

TRANSPARENCY • EFFICIENCY • NETWORKS
WHAT'S YOUR POSITION?



Adaptiv: Future trends and
challenges in financial risk
management

Marcus Cree
December 1st 2009



SUNGARD[®]

Agenda

- Overview of CMIB (2 mins)
- Market trends that Adaptive customers are facing
- How customers are reacting to these trends
- How SunGard is addressing the customer needs that these trends throw up

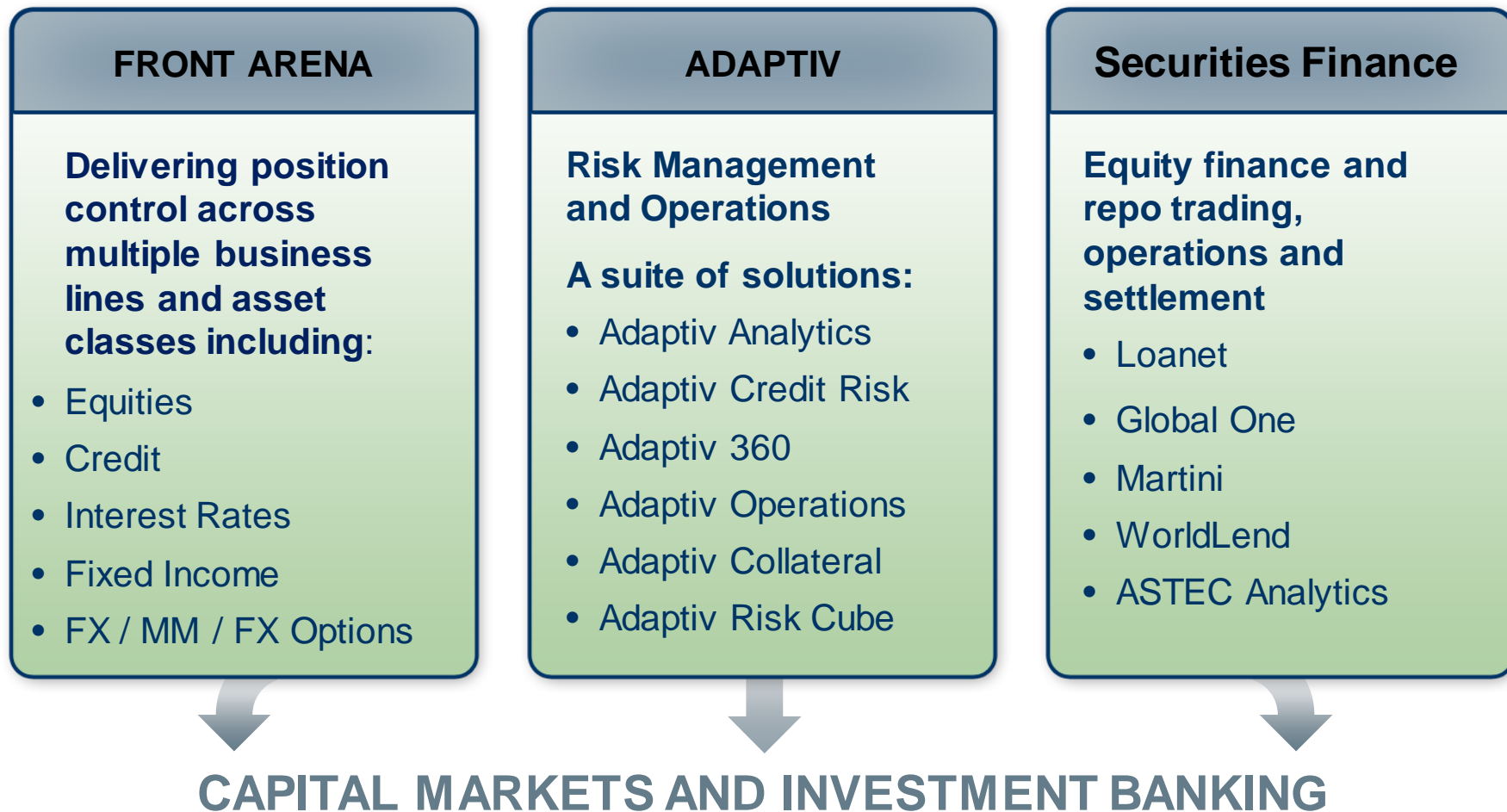


Overview of CMIB (2 mins)

CM&IB Global Presence

- Each of the **world's top 10 banks** uses at least one Capital Markets solution
- The **top five banks** in the world **each use several** of our solutions
- We have **450** customers worldwide in **30** countries
- Our Capital Markets team numbers **1,100** worldwide
- We operate from **23** office locations around the world

CM&IB Overview





Market Trends

Trends In Risk Management – Until Recently?

Trend

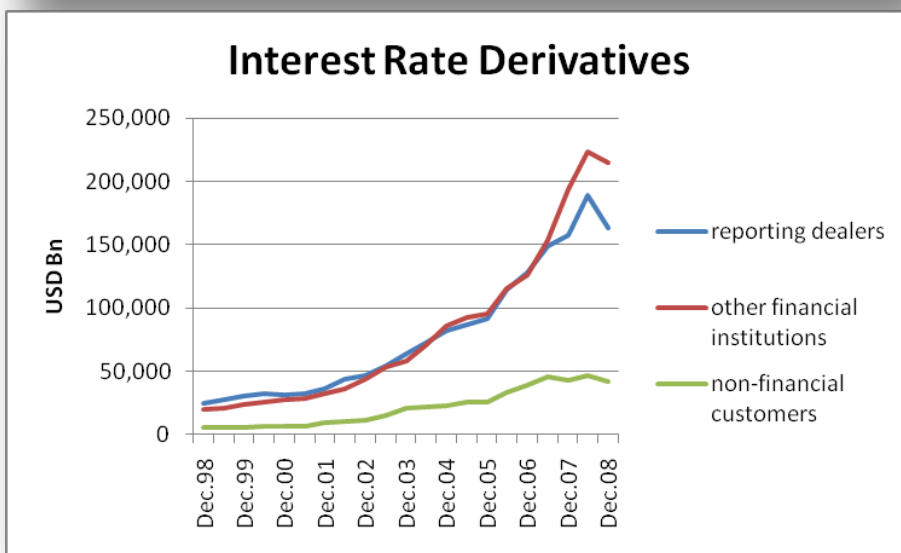
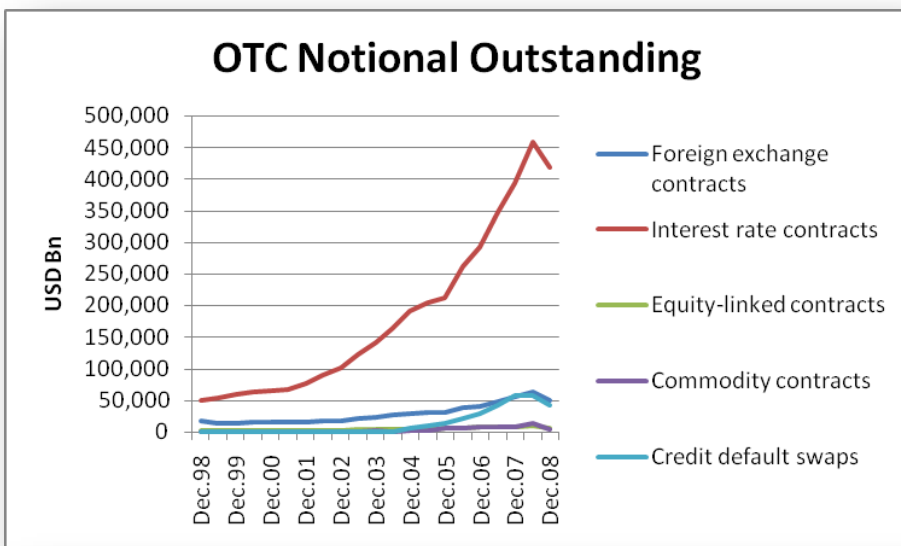
- High growth in derivative volumes
- More and more complex transactions
- Increasing emphasis on stress-testing
- Move towards using simulation based techniques for measuring credit risk exposure
- Consolidation of market & credit risk (e.g. Incremental risk charge, economic capital)

