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

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<th>10+</th>
<th>5</th>
<th>6</th>
<th>50+</th>
<th>600+</th>
<th>200ks+</th>
<th>100ks+</th>
<th>150ks+</th>
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<td>More than 10 years of presence in Luxembourg</td>
<td>Quantitative Risk Experts</td>
<td>IT Software Engineers</td>
<td>Clients around Europe</td>
<td>Funds daily processed</td>
<td>Reports sent yearly</td>
<td>Risk measures computed daily</td>
<td>Lines of code in our repository</td>
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We understand that algorithms and models have little or no value unless they are anchored in a strong understanding of the business context.
Data

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

**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.

- **Quantitative model**
  - Mathematical Modelling
  - Stochastic Analysis
  - Optimization and simulation
  - Algorithm assurance
  - Statistical inference
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

- Object oriented programming
- Quality
- Resilience
- Code Repository
- Code Style
- Integrity
- Software Development Life Cycle
- Effectiveness
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

MATLAB Core Engine
- High Performing Monte Carlo Simulation Method
- Cash Flow Simulation
- Sensitivity Analysis

Control & data routing service
- Authentication
- Request Handling
- Monitoring
- Data Routing

Real Estate Application
- Front End: Real Estate information capturing
- Back End: Orchestration of the data flow

Market Data Service
- Interest Rate Curves
- Inflation indicators
- Tenant Default Rates

Client Data Storage
- Real Estate Portfolio Information
- Client Specific Information
- Calculation Results
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