Risk Accounting – A Next Generation Risk Management System for Financial Institutions

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Abstract

The financial crisis has awoken financial service organizations to the reality that when financial transactions enter their operating environments they trigger real time risk exposures that can go well beyond nominal transaction values, capital charges and other measures deemed appropriate for preventing unexpected losses. Traditional risk accounting approaches have caused lagging measures of risk to be recorded in much of managements’ traditional performance and risk reporting systems. Conventional financial and risk management systems are failing management and their Boards due to their inability to measure, aggregate and report risk exposures as they accumulate. In reaction to the current financial crisis the Boards of many firms are assigning the additional task of oversight of management's risk policies and guidelines to Audit Committees. Accountants are also being asked to discuss the enterprise's key risk exposures with management including those that are beyond financial reporting related risks.

The current financial crisis can be linked to an inability to record and account for risk exposures in a timely manner. Indeed, recent failures of financial institutions provide some measure of the degree to which accumulating risk exposures escaped the exercising of business judgment simply because executive management, investors, auditors and regulators were unaware of their existence on such a scale.

The aim of this paper is to consider whether a more comprehensive and timely measurement framework for risk exposure is now needed and to examine one possible approach. The paper introduces a common unit of exposure measurement for a diverse set of business risk indicators and demonstrates how nominal transaction values and relevant quantitative and qualitative risk metrics can be coded into each transaction and used to calculate a risk adjusted transaction value. The combination of conventional risk measures derived from the capital conventions mandated by the Basel Committee on Banking Supervision and this proposed risk exposure measurement framework provides the basis for the system of Risk Accounting described in this paper.

Key Words: Risk Accounting, Basel II, Risk Management, Operational Risk, Enterprise Risk
BACKGROUND

Regulators have always fostered an expectation that capital is what sustains banks in periods of stress and prevents them from failing. However, given the recent failures, bailouts and nationalizations of some of the world’s leading financial institutions we should perhaps view regulatory capital as the measure by which banks countdown to failure rather than the system that proactively prevents it.

So what offers a bank the greatest protection against failure if it isn't capital? Quite simply, it is the risk culture embedded in its people and processes. And at the core of any risk culture are 1) the incentives for individual compensation that balance risk and return with short-term self interest and long-term stakeholder goals, and 2) the early warning systems that highlight growing exposures to risk. Here, Basel regulations for operational risk were designated for such things as model risk, fraud, control weaknesses, faulty product structures, process and control risk, inappropriate sales to counterparties, and business practices that lead to faulty incentive compensation schemes. The myriad of such business level details that blew up was left to last. Indeed, it was actually pushed backed by the industry’s leading risk managers with complacency demonstrated by their managements and regulators.

Stakeholders in the financial services industry have a right to expect that the new profession of risk management and the risk managers who practice it would, by their rapid elevation to the executive level ‘C suite’ in most financial firms, facilitate a risk culture in these enterprises. Thereafter, they would ensure that early warning systems are installed to highlight growing exposures to risk with the final purpose of presenting reliable and meaningful assessments of future losses. But this is what risk managers and conventional risk management systems have evidently not succeeded in doing. The result is risk management systems and, consequently, financial statements that failed to report the life-threatening concentrations of risk exposures that had unknowingly accumulated in so many of our leading financial organizations around the globe.

In recent testimony before Congress, Alan Greenspan acknowledged that he incorrectly assumed managers of financial firms were aligning their risk appetite to their shareholders’ interests. What he did not say, but implied, was that executives had aligned their appetite
for risk to their own individual interests and that self imposed risk and accountability controls failed regulators.

Risk management experts have long been aware of the difficulties attached to the measurement and management of operational risks particularly where this relates to the translation of operational metrics. All the evolving risk measurement systems and generally accepted accounting conventions have been devoid of the ability to accommodate operational metrics into the risk reporting and aggregation methods used to oversee business performance. These have been presented of late as useful management tools in balanced scorecards, dashboards, six sigma measurements and the like. Such operating metrics have always been open to interpretation by management against the results of the performance and reporting systems of the firm as they did not have a naturally occurring monetary basis from which they could be extrapolated or transformed into valuation measurements of any kind.