Drivers

- Market best practice
 - Simulation PFE a more accurate and “stable” estimation of future exposure
 - Cost of credit (CVA) incorporated into pricing
- Regulatory changes
 - Internal model for CCR – “EEPE”
 - Credit event risk (Incremental risk charge)
- Recent events – stress-testing / liquidity
- Better capital usage and allocation

Volume Growth Curtailed

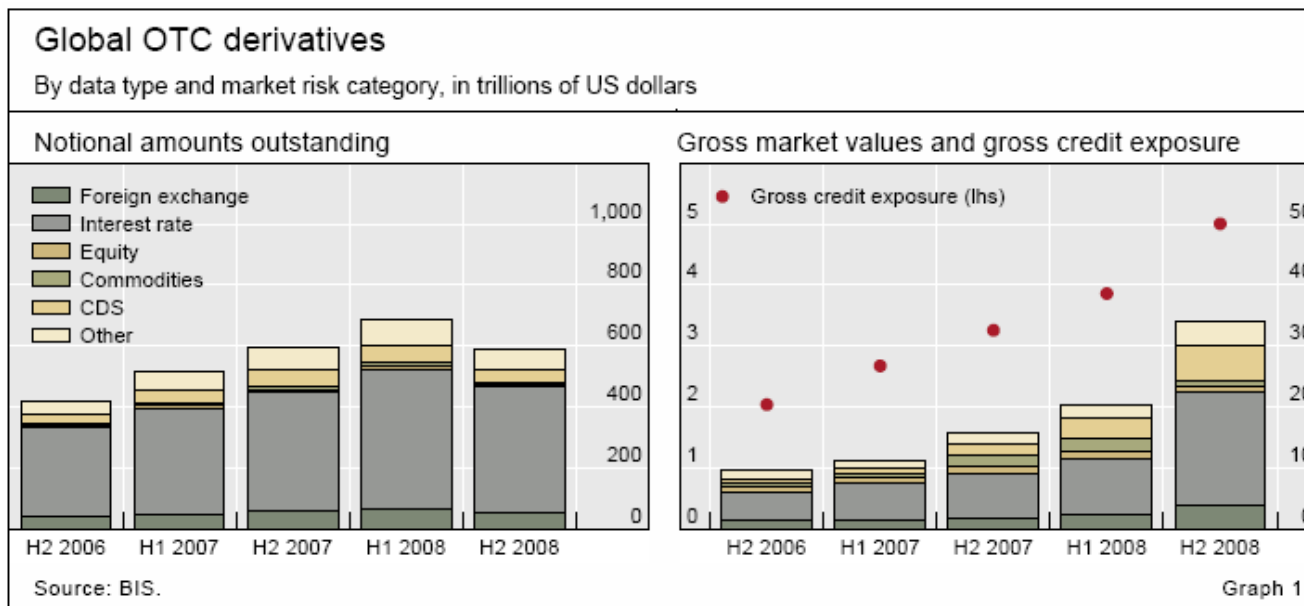
- End '08 saw a drop in notional outstanding
- Possible contributing factors:
 - Drop in demand
 - Tri-Optima cancelled \$13.8bn in IRS contracts



Source: BIS OTC Volume Survey, May 2009

But Risk Continues To Increase

- Increased volatility leads to jump in gross market risk and netted credit exposure



Conclusions – Trends Remain Valid

- Although OTC volumes have dropped, they remain at historically high levels
- More importantly, the replacement values have shot up due to market volatility
- Banks may be retrenching to more vanilla product types, however the complex long-dated transactions remain on the books and must be managed

Where are we now?: Implications Of The Crisis

- Increased regulatory intervention
 - Governments are now major shareholders in the banking system
 - Huge political demand to ensure “never again”
- Heightened focus on risk management
 - Deep recession increases credit problems
 - New regulation increasing pressure on capital
 - e.g. Stressed VaR, incremental risk charge
 - Capital constraints require careful management
 - Sharpened reputational risk
 - Deeper awareness of multi-dimensional stakeholder risk tolerance
- IT budgets are reduced
 - Need to prioritise “high impact” projects

Banks' Response To Recent Events

- Increased focus on explanation and analysis
 - Not just “here is the VaR number”
- Improve risk reduction capabilities
 - Invest in collateral management programs
 - Exchange traded OTC derivatives
 - Counterparty credit management
 - Manage capital much more closely
- Tighter integration of risk into daily business
 - Risk function given more authority
 - Follows Basel “use test” principle
 - CVA linked to pricing/front office reserves



How SunGard can help

SunGard Response To Trends In Risk Management

○ Investment in calculation performance

- Optimised for scalability – multi-threaded applications, grid computing
- Built for purpose risk models
- Incremental Monte Carlo engine

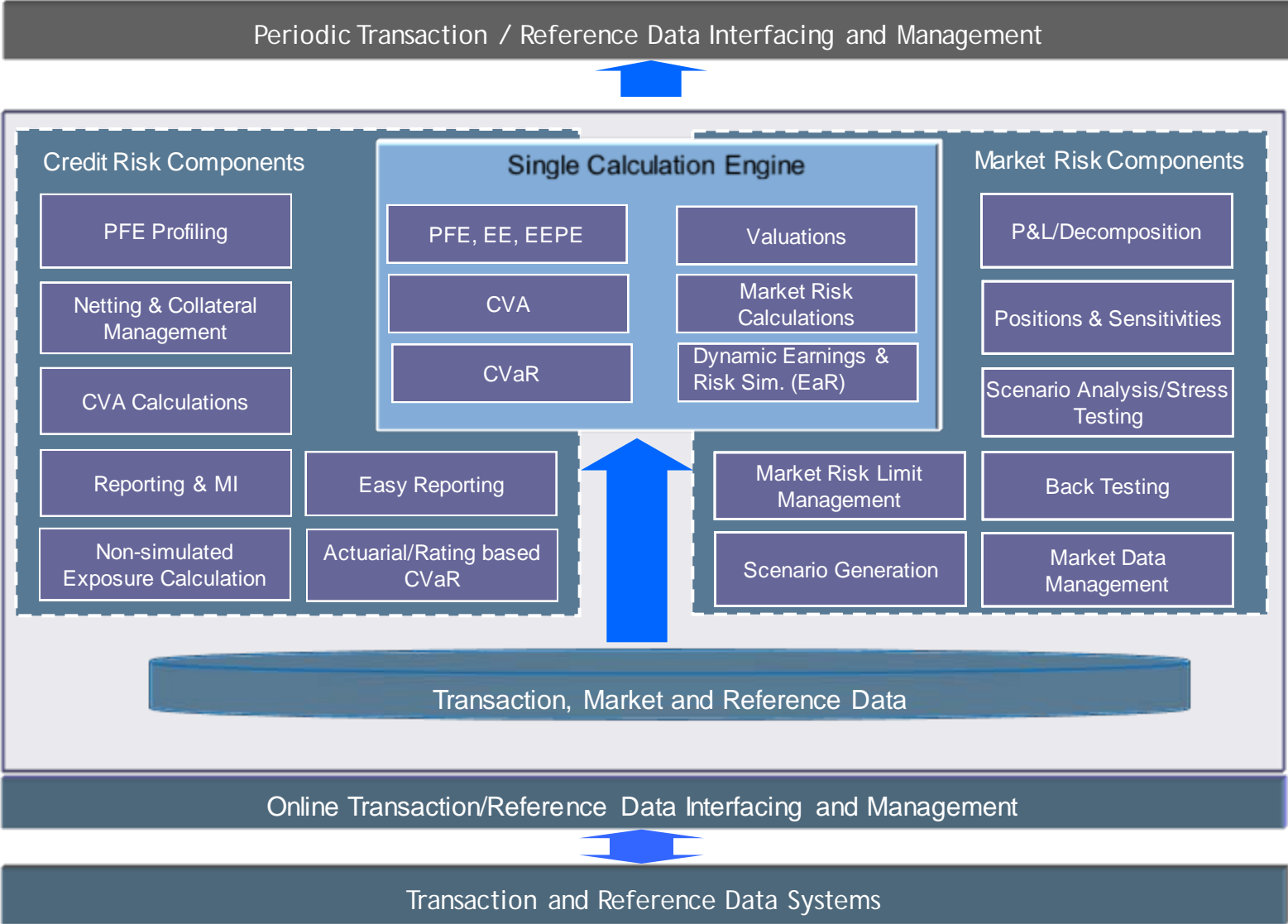
○ Leverage common elements of market & credit risk

