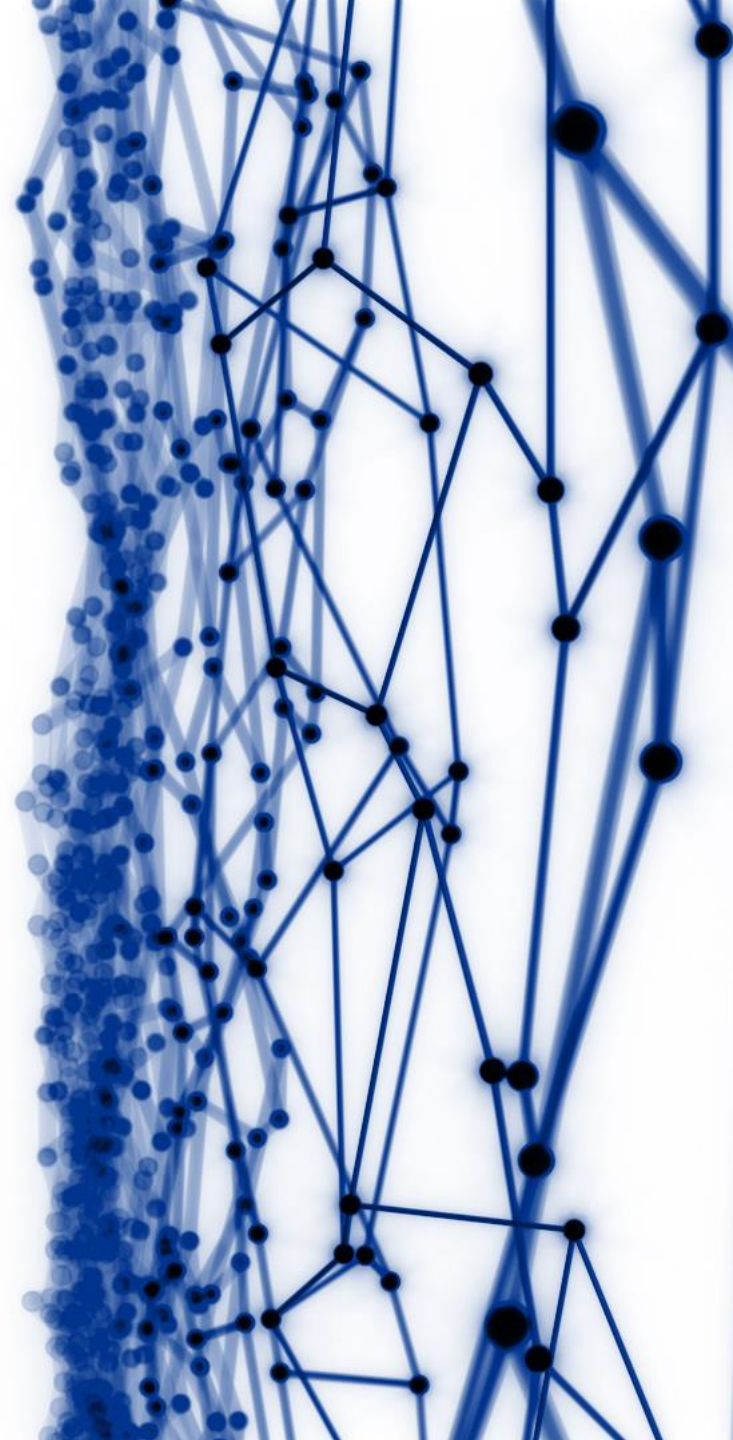




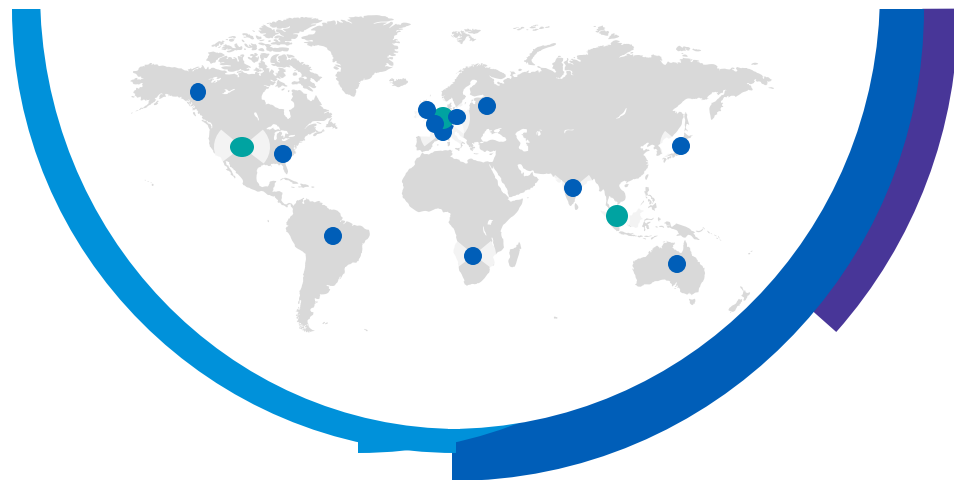
# Developing and Integrating Quantitative Models with MATLAB

Creating Analytics for decision making in Quantitative Finance



# KPMG Risk Services Luxembourg

Center of excellence for Quantitative Finance technologies



About KPMG Luxembourg:

- **Hub for Fund Risk Measurement solutions**
  - Risk Solutions for UCITS and AIFM
  - Wide range of models coverage
  - Standardized and tailor made approach
- **Center of excellence for Quantitative Finance**
  - Quantitative modeling experts
  - Software engineers
  - Data modeling and transformation resources

<b>10+</b>	<b>5</b>	<b>6</b>	<b>50+</b>	<b>600+</b>	<b>200ks+</b>	<b>100ks+</b>	<b>150ks+</b>
More than 10 years of presence in Luxembourg	Quantitative Risk Experts	IT Software Engineers	Clients around Europe	Funds daily processed	Reports sent yearly	Risk measures computed daily	Lines of code in our repository



Advanced data management  
Value at Risk  
Value at Risk  
Derivatives Pricing

## Quantitative Finance

Data visualization  
