



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA



**2025, May 26<sup>th</sup>**

Data Science and the  
World of Work: How  
Statistical Models Are  
Transforming Business







# FEDERICO ZANGHI

**Expert Data Scientist**

*BIG DATA & ANALYTICS*

- Master degree in Statistics @UniPd
- Since 2022 @beanTech
- Author of CRAN package ([DIMORA](#))
- E-mail: [federico.zanghi@beantech.it](mailto:federico.zanghi@beantech.it)
- LinkedIn: [Federico Zanghi](#)

# OUR NUMBERS

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**2001**

FOUNDATION

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**2**

LOCATIONS

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**240**

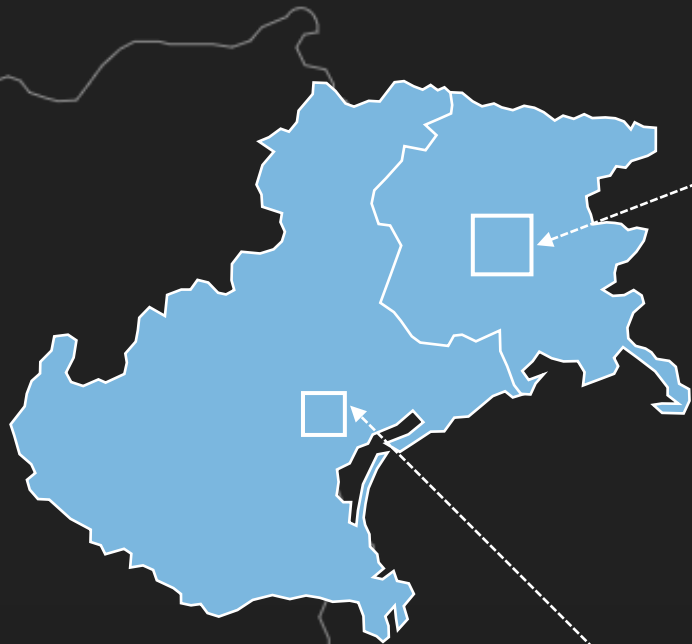
STAFF

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**34**

AVERAGE AGE

# OUR BRANCHES



## UDINE

200 employees  
3000 square meters



## MESTRE

40 employees  
500 square meters




# BUSINESS AREAS

## ARTIFICIAL INTELLIGENCE

An abstract visualization of a neural network with glowing nodes and connecting lines, set against a dark blue background.

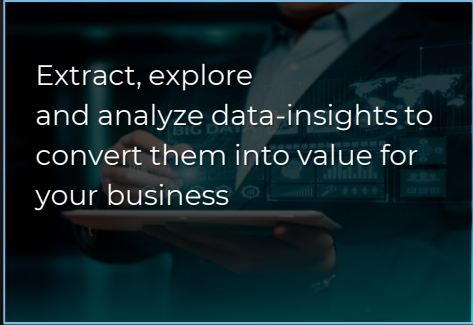
Elevate your business by integrating Artificial Intelligence solutions.

## BUSINESS PROCESS

A conceptual image showing a person in a business suit interacting with a large, complex flowchart or process diagram, overlaid on a cityscape.


Improve efficiency, collaboration and productivity in your organization

## BIG DATA & ANALYTICS

A person in a business suit holding a tablet, with a background of data visualizations and charts.


Extract, explore and analyze data-insights to convert them into value for your business

## INFRASTRUCTURE & SERVICES

A perspective view of a data center aisle with rows of server racks, illuminated by blue light.


Evolve your IT infrastructure with innovative solutions and cloud ready

## DIGITAL INDUSTRY

A conceptual image showing a person in a business suit interacting with a large, complex digital interface or data visualization, overlaid on a cityscape.

Integrate and connect the assets of your company in a smart way

## MANUFACTURING OPERATIONS

A person in a business suit holding a yellow hard hat, with a background of industrial equipment and data visualizations.

Manage, plan, supervise and controls the entire process corporate production

# BIG DATA & ANALYTICS

Advanced Data Analytics solutions and consulting activities to address diverse business needs and transform data into actionable information from any device, available on prem and in the cloud.

**BIG DATA PLATFORM**

**MANUFACTURING ANALYTICS**

**ADVANCED  
ANALYTICS**

**BUSINESS INTELLIGENCE**

**DATA SCIENCE**

# ACADEMY KNOWNOW

The **Academy** created to organize and carry out specialized training courses, aimed at developing the digital skills necessary to respond to the growing demand for IT figures.

01

INTERNAL TRAINING

02

CUSTOMER & PROSPECT TRAINING

03

TALENT RESEARCH TRAINING

**KnowNow**  
Competence Development Center



**Microsoft**  
Ambizione Italia



# OUTLINE

- > **DATA SCIENCE IN BUSINESS CONSULTING**
- > **CASE HISTORY: DEMAND PLANNING & ANOMALY DETECTION**
- > **CASE HISTORY: REAL TIME ANOMALY DETECTION**



# OUTLINE



**DATA SCIENCE IN BUSINESS CONSULTING**



**CASE HISTORY: DEMAND PLANNING & ANOMALY DETECTION**



**CASE HISTORY: REAL TIME ANOMALY DETECTION**



# Our job, **in synthesis**



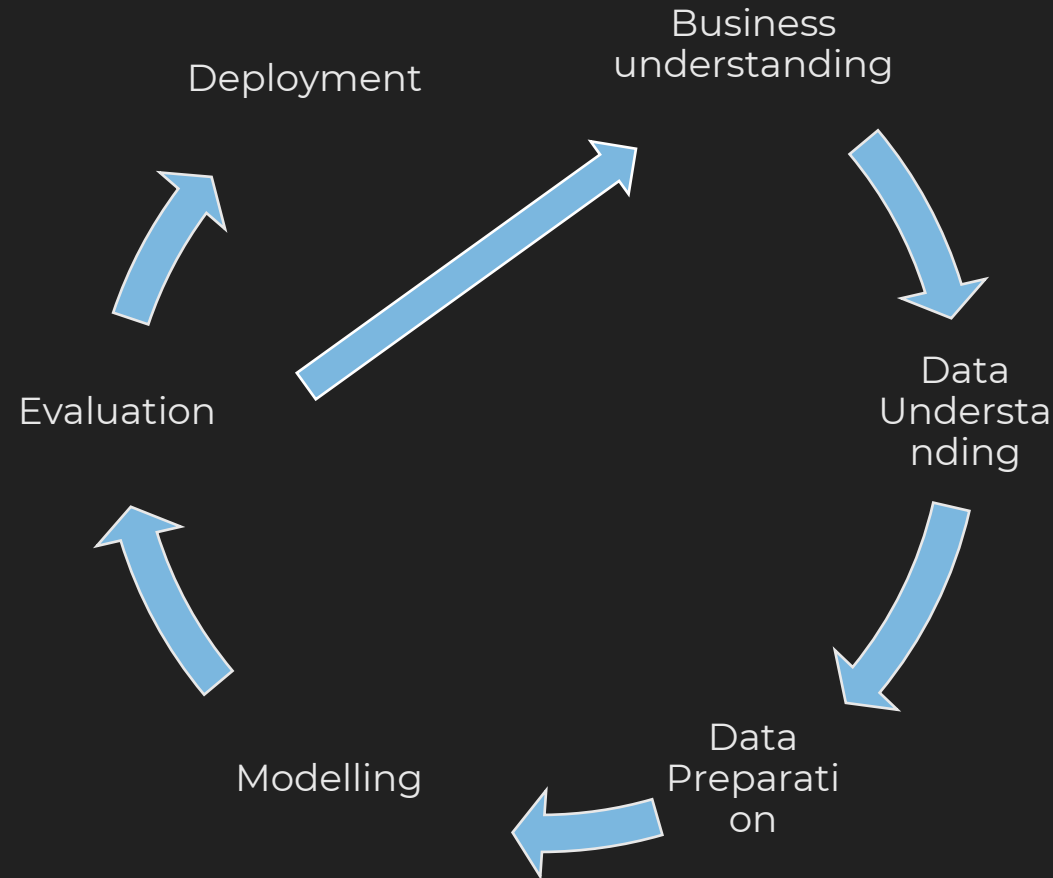


# Our job, **in synthesis**





# Profession **BIG DATA & ANALYTICS**





# Profession

## BIG DATA & ANALYTICS

### **B u s i n e s s   U n d e r s t a n d i n g**

It's the first step in any data science process.

Deeply understanding the **business context, objectives, and success metrics.**

It's not just about data it's about translating **business problems into analytical questions.**

# Profession

## BIG DATA & ANALYTICS

### Business Understanding

It's the first step in any data science process.

Deeply understanding the **business context, objectives, and success metrics.**

It's not just about data it's about translating **business problems into analytical questions.**

### Data Understanding

This phase focuses on **exploring, profiling, and assessing the quality of data**

It's a crucial step before any modeling or insight generation.

It's where we **turn raw data into meaningful knowledge.**



# Profession

## BIG DATA & ANALYTICS

### D a t a   P r e p a r a t i o n

**Shaping raw data into analysis-ready datasets**

This phase involves **cleaning, transforming, integrating, and formatting data** to ensure it's suitable for modeling and insight generation.

It's where **data becomes usable and trustworthy.**

# Profession

## BIG DATA & ANALYTICS

### Data Preparation

**Shaping raw data into analysis-ready datasets**

This phase involves **cleaning, transforming, integrating, and formatting data** to ensure it's suitable for modeling and insight generation.

It's where **data becomes usable and trustworthy.**

### Data Modelling

**Statistics** is about **extracting value from data** through analysis, modeling, and communication supporting smarter decisions across domains. It blends **mathematics, programming, and domain knowledge** and **statistics** is the backbone.

# Profession

## BIG DATA & ANALYTICS

### Data Preparation

**Shaping raw data into analysis-ready datasets**

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### Data Modelling

**Statistics** is about **extracting value from data** through analysis, modeling, and communication supporting smarter decisions across domains. It blends **mathematics, programming, and domain knowledge** and **statistics** is the backbone.

It's not just a toolbox it's a way of thinking **critically and rigorously** about information.



