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Razor White Paper: Liquidity Risk Management

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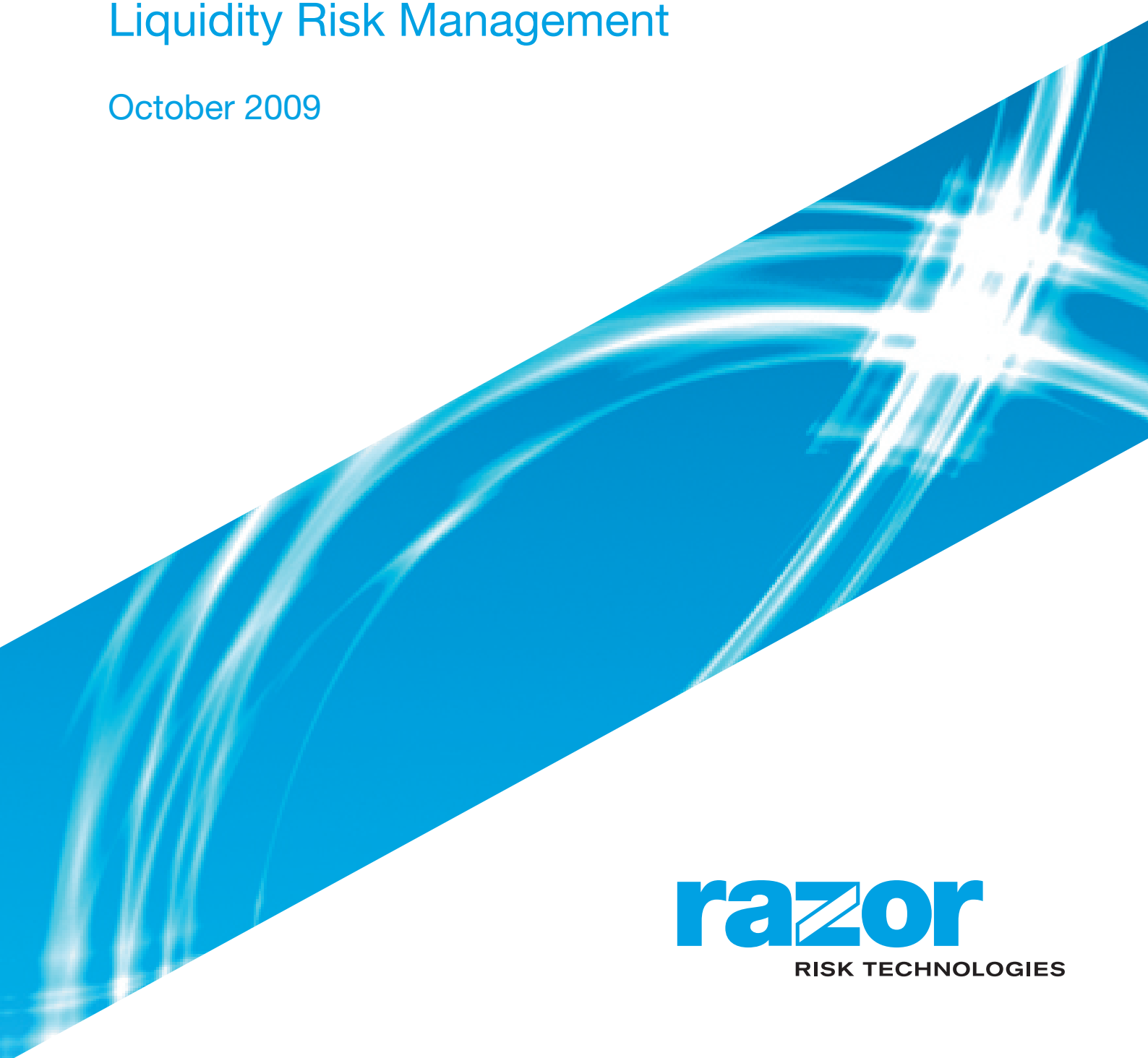

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RISK TECHNOLOGIES

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Executive summary

From October 2009, the Financial Services Authority (FSA) requires all UK banks, building societies and investment firms to report their liquidity risk. Given the level of detail, frequency and stress testing requirements, as well as the implementation deadlines, the new rules present a significant challenge to most financial institutions.

Central to the new regime is the need for institutions to evaluate their financial stability under various scenarios, including stress tests of severe but plausible scenarios. Institutions must examine the impact of 10 key liquidity risk drivers, including wholesale funding, intra-day liquidity and off-balance sheet liquidity. The FSA specifies three major stresses that institutions must test – a name-specific shock, market-wide dislocation and a combination of the two. Institutions taking a best practice approach will want to explore a wider range of possible scenarios.