Data transformation  
Analytical modelling  
Correlation Estimation  
Optimization  
Liquidity risk modeling  
Term Structure modeling  
Stress test

## Risk Measurement

Time Series Analysis  
Regression analysis

## Stochastic Process

Optimization and simulation  
Cholesky decompositions  
Monte Carlo simulation  
Brownian Bridge  
Principal Component Analysis  
Garch estimation  
Outlier detection  
Decision modelling

# The Essence of Quantitative Finance

Capturing the multidimensional complexity of the reality into a model

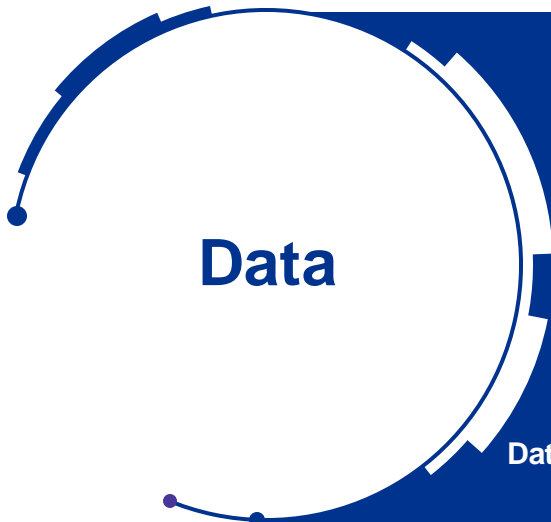
A model is only as successful as the data that underpins it.



Real value often only comes with scalability, repeatability and effective deployment.

We understand that algorithms and models have little or no value unless they are anchored in a strong understanding of the business context.

# Turning data into competitive advantage



## What it is

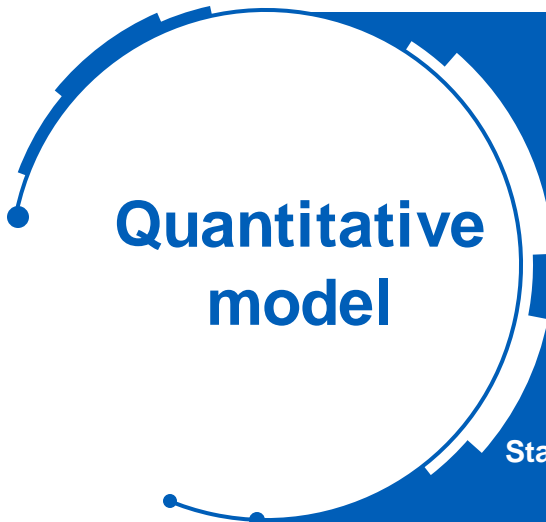
In our domain, data mainly comes from two different sources: client vs market data provider.

