

# Computer Aided Finance

*The Model-Based Design Approach for  
Financial Models using Matlab's Power*

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# Model Based Design

“MBD provides a **common design environment**, which facilitates general **communication**, **data analysis**, and **system verification** between development groups.

Engineers can locate and **correct errors early in system design**, when the time and financial impact of system modification are minimized. **Design reuse**, for upgrades and for derivative systems with expanded capabilities, is facilitated.”

*(Wikipedia)*

- 1. Modeling:** Cash flows of a financial product
- 2. Controller analysis:** Trading strategy, cost of capital, ...
- 3. Offline or realtime simulation :** e.g. Potential Future Exposure computation, VaR, ...
- 4. Deployment:** (automatic code generation): automatic hedging, ...

# Layers in Theta Suite

## Theta Suite & Matlab

Reporting Layer

Workflow Layer

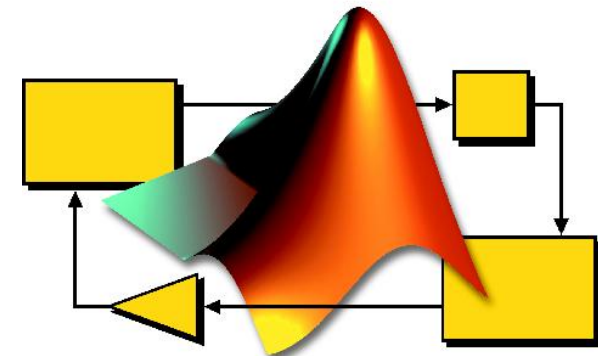
Configuration Layer

Orchestration Layer

ThetaML Layer



# MathWorks



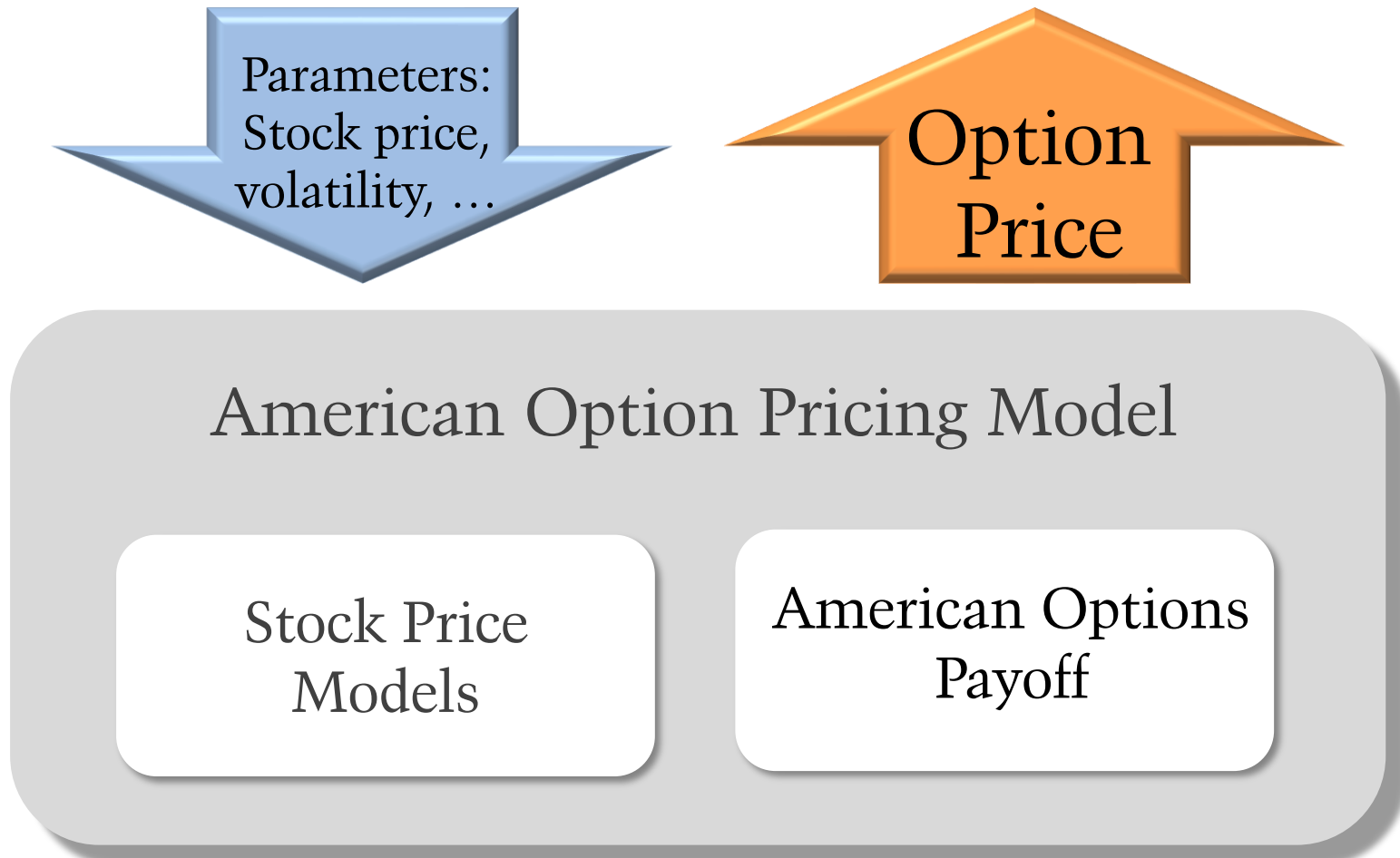
# Partner

# 1. ThetaML Layer

## Domain specific Language for Finance

- ➔ Programming in chronological order
- ➔ Easy access to conditional expectations
- ➔ Simultaneously taking care of both scenario- and time- indices
- ➔ Extensible due to full access to Matlab

## 2. Orchestration Layer



# 3. Configuration Layer

## ThetaML Configuration

**Info**

Name : conf  
Description : Default parameter configuration  
Valuation date : @date:2010-07-07

**Runtime parameters**

**config**

EquityModel : GBM  
Product : American  
put :

**data**

SInitial : 100  
TimeNodesR : [@date:2010-07-07, @date:2010-09-30, @date:2010-12-30]  
F : [0.05, 0.05, 0.05]  
DividendTimeGrid : 0  
DividendValues : 0