# Profession

## BIG DATA & ANALYTICS

### E v a l u a t i o n

This phase focuses on **assessing whether models meet business goals**, ensuring performance is not only good, but also **reliable, interpretable, and aligned with context**.

It's where **critical judgment and statistical depth** are vital.

# Profession

## BIG DATA & ANALYTICS

### E v a l u a t i o n

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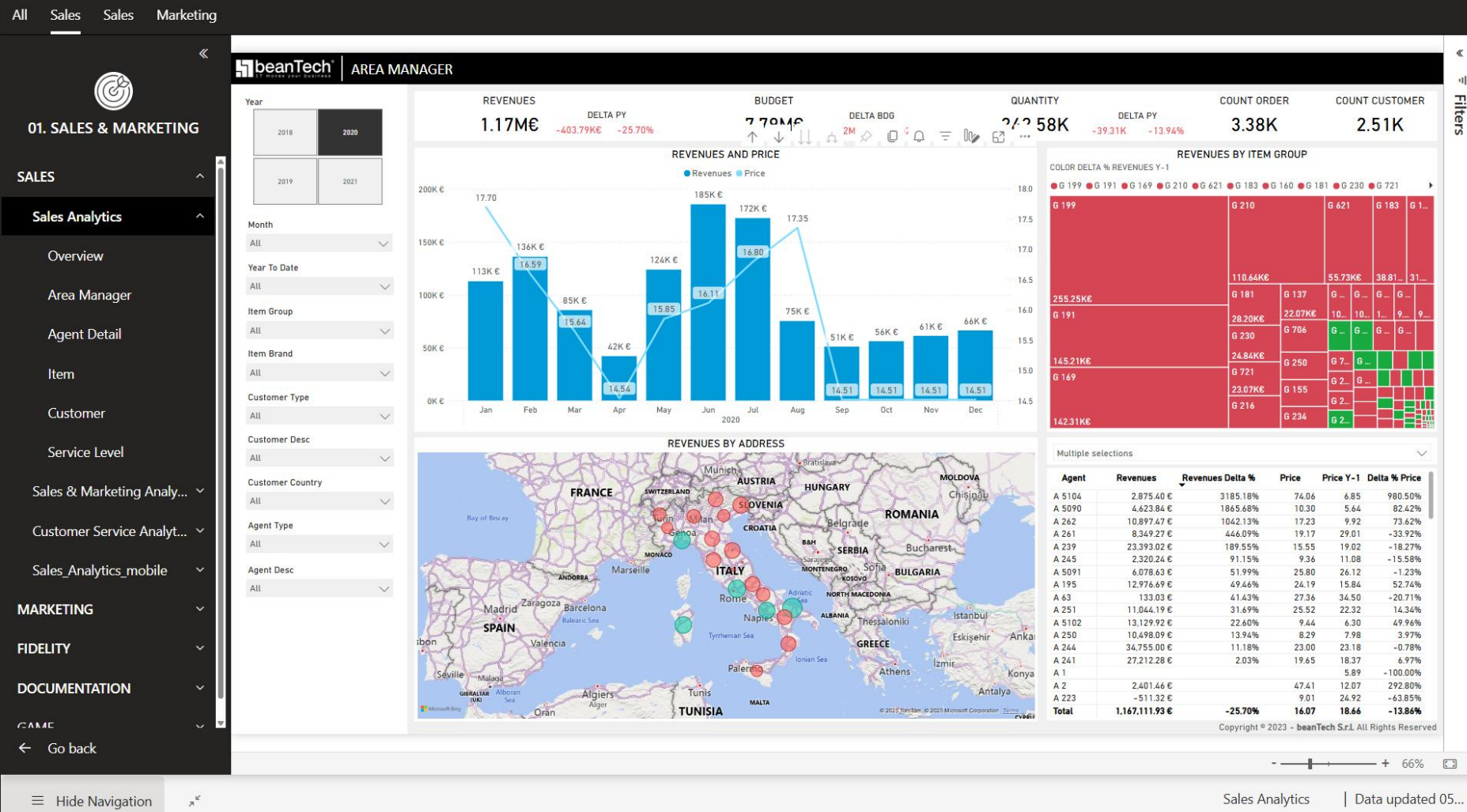
### D e p l o y m e n t

Deployment means integrating models into business processes and systems **making data science operational**.

But it's not just about putting code into production: it's about **ensuring the model behaves as expected over time**.

# Profession

## BIG DATA & ANALYTICS



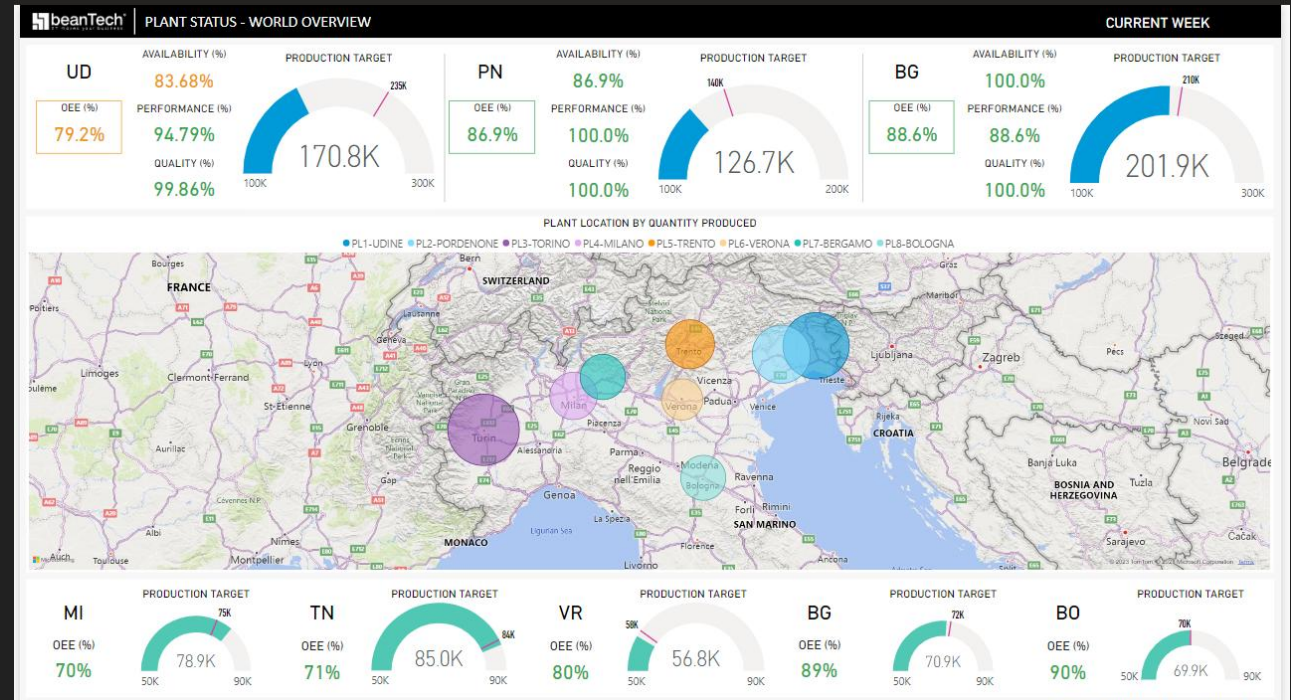


# What is Data Visualization

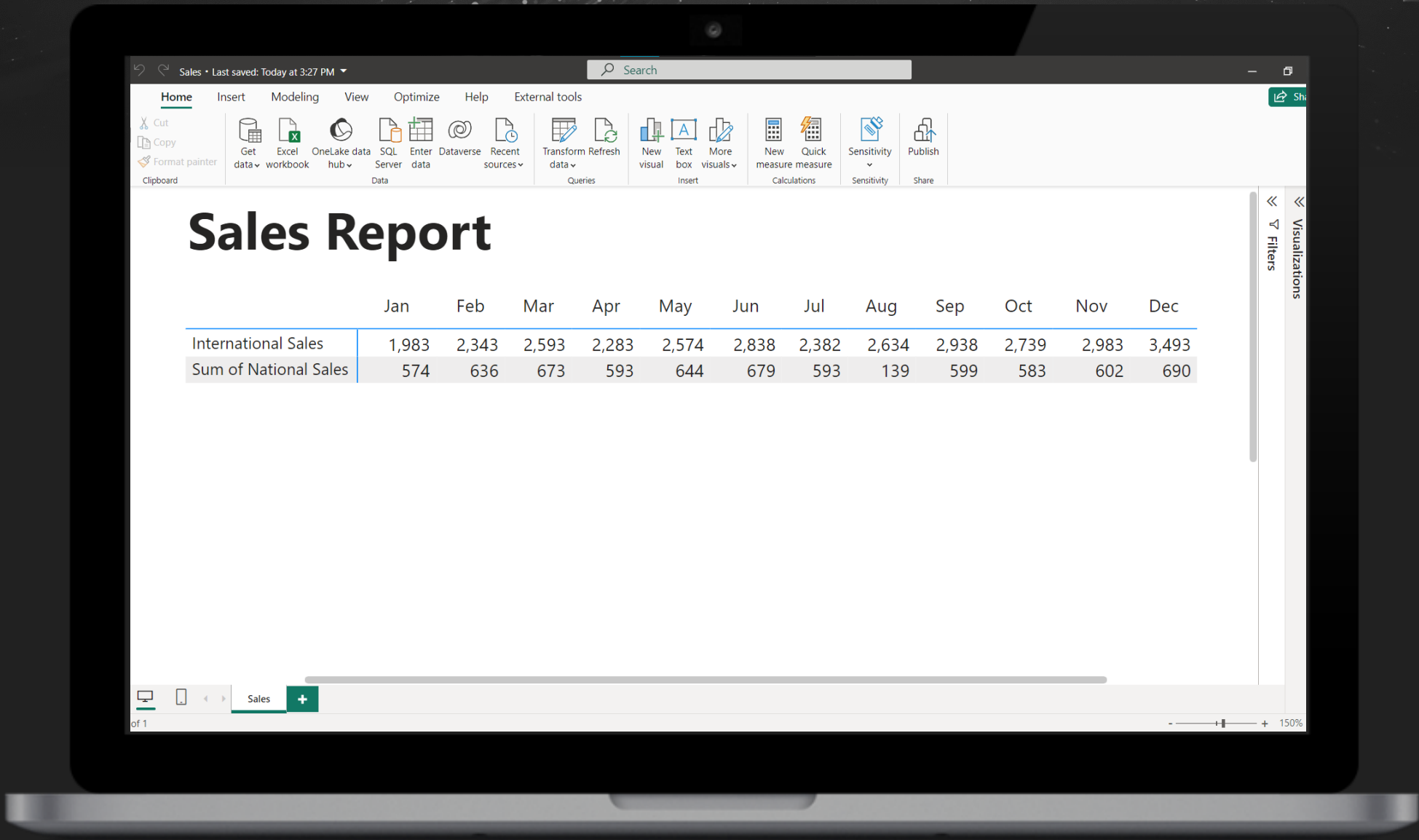
Data Visualization refers to the **graphical representation** of **information** and **data**.