Data, in the context of quantitative finance, almost always comes in the form of structured data



**Data, in the context of quantitative finance, refers to distinct quantitative and qualitative variables.**

# Creating insights that lead to valuable outcomes



## Quantitative model

### What it is

Analytics are applied to various sources of structured data to identify, extract, interpret and visualize meaningful patterns to provide advanced insights.

Quantitative analytics range from simple descriptive reporting to predictive and prescriptive algorithms that leverage the full potential of stochastic analysis.



**Set of qualitative and quantitative techniques and processes used to enhance productivity and provide business gain.**

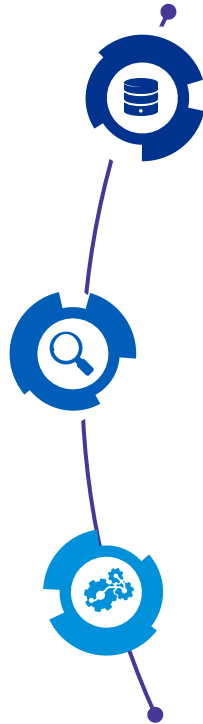
# Our daily challenge

Quantitative Risk Management never stops to increase significance

✓ For Regulators

✓ For Investors

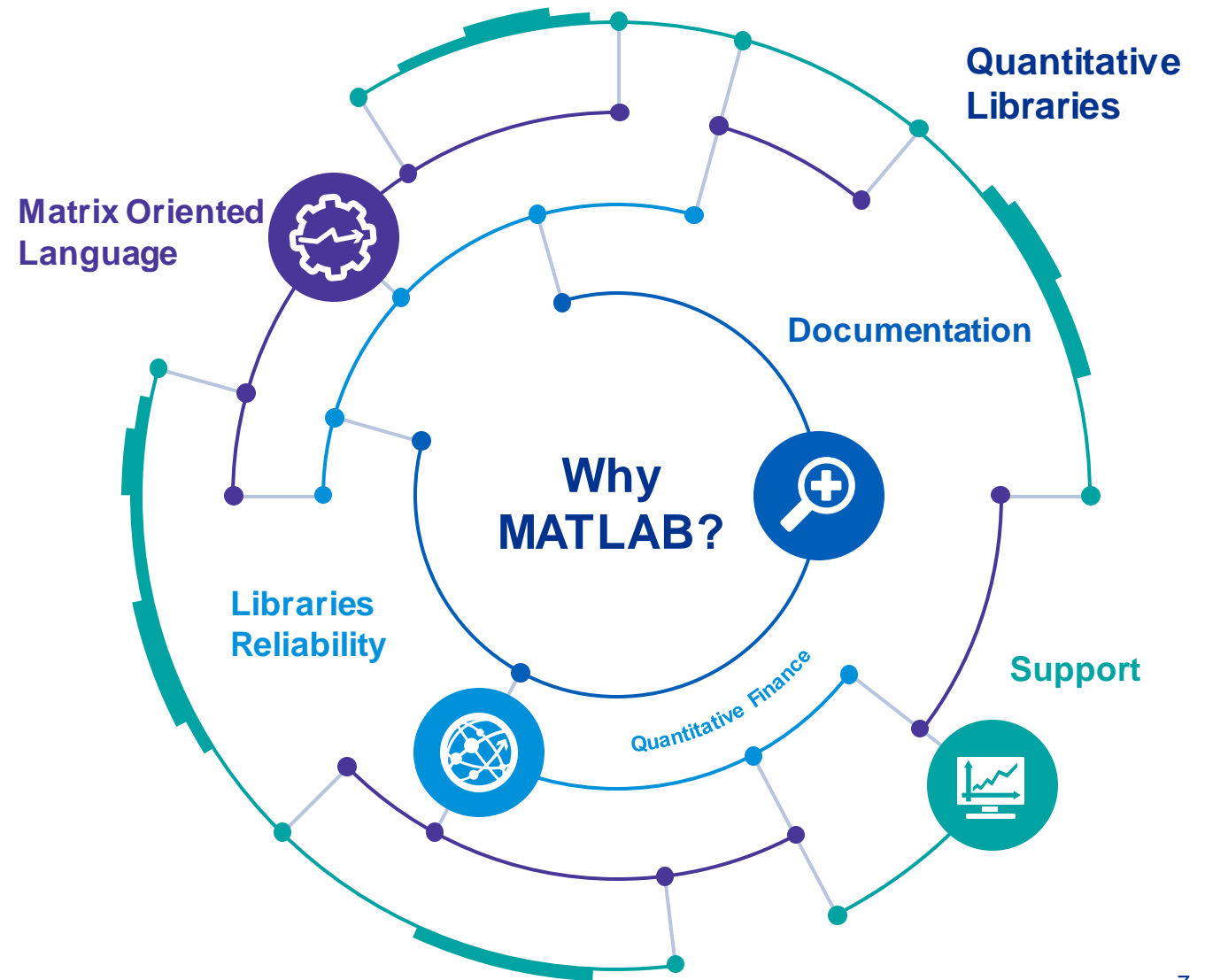
✓ For Decision Makers



**To provide high quality standards and help organizations navigate regulatory requirements by optimizing risk operations, models and analytics**

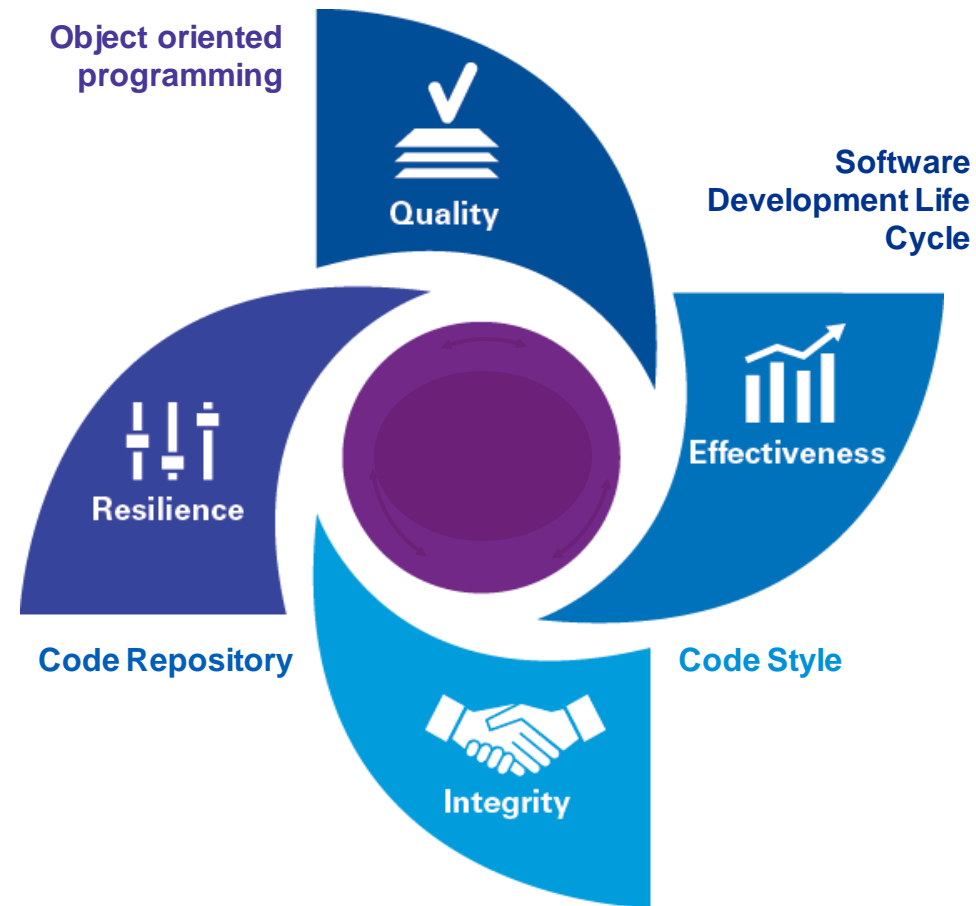
# How does MATLAB help us?

