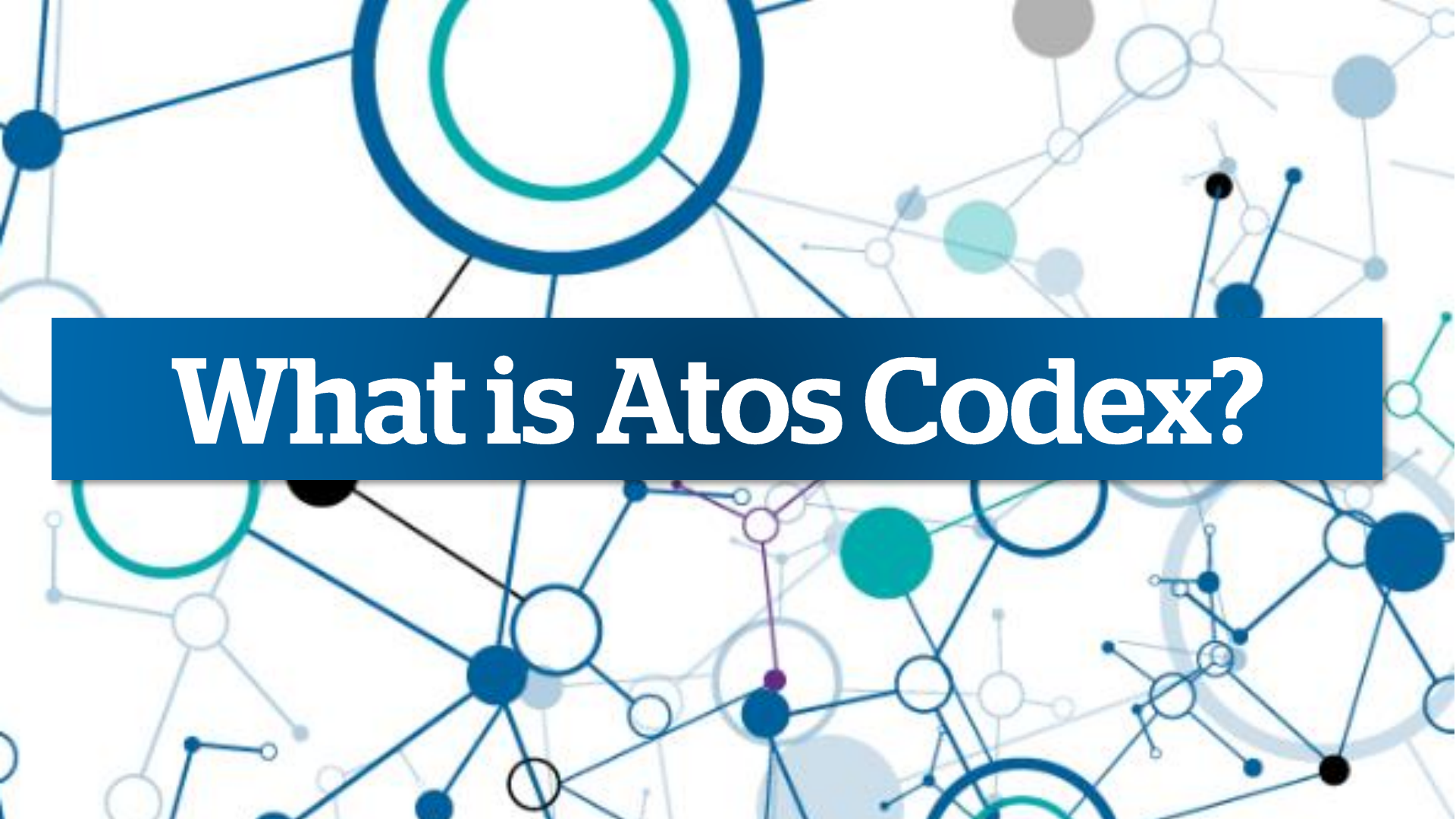
Atos Codex & Data Analytics in Manufacturing

Atos Innovatos Plaza 2017 Event

13-03-2017

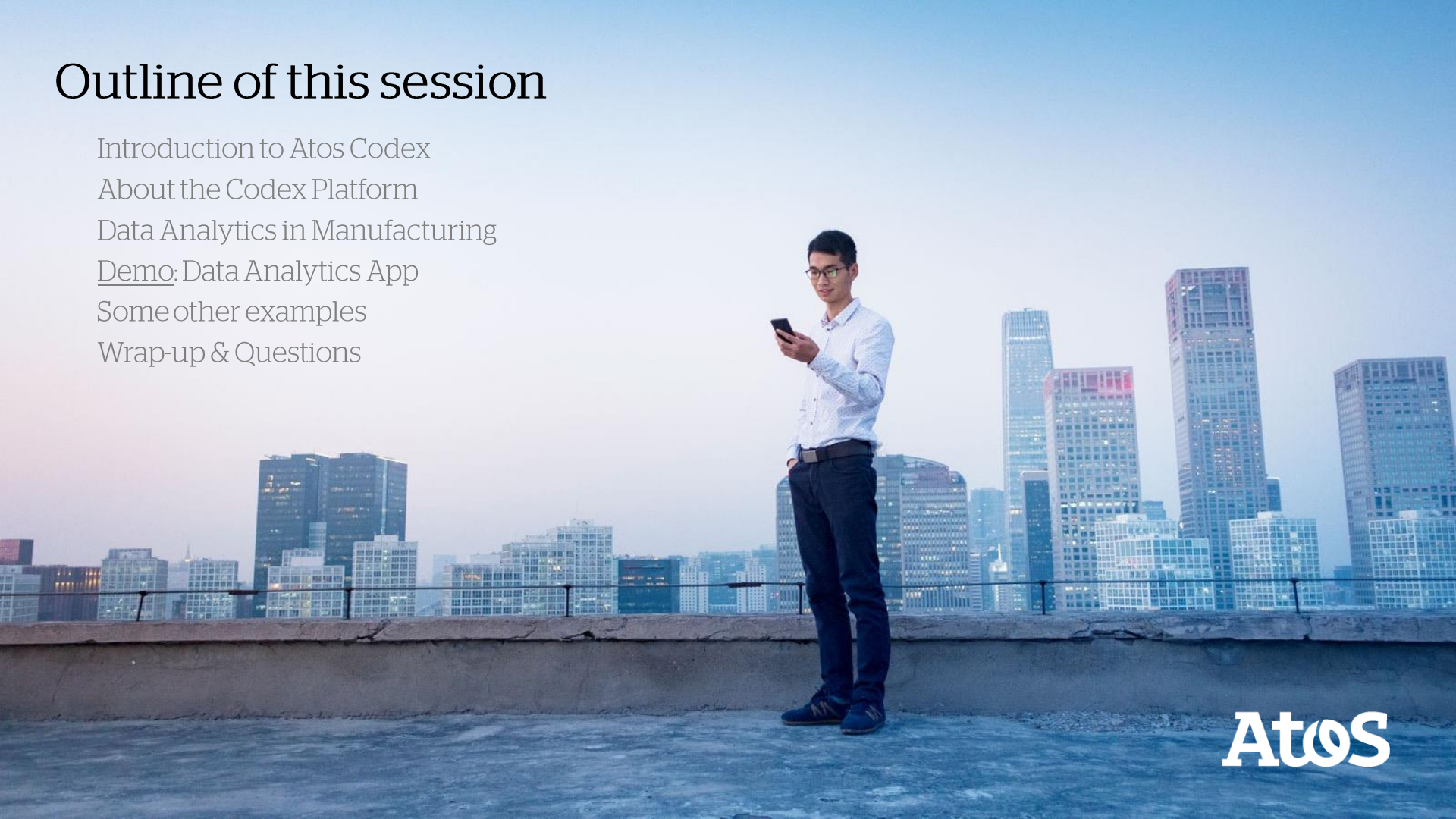
Trusted partner for your **Digital Journey**