**Humans respond to visuals information 60 000 times faster** than text.

In fact, visual data accounts for 90 percent of the information transmitted to the brain

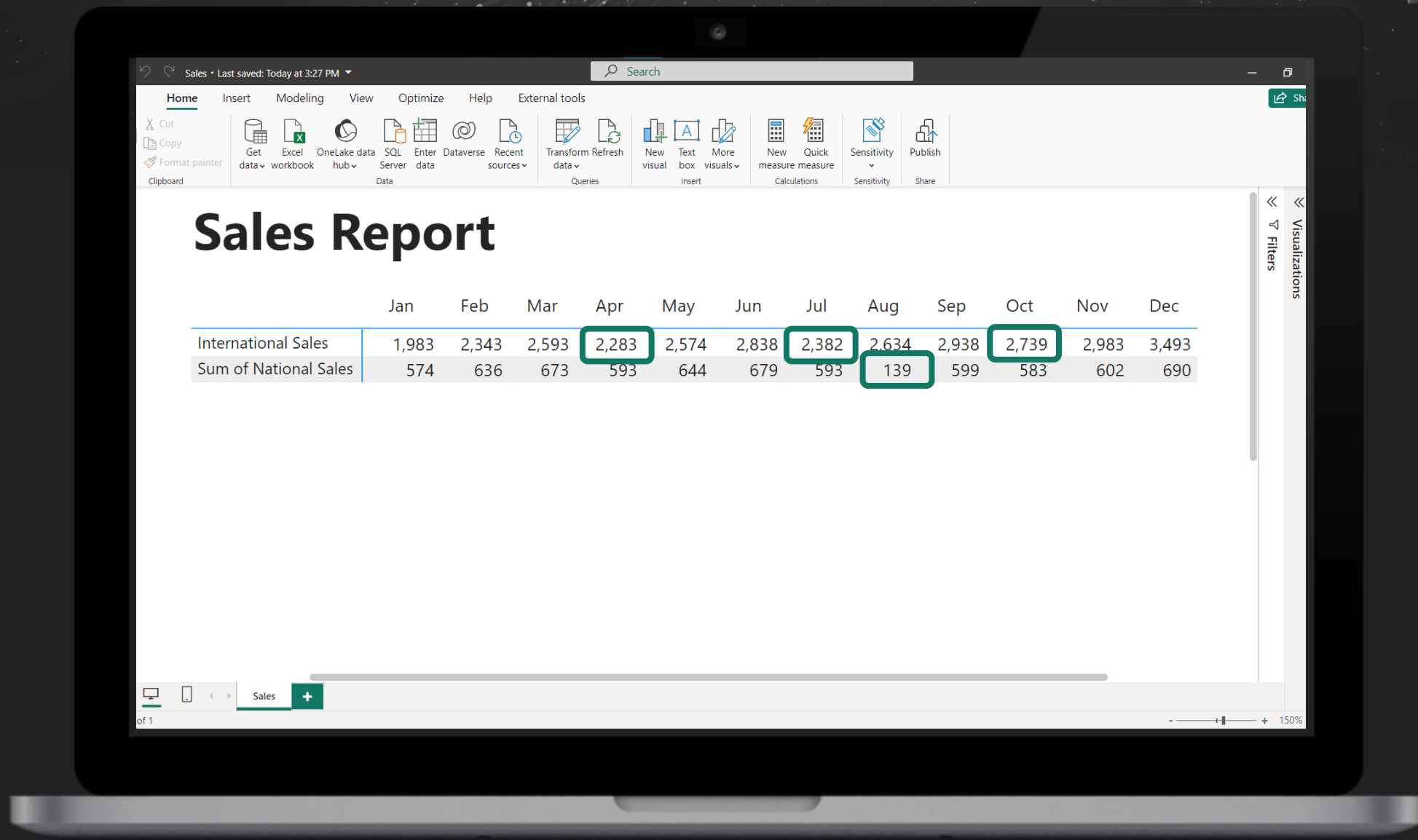


**The creation of good graphs and dashboards, however, is not always straightforward;** one must follow guidelines to maximize the effectiveness of information comprehension.



# Sales Report

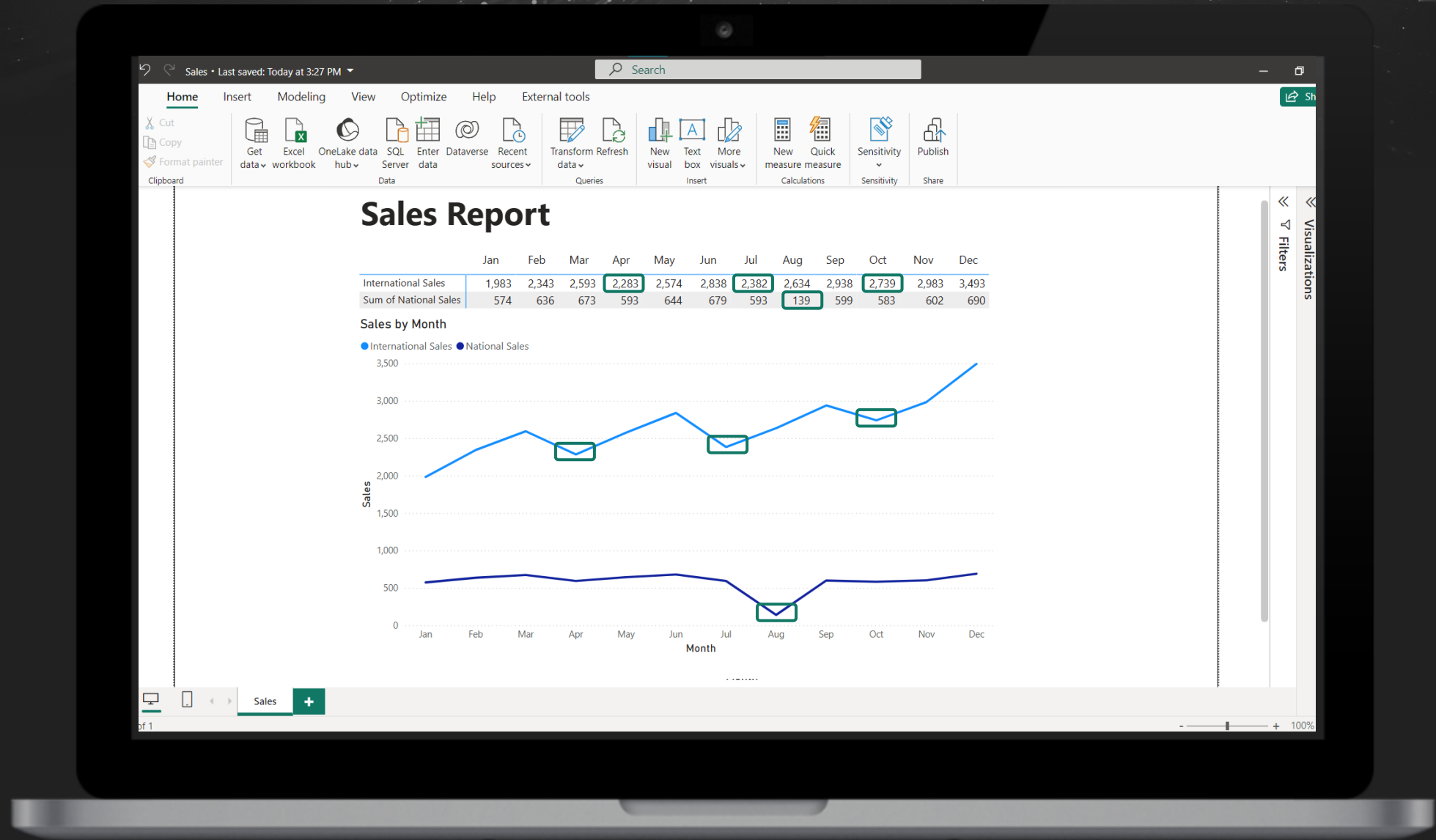
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
International Sales	1,983	2,343	2,593	2,283	2,574	2,838	2,382	2,634	2,938	2,739	2,983	3,493
Sum of National Sales	574	636	673	593	644	679	593	139	599	583	602	690