- Market data management / calibration
- Valuations and scenario generation
- Limit management and process control

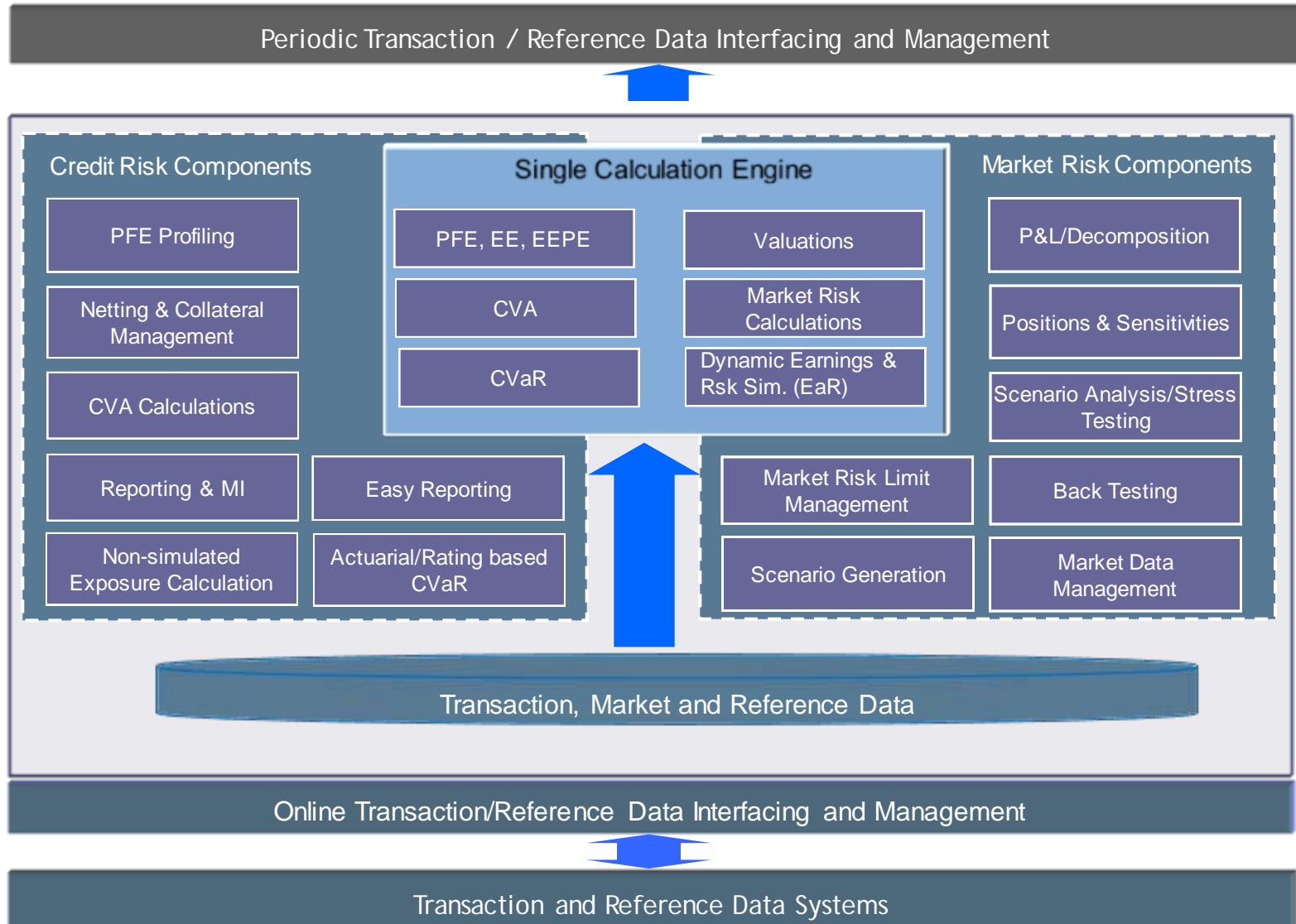
○ Flexibility in design

- Component architecture allows banks to address key pain points
- Store lowest levels of detail allowing ad-hoc drill down
- Centralised risk models vs re-use of front office models

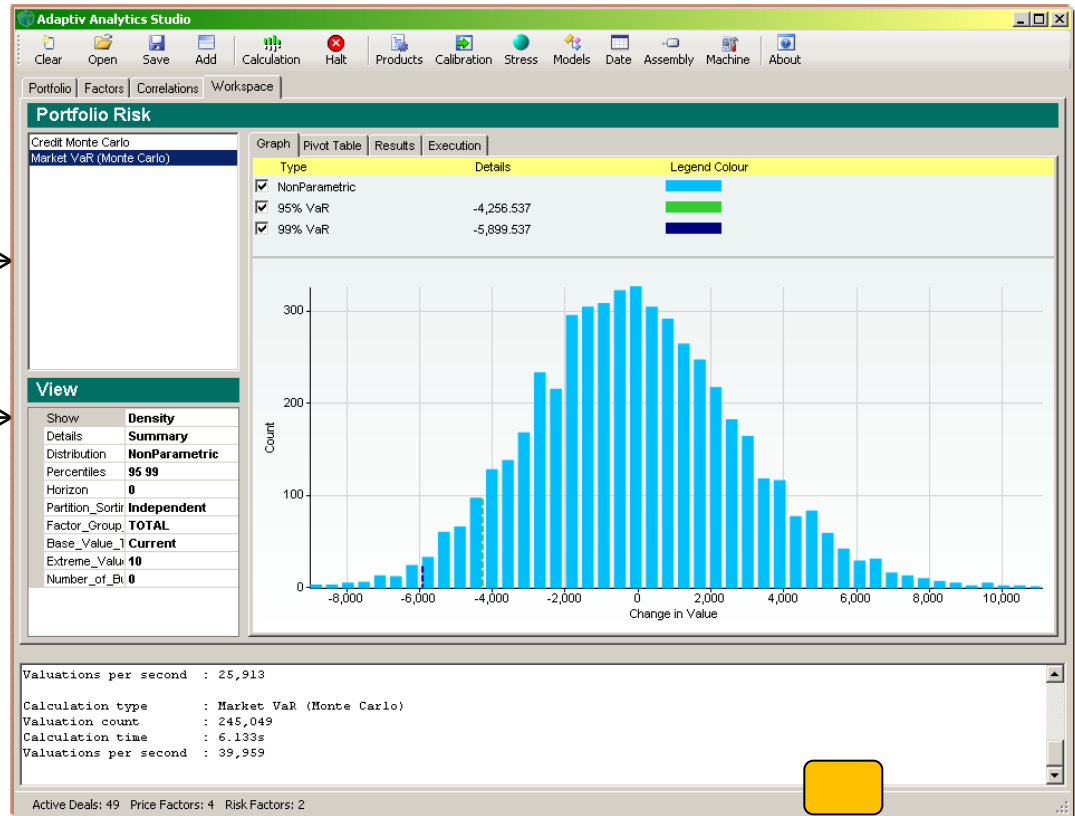
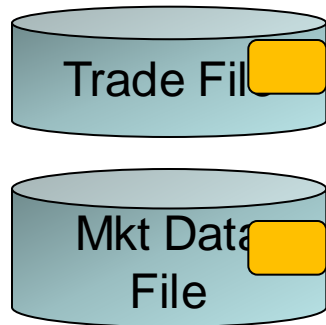
SunGard's Component Based Enterprise Risk Solution



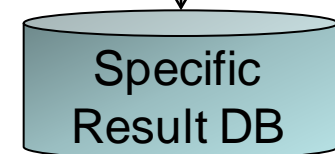
SunGard's Component Based Enterprise Risk Solution



