



# Introducing LIST

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Università degli Studi di Pavia

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# LIST in a Nutshell

**LIST** is a **privately owned company** founded in Pisa in **1985**

LIST is **100%** focused on **Banking and Finance** and delivers solutions for:

**Capital Markets** and **Risk Management**

LIST **designs, develops & distributes** its own **technology**

A **product oriented** company

Innovative Industrial International



# LIST: Technology for the Financial Industry



Phone



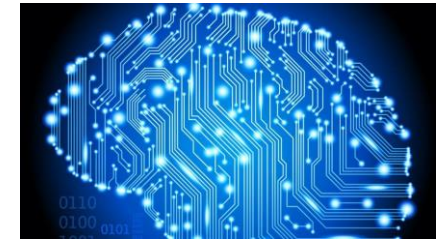
Financial Calculators



Spreadsheets



Screen Trading



Data Analysis, A.I.



Networking, Internet, Cloud



Algo Trading



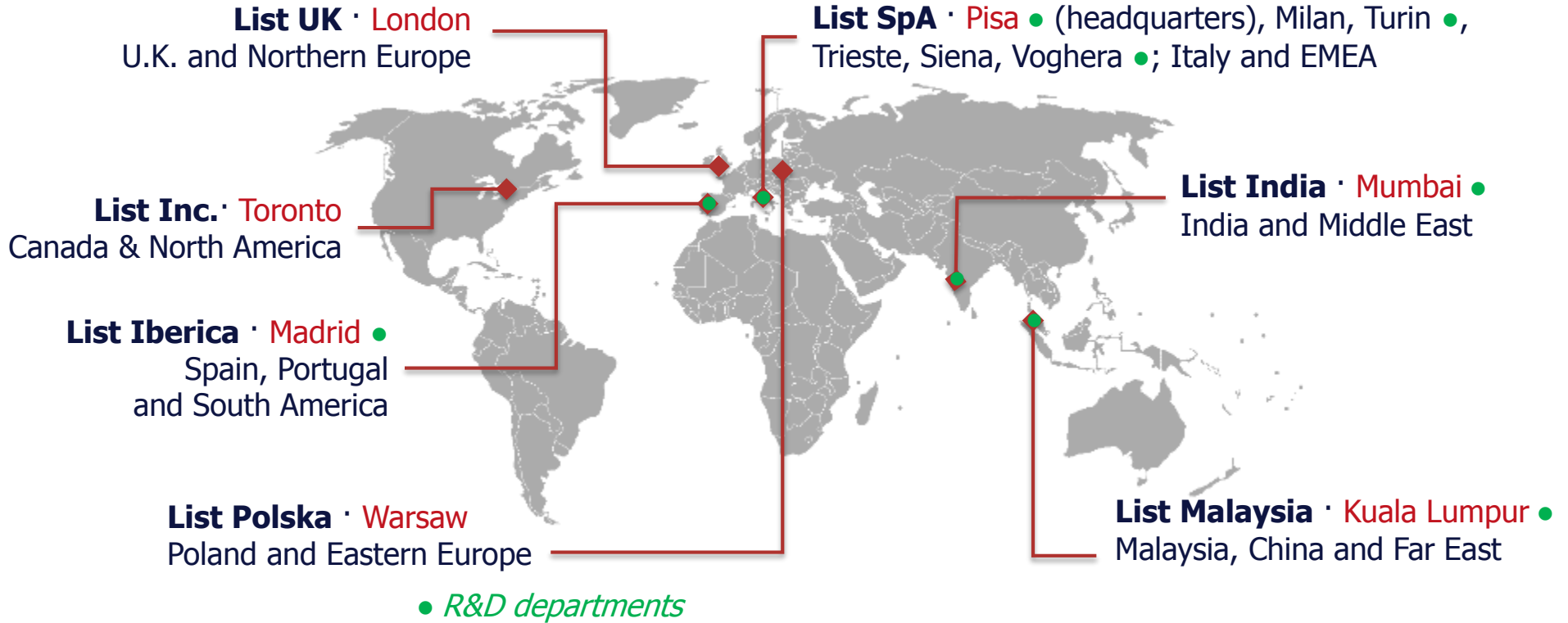
Trading Pit



Electronic Platforms



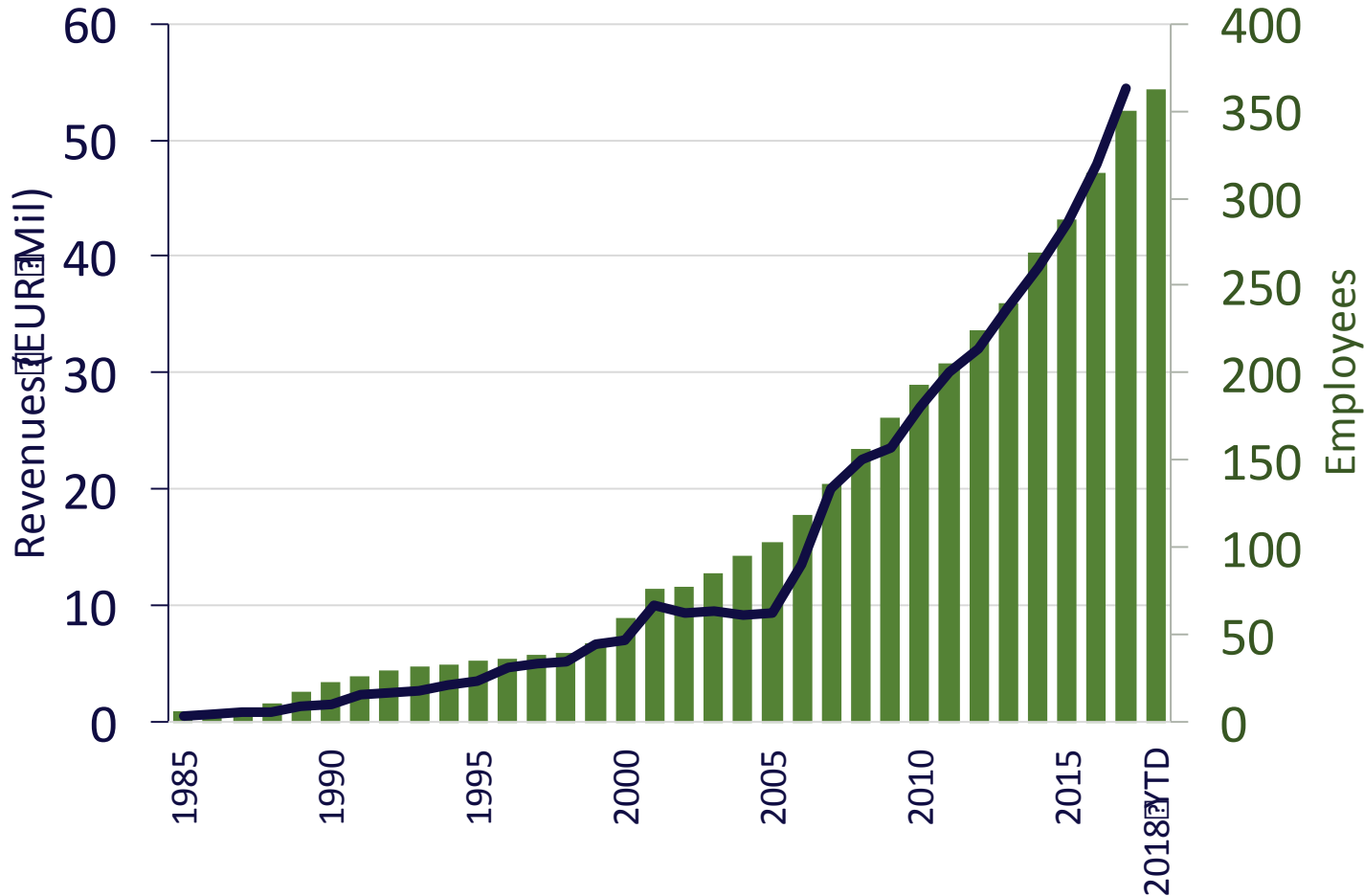
# LIST global footprint



*Distributing partners in Israel, China and Taiwan*