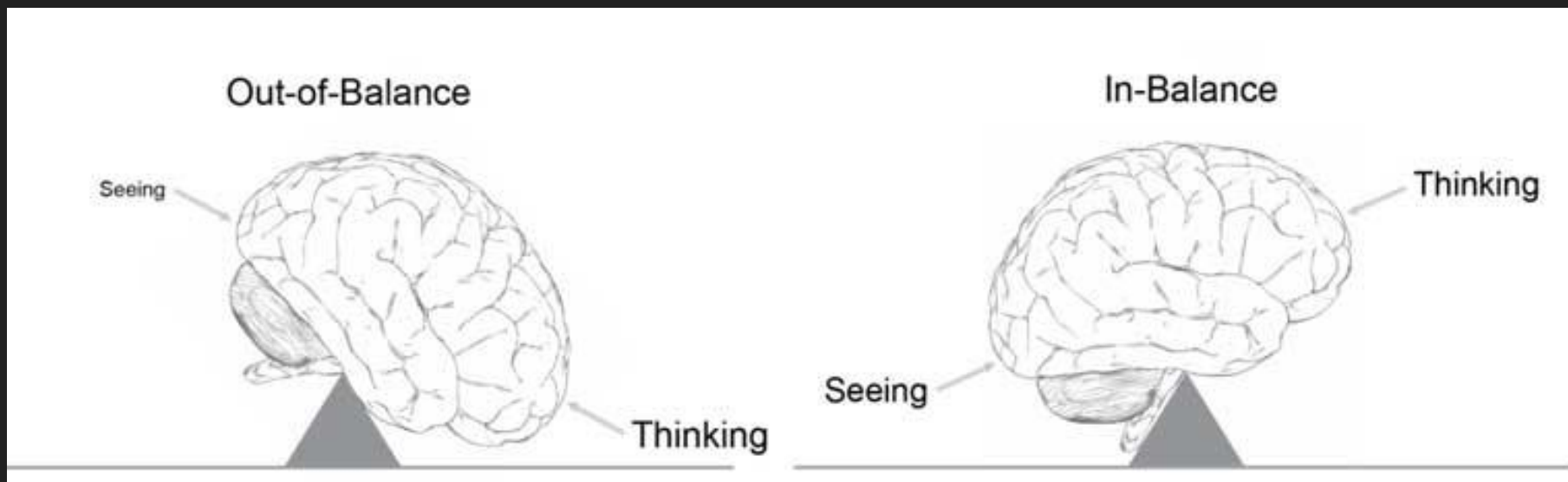
# Sales Report

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
International Sales	1,983	2,343	2,593	2,283	2,574	2,838	2,382	2,634	2,938	2,739	2,983	3,493
Sum of National Sales	574	636	673	593	644	679	593	139	599	583	602	690





# Data Visualization goal



Data visualization shifts the balance toward greater use of visual perception, taking advantage of our powerful eyes whenever possible.

# Profession

## BIG DATA & ANALYTICS

Project Manager  
TECHNICAL DELIVERY MANAGER  
Database Administrators  
Machine Vision Expert  
Software Solution Architect  
GRAPHIC DESIGNER  
Software Engineer

01

### BUSINESS ANALYST

Analyzes, investigates and transformd business needs into technological documentation.

02

### (DATA) SOLUTION ARCHITECT

Grants general compliance between the BI architecture and the development best practices.

03

### DATA ENGINEER & DATA ANALYST

Responsible for development of extraction, transformation and representation of data.

04

### DATA SCIENTIST

Develops data modeling and statistical interpretation using different technologies.

05

### SECURITY ENGINEER

Follows the definition and the management for security infrastructures.



# Today's case history

- > DATA SCIENCE IN BUSINESS CONSULTING
- > **CASE HISTORY: DEMAND PLANNING & ANOMALY DETECTION**
- > CASE HISTORY: REAL TIME ANOMALY DETECTION



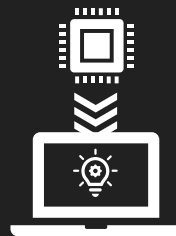
# DEMAND PLANNING

## What it is

A solution that allows you to process, analyze, validate and share forecast demand with other company functions.

It is based on historical time series data enriched and supported by specific or general information useful to the company's business and the Customer's reference market.

## Main Features



### Forecasts

Manages historical analysis and optimizes demand forecasting



### Reporting

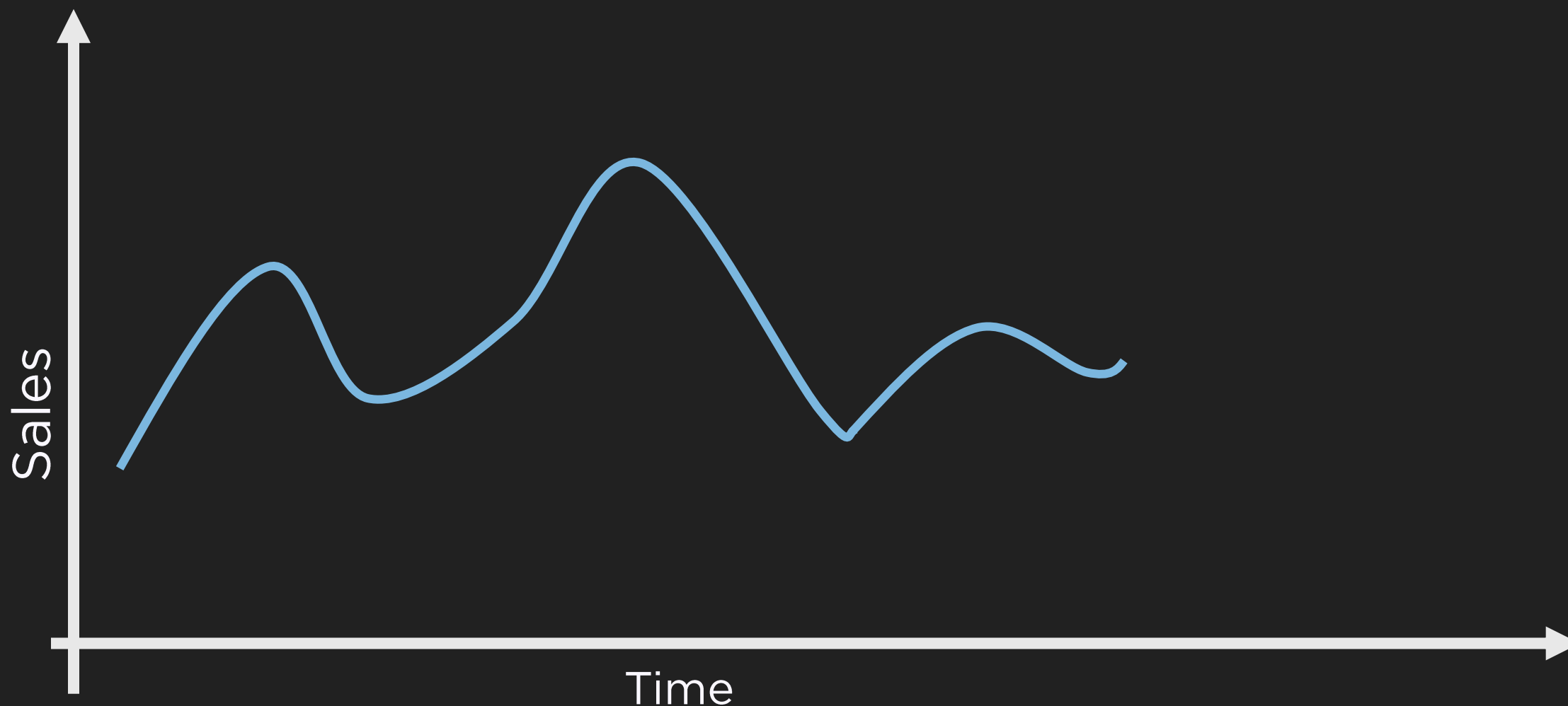
Viewing, managing and analyzing aggregated data



### Web Portal

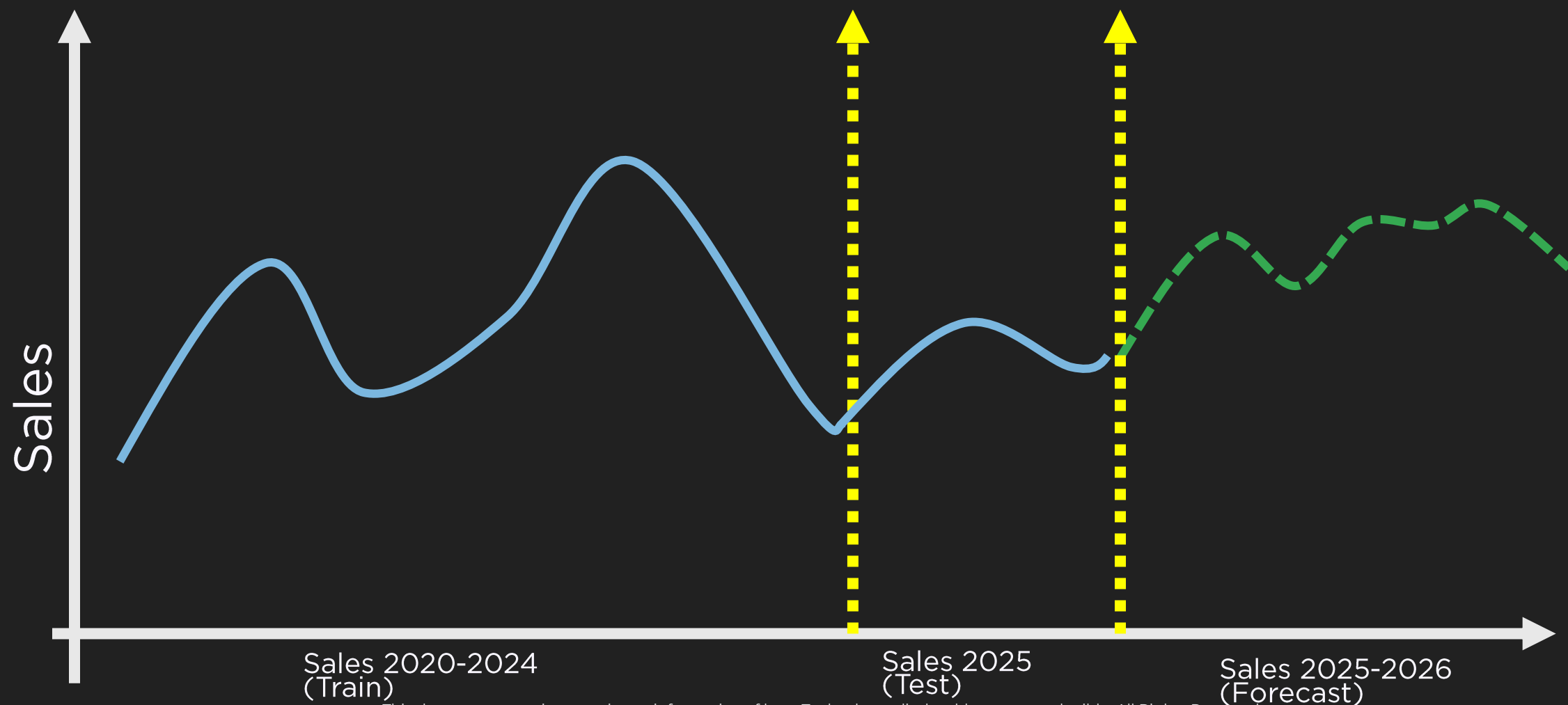
Dedicated multilingual web portal (Italian and English)