The quantitative analysis demanded by the new liquidity regulations requires a system that can handle all the complex calculations, can connect to wide-ranging data sources, and is high performance, robust and scalable. To attempt to build such a system internally within the deadlines means diverting valuable resources and invites project and maintenance risk.

Razor Risk Technologies'risk measurement, management and control solution, Razor, has all the elements required to support liquidity risk management and regulatory compliance, including a data framework, a scenario and stress testing engine, and an analysis and reporting module. Razor has powerful aggregation capabilities for consolidation of the relevant cash flows, and analysis at any level including by institution, business unit or individual trader.

Razor's reporting module meets the FSA's requirement for an institution to have reliable management information system, as well as being capable of automating the reporting process to meet the short submission deadlines for the new liquidity reports, including daily reporting in times of market turmoil.

Razor is a proven system already in use at a number of institutions, including a tier one bank, for liquidity and other risk management and regulatory reporting. Razor Risk Technologies has a track record of delivering its system on time and within budget.

Introduction

From October 2009, the Financial Services Authority (FSA) requires all UK banks, building societies and investment firms to report their liquidity risk. The rules also apply to UK branches and subsidiaries of non-UK financial institutions unless they apply for an exemption. Institutions have to produce both quantitative and qualitative reports, and have to conduct wide ranging scenario analysis and stress testing.

Given the level of detail, frequency and stress testing requirements, the new rules present a significant challenge to most banks and building societies, and especially to investment firms which have not had to report liquidity before now. Despite the transitional measures the FSA has proposed for some aspects of the new regime, the timetable for implementation is demanding.

The new rules are part of a global response by the authorities to the financial crisis, and are an attempt to avoid a repetition of the liquidity problems that paralysed the markets in 2008. The FSA's reporting regime is based on the recommendations of the Basel Committee on Banking Supervision, and is likely to set a benchmark for regulators around the world.

Under the new regime, institutions have to identify and manage 10 key liquidity risk drivers, including wholesale funding, intra-day liquidity and off-balance sheet liquidity. Central to the approach is the requirement for institutions to evaluate their financial stability under various scenarios, including stress tests of severe but plausible scenarios. Not only do institutions have to construct relevant scenarios, including shocks to the risk drivers, but they need to gather the relevant operational and market data, simulate the scenarios in a timely fashion, and report to the regulator, while embedding the process in the overall governance and risk management of the institution.

The quantitative analysis demanded by the new liquidity regulations requires a system that can handle the complex calculations, can connect to wide-ranging data sources, and is high performance, robust and scalable. To attempt to build such a system internally within the deadlines means diverting valuable resources and invites project risk, as well presenting problems in terms of documentation, maintenance and lack of flexibility.

Razor Risk Technologies' proven risk management system, Razor, has all the elements required to support liquidity risk management and regulatory compliance, including a data framework, a scenario and stress testing engine, and an analysis and reporting module. Razor Risk Technologies has a track record of delivering its solution on time and within budget. Razor is already in use for liquidity risk management by tier one banks and other institutions.

The requirements

According to the FSA, liquidity risk management "entails mitigating the risk that a firm is not able to maintain or generate sufficient cash resources to meet its payment obligations in full as they fall due" (FSA consultation paper CP08/22). To improve institutions' ability to manage their liquidity, the FSA has introduced a new quantitative framework with greater emphasis on institutions' ability to assess their liquidity risks and develop policies to tackle them. It has also strengthened the qualitative framework for liquidity risk management with an increased focus on stress testing and contingency funding plans, and new liquidity reporting requirements.

Under the FSA's quantitative framework, an institution must be able to project fully over an appropriate set of time horizons cash flows arising from assets, liabilities and off-balance sheet items. All sources of contingent liquidity demand must be captured, as well as all currencies in which the institution is active, and, where relevant, an institution's correspondent, custody and payment and settlement activities. The institution must set limits to control its liquidity exposure and put in place early warning indicators of increased risk or vulnerability. And the institution must have reliable management information systems "to provide its governing body, senior managers and other appropriate personnel with timely and forward-looking information on the firm's liquidity position" (CP08/22).

The FSA makes clear that the "primary fundamental tool" for the management of liquidity risk is stress testing. The new rules require that institutions conduct regular stress tests "in order to identify sources of potential liquidity strain, and to ensure that current liquidity exposures continue to conform to the liquidity risk tolerance established by that firm's governing body". Institutions must analyse the separate impact of possible future liquidity stresses on cash flows, liquidity position, profitability and solvency.