Atos Codex


What is Atos Codex?

Outline of this session

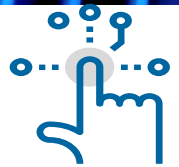
Introduction to Atos Codex
About the Codex Platform
Data Analytics in Manufacturing
Demo: Data Analytics App
Some other examples
Wrap-up & Questions



Introduction to Atos Codex

Atos Codex

Portfolio of Vertical Solutions



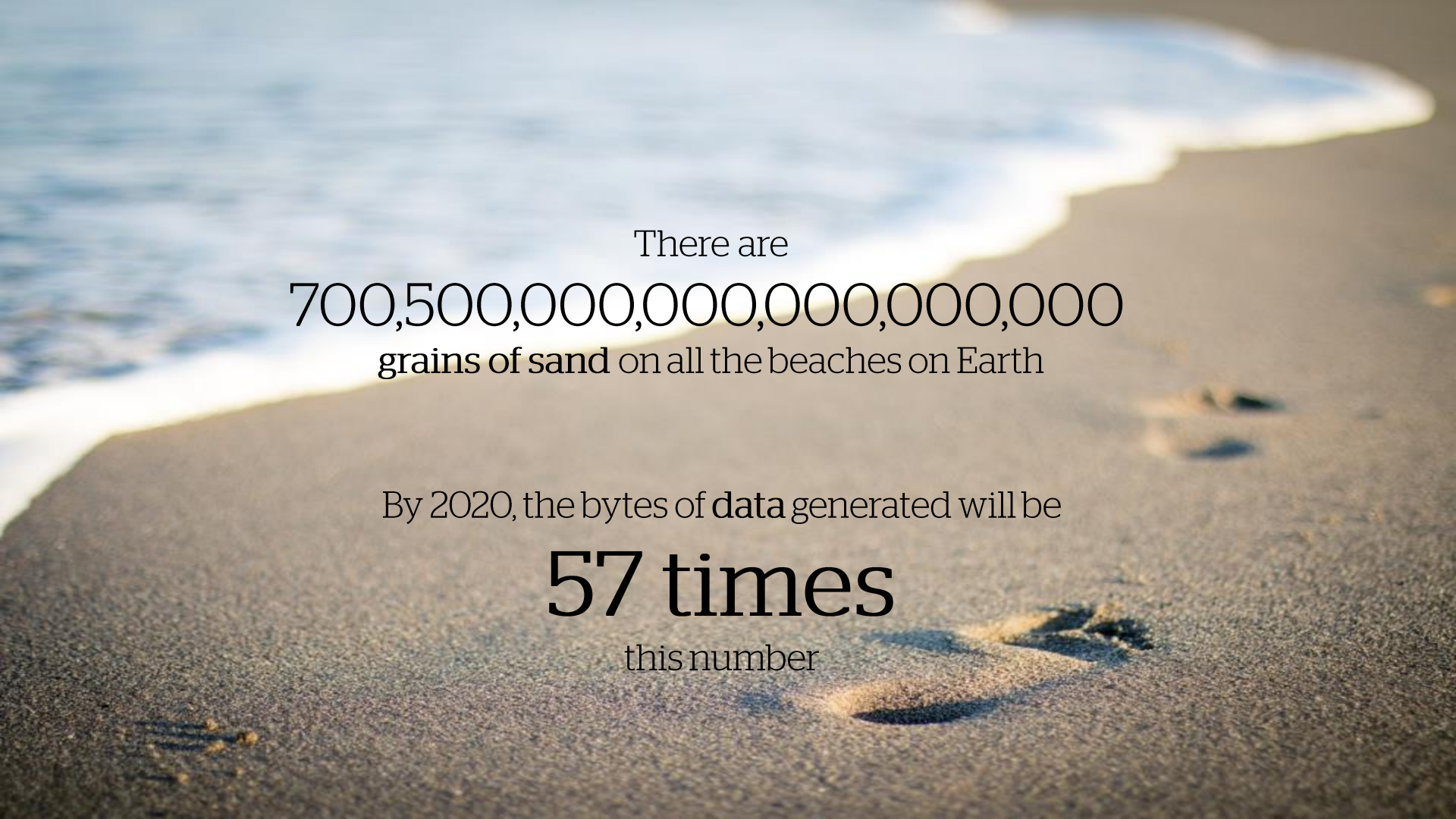
Methodology & Data Science

Customer Design Labs

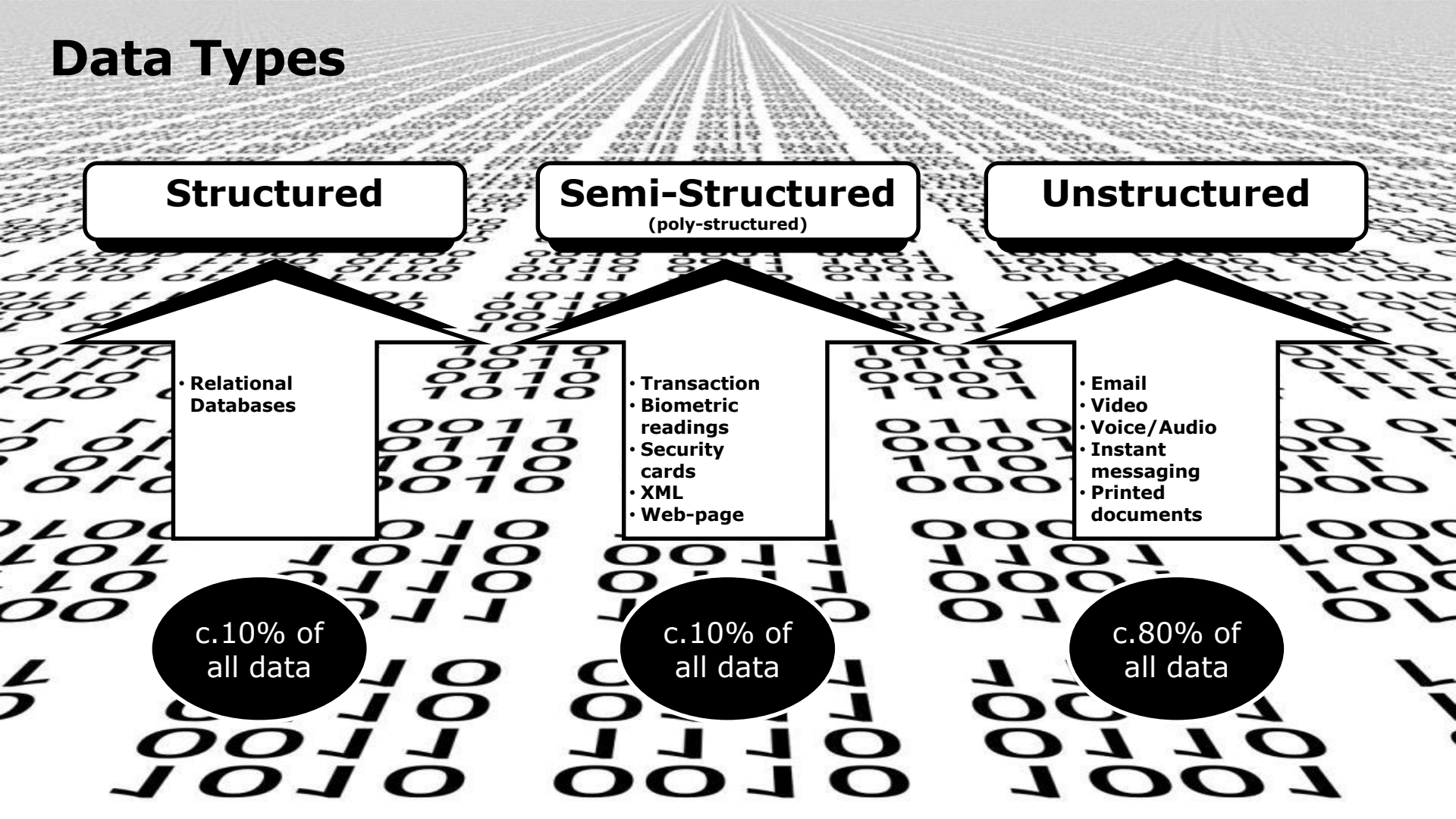
Open Industrial Platform

Leadership in Extreme Computing

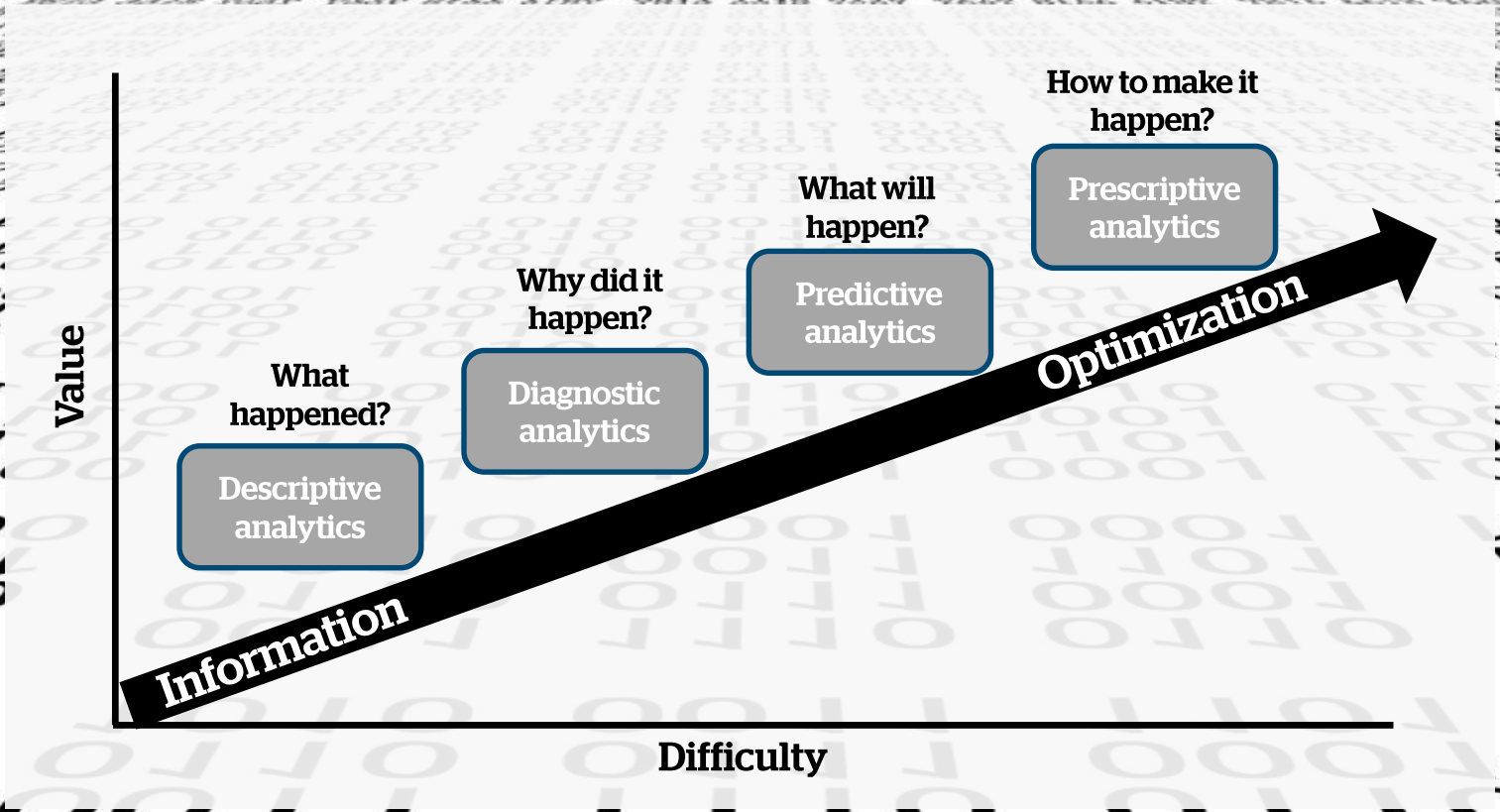
An end-to-end analytics solution


There are
700,500,000,000,000,000,000
grains of sand on all the beaches on Earth
By 2020, the bytes of data generated will be
57 times
this number

Data Types


Structured
Semi-Structured
(poly-structured)
Unstructured
• Relational Databases
• Transaction
• Biometric readings
• Security cards
• XML
• Web-page
• Email
• Video
• Voice/Audio
• Instant messaging
• Printed documents
c.10% of all data
c.10% of all data
c.80% of all data

Big numbers…… but so what?



What can we do for you?

1. Methodology & Data Science

Agile analytics consulting and Proof-of-Value sprints to transform data into profitable insights

2. Customer design labs (FabLabs)

Accelerators, templated solutions and fast incubation services to develop at start-up speed