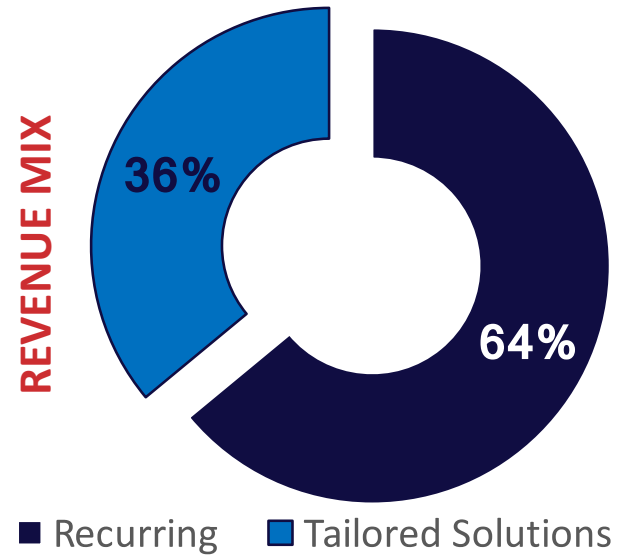
# LIST KPI

## REVENUES & EMPLOYEES

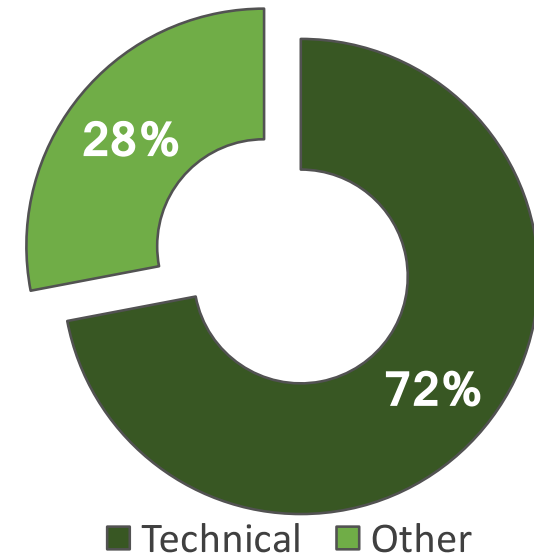


➤ 120+ clients in 18 countries

## REVENUE MIX



## STAFF BACKGROUND





# Financial Engineering Team



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# Financial Engineering

## Who we are

- Physic: 50%
- Financial Economist: 20%
- Mathematics: 20%
- Engineers: 10%

## What we do

- C++ Financial Libraries (pricing, analytics, risk)
- Data analysis
- Functional analysis
- AI - Deep Learning Research for finance

## Who we need

- Quantitative mathematical background
- Interest in financial mathematics
- C++ programming skill
- High level prototyping languages skill: Matlab, Python, MSEExcel, R

# C++ Financial Libraries

Overview of technical and mathematical functionalities implemented in the List libraries



# Technical features

Designed and developed in-house, object oriented C++, with the following characteristics:

- Multiplatform (Windows, Linux, Aix)
- Usage of Standard Template Libraries (STL) & Boost
- Usage of template programming
- Design Pattern

# Numerical Methods

## Monte-Carlo simulations

- are multi-dimensional simulations based on a lognormal dynamics with variance-covariance matrix provided by the user (equity) or calibrated by market data (swaption).
- Pseudo-Random Numbers (GFSR and RANLUX) and Quasi-Random Numbers (Sobol);
- Dimensionality Reduction (spectral decomposition); and Variance Reduction (antithetic sampling);
- Optimal Time Stopping (Andersen method and Longstaff-Schwartz).

## Optimization & Root finding

- are used for:
  - Calibrating parameters of stochastic differential equations;
  - Best fitting of financial data;
  - Solving high-order equations like yield to maturity calculation;
  - Implied Volatilities calculation.
- Least Squares, Brent, Newton Raphson, Levenberg Marquardt, Bisection, Secant.

