Since the publication of Basel II in 2004, operational risk is considered as one of the primary financial risks. Managing operational risk in financial services is a significant challenge due to the variety and vastness of the areas, which belong to that discipline. Although the first PRiM Risk Newsletter, which was published in 2003, was dedicated to Basel II and, to a large degree, on operational risk, this issue is the first one to focus entirely on operational risk. For the interview, we spoke to Stefan Look, the Head of Risk Management for the Deutsche Börse Group (including Clearstream) and John Trundle, the Head of Risk Management for the Euroclear Group to understand which operational risk issues are considered most important by the international central securities depositories and how they manage them.

Other articles on operational risk in this issue are an article on operational risk assessment and measurement by Jean-Philippe Peters of Deloitte S.A., an article on tools for managing operational risk by Thierry López and David Cau of PwC Luxembourg and an article on lean six sigma and operational risk by Philippe Renard, RBC Dexia.

Also included in this issue is an article on managing risk by achieving a balance between trading and banking books by Oliver Brandt, Risk-Architecture, Michel Dorval, Thomson Reuters Risk Management and Agatha Kalhoff, BII.

As always, your ideas for future issues and your comments are welcome. Please send them to info@prim.lu.

Bonne lecture!

Paul Kleinbart, Editor
Operational risk is central for many institutions in Luxembourg and accordingly it has been addressed in internal control frameworks for a long time. Yet, the focus of such practices was often related to day-to-day risk management. Since the inception of Pillar II requirements in 2008 and the development of ICAAP frameworks, efforts have been made to complement prevailing practices with further analysis of extreme situations.

This article discusses the trends observed in the industry with regard to such assessment, including how banks relying on simple methods for computing capital requirements under Pillar I (Basic Indicator Approach or Standardized Approach) can improve their operational risk management framework by learning from advanced measurement techniques and processes.

From techniques used in advanced models...

Historically most advanced measurement approaches (AMA) used to estimate minimum regulatory capital requirements to cover operational risk in banks can be classified in two categories:

- The loss distribution approaches (LDA), which apply actuarial techniques on past observed internal (and/or external) loss data
- The scenario-based approaches (sbAMA) that share with LDA the idea of combining two dimensions (frequency and severity) but differ from the previous approach in that the estimation of both distributions builds upon experts’ opinion regarding various scenarios.

Since the inception of Basel II, most of the attention in the booming literature on operational risk modelling has focused on the
LDA models\(^1\). These studies address mainly the key modelling challenges faced by the industry and recently highlighted in a paper issued by the Basel Committee (BCBS, 2009). These include

- The impact of the data collection threshold
- The granularity of AMA models, i.e., the degree to which the framework separately models individual operational risk exposures
- The dependence relationships among operational risks
- The distribution assumptions used for the severity distribution and, in particular, for its right-end part (i.e., the extremely severe events).

On the contrary, academic contribution to scenario analysis for operational risk modelling in banks is much more limited.

In practice though, convergence of LDA and sbAMA methods have sped up over the last two to three years, with financial institutions relying on expert opinion to develop worst case scenarios in their operational risk framework as a natural add-on to traditional models based on historical data. While the obvious reason to explain this convergence can be found in regulatory requirements \(^2\), this is not the only explanation.

Risk models based on historical data have indeed proven to be flawed during the recent crisis, questioning the relevancy of relying solely on past data so that risk modellers in financial institutions around the globe are now seeking alternatives (or at least, complements). While models heavily criticised after the crisis are not related to operational risk, the occurrence during the recent market turbulences of large operational risk events such as the internal fraud at Société Générale and the Madoff scandal pushed banks to pay increasing attention to “worst case scenarios”. As the interrelated nature of the events to be assessed in this type of scenario can hardly be captured in a loss database, expertise of several individuals is most often called upon and scenario analysis is now seen as a natural complement to LDA.

...to pragmatic application in smaller institutions

Careful analysis of events (or sequences of events) that can seriously harm the financial robustness of the institution is not limited to AMA banks. Globally scenario analysis has gained a lot of attention from regulators over the recent years and many supervisory bodies have emphasised the importance of including such analysis in ICAAP programs for all relevant risks, including operational risk.

For instance, the Committee of European Banking Supervisors (CEBS) mentions in its recently revised guidelines on stress testing (CEBS, 2010) that all institutions should set up “a robust analysis of major operational risks (that) includes stresses and analyses of historical and hypothetical operational risk events”. This analysis “could involve expert opinion and include the macro-economic environment (e.g. to reflect increasing fraud risk in an economic downturn) and other external risks and factors.” Locally, the Commission de Surveillance du Secteur Financier (CSSF) has also stressed the importance of scenario analysis, notably with regard to some specific operational risk sub-types such as outsourcing risk or custody risk (CSSF, 2009). All these elements indicate that the increasing presence of scenario analysis in the risk management toolkit is a general trend in the industry, whatever the size and complexity of the institution.