3. Open industrial analytic platform

As a service, on premise and BPO platforms to boost analytics agility & TCO fully embedded with our IOT solutions-

canopy the atos cloud · Bull atos technologies · worldline e-payment services

5. Industrialize best practices and use cases

Ready to deploy use cases to build best-in-class business solutions

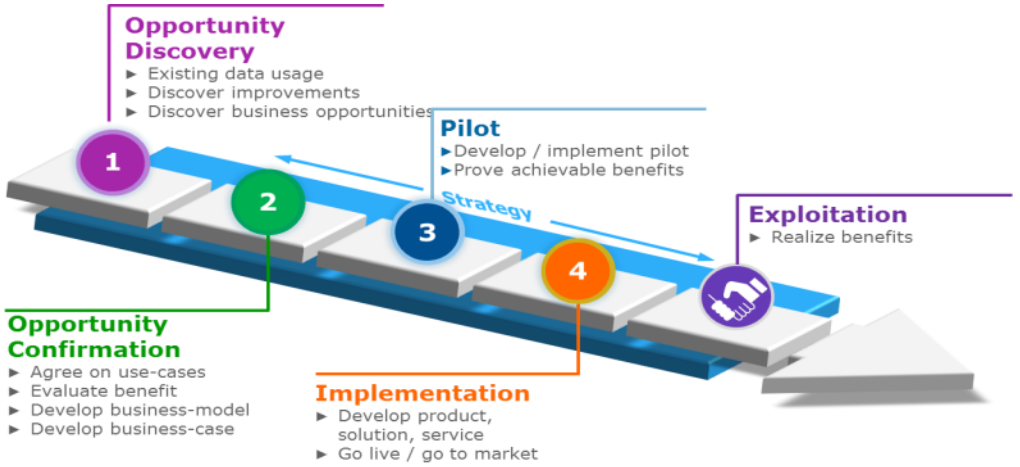
4. High-Performance Data Analytics

Open Exascale-class supercomputing and appliances to provide exceptional outcomes

Methodology & Data Science

The purpose of analytic is to deliver better business outcomes. Our consulting methodologies help you transform data into profitable insights

Based on **agile consulting** and **Proof-of-Value sprints**, we help you identify and select in days or weeks the most profitable opportunities for your business.



Timeline example	Workshop (1-2 day)	Study (4-6 weeks)	Proof-of-Value (2-3 months)	Project (6-12 months)	Exploitation & evolution management (>1 year)

Portfolio of Vertical Solutions

Why not leverage existing successes? Our collection of use cases and scenarios enable you to benefit from unique accelerators

Based on **Atos** and **Worldline** expertise, plus co-innovation with our customers, we help you replicate Industry **Best Practices**.