# How to forecast a time serie?

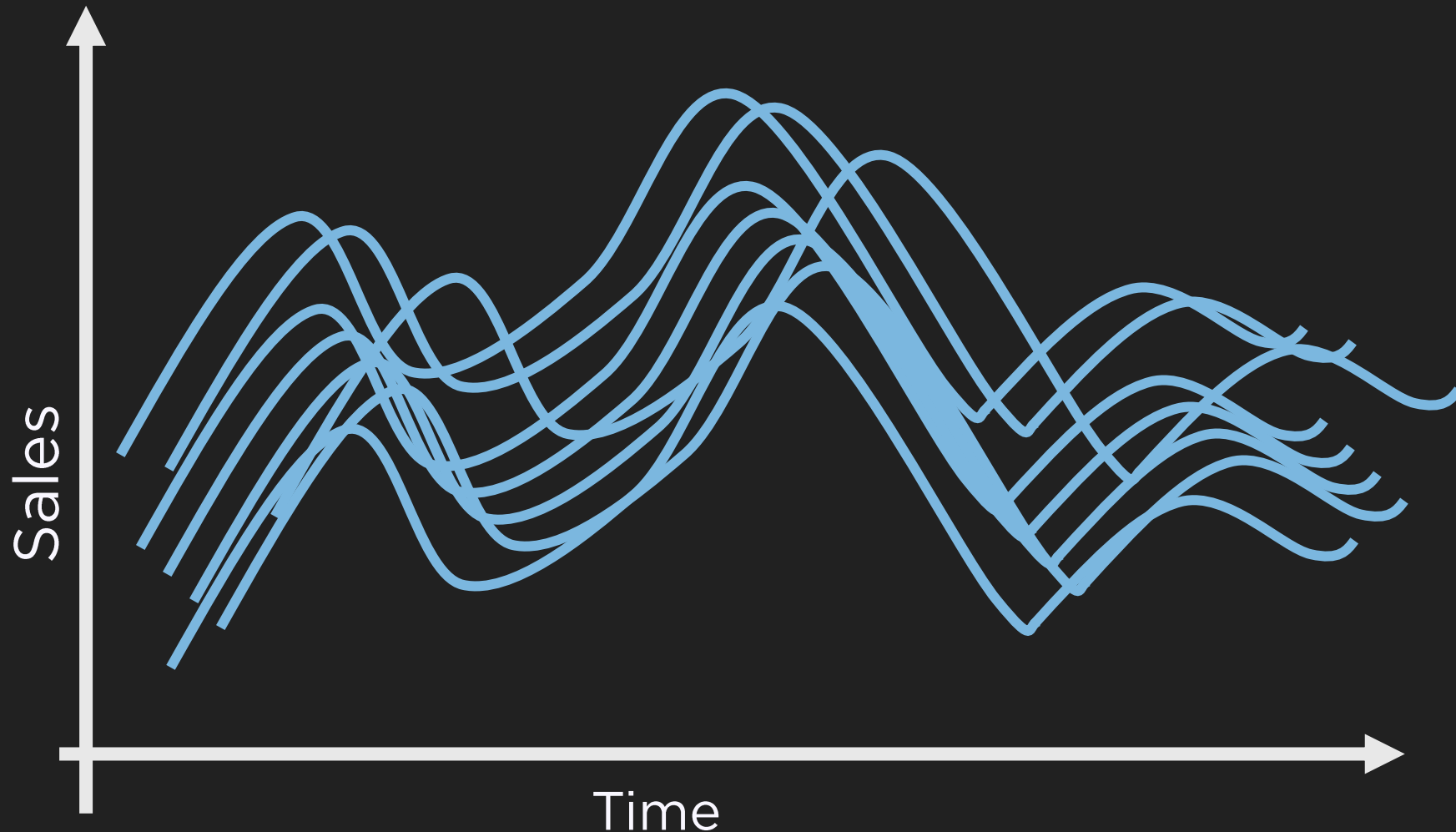




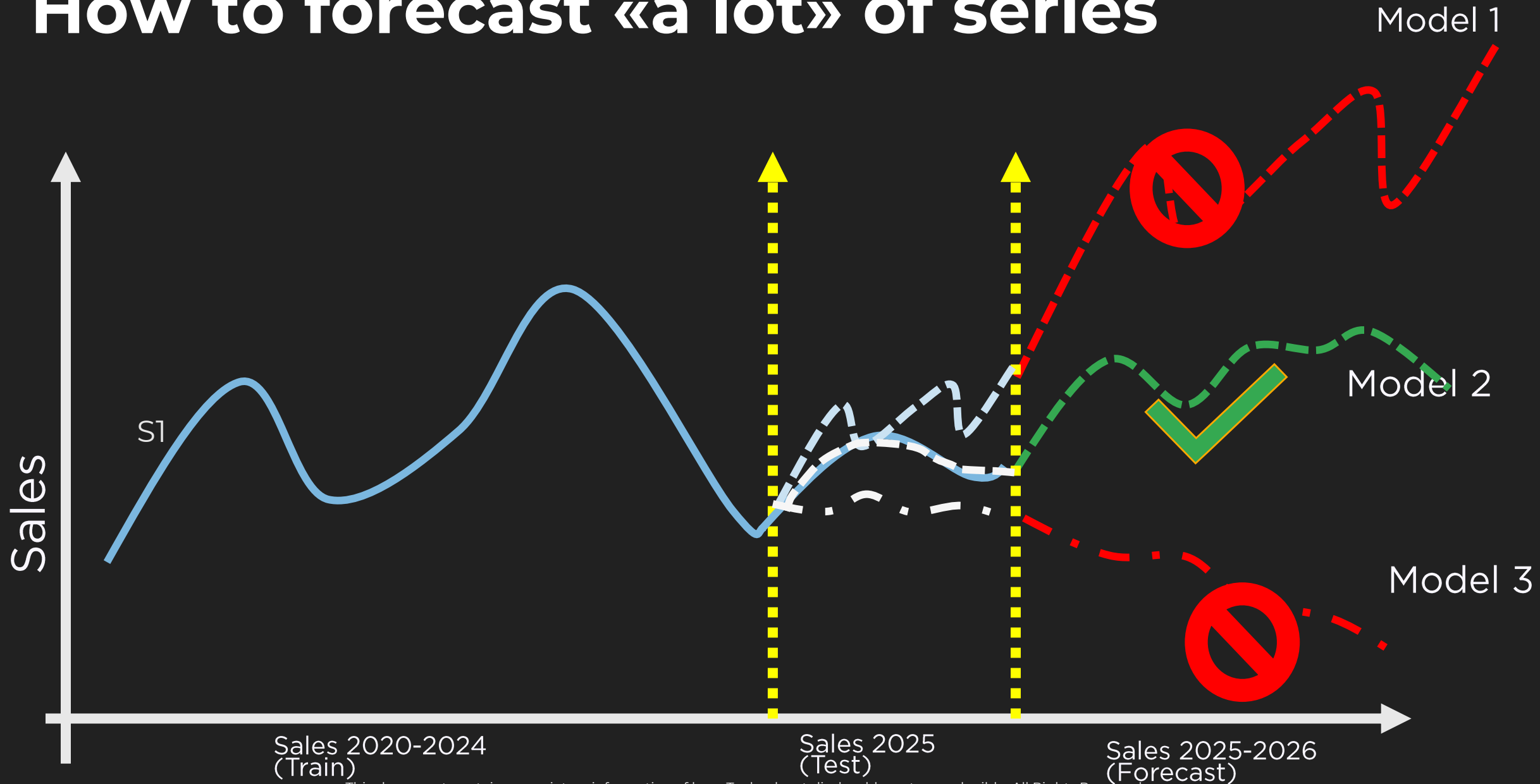
# How to forecast a time serie?