The FSA identifies three major stresses that should be considered:

- idiosyncratic – an unforeseen name-specific shock leading to liquidity stress;
- market-wide – an unforeseen short-term market-wide dislocation that gradually evolves into a long-term market-wide liquidity stress; and
- a combination of the two.

In addition, the FSA identifies the 10 key drivers of risk which would crystallise as a result of the stresses, including wholesale funding risk, intra-day liquidity risk and off-balance sheet liquidity risk.

Selecting the stress tests

If stress testing is the primary fundamental tool of liquidity risk management, the challenge is how to construct and run a set of appropriate scenarios. The scenarios must include shocks to the risk drivers, and must be comprehensible and easy to explain, while remaining realistic and relevant. And they must be run in a timely fashion to meet tight reporting deadlines.

In devising its scenario and stress test environment, an institution must decide whether it is going to take a defensive approach to the new regulations and just do the minimum that the rules require, or take a more offensive attitude and widen the scope of its scenario simulations, aiming for best practice to gain the maximum business and risk management benefits.

Razor Risk Technologies has constructed a series of stress tests, with appropriate time frames, which encompass the FSA's requirements, and goes beyond them in best practice to investigate other macro-economic and unexpected events. The stress tests cover scenarios from market crises to institution-specific crises. The following five stress test scenarios are already in use by Razor clients:

- financial market downturn – e.g. a credit crunch, tight monetary policy or economic recession (time frame 40 days);
- name crisis – a factual or market-hypothesised problem specific to an institution leading to a reduction in counterparty limits and possible withdrawal of deposits (time frame 20 days);
- ratings downgrade – a downgrade of the institution's credit rating leading to cuts in counterparty limits (time frame 40 days);
- major systems outage – an internal or systemic problem occurring in payment and settlement systems (time frame 5 days); and
- disruption of the commercial paper or certificate of deposit markets – a lack of liquidity in the CP or CD markets leading to the need to fully replace these funds (time frame 40 days).

The first two cover the FSA idiosyncratic and market-wide stress requirements, alone or combined. The others are realistic and relevant – for example, a major systems outage could be the Swift payment system going down, while the financial crisis saw a disruption of the CP and CD markets.

The output from the five scenarios, along with market, credit and operational risk scenarios, can be used to generate the so-called 'reverse stress tests' that the FSA is now requiring institutions to undertake as part of an overall business resilience check. The aim of the reverse stress tests is to "ensure that firms more fully explore 'tail risks' which, if they were to crystallise, would cause counterparties and investors to lose confidence in them" (FSA CP08/24). In other words, what stresses would break the institution. Reverse stress testing is a "holistic requirement", and must consider not only risks to an institution's capital position, but other relevant risks, specifically liquidity risk.

A stress test example

The following is an example of a stress test that can be run in Razor.

A bank wants to investigate the impact on its liquidity of a disruption of the CP market. The starting point of the stress test would be the cash flow of the bank's interbank business plus collateral. For each stress test, parameters are set which define the percentage of each transaction which would still remain after maturity and which can be revalued. As the scenarios simulate forward in time, roll over rates are applied to maturing transactions, with the rates depending on the initial cash flow or residual maturity structure. For example, an interbank deposit taken with a residual maturity of two weeks is assumed to be rolled over for another two weeks, but at 80% of the volume.

The simulation process runs the stress scenarios through time. At the end of the time frame of the scenario simulation (up to 40 business days), the resulting loss is compared with the bank's counterbalancing capacity – all eligible collateral as well as marketable positions excluding any applicable haircuts – which must be sufficient to ensure survival of the bank.

Testing liquidity risk drivers

The FSA specifies 10 key risk drivers which scenario analysis should explore, and which stress tests should shock in order to reveal the potential consequences of extreme events on an institution's liquidity position. Each driver must be stressed under each of the stress scenarios to reveal how they will be affected and the level of outflows that will occur as a result of the various stresses, and the institution must assess its ability to withstand the outflows given its liquidity resources.

The 10 drivers are:

- wholesale funding risk – sensitivity to changes in short-term wholesale funding;
- retail funding risk – sensitivity to changes in retail funding by value, maturity, estimated speed of outflow, product type and interest rate applied;
- intra-day liquidity risk – how net collateral requirement can change in timing and volume;
- intra-group liquidity risk – cessation of funding from, or need to provide funding to other group members;
- cross-currency liquidity risk – how gross outflows and inflows in major currencies can change and the shortfalls that can result;
- off-balance sheet liquidity risk – how cash flows from off-balance sheet activities can change;
- franchise viability risk – the extent to which liquidity resources can be reduced while still maintaining the core business franchise;
- marketable assets risk – the sensitivity of assets held to market changes, operational capability to generate funding from assets, etc.;
- non-marketable assets risk – the sensitivity of assets that cannot be sold or repo'd to market changes and counterparty behaviour; and
- funding diversification and market access risk – the adequacy of funding and market access diversification in stressed conditions.