Manufacturing

Embed analytics into your IoT & Industry 4.0 strategy

Connected living & data services

Predictive maintenance and operational optimization

Retail

Gain in-depth customer insight

Real-time personalized promotions and offering

Omni-channel customer management

Transport

Cope with increasing peak-time congestion

Demand forecasting & customer 360°

Traffic, route and schedule optimization

Public & Health

Improve social and welfare services

Citizen 360° & smart city management

Connected health & epidemiology

Financial Services

Enable better service to customers & mitigate risks

Insight driven customer interactions

Transactions optimization & cash management

Telco

Disrupt the entire telecom value chain

Customer loyalty & retention

Mobile advertising and location based offerings

Medias

Understand and connect with audiences

Audience sentiment analysis

Customer 360°, loyalty & personalized recommendations

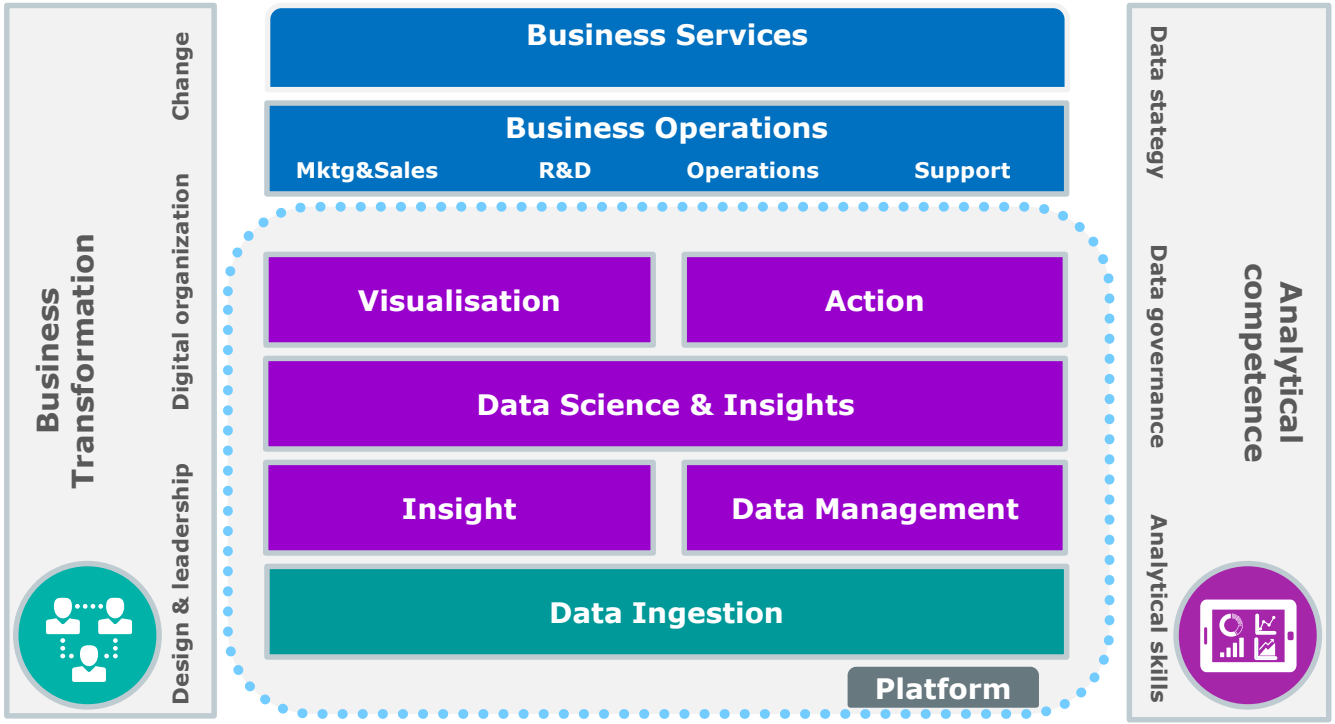
Energy & Utilities

Shape usage with targeted interaction

Customer loyalty by personalization

Outage prediction

Complete service: Analytics transformation



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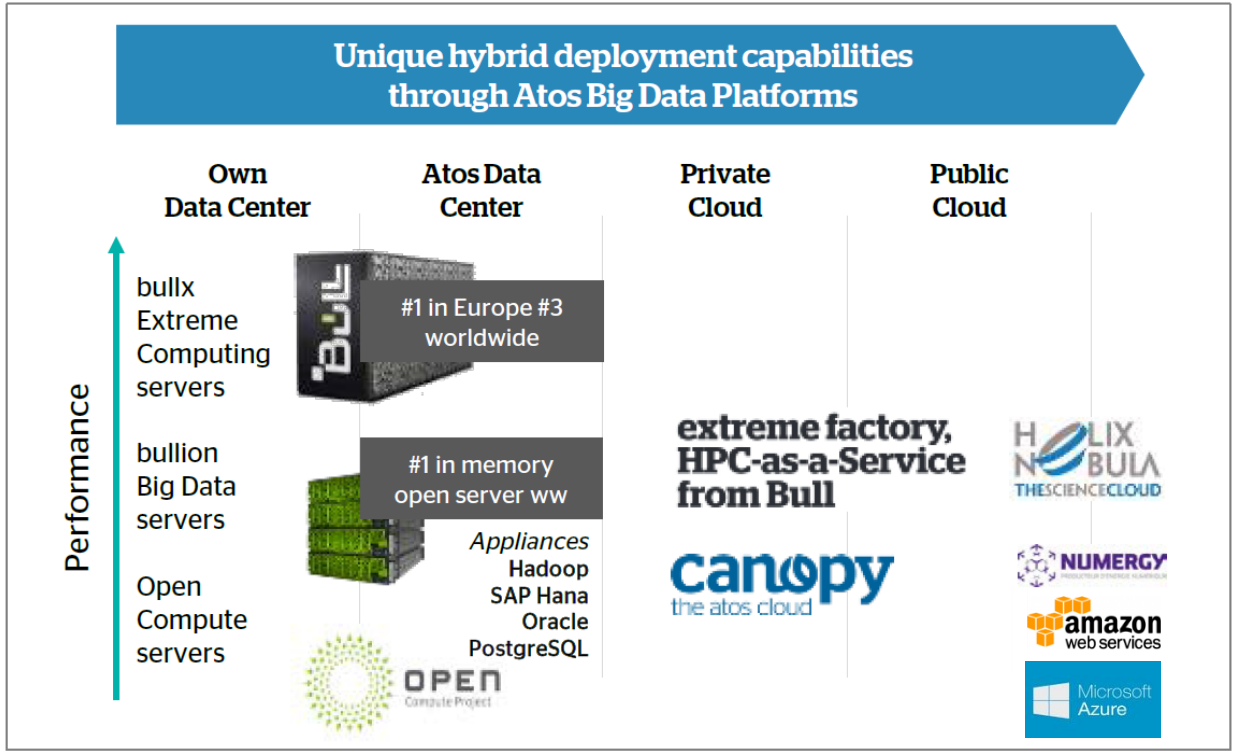
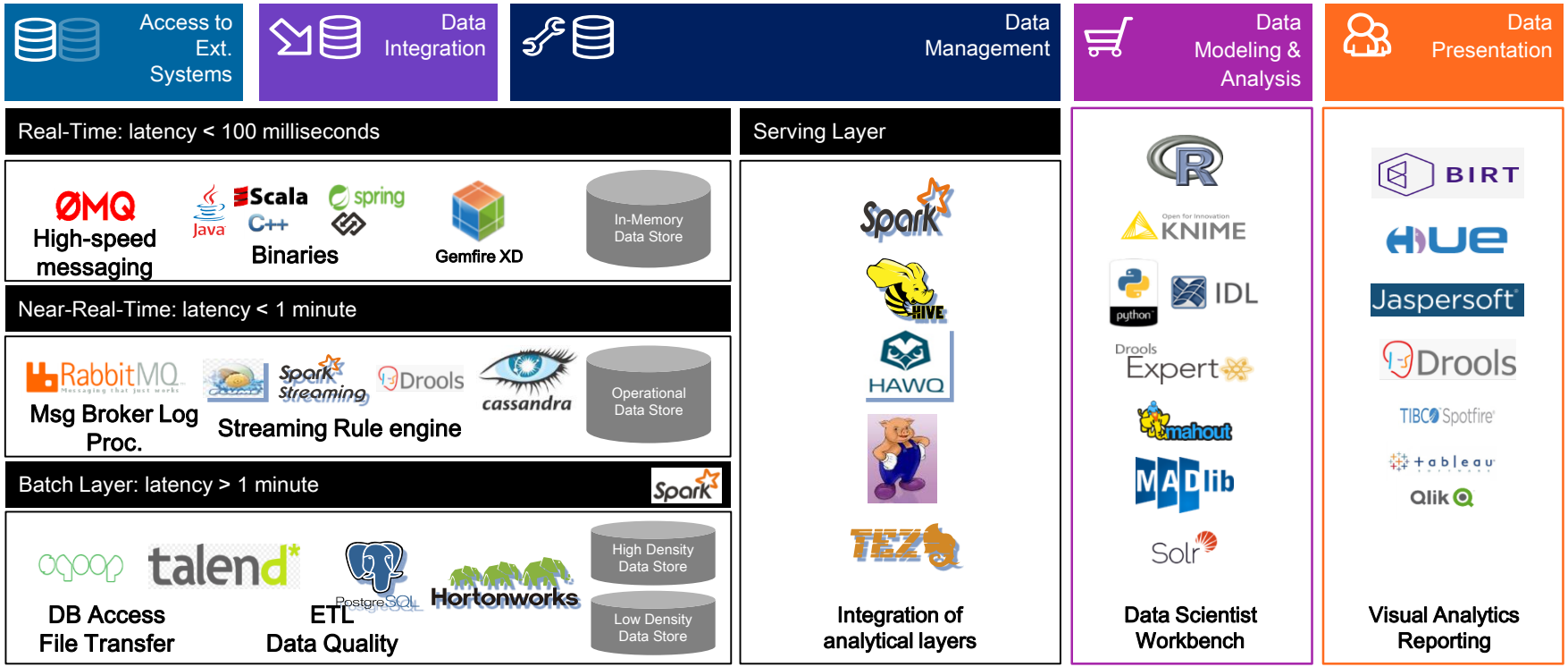
About the Codex platform