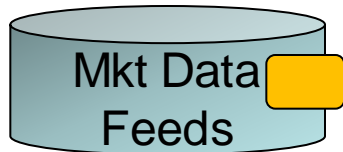
Adaptiv Analytics – System Flow – Basic Engine



- Transparent models and valuation techniques
- Efficient time grids and distributional design
- Online graphical explain
- Feeds remaining risk management network



Adaptiv Analytics – Market Data Manager



Market Data Archives: OFFICIAL - 01/8/2007 to 12/31/2008

OFFICIAL

- Definition
- Historical Data
 - Cap Volatility Surface
 - ATM Caplet Volatility
 - EquityVol
 - EquityPrice
 - EquityFuturesPrices
 - EquityOptionsPrices
 - Commodity Price
 - Credit Curve
 - Spot FX
 - Hull White Params
 - FX Volatility Surface
 - ATM FX Volatility
 - Yield Curve
 - Zero Rate

| Date | USD USDSWP | | Value | | | | |
|-----------|------------|------------|------------|------------|------------|------------|-------|
| | By Date | | | | | | |
| 01/8/2007 | 01/8/2007 | 01/10/2007 | 01/11/2007 | 01/12/2007 | 01/15/2007 | 01/16/2007 | 01/17 |
| Zero 1d | 4.17 | 3.92 | 4.25 | 4.19 | 3.88 | 4.09 | 4.36 |
| Zero 3m | 4.48 | 4.09 | 4.20 | 4.52 | 4.43 | 4.32 | 4.57 |
| Zero 6m | 4.48 | 4.09 | 4.20 | 4.52 | 4.43 | 4.33 | 4.58 |
| Zero 1y | 3.84 | 3.89 | 3.79 | 3.87 | 3.82 | 4.01 | 3.85 |
| Zero 2y | 3.51 | 3.57 | 3.54 | 3.61 | 3.34 | 3.44 | 3.31 |
| Zero 5y | 4.02 | 3.91 | 4.12 | 3.91 | 4.30 | 4.03 | 4.34 |
| Zero 10y | 4.36 | 4.33 | 4.26 | 4.34 | 4.39 | 4.29 | 4.67 |
| Zero 20y | 5.18 | 5.21 | 4.78 | 5.34 | 5.39 | 5.25 | 4.99 |

VaR Statistics Set 09/MAIN

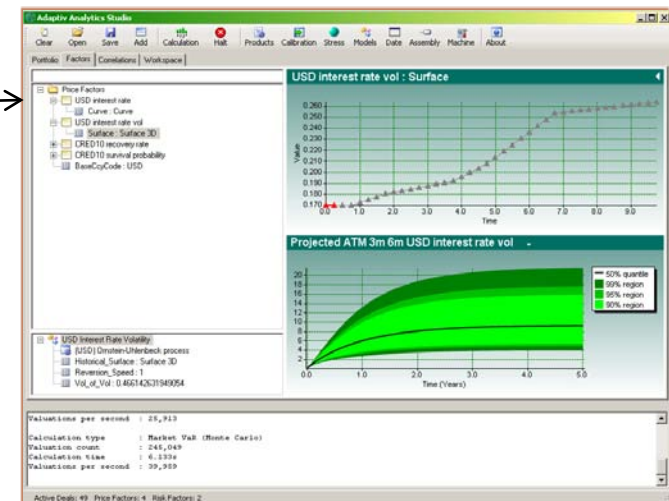
Statistics Correlations Decomposition Equity Index Betas