The technology

The quantitative analysis of liquidity risk, including the stress testing of all risk drivers, as demanded by the FSA's new regulations requires a system that can connect to the relevant data, perform the computationally intensive scenario simulations in a timely manner, and produce the reports to the appropriate specifications and frequency. Several of the new reports must be submitted weekly with very short submission deadlines, and may have to be submitted daily in times of market turmoil. This requires a high degree of automation and reliability. There is little time to build such a system internally, and any project to do so runs all the risks associated with complex technology development, such as time and budget overruns, while diverting valuable resources from the business.

Razor is a proven risk management system that has all the elements required to support liquidity risk management and regulatory compliance, including a data framework, a scenario and stress testing engine, and an analysis and reporting module. Razor Risk Technologies has a track record of delivering its solution on time and within budget. Razor is already in use for liquidity risk management by tier one banks and other financial institutions.

The Razor approach

As with all institution-wide risk management, liquidity risk analysis requires a significant amount of data from a wide range of sources. Some of this will be data that institutions have not collected for regulatory reporting before, such as contractual cash flows assigned to appropriate time buckets for the Enhanced Mismatch Report. Then there is the issue of how to store and report the results of stress tests.

Razor has a data framework that includes an application programming interface (API) which simplifies integration with the diverse set of systems from which liquidity risk data will need to be extracted. Data is validated and transformed for internal consistency, which enables aggregation at any required level. Audit trails are an inherent part of the framework.

At the centre of the data framework is a single repository for regulatory and risk information, including the data required for liquidity stress testing – 'a single source of truth'. It also stores the results of the stress tests.

The Razor data framework has a 'meta data' design, where high level data defines the nature of the primary data held in the repository. This provides future flexibility for when liquidity and stress testing requirements evolve, as they are bound to do. By simply redefining the meta data, an institution will be able to add, edit or delete data requirements, under appropriate security, and the changes will then be available to the Razor database, the graphical user interface of the

application and the servers with no modification of source code required.

Scenario simulation and stress testing

Razor has a scenario and stress testing framework for calculating risk and reward measures that

explicitly capture the passage of time. For liquidity risk, it is able to generate all the required cash flows through time, as well as the risk drivers that impact liquidity, across all asset classes, including non-linear over-the-counter (OTC) derivatives. Razor can take in transaction-level data and reprice all instruments and generate the cash flow data with an accuracy that matches the front office sufficiently to be seen as 'a single source of truth'.

Razor has powerful aggregation technology which can consolidate all cash flows and allow them to be broken down by institution, business unit or even individual trader. Comprehensive graphical or tabular result screens enable users to drill-down to any level of aggregation, including transactions and trade contributions, to analyse the causes of risk.

An extensive Scenario Analysis module enables institutions to run all the business-as-usual and stressed scenarios of their liquidity position required by the new regulations. Simulations can include collateral and netting and their impact under the various scenarios. The module provides online what-if analysis on a market, trade or position level. The stress testing functionality includes an extensive ability to apply shocks to the risk drivers across the complete data set. Simulations are dynamic – they recognise that portfolios change over time, as does the market data that defines their value.

Razor supports distributed computing architectures, including grid computing, to achieve the performance necessary to run multiple complex stress scenarios, including all risk drivers, within the tight time frames required of the new liquidity risk reporting regime. This powerful computational environment enables institutions to simulate scenarios forward for any required period, typically 30-90 days.

Razor's scenario and stress testing framework also supports the FSA's new reverse stress testing requirement, where all risks must be considered in a holistic approach that includes liquidity risk. This enables an institution to explore the vulnerability of its business model, including the conditions that will break the institution.

Reporting

Part of the FSA's new rules is a requirement for reliable management information systems to provide senior management with information on the institution's liquidity position. A wide range of management reports is needed, and institutions must be able to monitor key liquidity indicators and trends. Razor's reporting module enables institutions to meet this requirement, as well as the demanding regulatory reporting schedule of the new regime.

Several of the new regulatory reports must be submitted weekly and have a very short submission deadline, such as the Enhanced Mismatch Report (EMR), which must be submitted on the Monday following the reporting week, and may be required daily in times of market turmoil. Razor provides the functionality and automation to generate these reports within the given deadlines. It is also able to produce the reports in the XML format and submit them electronically via the FSA's Gabriel reporting system.

