

## WHITE PAPER SERIES

### *Risk Management Infrastructural Design*

### *In 2010 And Beyond*

by Marcus Cree, Director, Solutions, SunGard Adaptiv



**Today's risk management environment requires greater transparency and efficiency as well as reliable networks to manage business processes in order to meet stakeholder demands, control costs and find liquidity.**

Marcus Cree is the director in charge of client solutions for North America, for Capital Markets and Investment Banking.

## Transparency

When it comes to risk infrastructures, process clarity, risk tolerance within statements of risk, and the publishing of risk metrics are all critical aspects of enhancing transparency.

The most compelling is process transparency. The events of the last two years have led to general skepticism around risk controls within financial institutions, as well as the external judgments made by ratings agencies regarding such controls. This has led to:

- Increased direct stakeholder scrutiny of each firm's risk management practices
- A greater chance of credit spread where risk management appears opaque
- Growing demand for coherent statements of risk, and greater expectations around adherence to such demands

Stakeholders continue to question senior management, who in turn look to their risk managers to ascertain the strength of the firm's risk management procedures. In this respect, transparency refers to the process itself, in terms of clear reporting lines, board and chief risk officer (CRO) level accountability, and risk-based trading control measures. The more precise these are, the more stakeholders will see that the firm has a clear risk-oriented culture.

Once process transparency is established, the firm must then determine the level of transparency of implied risk tolerance within the statement of risk, and the ability to express the risk in a way that allows for objective comparison. This could take the form of risk as 'economic capital' rather than in absolute terms, but most important is conveying a clear message around risk tolerance and showing it as observed.

When clarity around the statement of risk is determined, the firm can then publish riskiness and risk metrics as produced by its risk system. Tying the actual risk taking to the statement of risk is the most effective way to demonstrate both management quality and an enforced and clear risk policy -- two key factors used by rating agencies to produce ratings. This robust approach to transparent risk management can lead to a lower credit spread, reduced cost of funding, and improved profitability.

Once the risk process is established, transparency is approached at the granular level, where clarity around data and methodology is exposed to the internal stakeholders. This detailed level of transparency speaks directly to the internal credibility of the risk department, and will impact the resistance levels that are met when

unpopular limits are imposed. If data and methodologies are clearly presented, then the risk limits can be more easily situated and contextualized by the internal stakeholders.

### Efficiency

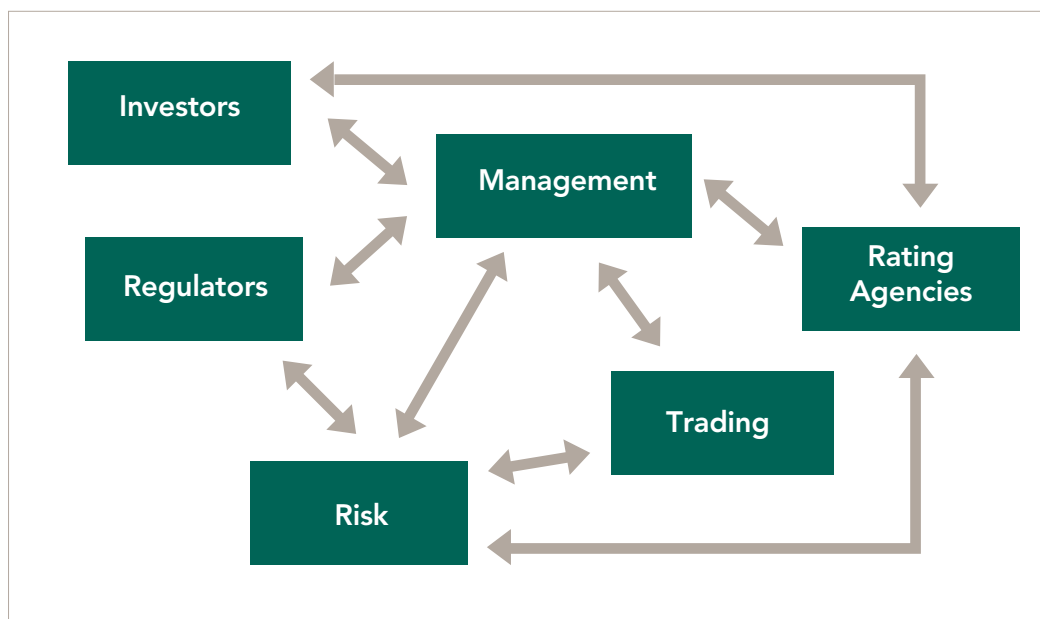
In risk management, operational efficiency of risk calculation is imperative. Calculation requires a risk framework that can be optimized yet flexible enough to accommodate newer and more efficient calculation methodologies at any time. Risk calculation must include efficiencies in:

- Data storage that enables historic data to be easily accessed and interrogated
- The calibration of data into risk factors that can be used to price instruments and drive sophisticated, stochastic distribution algorithms for simulation-based risk measures, such as value at risk (VaR) or potential future exposure (PFE)
- The calculation framework for pricing instruments across thousands of simulations in a timely manner
- Infrastructural design to facilitate transparency

Data storage is a vital component of any risk system, as the quality of the data not only needs to be validated by the risk managers themselves as part of risk limit breach checking, but also is used in the calculation of correlations, drifts and other statistical inputs to risk calculations. Any risk infrastructure must provide efficient access to the base data, the calibration parameters, and the derived statistical data.

The calibration of data provides the availability of multiple data sets using different date ranges (including static date ranges for Stressed VaR), as well as the facility for user defined stresses. As product complexity increases and new data elements are required for pricing and simulation, these data elements should be added easily to the data library, the calibration routines and the distribution models. This level of efficiency is tied directly to the transparency of the risk system.

Timely calculation of results is the product of both sound system design and efficient calculation methodology. Today's risk system must be scalable for tomorrow's potential volumes and complexity, by employing a component-based approach in which differing scaling issues can be managed in a component



Risk/Stakeholder relationship in Transparent, efficient network

specific manner. These components include a flexible, extendable database for trade and data storage, where new data types can be easily added as required; and grid-based calculation engines optimized for grid technology, which allows increasing volumes of calculations while maintaining speed with additional hardware.

Efficiencies in risk management infrastructures also can be achieved by separating the logic of the risk calculations from the trade-by-trade valuations per scenario. This allows simulations, stresses and data 'bumps' to be defined, and individual trades valued against each scenario within the engine. From there, the results are stored by trade and by scenario in a separate database. The logic required to convert these results into risk outputs such as VaR, DV01, first and second order sensitivities can then be built into the output section of the system. This final step allows risk results to be created on-demand by 'point of use' stakeholders as well as by risk managers. The benefits of this componentization are:

- The inability of the calculation of results to impact the performance of the analysis of results throughout the day
- The accessibility of results for stakeholders, yet without access to the entire risk suite
- The ability of result hierarchies to be built and called directly without redefining the calculation parameters

## Networks

Core to the modern risk infrastructure, networks can be viewed from two main perspectives:

- Networks of stakeholders, where risk calculations and outputs can be distributed both vertically and horizontally to aid in the creation of a coherent risk culture
- Networks of data, where understanding the complex relationships between data used in pricing and in determining trading strategy can facilitate the communication between risk and trading functions

Stakeholder networks are becoming increasingly important as regulator and investor scrutiny increases in the aftermath of the recent credit crisis.

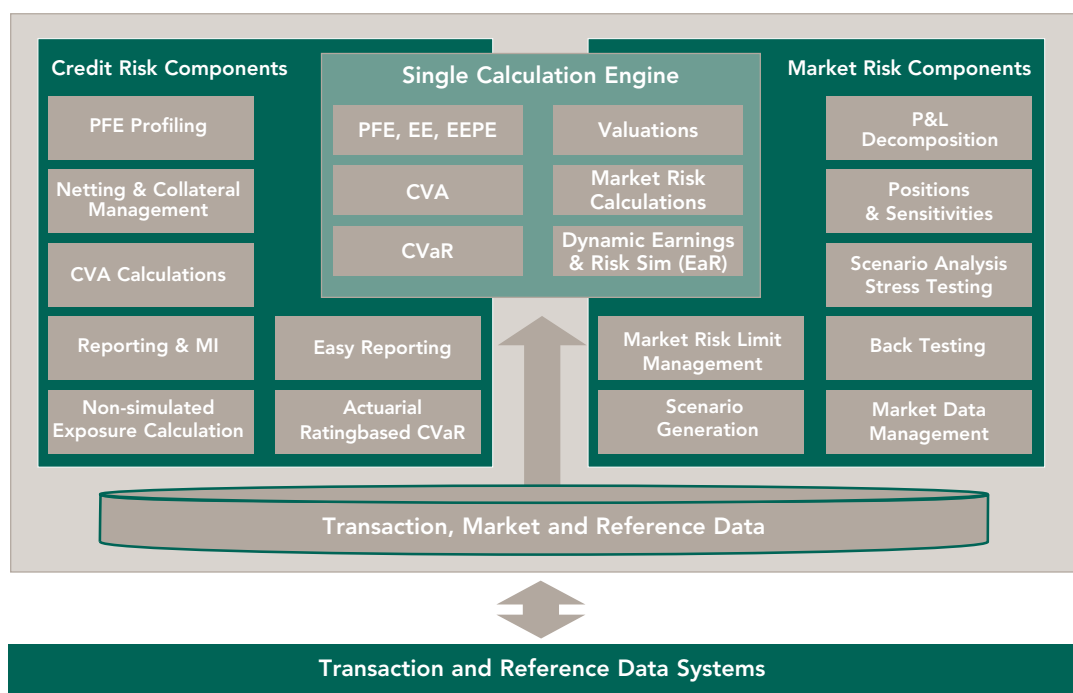
The emerging model is towards board level risk awareness, as evidenced by the growing number of CROs across the financial industry. This level of management involvement requires access to risk outputs that provide detail beyond the summary level. By providing access to the risk outputs vertically through the management structure, firms will be able to enforce adherence to the official risk statement.