Calculate Statistics... Description: Main 2003 Statistics Set

View Set... (All Views) Basics

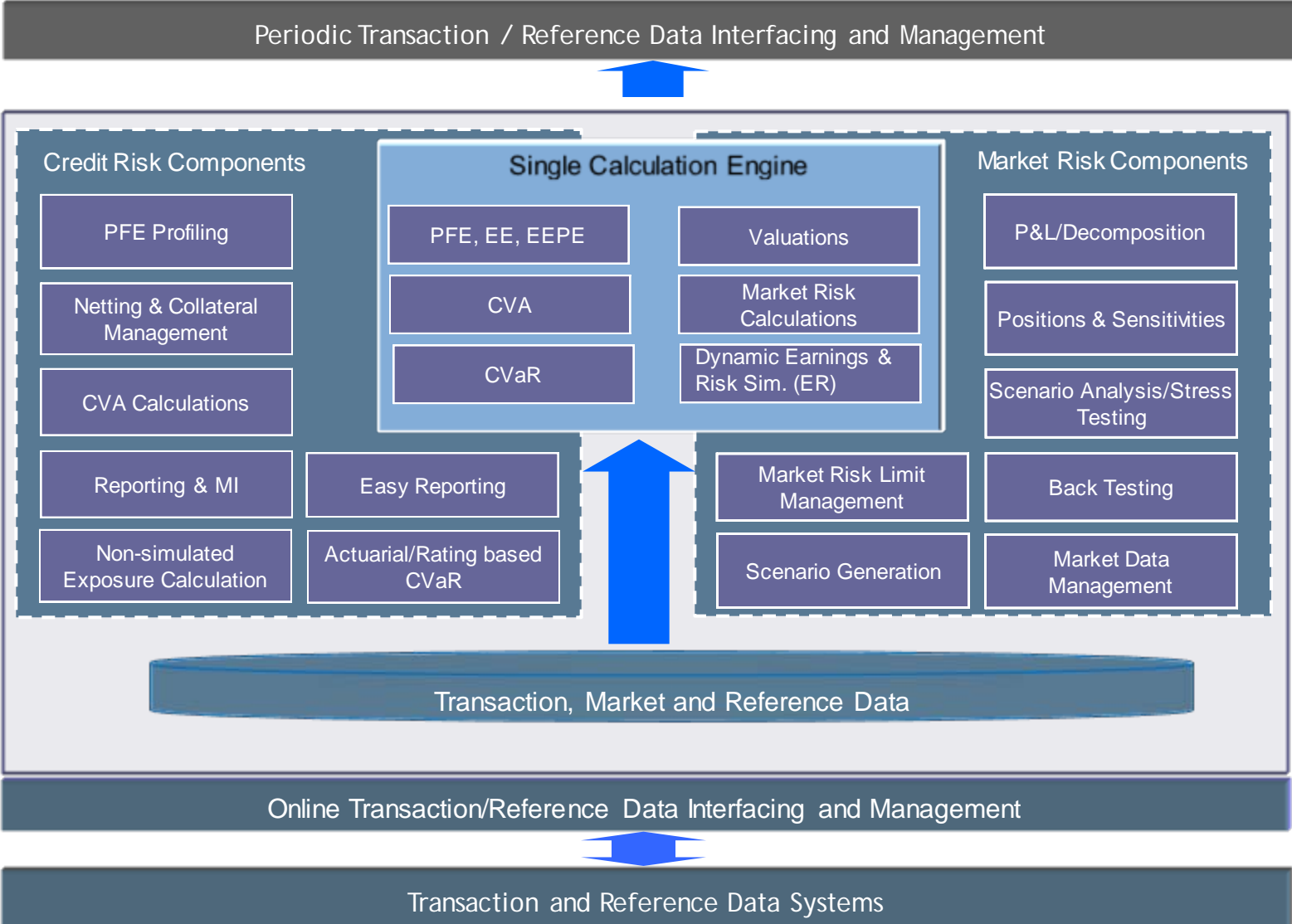
Horizon: 1d

| Statistics | Volatility | Drift | Mean Rev. Speed | Long Run Mean | Reversion Vol |
|--------------------------------|------------|-----------|-----------------|---------------|---------------|
| Zero Rate:GBP:GBP:SWP:Zero 6m | 6.502 | -0.001295 | 1.418 | 5.474 | 4.584 |
| Zero Rate:GBP:GBP:SWP:Zero 1y | 5.816 | -0.000637 | 1.042 | 5.081 | 4.059 |
| Zero Rate:GBP:GBP:SWP:Zero 2y | 5.977 | 0.000014 | 0.970 | 4.848 | 4.249 |
| Zero Rate:GBP:GBP:SWP:Zero 5y | 5.824 | 0.000950 | 0.860 | 4.801 | 4.151 |
| Zero Rate:GBP:GBP:SWP:Zero 10y | 6.515 | -0.001104 | 1.033 | 4.783 | 4.514 |
| Zero Rate:GBP:GBP:SWP:Zero 20y | 8.400 | -0.001246 | 1.213 | 5.744 | 5.273 |
| Zero Rate:JPY:JPY:SWP:Zero 1d | 5.747 | -0.000124 | 1.191 | 0.747 | 3.725 |
| Zero Rate:JPY:JPY:SWP:Zero 3m | 6.167 | -0.000511 | 1.112 | 0.897 | 4.116 |
| Zero Rate:JPY:JPY:SWP:Zero 6m | 6.296 | -0.000835 | 1.115 | 0.900 | 4.168 |
| Zero Rate:JPY:JPY:SWP:Zero 1y | 5.054 | 0.000232 | 0.974 | 0.892 | 3.607 |
| Zero Rate:JPY:JPY:SWP:Zero 2y | 6.542 | 0.000652 | 1.192 | 0.998 | 4.574 |
| Zero Rate:JPY:JPY:SWP:Zero 5y | 8.231 | 0.000666 | 0.973 | 1.104 | 3.731 |
| Zero Rate:JPY:JPY:SWP:Zero 10y | 6.266 | 0.000377 | 1.120 | 1.606 | 4.144 |
| Zero Rate:JPY:JPY:SWP:Zero 20y | 7.300 | 0.000512 | 1.120 | 1.972 | 4.824 |
| Zero Rate:USD:USD:SWP:Zero 1d | 5.870 | -0.000497 | 0.906 | 4.164 | 4.317 |
| Zero Rate:USD:USD:SWP:Zero 3m | 5.106 | 0.000011 | 0.896 | 4.506 | 3.803 |
| Zero Rate:USD:USD:SWP:Zero 6m | 5.132 | 0.000017 | 0.896 | 4.507 | 3.825 |
| Zero Rate:USD:USD:SWP:Zero 1y | 5.123 | -0.000217 | 1.163 | 3.866 | 3.501 |
| Zero Rate:USD:USD:SWP:Zero 2y | 5.577 | -0.000233 | 1.065 | 3.524 | 3.813 |
| Zero Rate:USD:USD:SWP:Zero 5y | 5.905 | -0.001034 | 0.895 | 4.600 | 4.400 |
| Zero Rate:USD:USD:SWP:Zero 10y | 6.737 | -0.000335 | 0.877 | 4.588 | 5.021 |
| Zero Rate:USD:USD:SWP:Zero 20y | 7.887 | 0.000950 | 1.041 | 5.203 | 5.500 |



- Historic data stored for data input transparency
- Stochastic parameters calculated
- Vols, drifts, correlations, S.Ds

SunGard's Component Based Enterprise Risk Solution



Latest Advanced In Adaptiv's Credit Risk Offerings

- Credit valuation adjustments (cost of credit) shown on pre-deal checks
 - Incentive-based credit Risk management
- Executive dashboard
 - Gain executive level buy-in
- Adaptiv Collateral integration
 - Big pull from market in 2009

Risk Limit Handling

- Workflow easily configured
- Notification of actions dependent upon severity levels
- Passive/active limit breach differentiation
- Temporary timed approvals

The screenshot displays the SunGard Adaptiv web application interface. At the top, a window titled "SunGard Adaptiv -- Web Page Dialog" shows the state "<< New Violation Workflow State >>". The main browser window, titled "SunGard Adaptiv - Microsoft Internet Explorer", shows the application's navigation menu and the "Violation : 133110" details page. The page includes tabs for "Properties", "Dealing Activity", "Executive Summary", "Deal Violations", "Entity Violations", and "Entity Excesses". The "Violation 133110" section provides details such as "Customer: ABNAMROBankNv", "Occurred: 11 Jun 2007 19:01:21", and "Cause: Deal Entry". The "Excess Details" section shows "Start" and "End" dates of 19Apr2008, a "Duration" of 1 day, and "Breaches" of 1. The "Highest Excess" section shows "Start" and "End" dates of 19Apr2008, a "Duration" of 1 day, and "Excess" of 200.340 USD. The "Violation - Transition History" section shows a single result with columns for "Status", "New Status", "User", "Date Stamp", and "Comments". The transition history entry shows a status change from "Unreviewed" to "Approved" by "Richard.Dyson" on "01Apr2008 05:18:11" with the comment "Deal Temporarily Approved". A red oval highlights this transition history entry. The bottom of the page shows the user "Richard.Dyson - 2007.1.0.124 (RC)" and the "Local intranet" environment.

Violation : 133110
Branch - GROUP
Go to Entity Transition Check Details Show Deal

Violation 133110
Changes Modify Print Link

| - Violation | |
|-------------|----------------------|
| Portfolio | Customer |
| Measure | Settlement |
| Band | |
| Legend | ABNAMROBankNv |
| Occurred | 11 Jun 2007 19:01:21 |
| Cause | Deal Entry |
| Priority | 2 |
| Message | Unapproved |
| Comments | |

| - Excess | |
|----------|-----------|
| Start | 19Apr2008 |
| End | 19Apr2008 |
| Duration | 1 day |
| Breaches | 1 |

| - Highest Excess | |
|------------------|-----------|
| Start | 19Apr2008 |
| End | 19Apr2008 |
| Duration | 1 day |

| - Details At Highest Excess | |
|-----------------------------|-------------|
| Limit | 0.000 USD |
| Exposure Before | 0.000 USD |
| Exposure After | 200.340 USD |
| Excess | 200.340 USD |

Violation - Transition History 1 result

| Status | New Status | User | Date Stamp | Comments |
|------------|------------|---------------|--------------------|---------------------------|
| Unreviewed | Approved | Richard.Dyson | 01Apr2008 05:18:11 | Deal Temporarily Approved |

Richard.Dyson - 2007.1.0.124 (RC)
Local intranet

Risk Limits Reporting Options

- Online for immediate limit checking
- Visible trading utilisations
- Real time/overnight reporting options
- Outstanding lists for limit controllers

SunGard Adaptiv - Microsoft Internet Explorer

Address: http://localhost/adaptiv/

Adaptiv Customers Deals Violations Excesses Analytics More... System

SunGard Adaptiv

Open Excesses (GROUP) 6 results

Type your search [Apply](#) [Reset](#) [Options](#) [Transition](#) [Choose Report](#)

| Excess ID | Priority | Portfolio | Legend | Measure | Band | Assigned To | Last Update | Open Date | Close Date | From | To | Date To Order | Currency | Peak | Peak Limit | Peak Date | Viol | Limit | Cust | Customer |
|-----------------------------------|----------|-----------|----------|---------|---------------|-------------------|-------------|-----------|------------|-----------|-----------|---------------|----------|---------|------------|-----------|------|-------|------|----------|
| - Status = New Active (1) | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | 23428 | 2 | Customer | NOP | Settlement | | 31Mar2008 | 05Jun2007 | | 19Apr2008 | 19Apr2008 | 20Apr2008 | USD | 200.340 | 0 | 19Apr2008 | x | x | x | NOP |
| - Status = New Passive (5) | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | 23432 | 2 | Customer | Cube | ABNAMROBankNv | /// ABNAMROSydney | Primary | 31Mar2008 | 31Mar2008 | 31Mar2008 | 10May2012 | 11May2012 | EUR | 9.947 | 100 | 01Oct2008 | x | x | x | ABNAMRO |
| <input type="checkbox"/> | 23431 | 2 | Customer | | ABNAMROBankNv | | Settlement | 31Mar2008 | 31Mar2008 | 19Apr2008 | 19Apr2008 | 20Apr2008 | USD | 200.340 | 0 | 19Apr2008 | x | x | x | ABNAMRO |
| <input type="checkbox"/> | 23430 | 2 | Customer | | MNOsecurities | | Primary | 31Mar2008 | 31Mar2008 | 02Apr2008 | 30Mar2009 | 31Mar2009 | USD | 8.517 | 0 | 01Oct2008 | x | x | x | MNOsecu |
| <input type="checkbox"/> | 23429 | 2 | Customer | | DEF | | Primary | 31Mar2008 | 31Mar2008 | 12Jun2009 | 15Jun2009 | 16Jun2009 | USD | 22.553 | 200 | 12Jun2009 | x | x | x | DEF |
| <input type="checkbox"/> | 23427 | 2 | Customer | | CDE-AU | | Settlement | 31Mar2008 | 05Jun2007 | 19Apr2008 | 19Apr2008 | 20Apr2008 | USD | 0.340 | 200 | 19Apr2008 | x | x | x | CDE-AU |