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1 See Frachot, Georges and Roncalli (2001), Cruz (2002), Aue and Kalkbrener (2006) or Chapelle et al. (2008), among many others

2 The Basel II framework indeed requires AMA banks to develop their models based on four elements: internal loss data, relevant external loss data, scenario analysis of expert opinion and bank-specific business environment and internal control factors.
Of course, the mathematical foundations can vary in complexity from one bank to another. On one hand, operational risk managers in large international banks rely on advanced statistical techniques to model expert opinion. As often in finance, these techniques are borrowed from other fields of science, such as psychology or decision sciences. For instance, elicitation of probability measures by experts and combination of opinions from several experts have been extensively studied by statisticians over the last decades, using techniques such as Bayesian methods or the classical model of Cooke (1991). The former involve experts giving their opinions to a decision maker (sometimes called a supra-Bayesian) who then updates his prior belief on the parameters of interest using Bayes' theorem. The latter tests the level of expertise of each expert with a questionnaire that includes questions directly related to parameters of interest (“target” questions), but also questions to which the assessor already knows the answers (“seed” questions) so as to evaluate the “degree of expertise” of each respondent.

On the other hand, smaller banks rely on less complex methods, often building upon existing bottom-up processes such as the Risk and Control Self Assessment (RCSA). This is the most common situation encountered in Luxembourg as only a handful of banks have adopted AMA models under Pillar I. Typically, the RCSA process allows identification of key operational risks, which are then further analysed (and quantified) in the ICAAP. There it serves as support to challenge the adequacy of the capital charge computed in Pillar I, since relevancy of the gross income as a proxy for operational risk exposure can be questioned. Being internally defined and driven, models used in the ICAAP are not subject to the same level of requirements as Pillar I models, allowing the development of “simpler” and pragmatic models.

These techniques often consist in assessing frequency and impact of scenarios, similar to the logic used in more advanced methods. This is an appealing feature for banks wishing to improve gradually their operational risk measurement practices: as time passes, the operational risk framework becomes more mature and the models can evolve accordingly.

For instance, several Luxembourg banks using scenario analysis for less quantifiable risks (such as operational risk) have switched over time from a simple assessment of the direct impact of the event under consideration to scenarios that embed indirect or contagion effects and/or include probabilistic components.

**Stressing the importance of the process**

Whatever the complexity of the models, banks should consider the process at least as important as the results. Indeed, many benefits can be gained from implementing a sound scenario analysis, including improved awareness of the operational risk profile by business owners and identification of the potential weaknesses of its control environment. Yet these benefits are not automatic and they depend on how the process is defined and organized.

To implement a successful scenario analysis process, the following key principles should be followed:

- "Set the tone at the top": senior management’s buy-in and involvement in the process is a critical success factor, if one wishes to improve risk culture and related behaviours in the organisation;
- "If you own the business unit, you own the risks": business lines should be the ones identifying and assessing the risks,

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3 Interested readers will find more details on these techniques in Peters and Hübner (2009).
supported and/or challenged by the risk management function;

• "Don’t think in silos": risks should not be analysed independently, but they should be seen as interconnected. Analysis of indirect consequences of the scenario and possible contagion to other types of risk is crucial;

• "Find the unexpected before it finds you": the purpose of scenario analysis is not to predict the future, but to discuss and identify what could potentially go very wrong, how it might arise, how bad it could get and how the company could absorb such shocks. Assumptions should accordingly be severe enough;

• "Management is not idly standing by": management actions in case of occurrence should be discussed and included in the assessment. Furthermore such discussions can help organisations to be better prepared, if the unlikely actually happens.

Conclusion

Over the recent years, more attention has been paid to scenario analysis when assessing and modelling operational risk. As such, it has become an important building block of any sound risk management framework that will most probably be scrutinised by regulators (including the CSSF). One can expect that limited size or low complexity of operations will no longer be valid arguments for failing to implement such processes, given that pragmatic and commensurate solutions exist.

Designing, rolling out and getting people on board for such analyses takes time. Yet the effort is worth making: when implemented correctly, scenario analysis can lead to benefits that go well beyond pure measurement aspects by enabling a better informed decision-making process. As such, it should be seen as an opportunity that is worth grasping.

References

The area of operational risk management has developed rapidly since Basel II was finalised in 2004. Keeping up with changes in this area is therefore often difficult. To bring our readers up to date with recent developments in operational risk management, PRiM interviewed two experts in the field from the international central securities depositaries (ICSDs) Clearstream and Euroclear. The experts are Stefan Look, Head of Risk Management for the Deutsche Börse Group (including Clearstream) and John Trundle, Head of Risk Management for the Euroclear Group.

PRîM: Between 2000 and 2004 when the New Basel Accord was being compiled, managing operational risk in financial services became a very popular topic of discussion. Has that focus continued? How would you evaluate the status of operational risk management today?

John Trundle: When the New Basel Accord was first being discussed, risk managers focused mostly on regulation and compliance. Today, the focus in operational risk management is more on the practical aspect of how to improve the business. Models for managing risk today cannot be “black boxes”; they must give insights into the business details on which they are based. Operational risk management today must therefore combine quantitative expertise risks they represent and data, with input from day-to-day operations. For this reason, in Euroclear our risk management division includes two groups: one group focuses on developing quantitative models, while the other group studies the details of everyday operations. The interaction of these two disciplines provides us with a solid foundation for identifying, assessing and managing operational risks.
Operational risk management has improved significantly since Basel II was formulated. Most of that improvement, however, has been on management of the business risks rather than the strictly regulatory aspect of trying to determine a single capital number. One major constraint on that regulatory extent is the absence of reliable data to assess risks in the “trails of loss distributions” i.e. unlikely events. This means that the process is inevitably judgemental.