# How to forecast «a lot» of series?

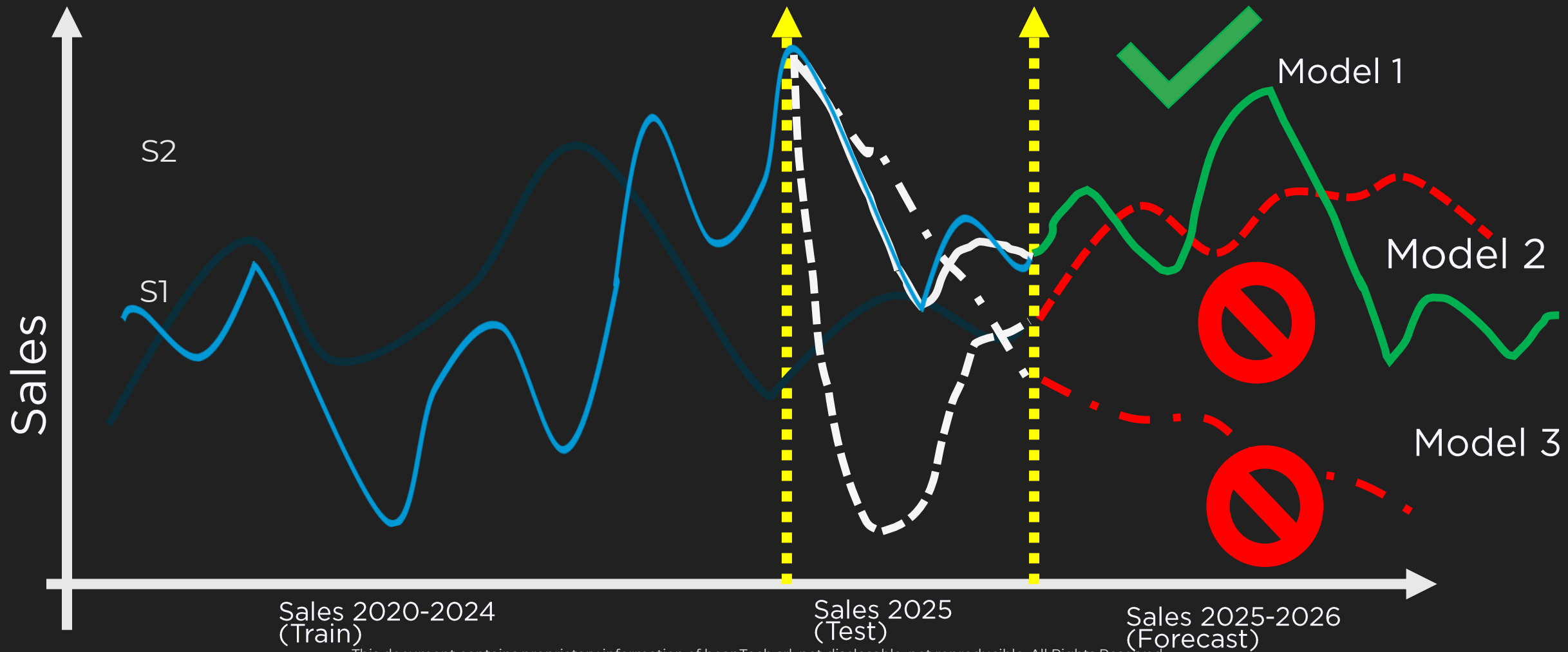


# How to forecast «a lot» of series



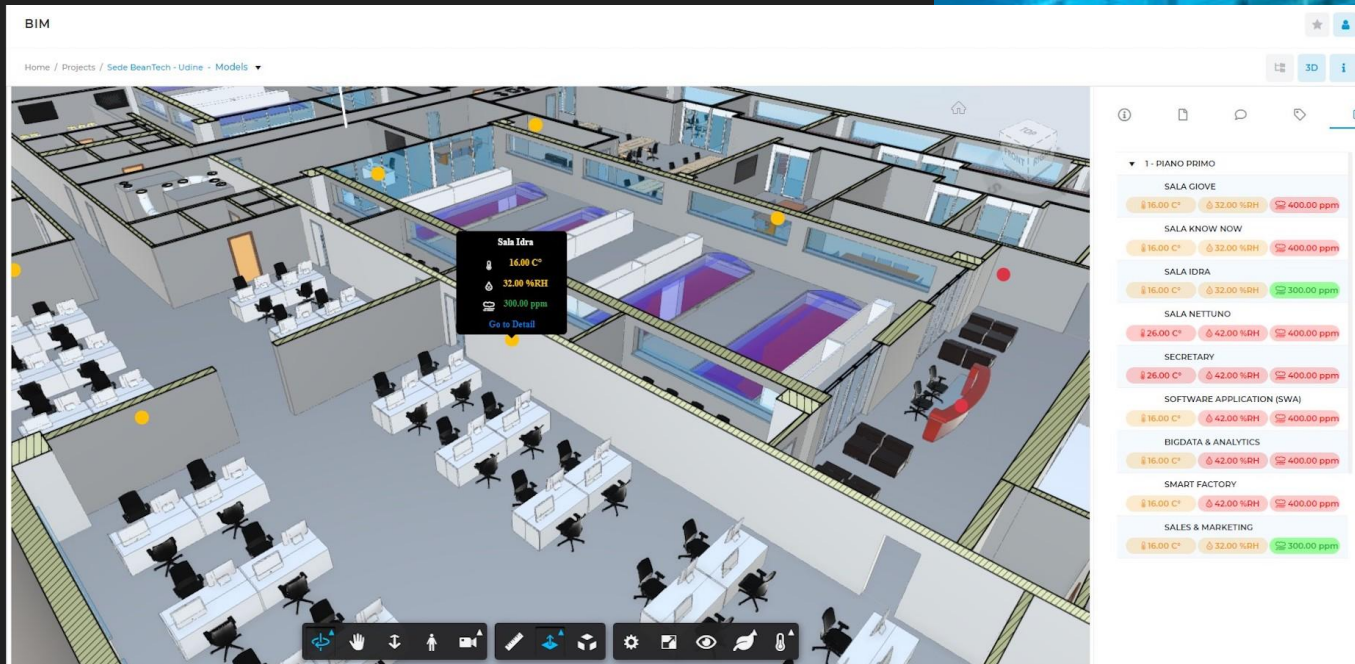


# How to forecast «a lot» of series



# Demand Planning

## Energy Forecasting



# Demand Planning

## Energy Forecasting

### **Business Goals**

- Data Collection & Organization
- Real-time Consumption Monitoring
- Consumption Forecasting
- Anomaly Detection
- Cost Optimization & Reduction



# Demand Planning

## Energy Forecasting

### Model Championship

- SARIMA/SARIMAX



# Demand Planning

## Energy Forecasting

### Model Championship

- SARIMA/SARIMAX
- LSTM (+ EXOGENOUS VARIABLES)

# Demand Planning

## Energy Forecasting

### Model Championship

- SARIMA/SARIMAX
- LSTM (+ EXOGENOUS VARIABLES)
- **FACEBOOK PROPHET (+ EXOGENOUS VARIABLES)**



# Demand Planning

## Energy Forecasting

### Model Championship

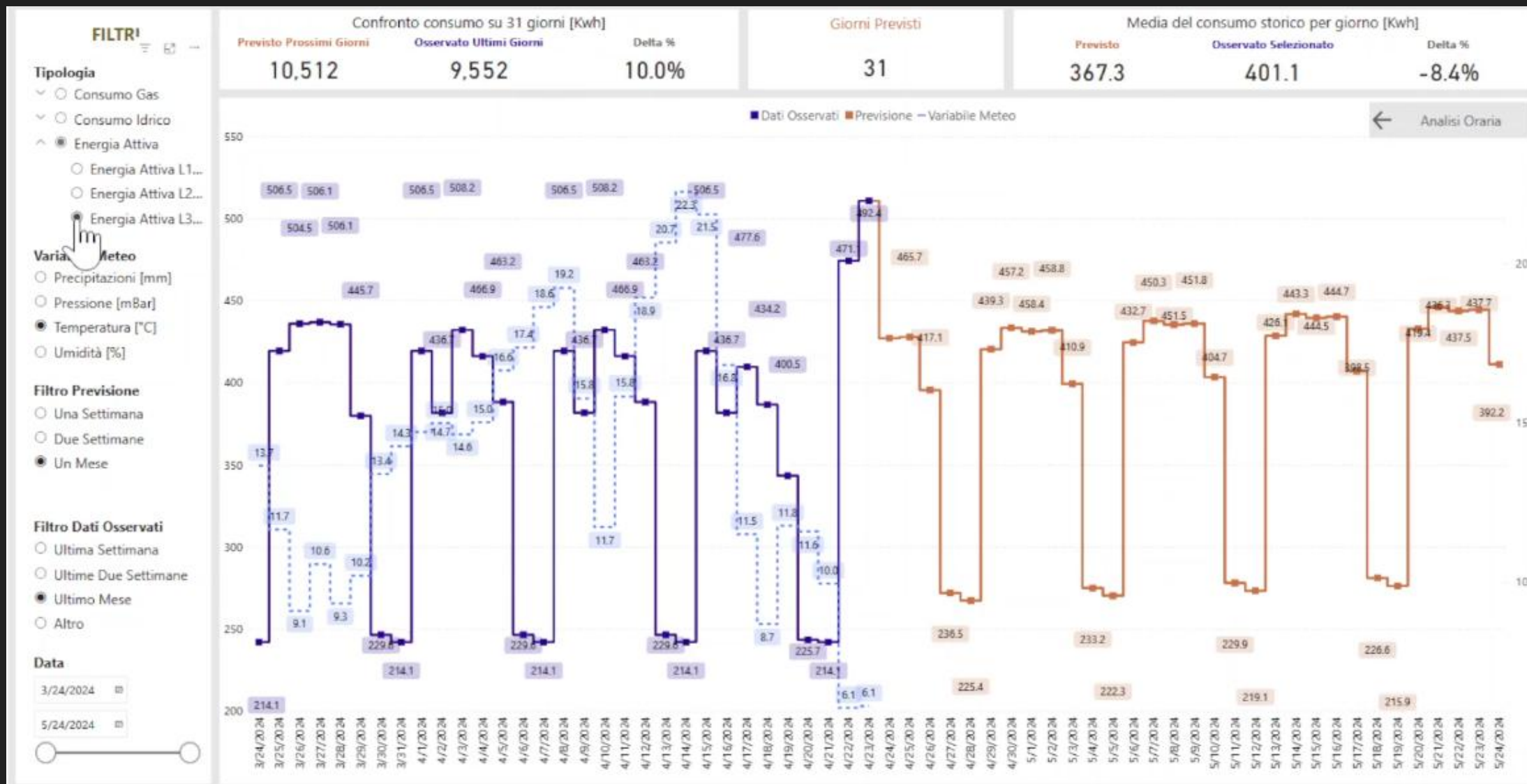
- SARIMA
- LSTM (+
- **FACEBO**

#### Process Summary:

1. Definition of priors
2. Calculate MAP
3. Calculate estimates and CI (by simulation)



# Results



# Demand Planning

## Anomaly Detection

### Models:

- ISOLATION FOREST



# Demand Planning

## Anomaly Detection

### Models:

- ISOLATION FOREST
- LOF





# Demand Planning

## Anomaly Detection

### Models:

- ISOLATION FOREST
- LOF
- **DELTA PERCENTAGE FORM PREDICTION**



# Demand Planning

## Anomaly Detection

### Models:

- ISOLATION FOREST
- LOF
- DELTA PERCENTAGE FORM PREDICTION
- SVM

# Anomaly Detection



# DATA SCIENTIST LIFE (and his colleagues)

1. Why is the model giving me “flat” forecasts?
2. Why did I sell 100 pieces last year and the forecast for this year is only 50?
3. Why didn't the model understand that I had a wonderful order of 5000 pieces in February?
4. Why can't I have forecasts for a single day?
5. Why is the forecast 0? How is that possible?
6. Why did the forecast tell me that I would sell one piece in February, and instead I sold it in March?
7. This product has been available for 3 months already, and the forecast seems not very good to me!
8. ...