Atos Codex Platforms



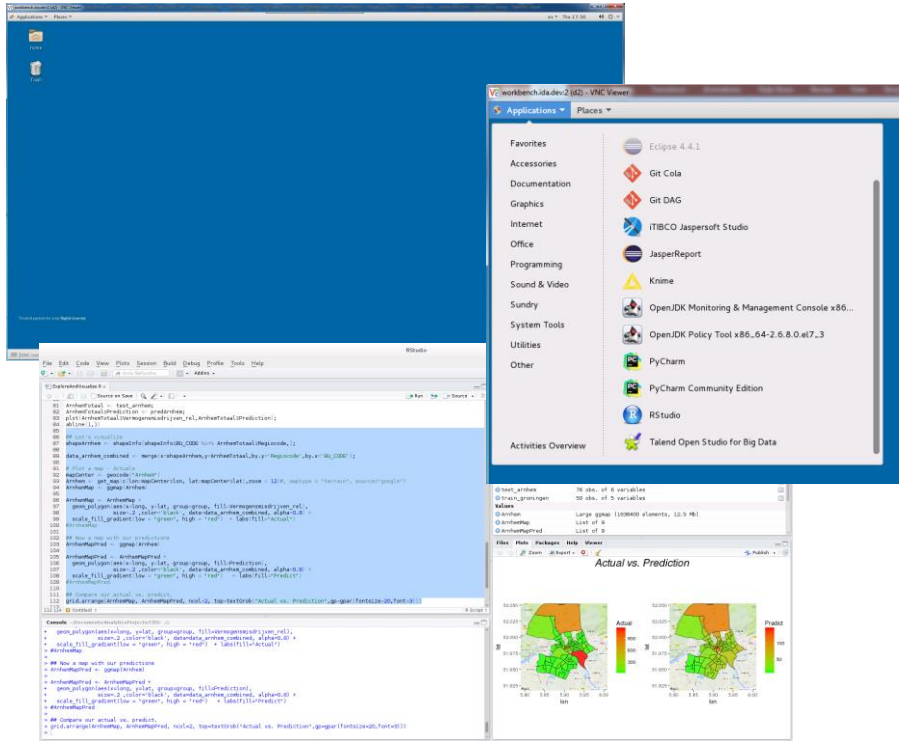
Atos Codex Framework Architecture



Atos Codex - Data Scientist Workbench

- **This is the place for the Data Scientist.**
  - Explore data, develop new algorithms
- Also used to interface with the runtime environment

- **Unique selling points:**
  - Very attractive look and feel, excellent presentation possibilities
  - Out-of-the-box easy to use (no additional configurations needed), supporting the complete workflow for a Data Scientist
  - Supports the most frequently used analytic tools in the market (e.g. R, Python, KNIME, Scala)
  - Supports the most frequently used data exploration and data mining set of tools
  - Rich set of (additional) tools to make life of the Data Scientist as convenient as possible



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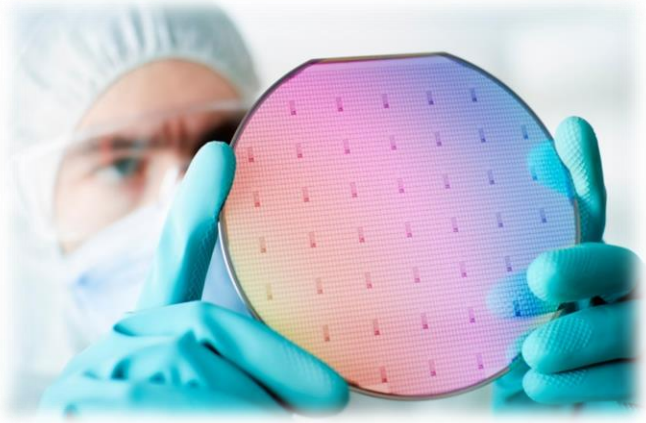
Case: Data Analytics in Manufacturing