**GBM**

Sigma : 0.2

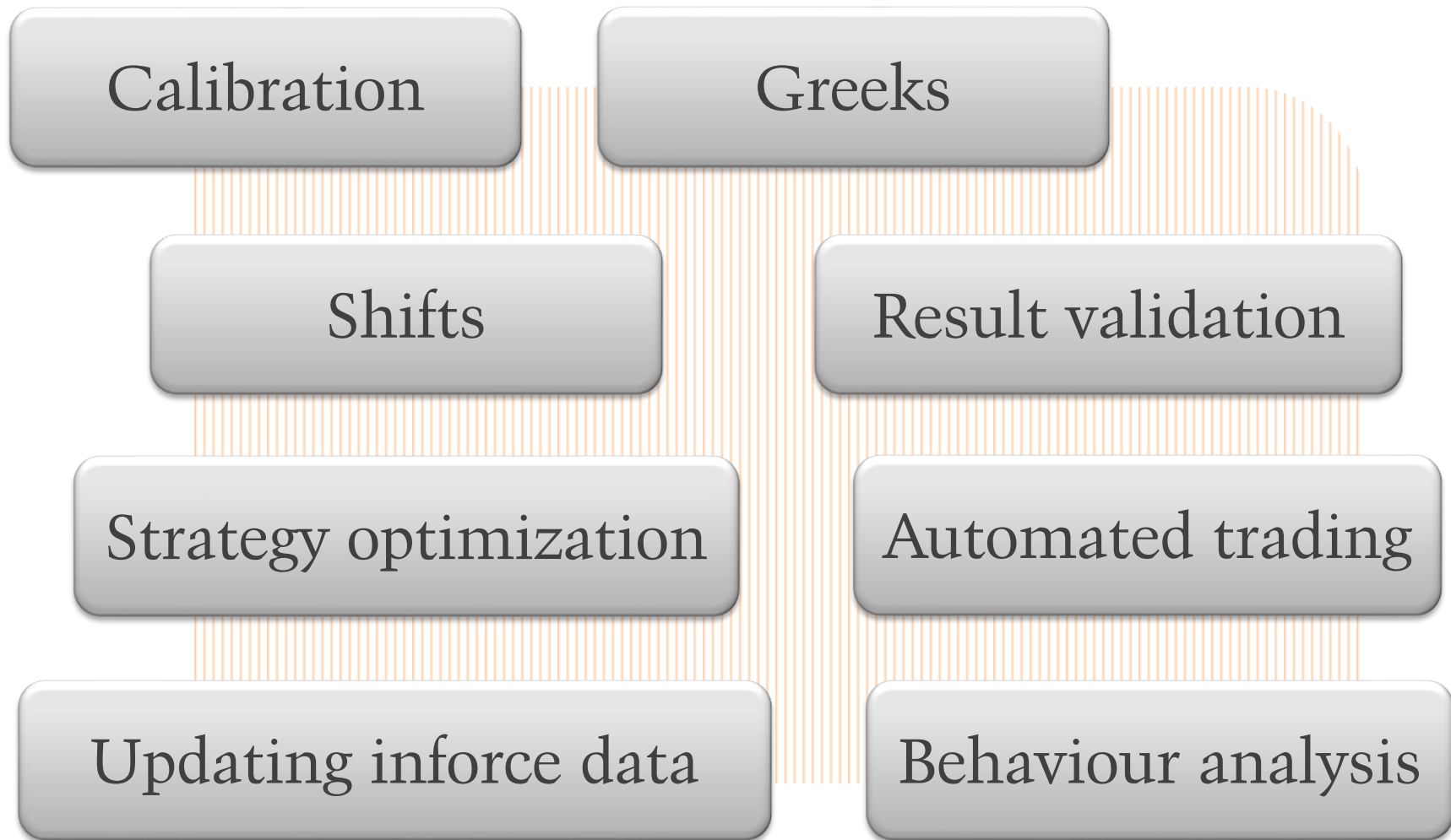
**param**

K : 100  
T : 1  
ExerciseInterval : 1/25

## Chosing

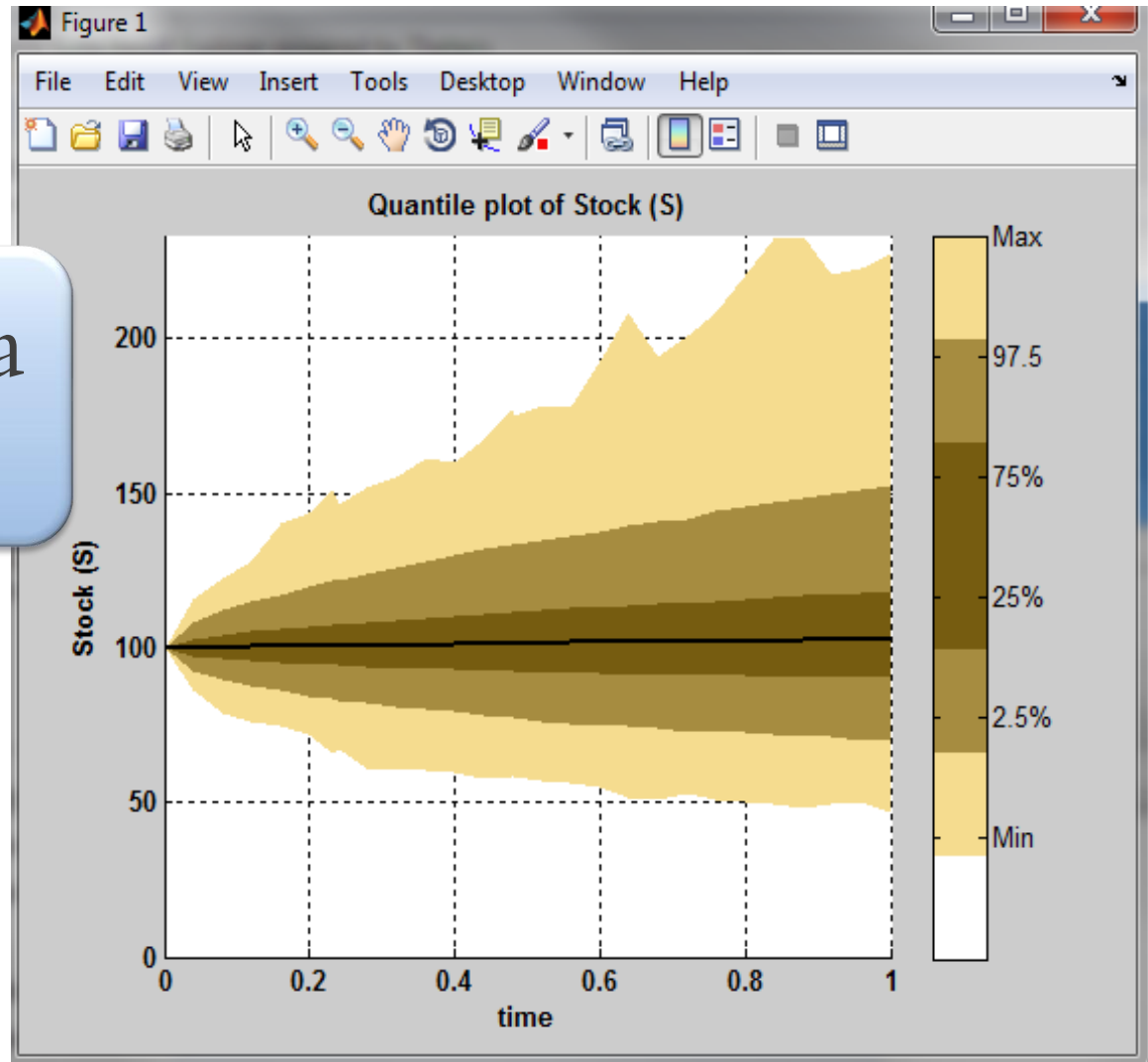
- parameters
- models
- time conventions
  
- Allow Matlab access for data source integration

# 4. Workflow Layer



# 5. Reporting Layer

Prepare result data with Matlab





# Large Library Support

## Live Insurance Contract

Market

Stocks

Interest Rates

Fund

Rebalancing

Non-Rebalancing

Mortality

Deterministic

Stochastic

Lapse

Optimal

Deterministic

Withdrawal

Optimal

Deterministic

Confidential

# Conclusion

- ➔ Computer Aided Finance brings a solid engineering approach for the financial sector
- ➔ Theta Suite simplifies the generation and maintenance for large libraries for financial models
- ➔ The deep Matlab integration empowers the user to create the best solution – efficient, fast, error safe and easy to use



# THETARIS

Engineering in Finance

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