**Stefan Look:** With the introduction of Basel, operational risk is now an established risk type beside credit, market and liquidity risk. With its impact on the regulatory capital requirement, top management attention is ensured. The Pillar III disclosure reports ensure a full transparency to the public.

For Clearstream, operational risk management always was a key area of focus. Although Clearstream is a bank, our risk profile is unique, since operational risk, not credit risk or market risk, is the most important type of risk for us. We therefore opted for the Advanced Measurement Approach (AMA), as soon as Basel II was published. Choosing AMA entailed obtaining the approval of two regulators, the CSSF and BaFin (Bundesanstalt für Finanzdienstleistungsaufsicht, the German regulator), which we received in 2008 without any add ons.

**PRiM:** Are the Basel II definitions and standards for measuring and managing operational risk in financial services still adequate today? If not, what would you see as the key areas needing improvement?

**models for managing risk today cannot be "black boxes"; they must give insights into the business details on which they are based.**

- **John Trundle**

**John Trundle:** In comparison with the original Basel Accord, Basel II was a major improvement as it sought to be risk based. One significant problem in implementing Basel II, however, has been the amount of operational risk data that is available in the absence of business model data on unusual or extreme events. Because Euroclear’s business model approach to operations has always been low risk, we do not have a large collection of loss data. Organisations such as ORX (The Operational Risk data eXchange Association, www.orx.org) have been very helpful in this regard, because they collect from and share with their members significant amounts of operational risk data anonymously.

I believe that the areas which still need a considerable amount of work are the ones that are most difficult to quantify, such as reputational risk and behavioural risk (e.g., the impact of incentives on the risk culture of a company).

**Stefan Look:** I believe that the Basel II definitions and standards for the Advanced Measurement Approach are still valid today. There are some areas that still need clarification, e.g., risk mitigation techniques, the use of insurance.

Basel is the foundation for dealing with operational risk, but the implementation of Basel in each country can vary significantly. In Europe there is some harmonisation, but the approaches in the U.S. and Asia are quite different and should be aligned.
Furthermore, the parameters of the BIA (Basic Indicator Approach) and STA (Standardised Approach) should better reflect the risk profile of a bank. Especially the parameters should be set in a way that capital requirements from BIA and STA are usually greater than the one from AMA.

PRiM: The recent financial crisis has often been viewed as deriving from problems of market risk and credit risk. What role has operational risk played in the financial crisis? How could that risk have been managed more effectively?

John Trundle: Indeed, credit risk and market risk were the most visible causes of the recent financial crisis. A root cause behind them, however, was poor operational risk management, i.e., inappropriate governance models and lack of controls. To address these types of issues, operational risk management must have an effective system of internal controls that must be at the heart of the business strategy. Contrary to the oft-cited view that operational risk controls impede efficient business processes, managing operational risk effectively makes companies more efficient by enabling them to do more with less, by doing the right things right, first time. Certainly this has been our experience at Euroclear through the successful "LEAN" programme that we have been implementing.

Stefan Look: Certainly the trigger for the crisis was not operational risk. But whenever something is handled or processed, there is operational risk. While the objective in managing the crisis may have been to cover credit and market risk, the manner in which banks and regulators did that is a question of operational risk. The Lehman Brothers situation, for example, started as a problem of credit risk. But it then became an issue of operational risk, i.e., how to liquidate the assets of Lehman Brothers. Since Lehman was not a Clearstream client, we did not have to deal with this problem directly. Because Clearstream is a "critical infrastructure provider" as defined by our regulators, we need to be very good at managing operational risk and ensuring that our services are always available.

PRiM: In reaction to the financial crisis, the regulatory environments of financial services in the U.S. and in Europe have changed considerably. It is likely that this trend will continue. How would you evaluate the impact of this changing regulatory environment from an operational risk perspective?

John Trundle: Having worked previously as an overseer at the Bank of England, I can see both sides of the debate on the type of regulation we need. I would see the current situation as part of a regulatory cycle, in which regulation moves between increasing controls, on the one side, and encouraging innovation, on the other. After a long period of encouraging capital market innovation, competition and support for economic growth, which saw the development and popularisation of credit default swaps, collateralised debt obligations and other structured products, we are now moving to what is likely to be a
PRiM: As risk managers of international central securities depositories (ICSDs), what do you consider to be the most threatening operational risks in securities settlement and custody today?

John Trundle: For Euroclear, the most threatening risks are the ones that are low probability and high impact. The everyday types of operational risk can be managed effectively through well-established procedures which can be fine-tuned as necessary. But low-probability/high-impact risks, including pandemics, natural disasters or terrorism, are the ones that are most difficult to judge. Effective business continuity plans (BCP) are of course necessary for dealing with these types of risk. For this reason, Euroclear’s BCP is extremely comprehensive and tested regularly.