- ✓ Expressive high-level language for easy expression of ideas
- ✓ Vast and reliable multi-disciplinary algorithm library
- ✓ Open, editable code library for learning and modification
- ✓ Easy deployment into production environments



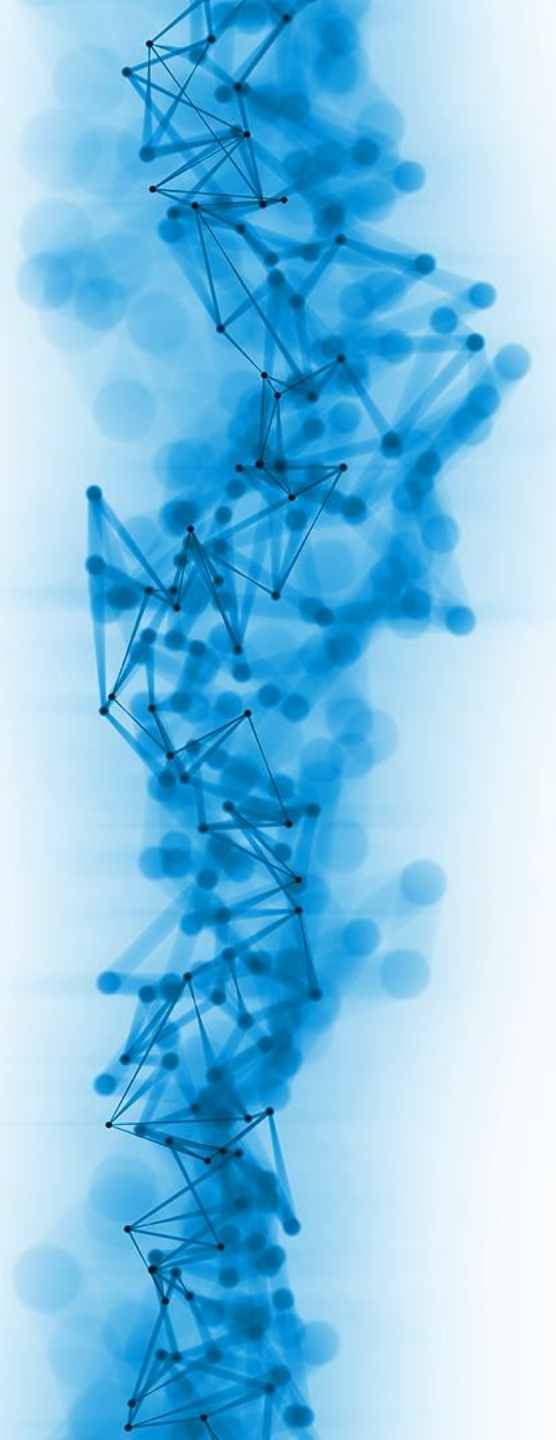
# Some Best Practices to get the most out of it...