# Today's case history



DATA SCIENCE IN BUSINESS CONSULTING



CASE HISTORY: DEMAND PLANNING & ANOMALY DETECTION



CASE HISTORY: REAL TIME ANOMALY DETECTION







**FINCANTIERI**  
FUTURE ON BOARD

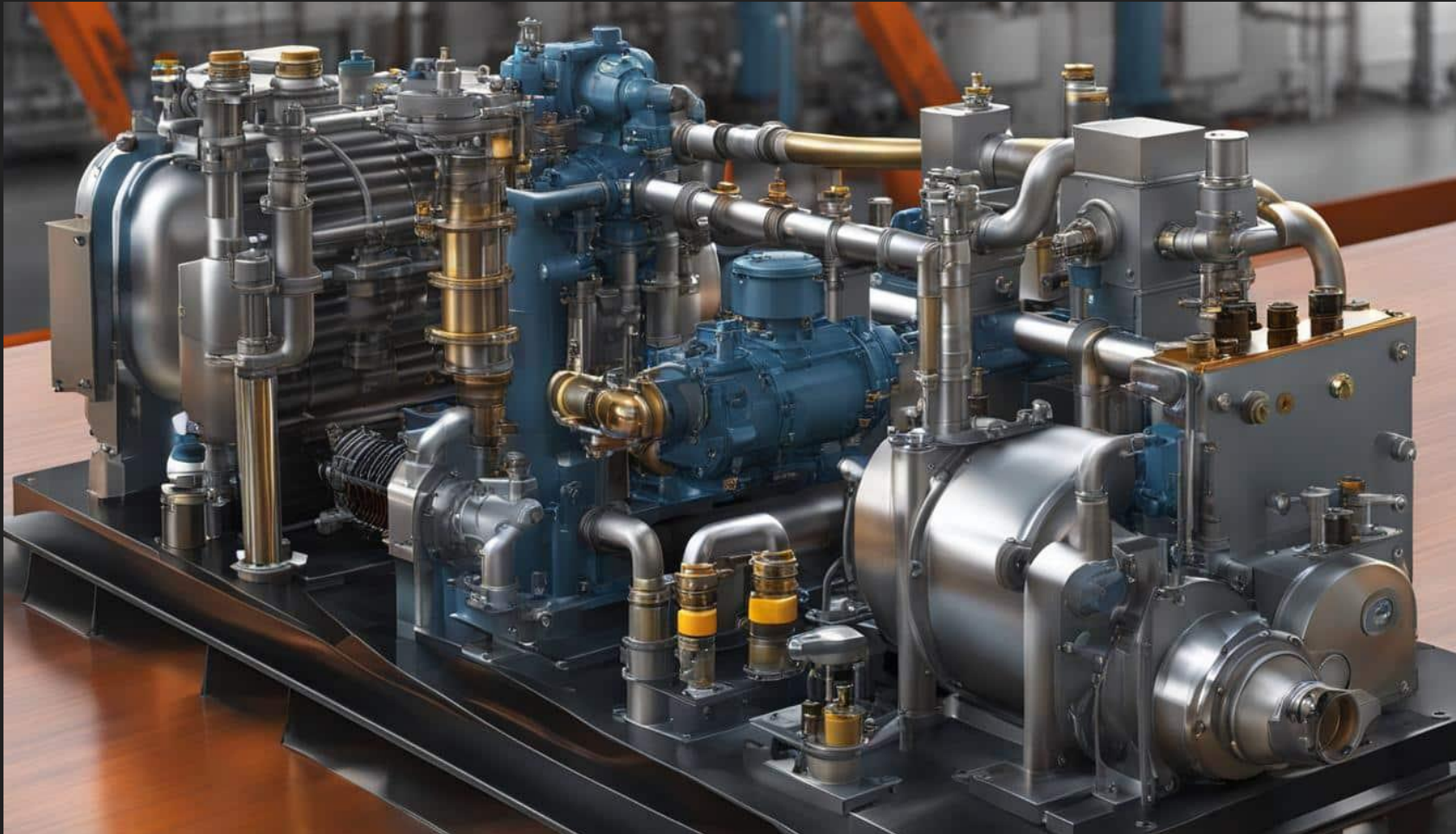
Fincantieri is one of the world's leading shipbuilding groups and the only one active in all high-tech naval engineering sectors. It is a leader in the construction and conversion of cruise ships, military vessels, and offshore units in the oil & gas and wind power sectors. The company is also involved in the production of systems and components, provides after-sales services, and offers naval interior solutions.

# We have 2 approaches

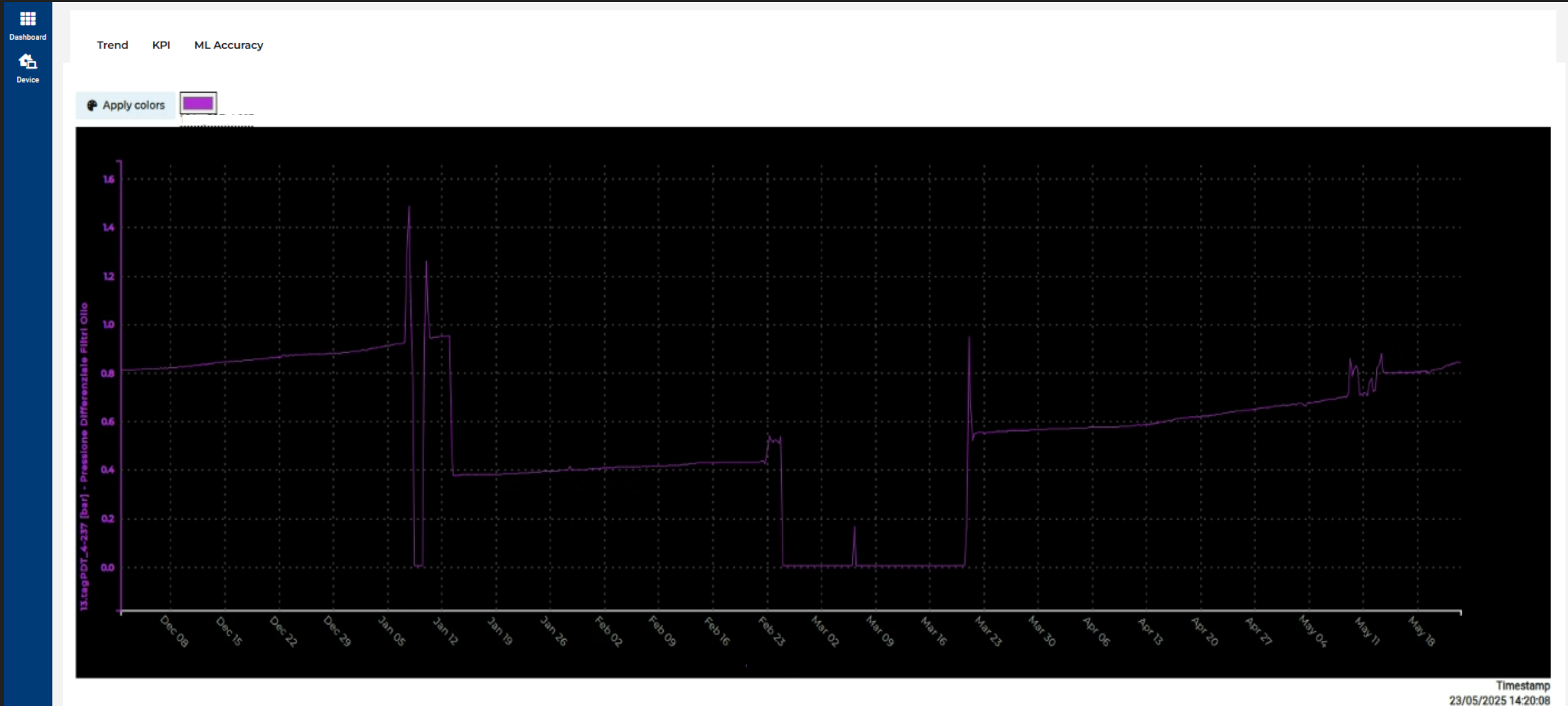
- > The «what is going on» approach
- > The «what is» vs. «what should be» approach