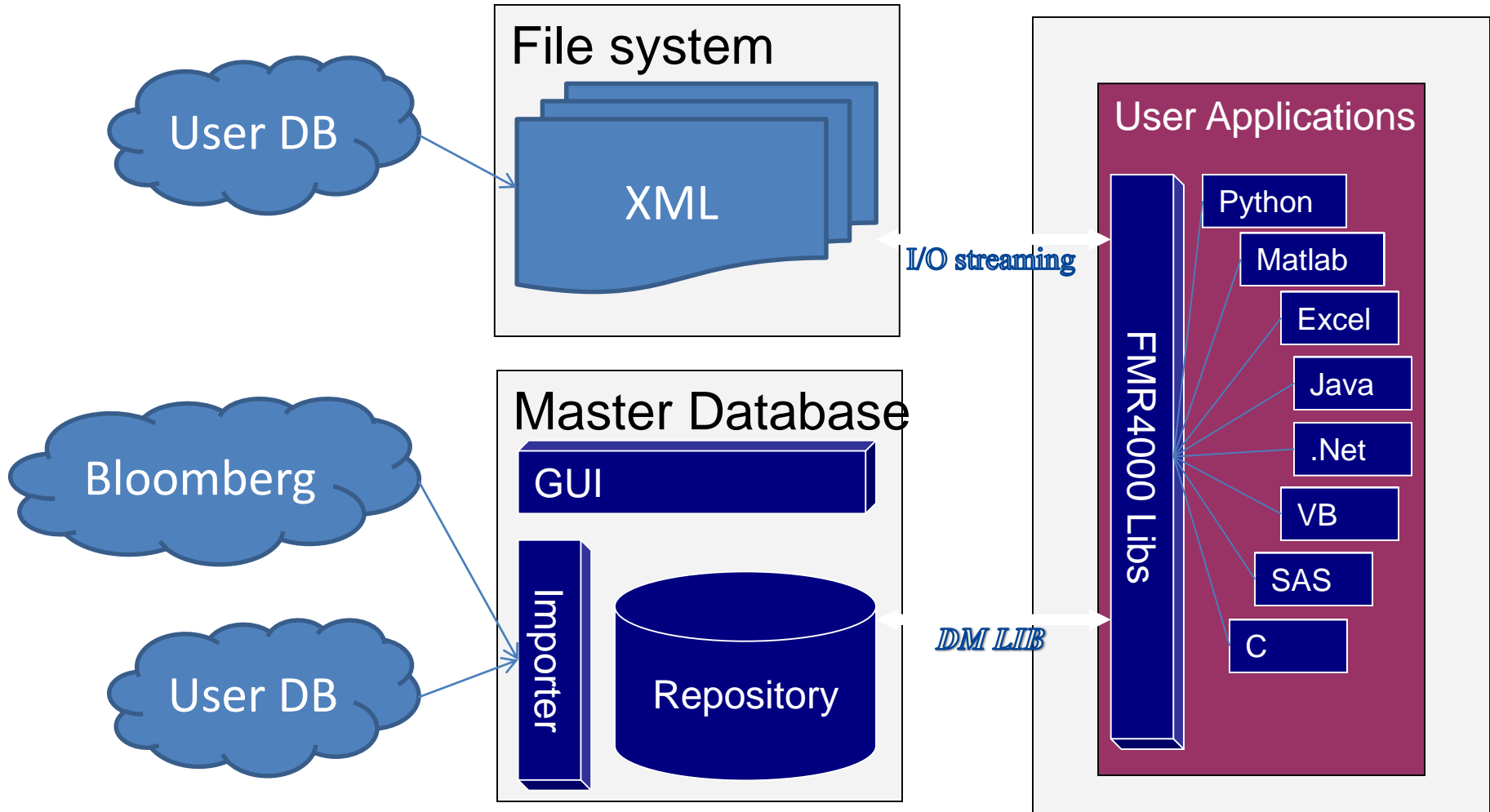
## Numerical Trees

- alternative to Monte-Carlo simulations in order to discretizes the filtration on which underlying is defined.
- Deterministic Discretization (binomial and trinomial trees);
- Random Discretization (path integral between beginning and final states of underlying).