But in addition to these extreme events, we also need to think about how to deal with more subtle risks, such as reputational risk or a sudden change in the regulatory landscape. The new Alternative Investment Fund Manager Directive (AIFM), for example, is likely to have a significant impact on all CSDs and how they operate, although in this case I think the infrastructure will be able to adapt sufficiently.

Stefan Look: There are two key areas that I find are the most threatening for an ICSD today: System availability and human error.

Furthermore the recent crisis has shown that extreme events might not be as unlikely as expected. Therefore the guidelines on stress testing have been revised which includes also the stress testing of operational risks.

"The recent crisis has shown that extreme events might not be as unlikely as expected. Therefore the guidelines on stress testing have been revised which includes also the stress testing of operational risks."

- Stefan Look
explains our emphasis on an effective and comprehensive business continuity management (BCM). Our BCM is extensive and based on five different operational sites across the world – Luxembourg, Frankfurt, Prague, London and Singapore. Because our business continuity plans are tested regularly and unannounced, we are confident that we are well prepared to handle the unavailability of our key resources, making it possible to deliver our services on time, even in case of a significant incident.

To reduce the threat of human error, we implemented a strong quality management and try to implement straight-through processing (STP) as widely as possible, but 100% STP remains a utopia. As a global service provider, we must accept the fact that there are numerous exceptions, particularly in the area of corporate actions, which cannot be automated. To deal with human error effectively, we also have an open environment, in which a mistake is viewed as an opportunity to learn and improve our processes, so that the mistake does not recur. In this context, we rely heavily on our colleagues in operations, who provide us with detailed expertise about how processes should function on a daily basis. We see this close collaboration between risk management and operations as an essential tool for reducing operational risk.

**PRiM:** With the recent entry of the ICSDs into the area of over-the-counter (OTC) derivatives, do you see derivatives as posing a particularly difficult operational risk?

**John Trundle:** The area of OTC derivatives is already very crowded with potential service suppliers. The ICSDs, however, are favourably placed to provide some new services, since we both have relevant expertise in providing services for OTC markets. Derivatives products can be risky and there is a need for clear, standard contracts and the corresponding legal structures around them. Once the appropriate standards and legal structures are in place, it should be possible to increase the level of straight-through processing (STP) and automation for OTC derivatives.

Euroclear has experience of providing the messaging and netting arrangements for LCH.Clearnet which then manages the derivatives position as a CCP.

Euroclear already has a very efficient collateral management service, which could be used to manage the collateral linked to transactions involving OTC derivatives. Collateral management is a key component in managing the risk associated with OTC derivatives.

**Stefan Look:** Clearstream is in the process of creating a trade repository for OTC derivatives. While creating a trade repository is not a high-risk activity, it might be a first step toward finding an effective solution for OTC derivatives.

Our sister company Eurex – like Clearstream a part of the Deutsche Börse Group - is already a CCP for European index and single name OTC derivatives, supporting financial markets by reducing systemic risk, increasing transparency and gaining efficiencies. Clearstream performs STP
PRiM Risk Newsletter

Collateral management services to collateralise OTC derivatives. Therefore, we need to develop a multidisciplinary approach that brings risk management and business together. A further area needing development is the use of risk-adjusted targets in performance management, as I described it earlier.

Generally speaking, operational risk must be measured in a more granular way. To achieve this goal, we need to work more closely with operational experts to understand where the risks are and how they can develop into losses. We need to break away from the tendency to reduce operational risk to a few simple numbers. The approach that is needed is one that combines quantitative and qualitative methods to produce a balanced view of operational risks. This will require creativity and new techniques, such as reverse stress testing, which starts with the impact of a risk and works back to what the causes could be. Unlike managing credit risk or market risk, operational risk management cannot be fully automated by simply using computer models.

PRiM: Thank you for sharing your views with us.

"We believe that quantification should not be exaggerated. Equally important is the need for creativity in operational risk management."

- Stefan Look

"We need to overcome the tendency to believe that a single number can summarise a distribution of possibilities (...) We need to be creative in managing the unexpected."

- John Trundle

PRiM: How do you think that operational risk management will develop in the future?

John Trundle: Operational risk management has taken its place alongside the other main risk types at the core of risk management. Sharing operational risk experience and data through associations like ORX has been a key contribution in developing the discipline. I think we will see more effort to define best practices for the market which will accompany the professionalisation of operational risk management. We will need to maintain a balance between the quantitative aspects of our specialisation. We need to overcome the tendency to believe that a single number can summarise a distribution of possibilities (just as VaR is insufficient to summarise market rise). To overcome this, we need to think in terms of “what-if” scenarios and we need to be creative in managing the unexpected.