Effective analytics are grounded in four anchors of trust



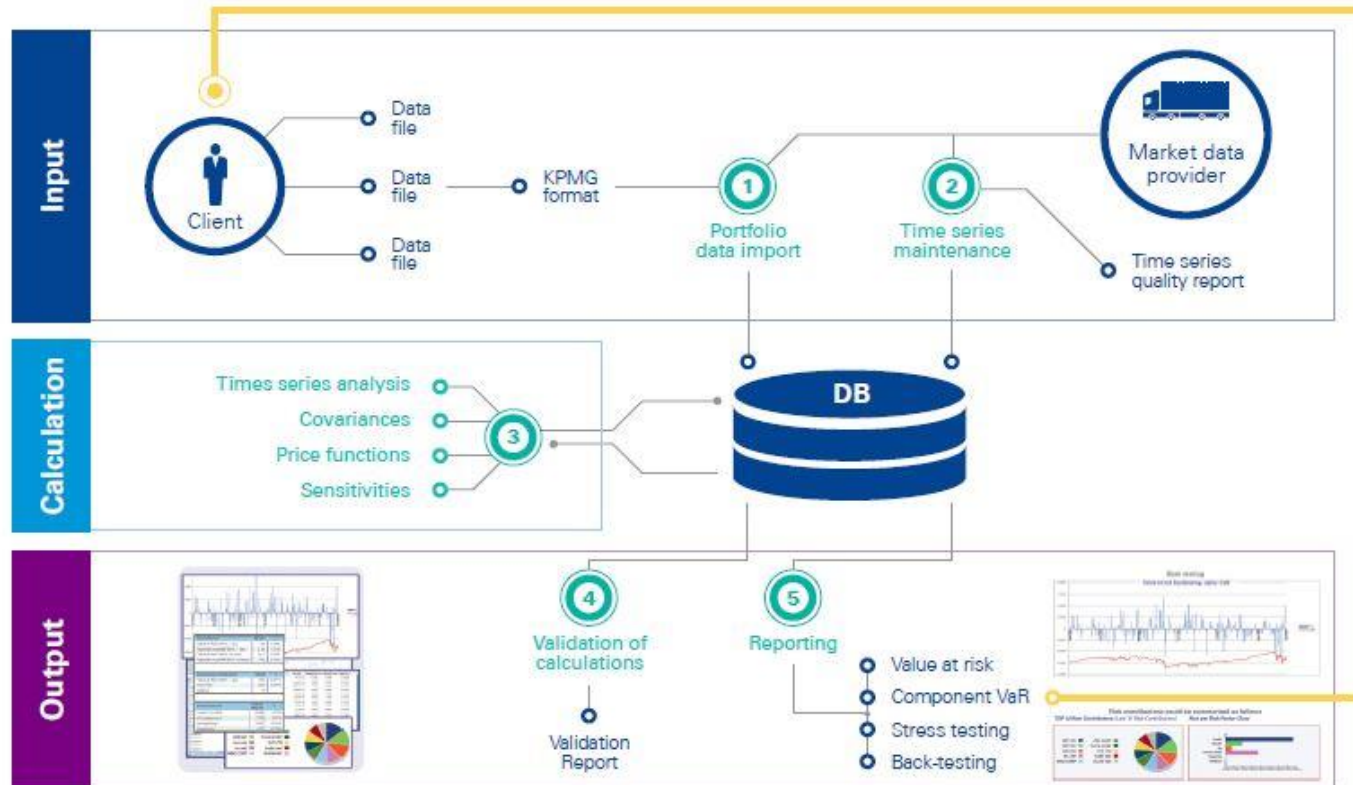


# How we deliver our services



# Focus on the Market Risk Engine

Our technology relies on a solid multi-layered integration technology framework



## RACER Platform – Key Benefits

- ✓ One central service platform that enables reporting based on client needs
- ✓ Central source of reference data in a standard format / normalized for different service platforms and service providers
- ✓ Easy access to other tools and functions
- ✓ Benefit from common development