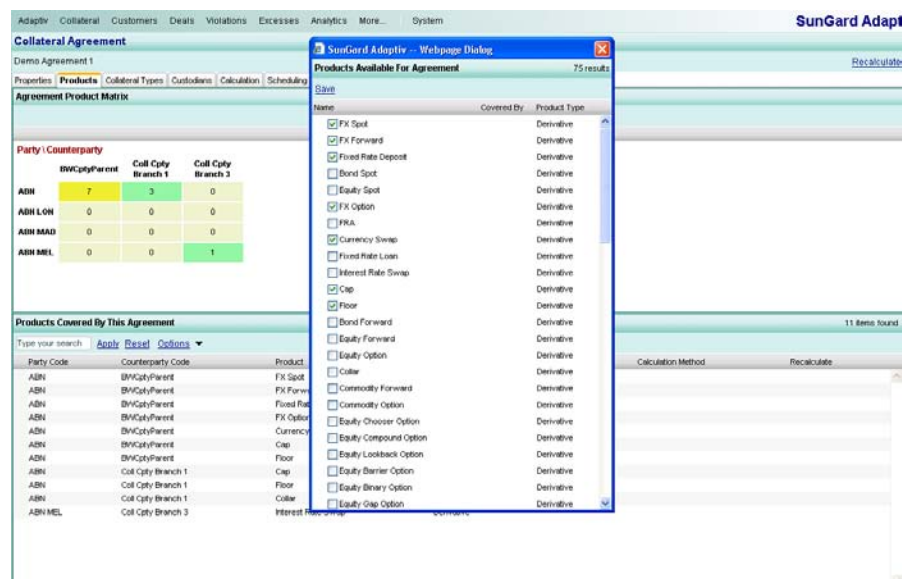
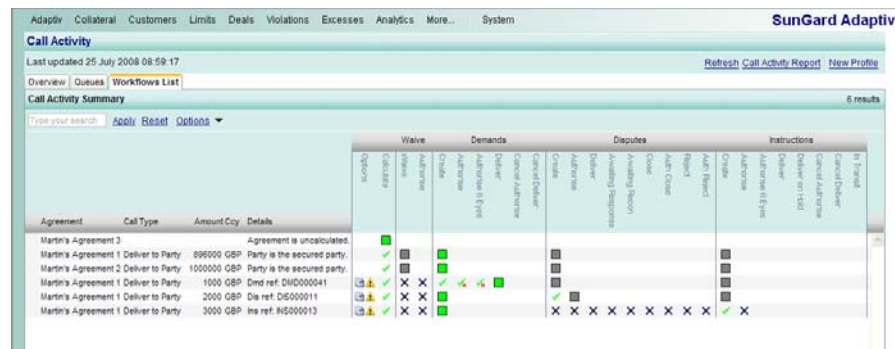
Richard Dyson - 2007.1.0.124 (RC)

Local Intranet

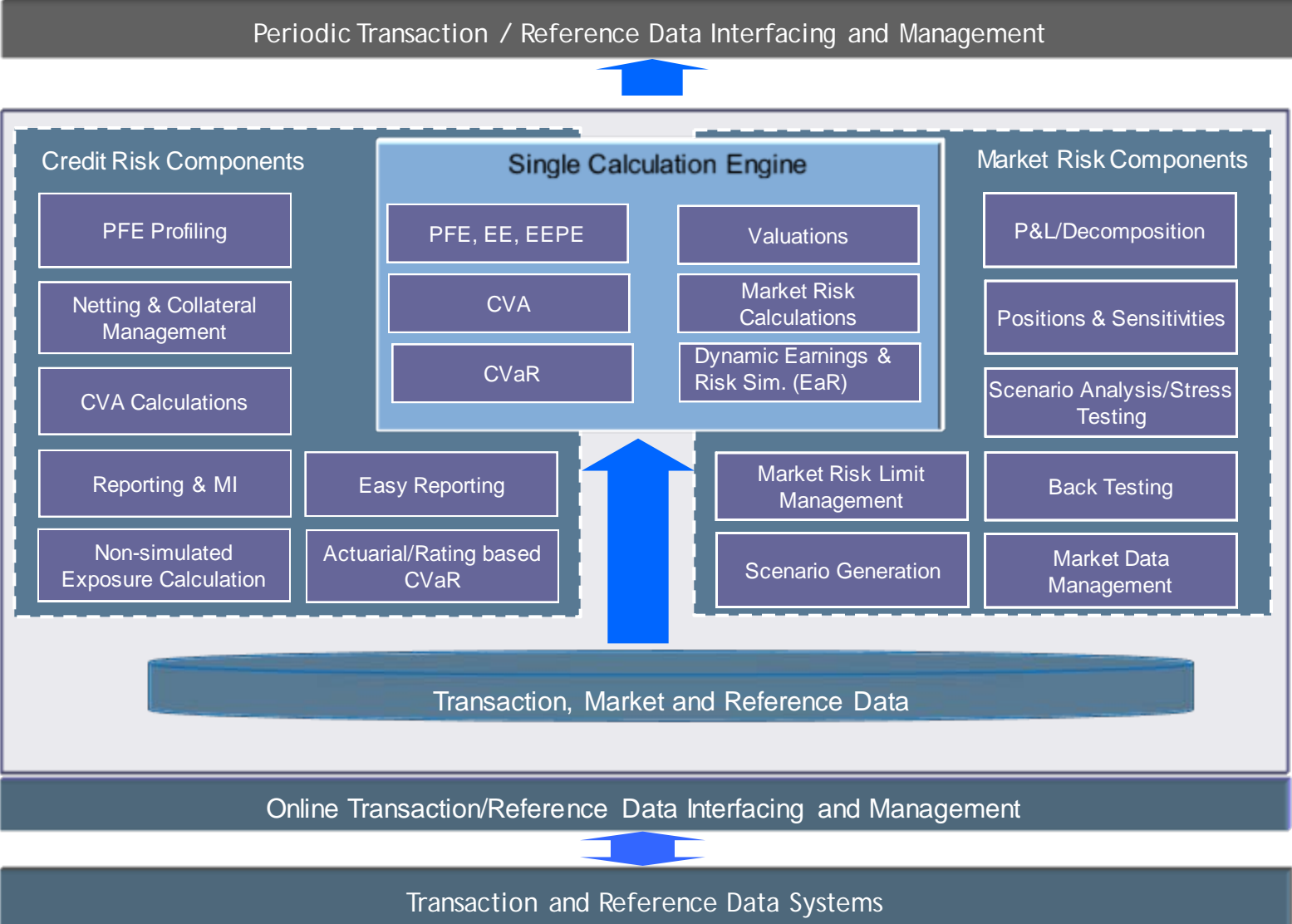
SUNGARD

Adaptiv Collateral

- Computes collateral requirements
- Central storage of netting and collateral agreements
- Workflow automates business processes
- Optimises collateral usage
- High-level executive reporting
- Designed for global use across multiple physical sites
- Cross product, cross asset, cross business line
- Can be Installed or ASP