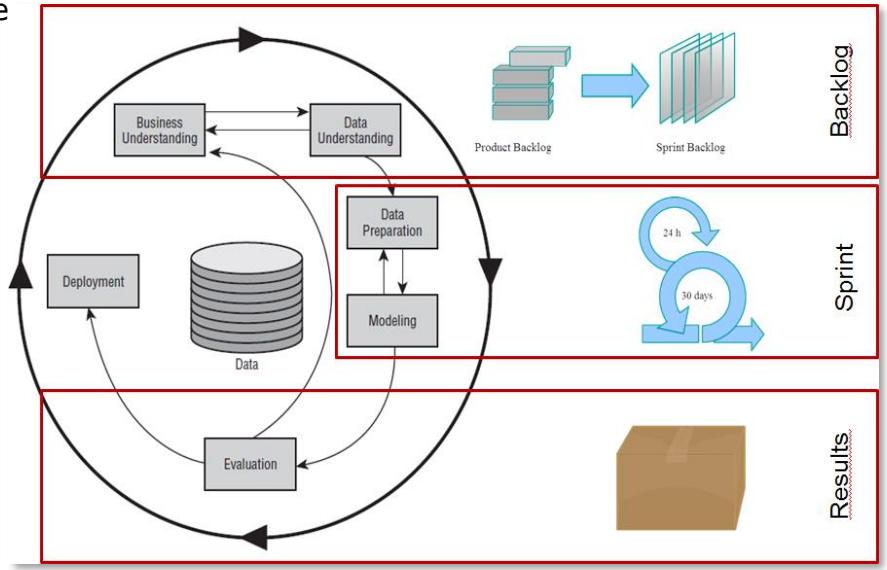
Brief introduction

- **For "a major semiconductor manufacturer" we executed an advanced analytics project**
- The end product was a **Data Analytics App** that gave users an easy way to apply a series of algorithms on their wafer production data and quickly get insights out of it
- **Goals of this project were:**
  - Reduction of wafer scrap and improve yield
  - Decrease the troubleshooting time
- Inspirited by the real project, **we created a demo case**, which is based on a public dataset and does not contain any specific intellectual property or customer data
- Source of the demo dataset:
  - SECOM Dataset (https://archive.ics.uci.edu/ml/datasets/SECOM)



The CRISP-DM Approach

- **Understanding the business**
  - To clarify business needs and the values that data science can bring to the business.
- **Understanding the data**
  - Finding insights on available set of data and its variables.
- **Data preparation**
  - Preparing the data for modeling.
- **Modeling**
  - Turning raw data into the insights being asked in the business question.
- **Evaluation**
  - Evaluating the results with the domain experts.
- **Deployment**
  - Deploying a working solution for the client

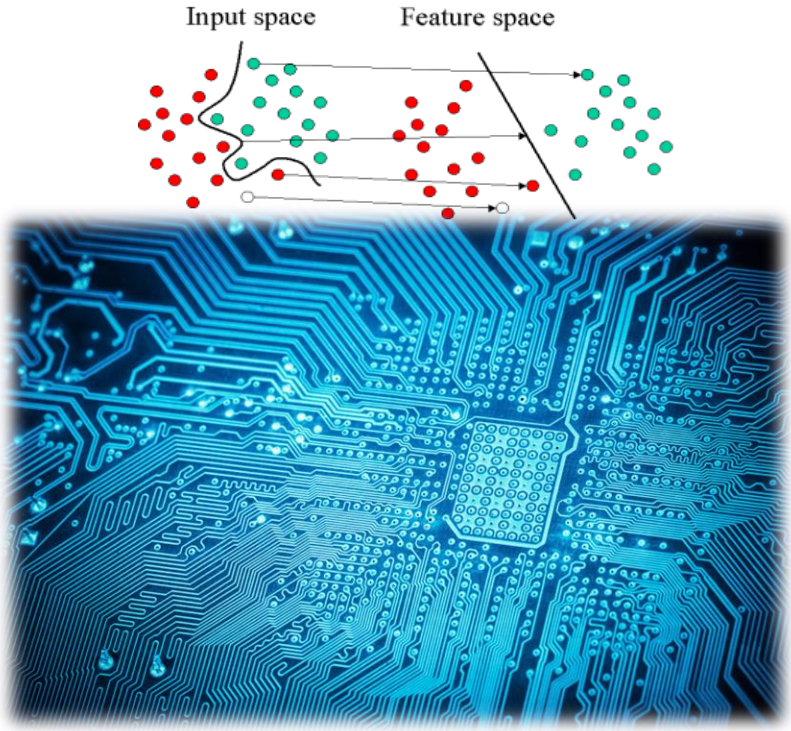


Background and Business Question

- A complex modern semi-conductor manufacturing process is normally under consistent surveillance via the monitoring of **signals/variables collected from sensors** and or **process measurement points**.
- The sensors monitor the process and production lines which sometimes lead to failure.
- Therefore, the question is how to ***predict the failures in early stages in production line*** using sensory information?