## Interpolation and extrapolation

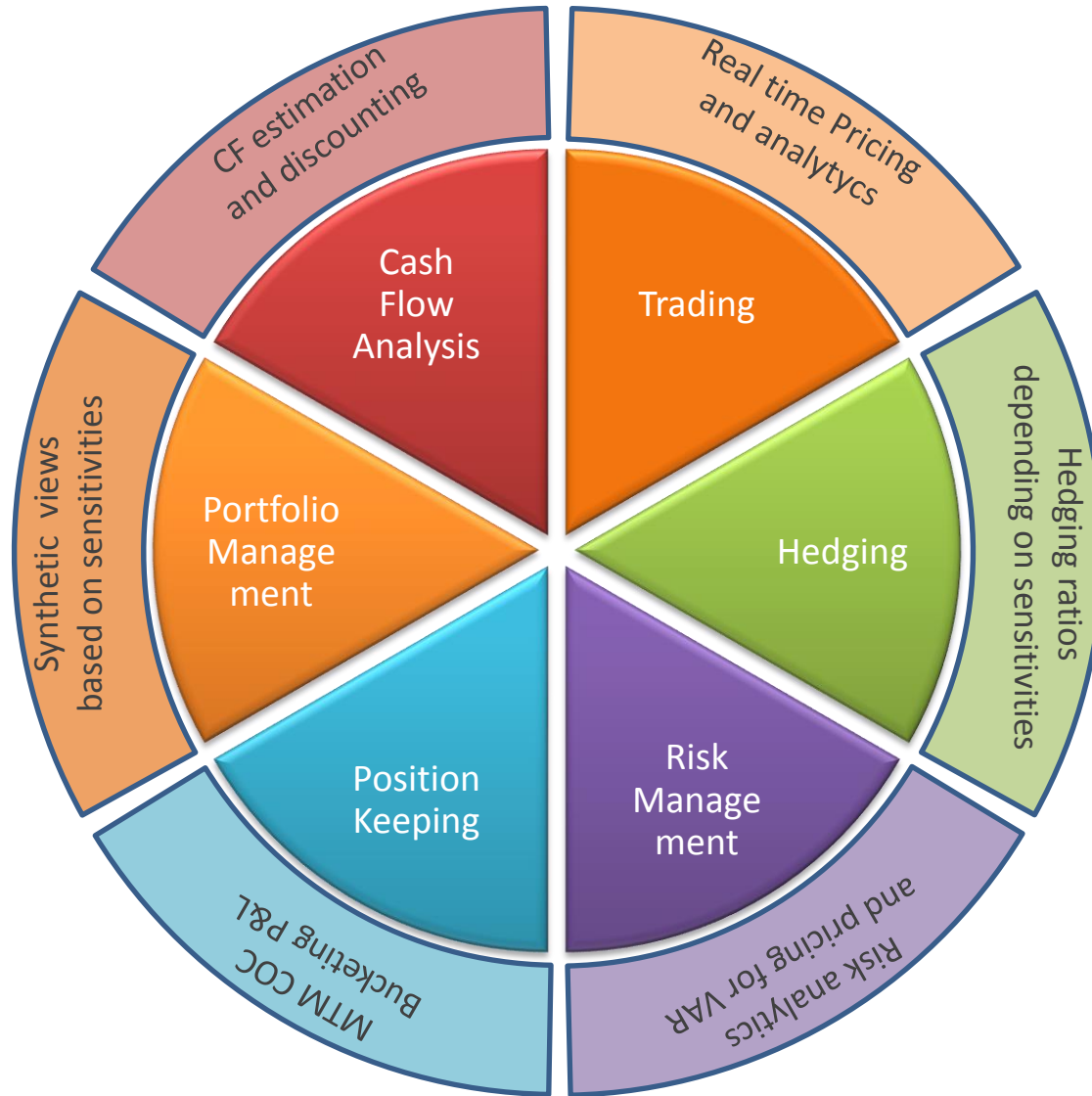
- are used for querying discrete term structure objects like interest rate curve, credit curve, volatility matrix;
- Linear, Flat, Log-Linear;
- Cubic Spline (global method), Hyman (local method), Hagan West (local method)

# FMR4000 Data flow



# **Financial Engineers Team: Areas of activity**

# Financial Engineers Team: Areas of activity



# Grazie per l'attenzione



<https://www.linkedin.com/company/list-spa>



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