Stefan Look: While Basel II was very important as a first step towards quantifying operational risk, we believe that quantification should not be exaggerated. Equally important is the need for creativity in operational risk management. To manage operational risk effectively, we need to develop a...
The experience of the operational risk management (ORM) team at PricewaterhouseCoopers shows that an integrated approach embedding operational risk into the overall management of risk and control is often beneficial because:

- Operational risk quantification is too often viewed as irrelevant to the day-to-day management of risk,
- Loss data collection may provide a one-way feed into an ‘invisible’ group model, rather than being used by the business to identify areas of control weakness,
- Risk assessment processes often fail to provide an effective means of understanding the operational risk profile or a practical tool for driving control improvement actions and consequent reductions in allocated capital.

The most effective way to make ORM processes smarter is to establish the links between risk processes and enable them to interact in a dynamic risk management cycle. By creating these links, companies can create a self-improving and dynamic operational risk framework. Naturally such a performing and integrated operational risk system requires adapted supporting tools.

The operational risk software market segment has been initially dominated by niche providers with various combinations of qualitative and quantitative capabilities. Two broad categories of IT tools were progressively introduced in order to support operational risk management processes: systems based largely on compliance-oriented process control, and systems based on mathematical formulas that calculate the risk attributes of historical data streams. The outputs from compliance-oriented applications are qualitative in nature, concentrate on control effectiveness and have a relatively low technical dependency. The calculator-oriented solutions rely
heavily on the quantity of available historical data, regardless of process.

A selection of key vendors in this segment of niche / specialised ORM providers is:

- **SAS Institute**: with SAS OpRisk Management which includes:
  - SAS OpRisk Monitor, a Web-based application that collects, manages, tracks and reports information about operational loss events, key risk indicators, risk-assessment maps and control-assessment scores,
  - SAS OpRisk VaR, a Value at Risk model that enables users to splice, dice, drill-down, adjust, trend and plot operational loss data,
  - SAS OpRisk Global Data, a central database of external loss data that enriches the statistical sample used for modelling,

- **OpenPages** (recently acquired by IBM): with ORM. OpenPages ORM automates the process of identifying, measuring and monitoring operational risk, combining all risk data, risk and control self assessments, loss events, scenario analysis, external losses, and Key Risk Indicators (KRI) into a single integrated solution,

- **Algorithmics**: with Algo OpVar. This solution captures and stores information in a centralised database that can serve all users involved in the management of operational risk and compliance issues,

- **Mega International**: with Mega ORM Solution. The Mega ORM Solution provides a support for risk assessment and control. This is accomplished by integrating information on incidents and internal and external losses, and Key Risk and Performance Indicators,

- **Avanon**: with OpRisk Suite which offers a solution positioned to provide operational risk management and measurement requirements set down by the Basel II framework.

The most common functions of these tools are generally:

- Risk and control self-assessment which allows companies to inventory key risks and controls and then make decisions to control/mitigate operational risk,
- Support to the estimation of the likelihood and impact of a loss. Losses are generally stored in a specific Loss data base system for further analysis,
- Definition of custom key risk indicators with the ability to assign them to any process or loss event across the organization,
- Capital calculation facilities based on operational risk exposures,
- What-if analysis and assessment of the impacts of operational risk exposures,
- Internal Reporting capabilities,
- Regulatory reporting based on predefined reports or extracts.

However, as the Governance, Risk Management and Compliance (GRC) market matures, and most of the companies are expecting more integrated, complete and scalable software offering. The current trend on the vendor market highlights a convergence between GRC oriented tools and ORM software solutions.

According to a recent study from Chartis, the worldwide financial services OpRisk and GRC technology market will grow to $2 billion by 2013, at a compound annual growth rate of 6.5 percent.

A selection of key vendors in this GRC segment is:

- **Oracle**: with Reveleus. Oracle Reveleus Operational Risk provides a solution that enables to identify, monitor, and manage risk within a comprehensive GRC framework,
• **BWise**: with BWise 4 which provides an integrated GRC software solution that enables to use the same software throughout the organisation for ORM,

• **Intech**: with Governus. This tool has been developed by a provider located in Luxembourg in order to assist companies in gathering, documenting, evaluating and following-up information about their objectives, risks, incidents and controls, as well as improvement measures that should be undertaken. The tool has been designed as a governance tool that is used as a front end for risk data collection and a flexible dashboarding and reporting tool for stakeholders, in particular senior management, internal audit and risk management, so that they are continuously aware of the state of their risk environment. Governus comes with multiple templates dedicated to specific industries or risk areas,

• **Methodware**: with Enterprise Risk Assessor (ERA). ERA provides numerous features that allow companies to conduct Enterprise Risk Management. ERA encompasses operational risk management, project risk management, etc. within one single tool.

Traditionally, most of the enterprises have managed operational risk in silos, where separate business units have maintained their own data, analytics and assumptions. As a result, departments have ended up focusing on risks that had less impact or low probability of occurring, while failing to recognise more substantial and preventable losses. Now executive management and boards of directors expect integrated operational risk practices and tools that will enhance an organisation’s ability to be competitive in the market place, since it enables management to make strategic business decisions that are based on a complete and integrated risk portfolio.
To find outside-of-the-box ideas that can support the development of operational risk management (ORM), it is often useful to cross the border of an economic sector and look for inspirational examples in other sectors.