# The «what is going on» approach

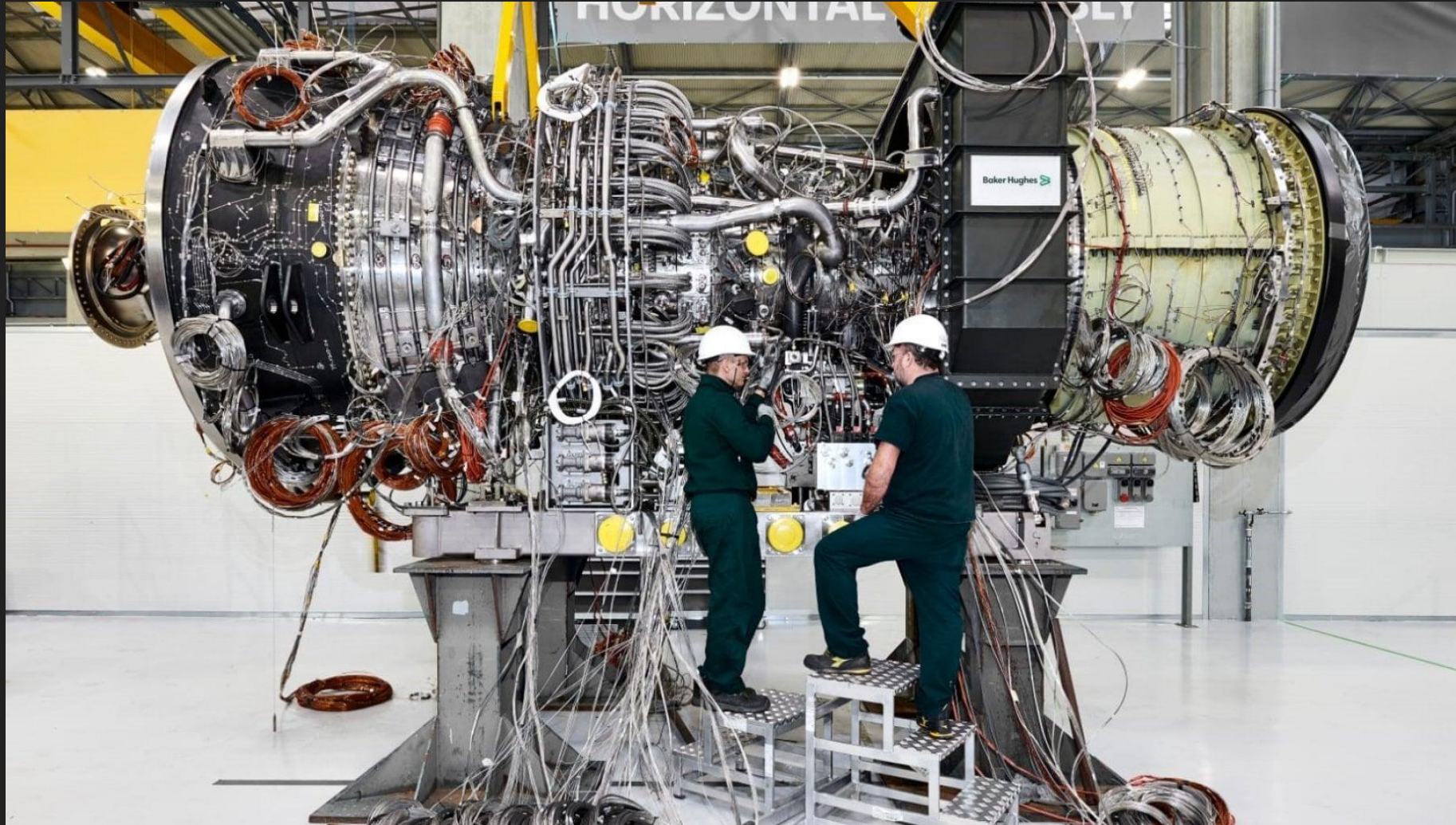


# The «what is going on» approach

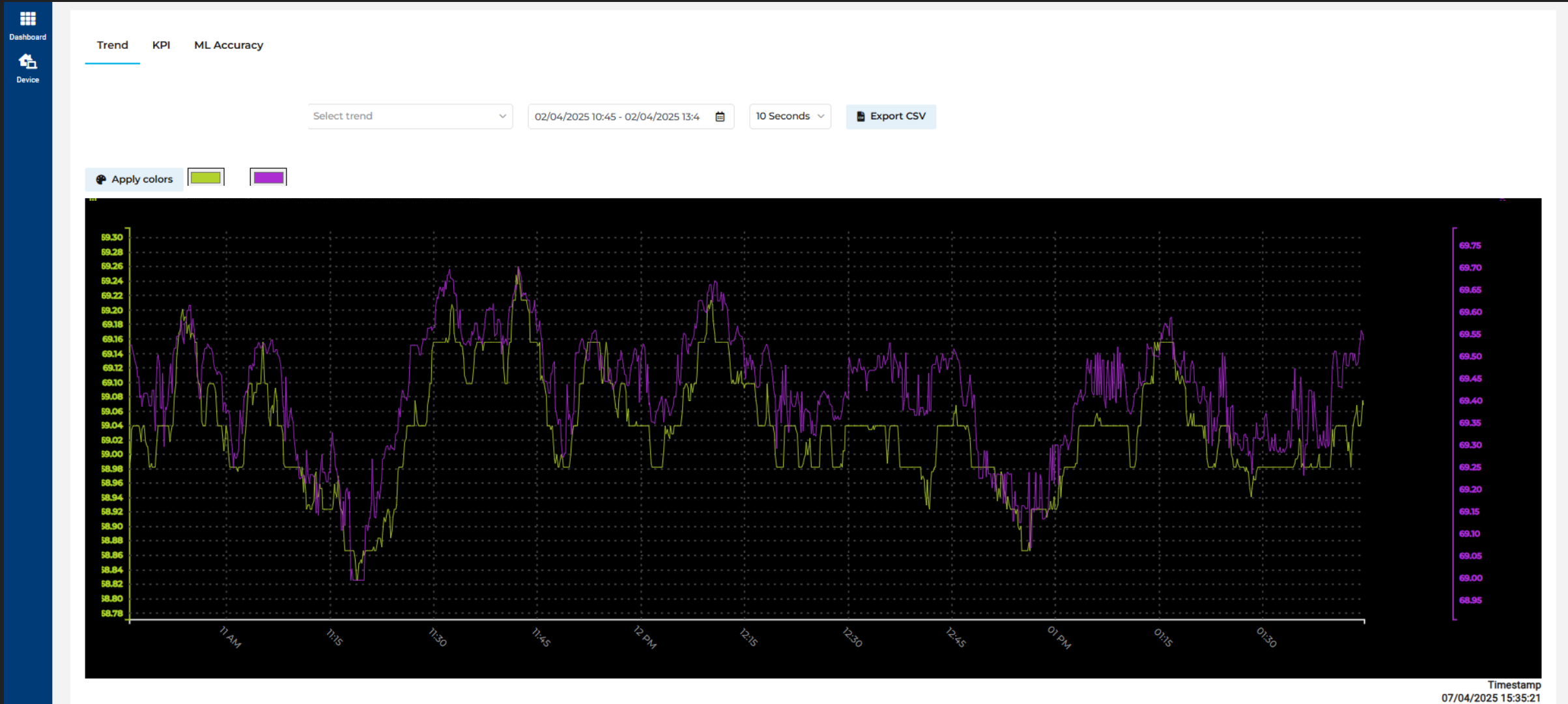




# The «what is» vs. «what should be» approach



# The «what is» vs. «what should be» approach

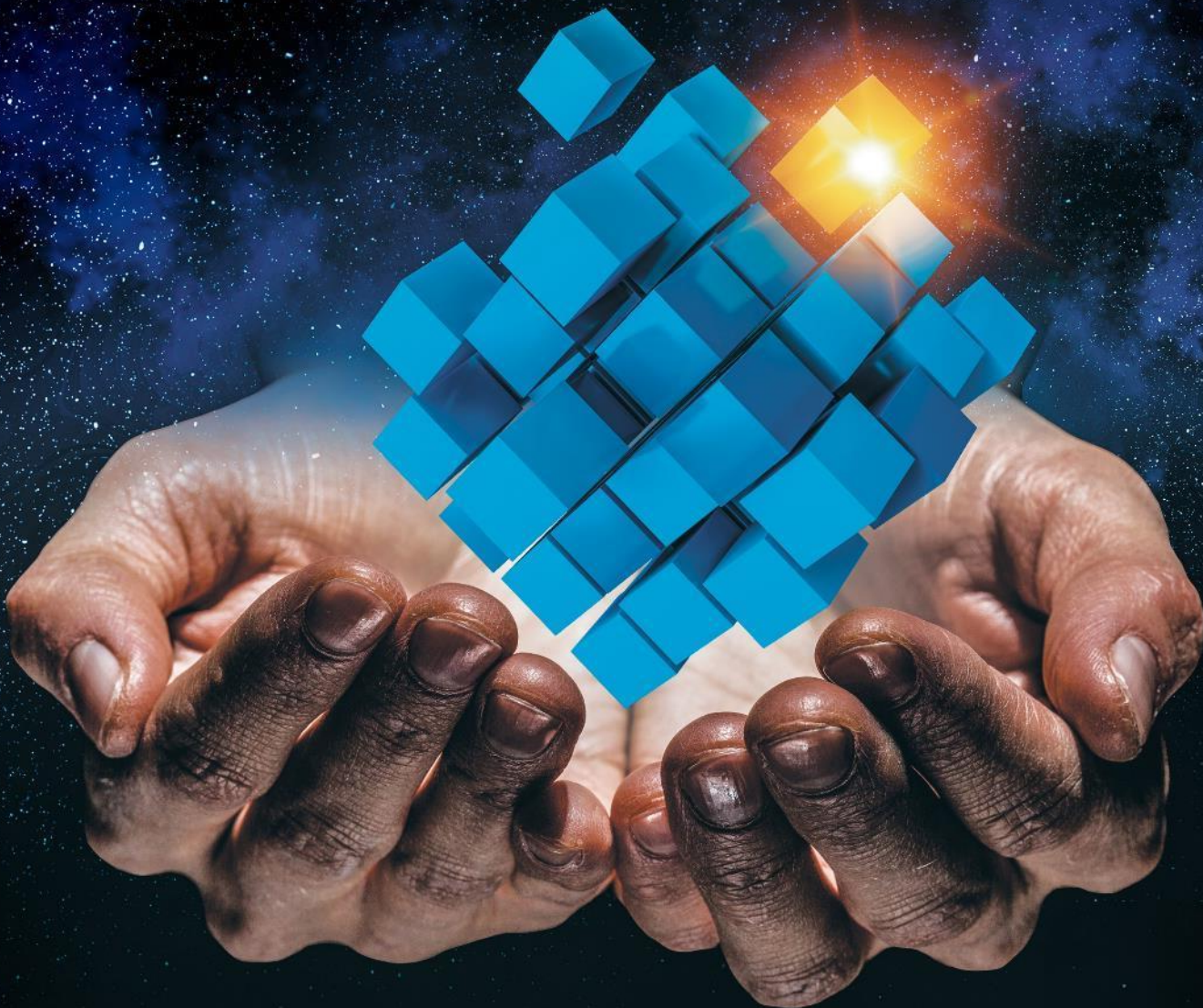




# QUESTIONS?







Thanks for your  
**ATTENTION**

[www.beantech.it](http://www.beantech.it)