Modeling

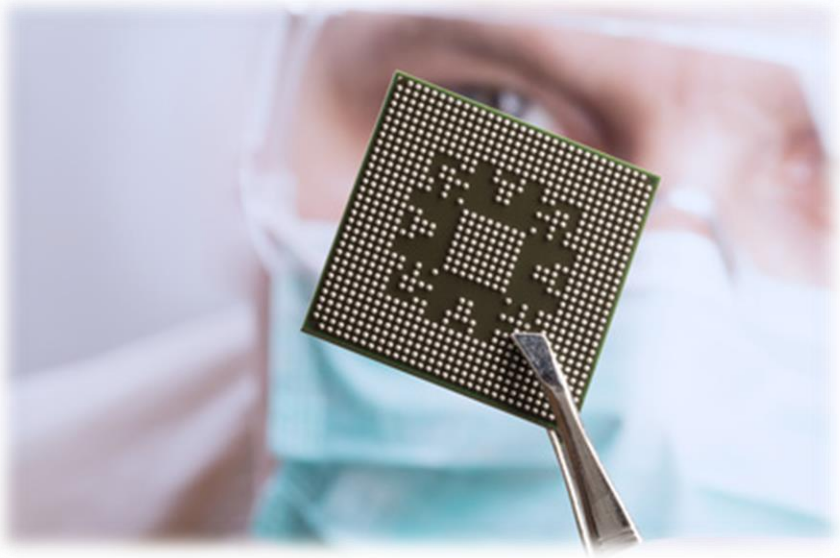
- In modeling phase the selected variables (in data preparation phase) are chosen. They are broken into train set and test set.
- Splitting the data into a train and test set imposes some challenges because.
  - the number of data samples representing ‘failures’ are much lesser than ‘normal’.
  - Therefore, the SMOTE approach is used to artificially augment the number of ‘failures’.
- Modelling is done using **SVM** (Support Vector Machines) to classify ‘failures’ from ‘normal’ operation.



The results

- In the best model - failures are predicted with 74,5% accuracy!

```
Confusion Matrix and Statistics

          Reference
Prediction  0  1
         0 74 25
         1 26 75

               Accuracy : 0.745
                 95% CI : (0.6787, 0.8039)
    No Information Rate : 0.5
    P-Value [Acc > NIR] : 1.25e-12

                  Kappa : 0.49
 Mcnemar's Test P-Value : 1

            Sensitivity : 0.7400
            Specificity : 0.7500
         Pos Pred Value : 0.7475
         Neg Pred Value : 0.7426
             Prevalence : 0.5000
         Detection Rate : 0.3700
   Detection Prevalence : 0.4950
      Balanced Accuracy : 0.7450

       'Positive' Class : 0
```



Demo: Data Analytics App

Data Analytics App Demo

- **Try it yourself! Download the source-code from:**
  https://github.com/mvdbosch/AtosInnovatos2017

Other examples of Data Analytics in Manufacturing

Less failures

Our business impact:

Increased production capacity by improving operational efficiency

We helped large oil and gas operator to improve their operational efficiency and save repair and replacement costs by providing a predictive maintenance solution

What we did for a Global Oilfield Service company

The Atos team created a **predictive maintenance analytical solution** to enable the organization to **improve equipment reliability** and **reduce ongoing operational maintenance and replacement costs** for expensive equipment.

Data was gathered from **120 sensors to analyse the performance of the drilling bits in real-tim**e to observe anomalies and predict likely failures. **The same techniques are now being applied to flow control valves.**

Improving Uptime for an Global Oilfield Service company

Project Background

Challenge & Trigger:

- Oil prices under pressure lead to margin decrease
- Improvement of "Mean time between Failure(MTBF) and Non-productive Time (NPT) = direct impact on bottom-line

How can Advanced Analytics help?

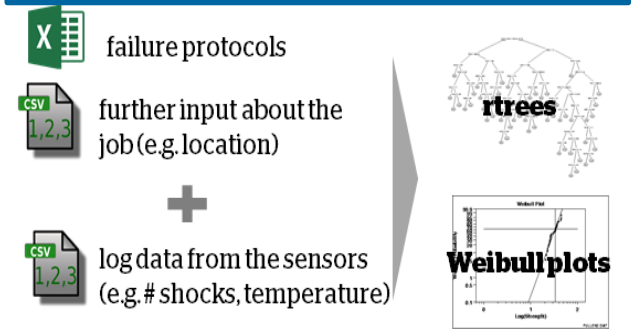
Our Approach

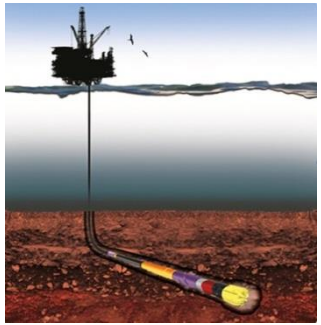
Agile Team-set (Data Scientist, Industry Expert and SI Achitect) + Cloud Based Analytics Platform

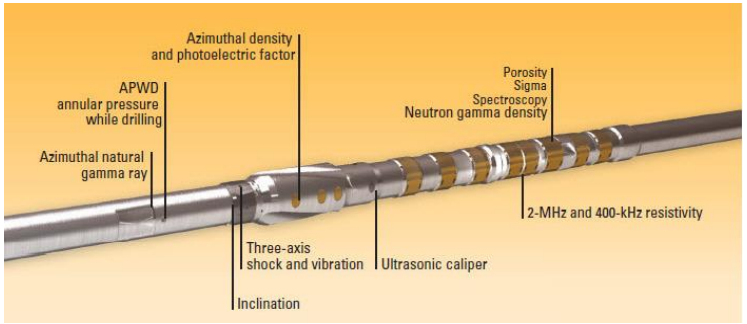
2 Project Phases :

1) 2 month: Understand major environmental conditions and operational parameters that lead to a failure (using historic data and descriptive models)
2) 3 month: Explore data driven analytics approach for reliability improvement (using Analytics and predictive models)

Used Data Sources and Models







Results

- Transparency of Root causes of failures
- New maintenance policies defined
- Mean time between failure (MBTF) significantly improved


Increased Yield
Atos



Our business impact:

Increased yield & production

We delivered actionable insights to decrease outlying Modulus-Tenacity and yarn breaks.

What we have realized for global science-based company

The Atos team delivered an **analytical proof-of-value** to enable our customer to enhance its production eventually leading to increased **production yields and product quality.**

Data was gathered from **the manufacturing process and quality measurements** to observe anomalies and predict quality issues.

Wrap-up and questions

More information

- **BK spaces:**
  - Atos Codex
  - Big Data Analytics BTN
  - Industrial Data Analytics (IDA)
- **White Papers:**
  - Analytical driven organization
  - Big data analytics, privacy & data protection
- **Typical training:**
  - Atos Codex Introduction
  - Certified Big data scientist
  - Solutions: Hortonworks
  - Data science:
    - Introduction to R and CRAN libraries, SWIRL
    - Coursera courses
- **Contact us!**

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Thank you

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