Considering practices in the manufacturing industry, for example, could be helpful for several reasons:

1. **Cost control culture** - In many industrial sectors, operating margin is 3-5%, far less than in financial services, and any large event can dramatically impact profit; reworks are often not possible, thus amplifying the impact of errors.

2. **Risk control culture** - Risk is not only financial, but also environmental, including physical safety, which draws more social pressure and management attention.

The best response of industry to these challenges has so far been Lean Six Sigma (LSS) and other related methods. LSS has developed progressively since the 1960s and examples of its use can be found by car manufacturers like Toyota and generic parts suppliers/manufacturers like Motorola and General Electric. Since the 1990s, LSS has been used in the financial sector as well.

LSS is often considered as a technique in relation with efficiency, productivity and operational process improvement. This is perhaps too restrictive and overlooks the benefits and contribution of LSS to operational risk mitigation.

Recently having moved from LSS to operational risk management, I would like to highlight the bridges between the two disciplines through a number of pragmatic examples.

Poorly defined process and procedure documentation or the inability to make employees understand that information is a major source of operational errors. LSS helps articulate these visually through...
process flows by level of detail. It is my experience that a twenty-page procedure document, which staff never read, can easily be reduced to eight pages through introduction of process flows. These ones can even be displayed on office walls. In some manufacturing plants, management by visual tricks is pushed to the extreme: Any removable part, tool or product is marked on the ground or a wall so that you immediately notice if anything is missing, in the wrong place or having a probability to disturb the normal flow of work.

Management by metrics is often the Holy Grail of managers. How can we pick the right metrics in an overflow of figures from every corner of an organisation? The question is also relevant for key risk indicators at a business unit level, particularly if we would like to have leading ones that offer a forward looking view of future operational events. In this area, the LSS core practice of process variation reduction offers an adequate selection tool. The idea is that any process output is defined by the sum of all the process inputs. If we want to control the variation of output, i.e., avoid an error, then we have to control all the inputs on the appropriate tolerance levels. This illustrates a basic tenet of KRI leading indicators: We need to select and monitor the right process inputs.

In industry, constant monitoring of process input is part of day-to-day management. More emphasis is placed on controlling the most upwards in the process, even up to suppliers. Long before banks, the automobile industry started auditing suppliers and imposing LSS standards on them.

Another LSS tool that can help banks map operational events to root causes is the cause-effect diagram, also called a "fishbone diagram", which helps build a comprehensive overview of all process inputs into standardized cause and sub-cause categories, such as "Method, Man, Measure, Machine, Entry Material, Environment", which can easily be linked back to Basel II cause categories.

Risk Control Self Assessment (RCSA) is widely used across organisations to grasp the operational failure mode on any process and the effectiveness of the associated controls. But is it used efficiently? Applications that are oversimplified or over-complicated lose the added value. RCSA shares the same root as the LSS Failure Mode Effect Analysis (FMEA) tool. Returning to the roots of these methods to rethink them could be a useful exercise.

It is often forgotten that RCSA can be applied to future products and services. No NASA space shuttle, for example, can be launched without passing the FMEA exam and meeting expected low risk level. The usage of FMEA is iterative at each stage of product design, manufacturing and testing.

In terms of risk mitigation, undertaking a department/activity improvement project with LSS has proved to be a very effective method. Results show an average error rate reduction of about 60-80% with a corresponding increase in service quality. In a given project in the area of corporate actions, RBC Dexia was able to reduce financial loss through errors and omissions by 78%, measured on the 12-month period following the project closure.

LSS can help us reinforce operational risk management practices so they are proactive, forward looking and action oriented, as opposed to the reactive, backward looking, reporting mode that was the usage several years ago.
Recent market turmoil has compelled regulators to introduce new measures to help financial institutions meet the challenges of globalized financial markets. And firms themselves are looking for new ways to improve and tighten risk management.

A close examination of the Basel Committee’s new trading book requirements reveals how these new rules will have an impact on the way banks assign assets to both their trading and banking books.

A key component of the new requirements is the incremental risk charge (IRC). The inclusion of CDOs, CDSs and other structured and exotic products in the trading book inevitably produces a rise in default risk, correlation and skew risk. These are risks that ought to be captured in specific risk models. However, in practice they have proved difficult to capture adequately with VaR. The July 2009 IRC Guidelines Paper introduces a new minimum regulatory capital charge, which captures default risk and credit migration.

The IRC will have a measurable impact on the trading book’s capital charge, compounded with the proposed ‘stressed VaR’ (also published in the July 2009 paper and based on historical data from a 12-month period of severe market stress). The quantitative impact study, published by the BIS Committee in October 2009, demonstrated that these changes to the trading book framework will increase average trading book capital requirements by two to three times their current levels.1

This paper examines the new rules and shows how they relate to two of the most important tasks of modern risk management: How to Achieve a Balance between Trading and Banking Books.

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1 Analysis of the trading book quantitative impact study, October 2009
The development of an internal model for calculating the IRC puts very high demands on banks. From the outset, a constant level of risk over a one-year capital horizon has to be modelled, preferably taking into account well-founded assumptions on the liquidity horizons of different products or asset classes. As with default risk, analogies of functions like probability of default (PD)(t) and loss given default (LGD)(t) are needed to integrate issuer-related credit migration risk and credit spread risk.