This problem was to be confronted at the time operational risk was offered as the third leg of the Basel capital regime, following credit risk and market risk, which described a framework in which discovery of new techniques for measuring such risk would be incented with lower capital charges. However, whether for lack of will, inability to communicate across business silos, or preoccupation with the earlier Basel pronouncements of externally focused market and credit risk, the industry pushed back without really trying. For example, when considering the application of the Use Test applied to operational risk, one such expert group commented; “Operational Risk however is very different. The nature of Operational Risk is such that the direct linkage of measurement to management is difficult. This is partly due to the inherent difficulties in assessing the Operational Risk positions that a firm faces and how to measure these, but also because the risk profile of a firm does not change quickly, nor can changes to this profile be identified over a short time frame”\(^1\).

Risk management experts were publicly airing their misgivings before the financial crisis broke. Consider these remarks presented in May 2007 by the Advanced Measurement Approach Group formed by leading US Banks under the auspices of the Risk Management

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Association to respond to the US Joint Regulatory Agencies’ proposals for the supervision of operational risk under Basel II:

“Today, management relies on diverse information such as Risk and Control Self Assessment and audit results, Key Risk Indicators, past loss experience, external events or scenario analysis to arrive at a judgment on the level of and change in risk. A change in the level of risk may signal future loss or it may signal a change in the frequency and severity of future losses. A direct relationship between a change in risk and future losses has not been proven definitively except perhaps for highly predictable routine losses, where the amount of available and relevant data supports such a relationship.”

“Practically speaking, the requirement to produce comprehensive management reports including ‘changes in factors signaling an increased risk of future losses’ cannot be met at this point in time or in the near future. In many instances, operational risk factors that led to a particular event cannot be uniquely determined retrospectively, let alone detecting a change in factors that signals an increase in future losses”.

The current financial crisis and recent failures of financial institutions are all examples of exceptional and unmeasured accumulations of risk exposures that escaped the purview of management, investors, auditors and regulators. They had been unaware of their existence on such a scale and, therefore, had not accommodated appropriate unexpected loss scenarios into their risk calculations, liquidity risk being the most prominent of these failures. Further, many of the recent events including Société Générale’s $4.9 billion loss due to trader fraud; Bear Stearns collapse because its mortgage portfolios holding sub-prime debt was improperly rated as relatively risk free; Citibank’s report that its Market Value at Risk number did not include CDO positions because they are hard to value as there are no prices or model inputs; MF Global’s $141 million trading loss due to a reported systems control problem allowing a trader to avoid contract limits; Merrill’s acknowledgment that $43 billion of OTC Derivative cash flow was improperly recorded on both sides of the balance sheet; and Credit Suisse’s $2.8 billion write down due to valuation model pricing errors and use of stale prices; are all examples of risks that can be slotted into one or more of the

business level operational risk categories noted in the still unimplemented Basel operational
risk framework.

Indeed, the unmeasured and unreported risk exposures that contributed to the current
financial crisis were a cocktail of all the principal categories of risk... credit, market, liquidity
and operational. This serves to heighten the awareness of financial institutions and their
regulators to the need for the measurement and management of risk exposures in the
aggregate rather than on a specific risk category or ‘silo’ basis.

This awareness is expressed in an April 2008 paper issued by the Basel Committee on
Banking Supervision³ entitled ‘Cross-sectoral review of group-wide identification and
management of risk concentrations’. In its introduction the paper explains its aim, “...to
explore the progress that financial conglomerates have made in identifying, measuring, and
managing risk concentrations on a firm-wide basis and across the major risks to which the
firm is exposed”. In commenting on traditional risk management approaches the paper
states, “The risk management at financial conglomerates tends to be structured in silos
according to the risk category... several groups expressed a desire to develop more
“horizontal” (i.e. across the risk categories) insight into potential risk concentrations and
have started developing management tools to acquire a more integrated group-wide view of
risk exposures and potential risk concentrations.”