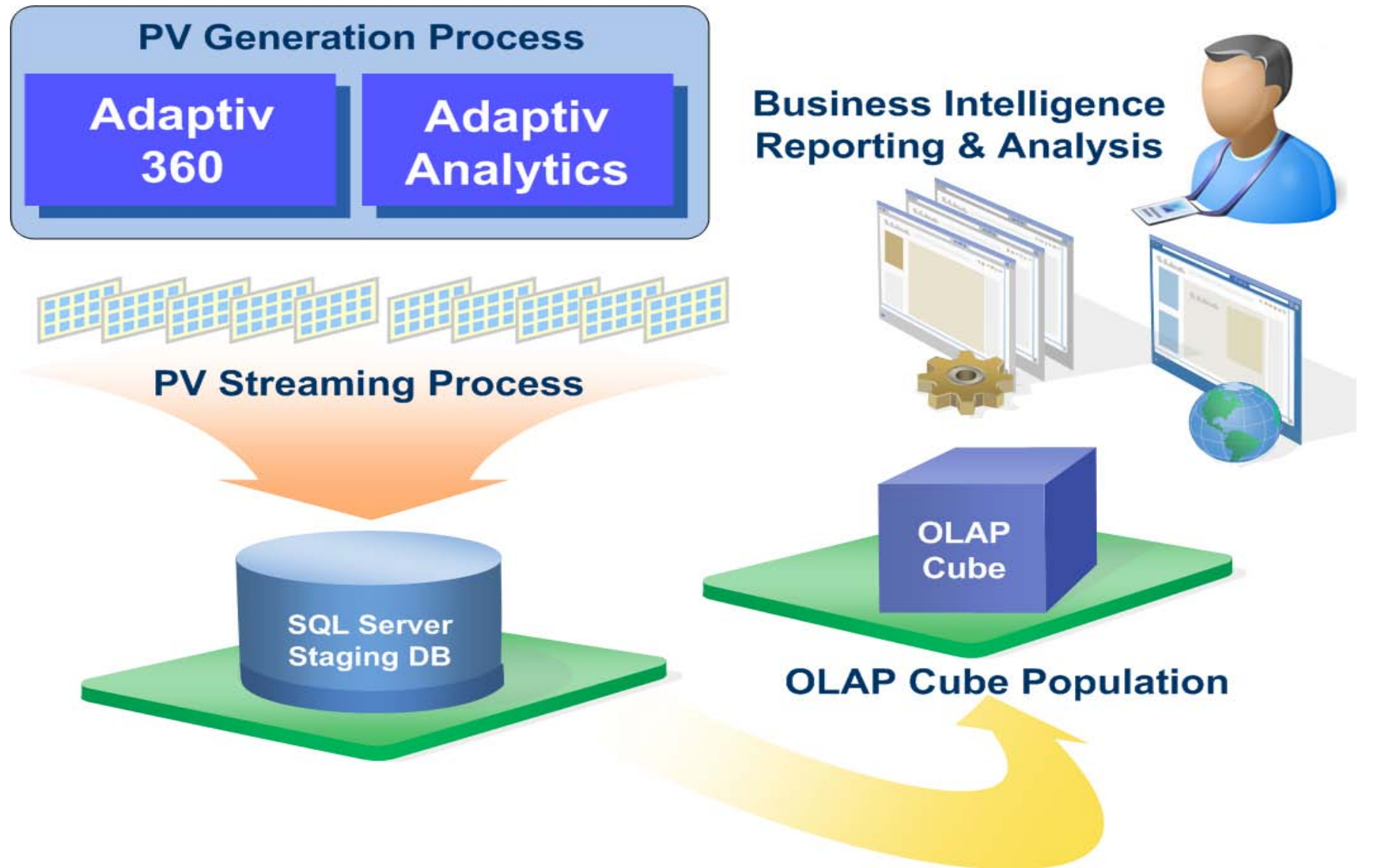
SunGard's Component Based Enterprise Risk Solution



Why Did We Build Adaptiv Risk Cube?

- Risk systems reaching data volume limitations
 - Positions, scenarios and calculations
 - Loss of transparency due to pre-aggregation of results
- Importance of risk aggregation
 - Feeding results from multiple calculation systems
- Risk production challenges
 - Delivering risk on time
 - Identifying errors and correction required full re-run
- Risk navigation challenges
 - Challenge of navigating huge data sets
 - Super-user risk system knowledge required to navigate
 - Over reliance on static reports

Adaptiv Risk Cube Data Flow



How Risk Cube Addresses Banks' requirements

Aggregated view of risk

- Single view of risk
- Retain ability to drill into risk
- Retain performance with huge data sets
- Designed for multiple feeds, time zones
- Designed to store results at lowest level
- Designed for large volumes (1.5 TB a day)

Timely delivery of accurate VaR

- Regulatory pressure for T+1 reporting
- Challenges to process corrections
- Estimation of VaR a necessity
- Transparency allows errors to be found
- Correction with only partial re-run
- Support for flash VaR workflow

Control of capital usage

- Transparency of capital attribution
- What-if analysis to reduce capital
- Identify largest contributors
- Real-time effect of removal or addition
- Real-time VaR hedging

Respond to future regulatory pressure

- More calculations and more reporting
- More pressure on existing systems [stress VaR, stress tests, IRC]
- Provide a framework for risk explanation
- Scalable with data volume and users
- Retain granular data for longer

Market Risk - Simulation Based Results

- Drill down to lowest level
- Enterprise wide view, achieved by consolidating data from multiple source systems: providing 'whole' picture
- Rapid time to market vs internal build lowers costs and reduces project risk

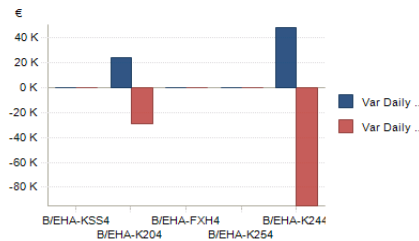
ARA Solutions : VaR | Shortfall | VaR Grid | VaR Sensitivity Grid | Sensitivites | Market Value | Operations | Scenario | Intraday

VaR

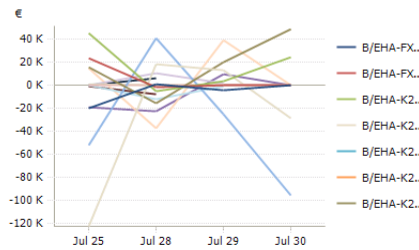
Filter Mode

| | 99% 1d VaR | |
|-----------------|---------------|--------|
| All | (€53,840,074) | -13.1% |
| Trading | (€5,761,251) | 2.3% |
| Asset Swaps | (€1,181,672) | 7% |
| Money Markets | (€4,792,409) | 0.1% |
| Capital Markets | (€580,674) | -1% |
| EH AKTIEN | (€380,894) | -15.2% |
| DERI | (€239,277) | 7.2% |
| KASS | (€233,045) | -2.5% |
| EH LEITUNG | (€557,830) | 7.2% |
| EH RENTE A | | 0% |
| EH RENTE E | (€373,494) | -0.1% |
| EH ZERTI | (€213,762) | 0.1% |
| Equities | (€59,739) | 5.7% |
| Sec Lending | (€162,013) | 5.7% |
| Banking | (€53,553,524) | -12.4% |

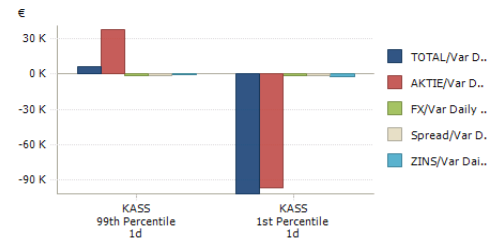
Book Hierarchy



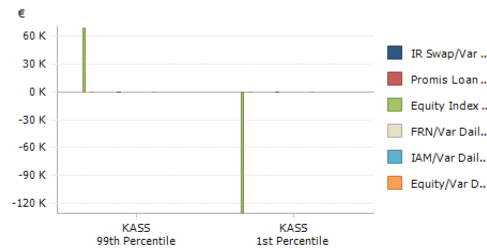
Book Hierarchy Trend



Book Hierarchy & Risk Factor Groups



Book Hierarchy & Trade Type



VaR Measure: [VaR Daily Change](#)

Percentile: [99th Percentile](#), [1st Percentile](#)

Market Risk - Sensitivity Results

- Sensitivity results for all risk factors
- Tabular and graphical
- Full drill down to trade level