**THE CAPTURE OF EVENT RISK AND JUMPS IN CREDIT SPREADS**

How can firms capture sudden jumps in credit spreads, such as those caused by event risk? Throughout 2007 and 2008, some banks adopted historic migration matrices and credit spreads of the issuers to model such jumps. However, bearing in mind the inherent problems with such figures, it may make sense to gain a qualitative perspective of historic and actual issuer-related single events and to analyse any corresponding jumps in credit spreads. In the wake of systemic concerns, we must also identify ‘triggering’ events and seek to understand the interaction between single events.

We must delineate ‘relevant’ events, establish how they are linked, and if possible classify them. The aim is to estimate price jumps for calculating expected future market values and to produce benchmarks. The following hypothesis offers a good starting point to start dealing with these challenges.

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2 The liquidity horizon for a position or set of positions has a floor of three months. Compare “Guidelines for computing capital for incremental risk in the trading book”, Basel Committee on Banking Supervision, January 2009.

THE IMPACT OF ISSUER-RELATED EXTERNAL EVENTS AND UNDERLYING CONDITIONS

Issuer-related events are only relevant to sudden price jumps once the events have become public knowledge or are at least known to some market participants. Consider some different types of issuer-related public events.

If these are about liquidity related to an issuer, then markets react immediately. This is even more pronounced in nervous markets as this example shows:

On Wednesday, September 24th, 2008, depositors lined up outside the branches of Bank of East Asia (BEA) in Hong Kong to withdraw their money. The savers were worried by rumours that the BEA was unstable as it held a large number of assets linked to the failed US investment bank Lehman Brothers and the troubled insurance giant AIG. The rumours were spread by text messages and over the internet. According to media reports, some disgruntled savers had to be held back by police as they battled to get inside a branch before it closed. The BEA extended opening hours to deal with the rush of customers. The bank’s shares slumped more than 11 percent on Wednesday, but rose after the BEA and the Hong Kong Monetary Authority (HKMA) insisted that the rumours of BEA’s financial instability were unfounded.

When looking at historical issuer-related events in more detail, several more incident types emerge. For example, consider cases of death that are associated with the products of particular companies, such as the Merck Vioxx disaster and the Spanair catastrophe. Other examples include severe cases of fraud or rogue trading, which bring about huge losses, like those of SocGen. Any of these factors might cause sudden jumps in the credit spreads of the issuer. Similarly, political events or serious operational failures can have a similar impact.

THE CASE AGAINST ORGANIZING RISK MANAGEMENT FUNCTIONS IN SILOS AND FOR INTEGRATED QUALITATIVE MEASUREMENT IN RISK MANAGEMENT MODELS

It is generally accepted practice to tabulate external events and classify them into categories like “operational risk”. However, for incremental risk -- and also for stress-testing and liquidity risk management purposes -- we need an industry-wide classification that extends beyond financial institutions to all industries. In addition, such categories must accommodate damages to the reputation of an issuer as well as certain strategic issues.

What determines an event as relevant? Our two examples above demonstrate that the relevance of an event highly depends on the conditions and circumstances prevailing at the time of occurrence. It is perhaps analogous to a marriage, when a single event might be non-threatening in the good times but it might cause breakdown when a couple is already at loggerheads.

In practice, issuer-related events that are initially seen as low-impact should not be a priori excluded. All scenarios and mathematical models should be built with sufficient flexibly to accommodate changes in underlying conditions and circumstances.

Managing capital charges for the trading book: three counterparty risk exposure methodologies explained

Incremental risk offers a clear example of the need to move away from a silo approach towards integrated risk management. However, it does have the effect of increasing the capital charge. The more advanced counterparty risk exposure methodologies...
Replacement Costs = maximum (0, Market Value (portfolio) - C)

There are several weaknesses associated with this current exposure methodology, which was designed for Basel I: changes of risk factor are not taken into account, exposures cannot be fully netted, and financial transactions in securities cannot be considered.

**Standardised method**

The standardized method (SM) was designed for banks that do not qualify to use the IMM, but wish to run a more risk-sensitive method than the CEM. The standardized method can be used only for OTC derivatives.

The main principle is the ‘building block’ approach for building hedging sets, which is already used in non-internal model capital charge calculations for market risk. The standardized approach is designed to capture certain key features of the internal model approach for counterparty credit risk.

The building-block approach for netting sets splits risk positions into key risk drivers, such as foreign exchange risk per currency pair, interest rate risk per maturity class and government / non-government rate or equity risk per index. Transactions are mapped to these risk positions that represent key risk drivers using the modified duration-for-debt instruments and the delta concept for options.

Risk positions within a netting set of the same risk driver form a hedging set. Building hedging sets for interest rate positions produces the additional requirement that only interest rate positions that have similar interest rates can be netted. For each hedging set, only the net amount can be used to calculate the exposure amount.

