



# Training Agenda

## Structuring and Pricing Derivatives using Numerix CrossAsset XL, CrossAsset SDKs & CAIL (C++/Java/C#)

### Numerix Training: CrossAsset XL and SDKs (C++/Java/C#): Orientation Implementation

#### Day 1

- 9:00–9:30 Overview of system architecture and Numerix solutions; why CA XL for developers  
Overview of Numerix CrossAsset XL and Pricing Library; Deal structuring and pricing in Numerix
- 9:30–10:00 *Numerix CrossAsset XL Environment*
- Numerix object structure and function interfaces in CA XL; Application settings in CA XL
- 10:00–10:30 *Static Data*
- Understanding and utilizing global calendars; Understanding and utilizing global fixing history
  - Understanding convention collections and their intended use: Global vs. Local vs. Smart conv.
  - Application example: setting up and pricing an IR swap via analytics (hands-on exercise with Numerix object interface; utilizing calendars, conventions and fixing history)
- 10:30- 10:45 *Coffee Break*
- 10:45-12:30 *Overview of the Template Library*
- Using the Quick Start Tool to Access Numerix Solutions
- Market Data*
- Walk through Numerix Market Data sheets
  - Updating Numerix Bloomberg market data sheets and creating market data sheets on the fly
  - Constructing the yield curves from discount factors
  - Stripping curves from market data instruments
  - Constructing volatility surfaces and volatility cubes
  - Walk through IR, EQ, FX market data
  - Discussion on market data construction for other asset classes
- Pricing vanilla and semi-exotic deals via analytics*
- **Case Study:** setting up and pricing a Swap via analytics; Capturing and displaying in spreadsheet pricing results and cash flow reports
  - **Case Study:** setting up and pricing a Swaption via analytics
  - Discussion on other vanilla and semi-exotic deals in Numerix via analytics
- 12:30–13:15 *Lunch break*
- 13:15-15:30 *Pricing vanilla and semi-exotic deals via analytics*
- **Case Study:** setting up and pricing a Swap via analytics; Capturing and displaying in spreadsheet pricing results and cash flow reports
  - **Case Study:** setting up and pricing a Swaption via analytics
- Discussion on other vanilla and semi-exotic deals in Numerix via analytics
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- 15:30 - 15:45 *Coffee Break*
- 15:45–17:30 *Understanding and Using solutions from the Numerix Template Library*
- **Case Study:** Pricing an Equity option using the out of shelf template Library
  - **Case Study:** Pricing a Bermudan Callable Inverse Floater Swap using the Template library
  - Modifying solutions to accommodate Coupon & Funding Step-up/Step-down schedules, Notional amortization tables, caps, floors and call probabilities; Pricing with a different model; Report templates

## Day 2

9:00–10:30

Review of day one materials and Discuss the difficulties faced in the Home work problem

### *Discussion on various ways to construct model objects and calibrate them to instruments*

- Model Construction; Using solution builder to add a model template and modify it
- Calibrating models to market instruments
- Model viewers: displaying and interpreting calibration results
- Price convergence study and Numerix scenario tools

10:30–10:45

*Coffee Break*

10:45–12:30

Discussion and walkthrough various Fixed Income and CC Solutions

### *Deal Structuring and Pricing of Semi-Exotic and Exotic Deals via Payment Streams*

- **Introduction to *Payment Streams and Contract Features***
- **Case Study:** Structuring, pricing and generating risk reports for a Bermudan callable bond with payment streams
- Setting up indices, schedules and inputting time dependent data like amortizing schedules or other time varying inputs
- Input the payment streams data tables
- Price and display pricing results and relevant cash flow and risk reports
- **Case Study:** Setting up and pricing a Bermudan Callable Swap via payment Streams
- **Case Study:** Setting up a Complex Swap with variation on cash flow formula on each coupon date.
- **Case Study:** Setting up and pricing a PRDC via payment streams

12:30–13:15

*Lunch Break*

13:15–15:30

- Deal Structuring and Pricing of Exotic Deals via scripting
- Case Study: Structuring, pricing and generating risk reports for a Bermudan callable bond using Scripting
- Setting up relevant indices, events, and line by line coding of Numerix scripts
- Setting up time slice observers to observe and display time slice values of underlying indices or various variables on script