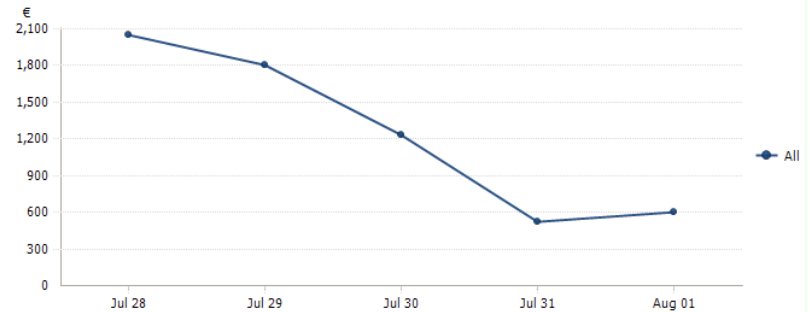
ARA Solutions : VaR | Shortfall | VaR Grid | VaR Sensitivity Grid | **Sensitivites** | Market Value | Operations | Scenario | Intraday

Ref: Jul 31

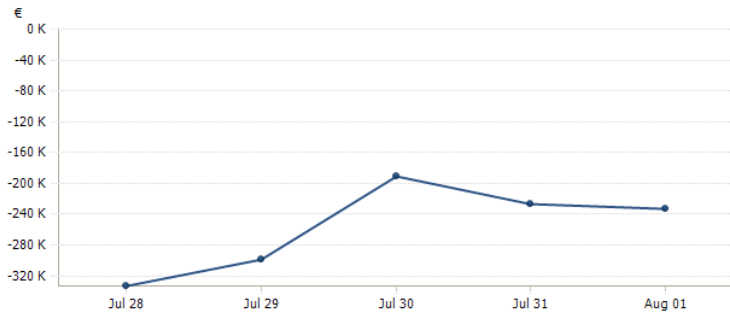
Sensitivites Grid

| Trade Internal | Zero Delta | Zero Gamma | IR Vega | FX Delta | FX Gamma |
|----------------|------------|------------|---------|----------|----------|
| All | -€226,419 | €720 | €523 | €193,511 | €28,982 |
| Banking | -€251,434 | -€146 | €57 | €58,675 | -€1 |
| Trading | €25,015 | €866 | €466 | €134,836 | €28,984 |

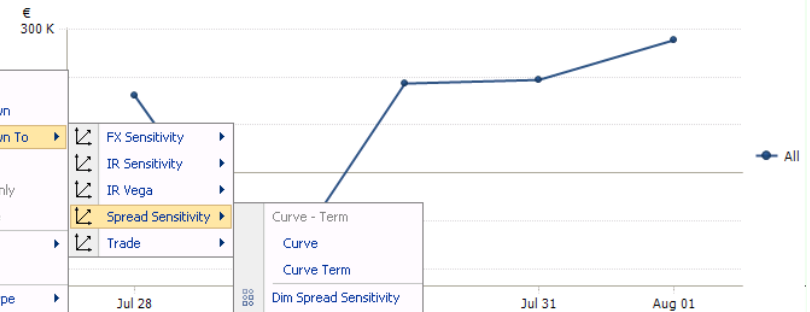
Sensitivites IR Vega



Sensitivites Zero Delta



Sensitivites FX Delta



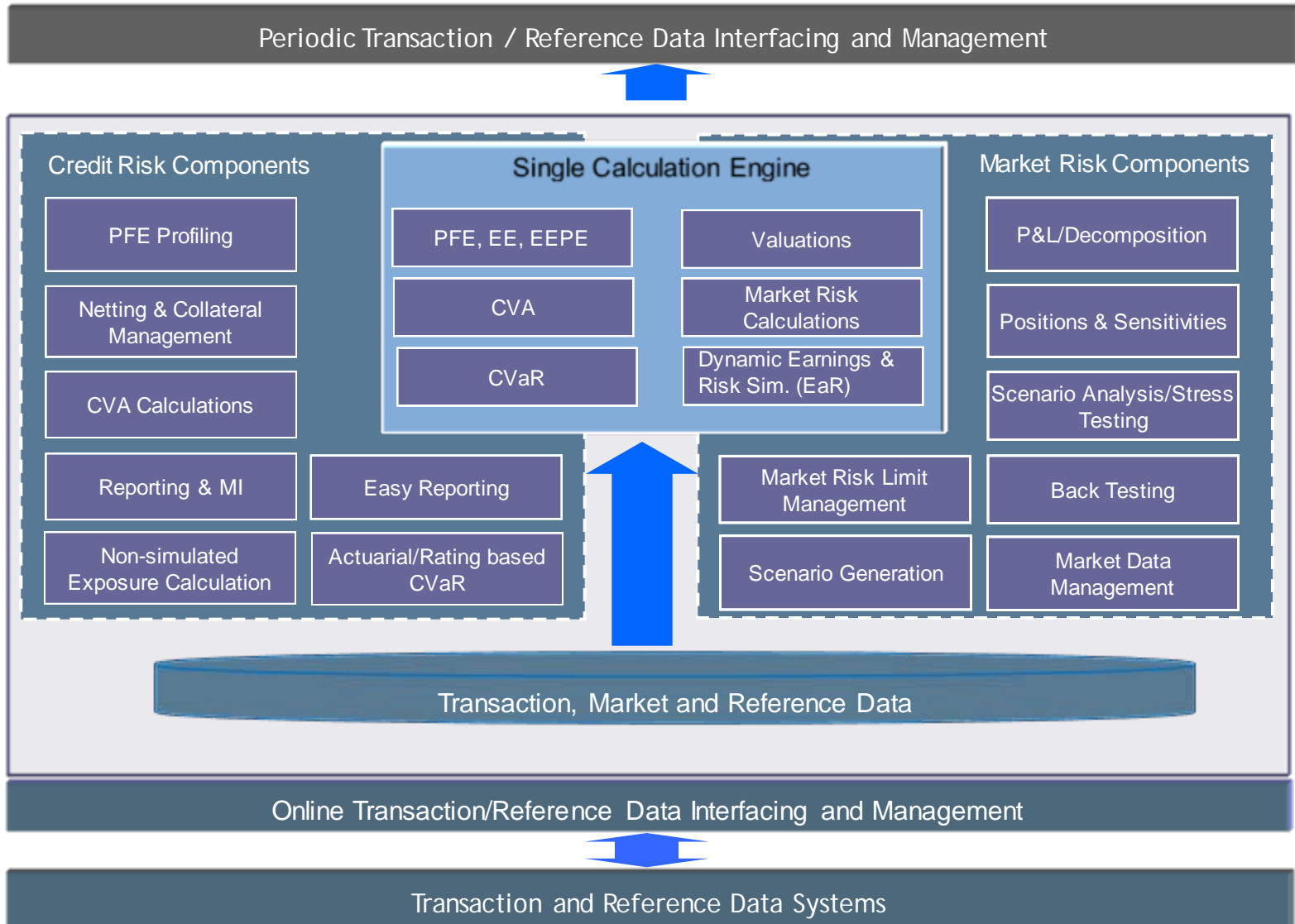
Drill Down menu:

- All
- Drill Down
- Drill Down To
 - FX Sensitivity
 - IR Sensitivity
 - IR Vega
 - Spread Sensitivity
 - Trade
- Drill Up
- Show Only
- Remove
- Filter
- Pivot
- Report Type
- Format Report

Curve - Term menu:

- Curve
- Curve Term
- Dim Spread Sensitivity
- Grouping

SunGard's Component Based Enterprise Risk Solution



Summary

○ Key trends affecting our clients:

- Need for ever more complex risk analysis
 - IRC, stressed VaR, CVA
- Heavy regulatory oversight
 - Need to prove risk numbers are complete, accurate, reproducible, sensible, understood...
- Big pressure on capital
 - New regulations threaten to increase capital requirements several times over
 - Need to quickly identify risk-reduction opportunities

○ SunGard CMIB response

- Componentised offering allows banks to fix key pain points quickly
- Leverage new technologies to achieve required levels of performance

Summary – Complete Solution

- Single vendor able to span the enterprise
- Software, services and hosting as a complete package
- Usage based pricing shares project risk

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