Under the building-block approach for building hedging sets, the exposure at default (EAD) is calculated by:

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5 The Application of Basel II to Trading Activities and the Treatment of Double Default Effects, Basel Committee on Banking Supervision, July 2005
The Basel Committee proposed the internal model approach to encourage the use of the potential future exposure (PFE) as a way to encourage best practice methodologies. Some enhancements were included to establish an advanced and robust capital charge framework for counterparty credit risk called Expected Positive Exposure (EPE).

One reason to extend the PFE concept for capital charge calculations is rollover risk, which is not adequately covered within standard PFE concepts.

The main concept of EPE is to use the time-weighted average of individual expected exposures for a one-year forecast horizon. The basic process of calculating this exposure is to generate Monte Carlo scenarios covering one year and various market risk factors including interest rates, exchange rates and credit spreads. The process values each transaction under each scenario then aggregates the transaction values. Credit mitigation forms can be taken into consideration to calculate exposure to individual counterparties at each future date. Finally, the appropriate maximums and averages over one year (or the effective maturity of the longest-dated transaction) are taken. This methodology accounts for portfolio effects (economic offsetting) and cross-product netting effects in the regulatory capital calculation process.

In order to capture a conservative economic climate, the final number is scaled by a

### Table 1: Credit Conversion Factors (standardized method)

<table>
<thead>
<tr>
<th>FX</th>
<th>CCF</th>
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<td>IRP (TBR)</td>
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One key conceptual difference between the CEM and the SM is the recognition of hedging within netting sets. It follows that well-hedged counterparty interest rate risk positions can lead to a lower capital charge. This should provide the incentive to manage counterparty risk with a more risk-sensitive approach than the CEM. However, by using a beta of 1.4 no general conclusions can be drawn about a capital charge reduction using the SM.

**Internal model method**

Regardless of the capital charge method used, banks are expected to employ sound practices in managing all aspects of their counterparty risk exposures. Many use Monte Carlo simulation, complemented by a wide variety of stress scenarios. This is the most appropriate methodology for accurately calculating credit exposure and understanding the underlying sources of risk, especially for derivatives portfolios.

The credit conversion factors that apply are taken from the following table.

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On October 14th, IFBL, the Luxembourg Institute for Training in Banking and the Luxembourg Association of Professionals in Risk Management (PRiM) invited Professor Philippe Jorion to speak on The Adequacy of VaR Calculations in the Fund Industry.

Prof. Philippe Jorion, is an eminent figure in the world of risk management. He is well known in Luxembourg for his preparation seminar for GARP Financial Risk Manager examination. Prof. Jorion is Chancellor’s Professor of Finance at the School of Business at the University of California at Irvine. He has written a number of books, including "Value at Risk: The New Benchmark for Managing Financial Risk," which is aimed at finance practitioners and has become a bestseller in its field. Dr. Jorion has also written the “Financial Risk Manager Handbook” which is the textbook for the GARP examination.

Prof. Jorion received a professorship “honoris causa” at the University of Liège on the day following this conference.

regulatory defined factor called “alpha”. This value is currently set at 1.4 and can be estimated by bank specific estimations which have to be approved by the regulators and can be minimized up to 1.2.

The advantage of this IMM approach is to implement best practice methodologies. These can be applied to counterparty risk for capital charge calculations using advanced risk management techniques, like cross-product-netting for OTC derivatives and securities financing transactions, diversification and hedging effects which can reduce the capital charges for trading activities.

This framework can also be used for the next challenge: setting up a counterparty stress-testing framework to strengthen the robustness of risk management processes. An advanced counterparty stress-test framework could cover concentration risk and correlation risk as well as the integration of market and credit risk.

The topics described above will clearly have an important influence on the fundamentals of risk management in the trading book. The qualitative aspects of risk management, like adequate risk factor simulations, external events and stress-testing, can unify risk departments. At the same time, the use of counterparty methodologies, such as a standardized approach or IMM, will allow offsetting capital-charge increases brought about by incremental risk.

NEXT EDITION: January 2011
THEME: Risk Management for Investment Funds
CONTRIBUTORS WELCOME
The firm plans to support Prime Risk with up to $200 million of equity capital. Thomas H. Lee Partners has partnered with industry veterans including Bret Quigley to form Prime Risk Partners. The firm plans to support Prime Risk with up to $200 million of equity capital. The company will acquire and grow property, casualty and employee benefits insurance agencies across the U.S. Prime Risk Partners. Shares in Experian dropped nearly 7 per cent today after investors took fright at the credit-checking company’s exposure to the US sub-prime mortgage market and its caution on the UK financial services sector. The company’s shares fell 6.54 per cent, or 36.5p, to 507.5p almost one year to the day after it floated on the London Stock Exchange following its demerger from GUS. Online shopping from a great selection at Subscribe to the Prime Newsletter Store. Prime members enjoy FREE Two-Day Shipping and exclusive access to music, movies, TV shows, original audio series, and Kindle books. Get started. Sign in. New customer? Start here. Your Lists. Create a List Find a Gift Save Items from the Web Wedding Registry Baby Registry Friends & Family Gifting AmazonSmile Charity Lists Pantry Lists Your Hearts Explore Idea Lists Explore Showroom Discover Take the Home Style Quiz.