15:30–15:45

*Coffee Break*

15:45–17:00

- Comparing side by side deal structuring via payment streams and via scripting
- **Case Study:** Setting up and pricing a Bermudan Callable CMS Spread Swap via scripting and via payment streams
- Discussion and walk through various Fixed Income (single currency and CrossCurrency Deals)

17:00–17:30

Q&A Take Home Problem

## Day 3

9:30–10:00

### *Deal Structuring and pricing for CrossCurrency Deals*

- Setting up CrossCurrency Basis Curves
- Three curve pricing of CC basis swaps (taking CC Spread into consideration for discounting)
- Specifics on Setting up CrossCurrency Models
- Setup time slice observers to observe the time slice values for various indices and display results

10:00- 10:15

- *Coffee Break*

10:15-12:00

### *Deal Setup and Pricing of Equity and Foreign Exchange deals*

- **Case Study:** Structuring and pricing an Equity Option via Scripting
- EQ/FX/Credit market data structure in Numerix
- **Case Study:** Structuring and Pricing an EQ/FX Dual Call Asian option
- EQ/FX Greek calculations

12:00–12:30

*Lunch break*

12:30-3:30

**Case Study: *Insert a TERMSHEET HERE – PROVIDED BY CLIENT OR by us***  
*Structure the Payoff, and pricing the deal*

- Defining the payoff for the deal.
- Defining the events for the deal.
- Setting up the kernel pricer and pricing the deal.

3:30 - 3:45

*Coffee Break*

3:45–5:30

**Case Study: *Insert a TERMSHEET HERE – PROVIDED BY CLIENT or by us***  
*Structure the Payoff, and pricing the deal*

- Defining the payoff for the deal.
  - Defining the events for the deal.
- Setting up the kernel pricer and pricing the deal.

5:30-6:00

- Q&A and Take Home Problem

## Day 4 CA SDK –Software Development Kit

9:00-12:30

### *Numerix System Development Toolkit (C++/Java/C#)*

- Overview of Numerix CrossAsset SDK packages and classes
- Similarities of CrossAsset XL and CrossAsset C++/Java/C# API
- ApplicationCall (data driven) API vs. Object Interface API
- Overview of object classes and their inheritance hierarchy: Lightweight utility objects and heavier financial objects; Entity class hierarchy; Handling Optional Arguments; Object lifetime and Garbage Collection
- Serialize and de-serialize Numerix objects from C++/Java/C# into XML and dump to or read from Excel XML; Deal debugging and support
- Benefits and drawbacks of each interface (when to use each)

12:30–13:15

### *Lunch Break*

13:15-15:30

- **Case Study:** Setting up and pricing a Bermudan callable swap deal from static data, market data, deal setup, pricing and risk reports (complete lifecycle of deal pricing)

### *Numerix Integration Tools*

- Use of Numerix XML as an integration Tool
- Automatic C# Code Generation from CA XL
- User Define Objects (UDOs)
- CrossAsset Integration Layer and CrossAsset Server (CAIL and CAS)

15:30–15:45

### *Coffee Break*

15:45–17:00

### *Implementation and hands-on case studies utilizing C++/Java/C# SDKs*

- **Case Study:** Setting up and pricing a portfolio of Swaps
- **Case Study:** Setting up and pricing a CDS
- **Case Study:** Setting up and pricing an European/American Call on FX

17:00-17:30

Q&A

## Day 5

## CAIL – CrossAsset Integration Layer

9:00–10:30

Accessing the Home Work problems – go through the issues

9:15-10:30

*Final Review of CA XL and SDK*

10:30–10:45

*Coffee Break*

10:45–12:00

*Overview of CAIL*

- *Input Data for calculations*
- *Templates and Templates Repository Concepts*
- *Calculation Context Concepts*

12:00–12:30

*Lunch Break*

12:30–3:00

- *Walk through the provided templates*
- *Templates Standard and Requirements*
- *Template customization and Reuse*

3:00–3:15

*Coffee Break*

3.30-5.00

- *Trade Template Standards.*
- *Creating Template objects and Class instantiation objects.*
- *Running Calculations on the Trade*

5:30-6:00

Q&A