There is no shortage of evidence that firms recognize these threats and in response have
elevated the monitoring of cross-enterprise risk exposures to the Board level. For example,
the ‘Journal of Accountancy’ recently reported the results of an Ernst & Young survey⁴ that
found that the Boards of many firms are assigning the additional task of risk oversight,
despite their already lengthy list of responsibilities, to Audit Committees. But not only are
they being charged with overseeing management's risk policies and guidelines, they are also
being asked to discuss the enterprise's key risk exposures with management including those
that are beyond financial reporting related risks. In a 2006 survey of Fortune 100 companies⁵
conducted by the Conference Board Governance Center and Directors’ Institute, McKinsey
and KPMG’s Audit Committee Institute it was found that 71% place responsibility to report
on risk to the Board with the CFO. The COSO ‘Enterprise Risk Management - Integrated

³ Basel Committee on Banking Supervision, “Cross-Sectoral Review of Group-wide Identification and
⁴ Ernst & Young 2008 Global Internal Audit Survey
⁵ Carolyn Kay Brancato, Matteo Tonello, and Ellen Hexter, The Conference Board, “The Role of the
Framework\textsuperscript{6} provides a broader perspective in that it expects the entirety of enterprise risk management to be monitored through ongoing management activities, separate evaluations, or both.

Irrespective of how risk monitoring accountabilities are assigned, if they are not underpinned by a consistent and replicable cross-enterprise risk exposure measurement framework that provides for the consolidation and aggregation of risk exposures, the task borders on the futile. Robert Rubin, a Citigroup director and former Treasury secretary, recently told the Wall Street Journal that a “Board can’t run the risk book of a company (...) the Board as a whole is not going to have a granular knowledge of operations”\textsuperscript{7}.

**BASEL II AND THE REGULATORY AGENDA**

Recently, the Basel Committee on Banking Supervision (BCBS) has progressively extended requirements for quantifying and reporting financial risk.\textsuperscript{8} It hopes to improve risk management by establishing operational risk as a separate category and publishing guidance for operational risk management. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events.\textsuperscript{9}

Research to date has considered the importance of operational risk in the financial marketplace, concluding that exposure is significant.\textsuperscript{10} Within banking organisations, corporate level risk has been allocated on a top down basis. A survey by the BCBS found that on average, banks had allocated approximately 15% of their capital for operational risk on this basis, adjusting for scale factors.\textsuperscript{11} An important aspect of operational risk is fraud potential, and significant losses have resulted from well publicised incidents, for example Barings in 1995, which suffered a $1.3 billion loss due to a rogue trader, Allied Irish Bank’s

\textsuperscript{7} Wall Street Journal, “Rubin, Under Fire, Defends His Role at Citi”, Nov. 29, 2008
\textsuperscript{9} BCBS, 2001; BCBS 2003, p.2
\textsuperscript{11} Fontnouvelle et al (2003, p.3).
loss of $750 million due to unauthorised trading in 2002\textsuperscript{12} and the recent Société Générale loss attributable to unauthorised trading activity. More recently, the sub-prime mortgage failures and the unprecedented leverage that had been allowed to accumulate in the financial system have triggered bankruptcies, bailouts and nationalisations of financial institutions on an unprecedented scale.

In response to BCBS inspired regulatory changes and these high profile cases of fraud and failure, a large body of academic literature has accumulated on the various aspects of operational risk modelling.\textsuperscript{13} Specifically, a number of studies has examined the problems related to the quantification of operational risk and associated events and processes, for example legal risk, that might defy precise quantification.\textsuperscript{14} Similar problems arise from detected frauds and errors, where infrequent high value occurrences produce an uneven pattern of loss history. Compared to credit and market risk, operational risk has a dramatically different distribution\textsuperscript{15} requiring different measurement and modelling approaches, characterised by assumptions about the statistical distribution of the loss history and calling on advanced mathematical techniques and theories.\textsuperscript{16} The objective of such techniques is to produce both a consistent measure of risk exposure and robust estimates of Value-at-Risk (VAR). Such methods typify what is described in Basel II\textsuperscript{17} as an Advanced Measurement Approach (AMA).\textsuperscript{18}

However, a consequence of attempts at modelling operational risk has been to create significant differences in terms of risk typologies, metrics, and mathematical analysis.