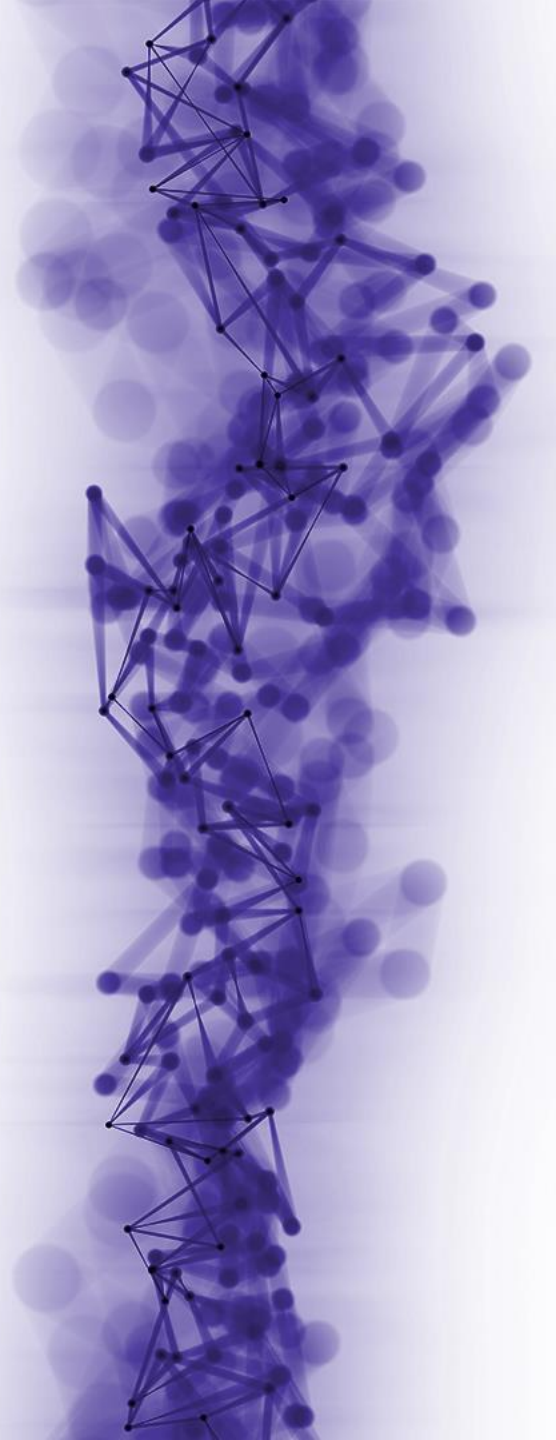


# Micro Service Architecture

## ... MATLAB as Core Calculation Engine



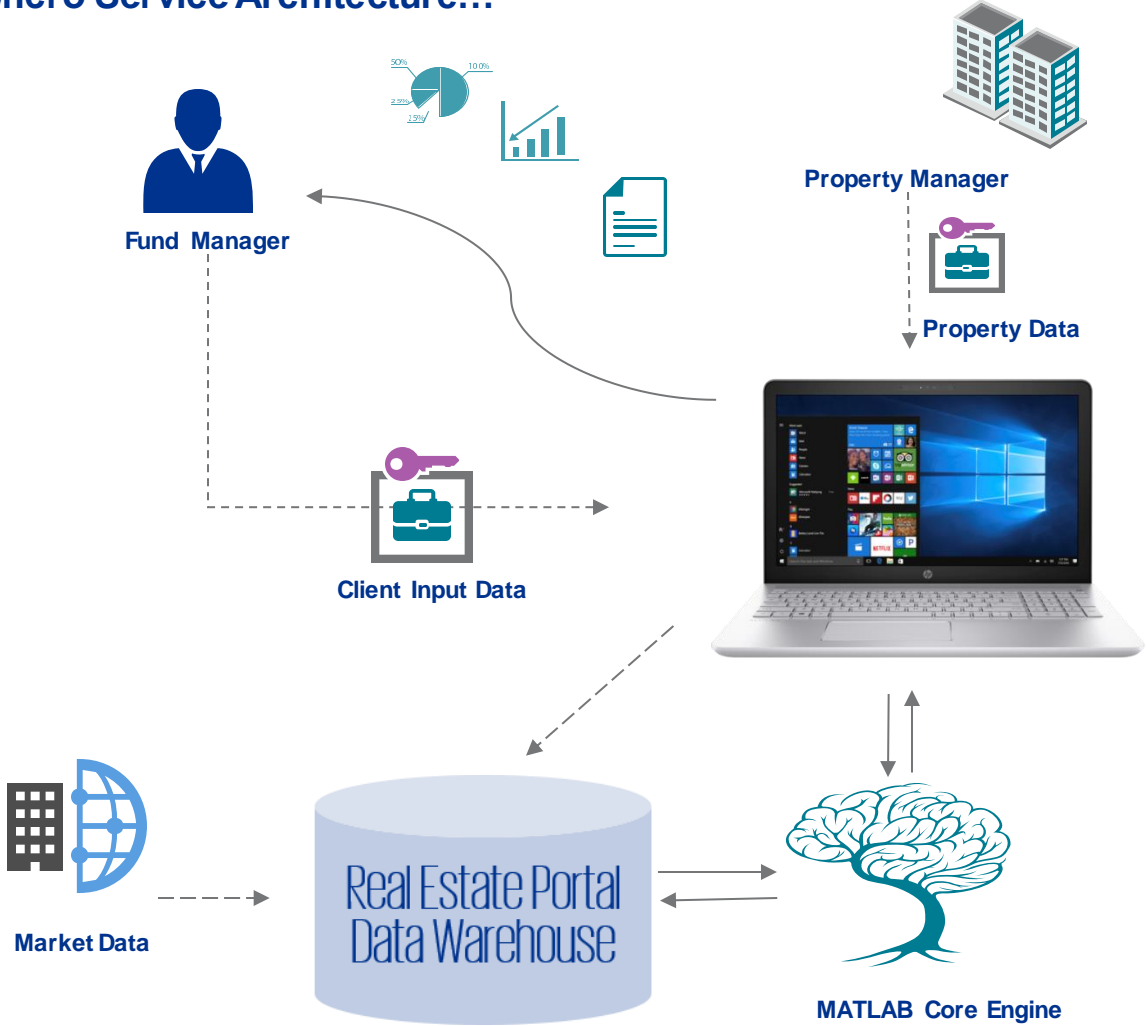
# A practical example: Real Estate Application