In order to create a risk culture within an institution, the trading division must have access to the risk outputs required to situate and understand the limits imposed by risk management in the context of the overall risk position. Making risk available at the trading level enables risk to be encoded into the trading decision making process. This is essentially the point at which a trading firm with a risk management function becomes a trading firm with a risk culture.

With data networks, the fundamental issue involves trading decisions made in the context of economic data, while risk management calculations are parameterized by just data elements used in direct pricing. This lack of 'soft' data in the data sets means that the communication between risk and trading is constantly skewed. The risk infrastructure should provide extensibility to incorporate such econometric data. As a result, correlations that would otherwise be hidden (and potentially damaging) may be uncovered as part of the risk management activity.

## Which Technologies?

Architectural business requirements should drive an institution's risk management infrastructure. A modern infrastructure should establish and maintain an efficient and consistent risk culture throughout the institution.



Separate components, creating a transparent, efficient risk management network

Organizations facing risk management infrastructure challenges need not despair. These requirements, driven as they are by the recent crisis, are now in harmony with the technology available in the industry. In fact, many of these systems were designed to meet the risk management challenges of today rather than yesterday. Systems that enable institutions to select and to use capabilities designed to solve specific issues necessitates a component based approach to data storage, calculations, and distribution of results.

### Data Storage

- Trade and data storage should meet two main requirements: Simplified interrogation by risk managers for analysis and data checking
- Extensibility to accommodate new data required for new types of trades

While standard relational databases can be used, the data management layer needs to be able to accept new data objects and allow them to fall naturally into related calibration routines and data archives.

### The Calculation Engine

The most important aspects of efficient result generation are:

- Scalability to cope with expected as well as experienced volumes
- Efficiency of re-using results and not repeating calculation actions
- Extensibility to allow new methodologies to be created, used and made transparent to the user base

The use of 'grid' based technologies allows expected volumes and increases through time to be accommodated as needed. Calculation and scenario generation and execution are designed to make full use of scalability. This is achieved by building a 'for grid' engine rather than attempting to distribute an existing engine's routine across a grid.

The way in which new calculation methodologies are added to the platform is also important. Institutions should be able to focus their resources on proprietary industry knowledge needed to run the business rather than on specialist programming skills.

In summary, a calculation engine can offer both the efficiency and transparency required if it is optimized via scalable grid technology and extensible within an understood scripting framework.

### Distribution of Results

A risk result network is the cornerstone of a firm-wide risk culture. The key elements for achieving this type of culture are:

- Fast, point-of-enquiry data mining capability
- Multi-dimensional outputs to service the various stakeholders interrogating the results
- Secure results that can be accessed but not altered by the stakeholders

OnLine Analytic Processing (OLAP), such as Microsoft Analysis Services, allows large numbers of trade level scenario results to be stored by date, providing queries of risk results along any trade dimension as well as risk trending. The query tool itself can be intranet-based allowing distribution vertically and horizontally throughout the organization.

### Conclusion

Transparency, efficiency and networks are of core importance to risk management, serving as the fundamental building blocks of the modern risk infrastructure for 2010 and beyond. The key aspects of transparency, efficiency and networks combine to provide powerful and achievable tenets on which risk management can evolve into a robust risk culture at the heart of the firm.



## About Adaptiv

SunGard's Adaptiv provides enterprise-wide credit and market risk management and operations solutions for financial services institutions. Adaptiv assists institutions of varying size and complexity to deploy technology to meet both internal and regulatory requirements for risk management and operational control. Adaptiv helps financial services institutions from the banking, hedge fund, asset management, insurance and corporate sectors with our deep understanding of risk management and operational processes. Visit [www.sungard.com/enterpriserisk](http://www.sungard.com/enterpriserisk)

To talk to an expert to learn how SunGard Adaptiv can help your business please call: +44 (0)208 081 2779 or email [adaptiv.marketing@sungard.com](mailto:adaptiv.marketing@sungard.com)

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