Razor provides a snapshot server and reporting database which is fed as required from the main application database. The reporting database contains enhanced views and summaries of application data that may be distributed as XML based reports or onto the corporate intranet.

Proven abilities

Razor is an enterprise risk management system that is in place at a number of financial institutions of all sizes across the world. Razor Risk Technologies has a positive track record of delivering its system on time and within budget. The flexibility of Razor's design, its modular architecture and its powerful scenario and stress testing capabilities enables it to be speedily implemented to suit diverse risk management requirements.

Razor is already in use by a number of institutions for liquidity risk management, including the use of the five stress scenarios outlined above. A tier one bank has used Razor to help it bring the portfolios of its special investment vehicles (SIVs) onto its main banking book. In this project, the bank used Razor to simulate forward in time the trades and the changes in the portfolios over time, as well as the market data through time, to identify those trades which were likely to cause problems in the future in order to take appropriate action. The bank was able to maintain the AAA ratings of the SIVs while moving their portfolios onto its banking book without causing any liquidity problems, and under

close scrutiny of the FSA, rating agencies and senior management.

Benefits of Razor

Razor offers a number of benefits to institutions looking to meet the new liquidity risk rules, as well as those intending to go beyond the minimum requirements to create liquidity risk management best practice.

The benefits of Razor include:

- seamless links to multiple systems for data collection;
- a flexible framework for designing, maintaining and monitoring scenarios and static and dynamic stress tests, which meets FSA liquidity risk requirements, including reverse stress testing;
- powerful data aggregation and analysis which allows for the investigation of any combination of liquidity risk triggers, by customer type, product, currency, country, etc.;
- easily adjustable by users for new simulations or changed market conditions;
- user-defined what-if analysis and contingency funding plans;
- time saving automation of reporting processes to meet new regulations as well as internal and on-demand reporting;
- 'a single source of the truth' through a single repository for regulatory and risk information;
- quick implementation;
- proven system in use today by institutions for liquidity and other enterprise risk management;
- supports distributed computing for rapid processing of computationally intensive scenario and stress test simulations, including daily analysis for crisis reporting;
- makes supervisory reviews made easier because historical scenario outputs can be saved and recalled for comparison, with full breakdown of underlying causes; and
- supports risk mitigation actions such as limits, where hard and soft limits can be applied at any level, and key risk indicators which can be displayed on screen, for example to highlight mismatch trends where scenarios should be escalated.

Conclusion

The new FSA liquidity risk regulations present a significant challenge. Institutions must be able to conduct scenario and stress tests across a range of risk drivers. Reporting deadlines are tight, requiring reliable automation. The short implementation timetable for the regulations argues against in-house development. Razor is a proven system with all the required capabilities to help institutions meet the new reporting regime and achieve best practice liquidity risk management.

About Razor Risk Technologies

Razor Risk Technologies is a leading provider of risk management technology and consulting solutions to financial institutions worldwide. Established in 1999, the company was created in response to the complex issues surrounding risk management. Razor Risk Technologies recognised that to proactively measure and manage risk, it was necessary to manage the total exposure of a financial institution across all of its global activities.

An Australian public company (ASX: RZR) with offices in Sydney (headquarters), Melbourne, New York, London and Chennai, Razor Risk Technologies has a highly skilled team of 75 specialists who provide risk management technology and consulting services across the financial markets and risk management sectors. The company operates on a global risk consultancy structure, drawing upon the expertise of all employees in implementing best practices for clients' individual needs. This methodology supports an efficient, low cost, minimal risk implementation, allowing clients to maximise optimal risk and reward. Razor Risk Technologies has a 100 per cent successful implementation record for its product, 'Razor'.

About Razor

Razor Risk Technologies' award-winning 'Razor' framework provides near real-time and pre-deal calculations that enable management to view their total exposure to individual entities on one consolidated platform. Clients use Razor's advanced analytics and scenario calculations to achieve best practice in managing risk exposures for credit, market, clearing and liquidity risk within a single application.

Since Razor is a framework and not a risk measure, practitioners can easily incorporate new sources of risk and accommodate innovations in best practice risk management. Razor also assists financial institutions to satisfy their requirements under the Basel Regulatory Framework and the IOSCO Recommendations for Central Counterparties.

Razor has helped improve the way Central Clearing Counterparties, Stock Exchanges, Banks, Hedge Funds and Brokers across the globe measure their risk and manage their capital.

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