# Real Estate Application

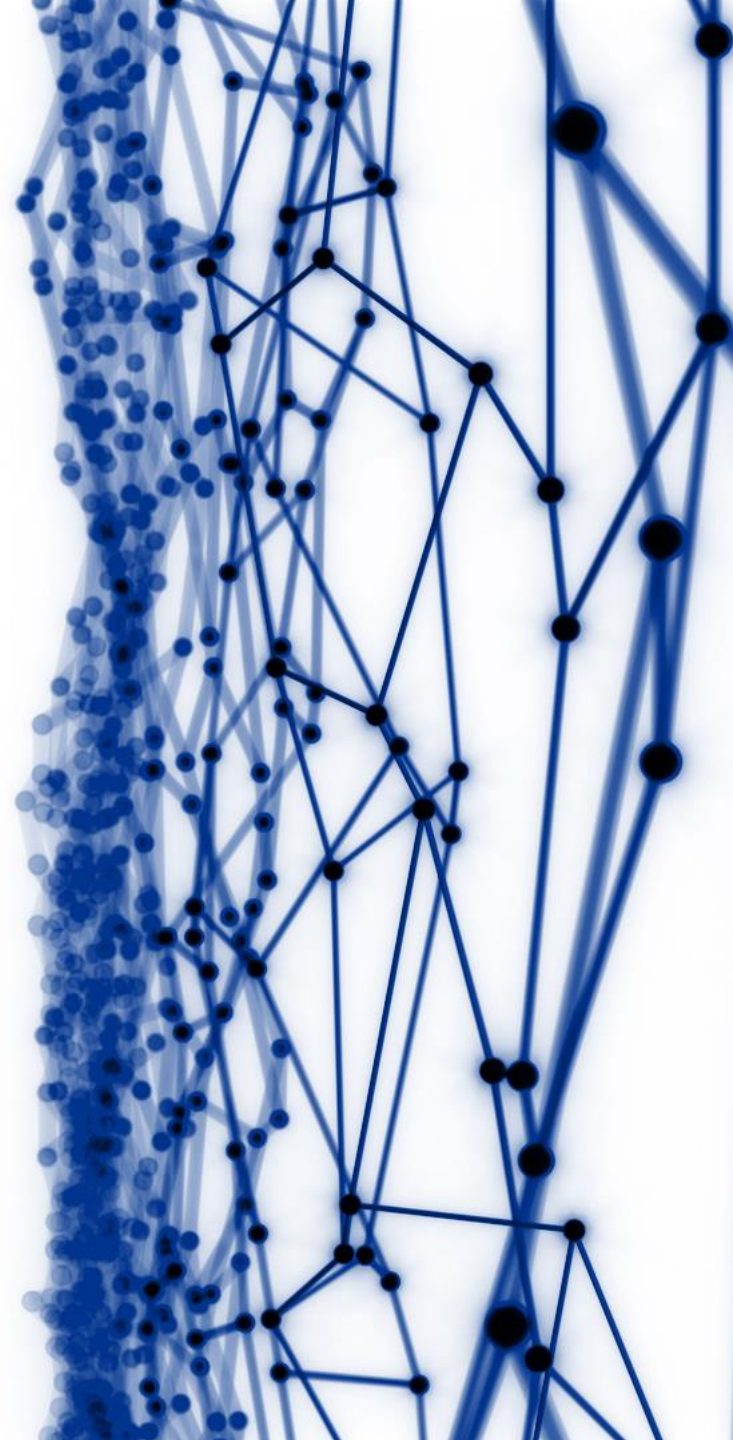
Based on Micro Service Architecture...





Anticipate tomorrow,  
deliver today

Unlocking the future with  
data-driven technologies



# Further questions? Contact us!

KPMG Risk Services Luxembourg



**Francesco Vittori**  
Head of Quantitative Development