\textsuperscript{17} Basel II, agreed in 2004, is a BCBS Framework for minimum capital adequacy now being implemented by national supervisory authorities.

\textsuperscript{18} Under AMA, banks must integrate internal data with relevant external loss data, account for stress scenarios, and model the factors which reflect the business environment and the internal control system.
According to a recent BCBS report these differing methods are both impediments to the integration of enterprise risk management and a promise of new modelling and measurement techniques. The purpose of the transaction based approach to Risk Accounting described in this paper and outlined in Figure 1 is to assign \textit{ex ante} values to risky processes which can subsequently be correlated with loss history events and, in turn, economic capital as they evolve. Information feedback loops can be developed to provide management with near real-

![Figure 1 – Risk Accounting Method and System Overview](image)

time risk exposure and risk management data. In complementary fashion, the new approach will help build more robust, comparable and, therefore, consistent estimates of VAR. Prior work\footnote{BCBS (2008), ‘Cross-sectoral review of group-wide identification and management of risk concentrations,’ Bank for International Settlements.} has demonstrated that a common measurement framework, connecting operational metrics to risk metrics, will assist the development of better systems to account for all the dimensions of risk, including those captured in expected losses (capital reserves), unexpected losses captured in capital charges, and those yet to be captured by measurement of exposures

to potential losses. This later dimension of a prospective measure of “loss potential” is best captured by the proposed introduction of a new unit of measurement for risk exposures and a methodology to map operating metrics to it, in a proposed system of Risk Accounting, the subject of this paper.

**CURRENT STATE OF RISK MANAGEMENT**

Risk managers have focused primarily on models of past losses as a means of calculating risk capital thereby foregoing the challenge of transforming transaction data and related operating metrics into forward looking risk exposure measures. Such metrics, if they were available, would certainly provide a vastly improved basis for risk-adjusted performance measurement systems and enable Boards of Directors to monitor risk exposures on a fully quantified and, consequently, prioritized basis.

Following testimony given before the USA House Oversight Committee in November 2008, Prof. Andrew Lo commented in an interview with the Wall Street Journal, “The very fact that so many smart and experienced corporate leaders were all led astray suggests that the crisis can’t be blamed on the mistakes of a few greedy CEOs. In my view, there’s something fundamentally wrong with current corporate-governance structures and the language of corporate management. We just don’t have the proper lexicon to have a meaningful discussion about the kinds of risks that typical corporations face today, and we need to create a new field of ‘risk accounting’ to address this gap in GAAP”.

Financial institutions need to find a way of accounting and reporting consolidated and aggregated cross-enterprise risk exposures as they accumulate. The challenge they face is analogous to the one they faced a generation or more ago as businesses evolved from legal entity based profit centers within sovereign states into globalised lines of business. At that time financial controllers had to learn how to tag transactions with business unit, unit cost, market segment, product and customer codes to drive cross-enterprise management performance analysis and reporting. The new challenge is to learn how to tag those same transactions with risk weighted exposure measures and risk-weighted financial values to produce a risk exposure metric that is additive and to do it within a framework that can actually track the value of risk mitigation efforts and drive cross-enterprise risk analysis and reporting.

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Recognizing that risk exposures are first triggered upon transactions entering the operating environment, it follows that risk exposure measurement for risk accounting and reporting purposes must be transaction based and occur at a financial institution’s transaction gateway at precisely the same points that financial (general ledger) and management accounting interfaces are positioned. It is upon these basic premises that the approach to Risk Accounting described in this paper is constructed.

**RISK ACCOUNTING**

Risk Accounting represents an extension of financial reporting to embrace a new risk metric, Exposure to Risk. It links changes in reporting of traditional value-at-risk measures to changes in business activity and the reporting of operational and performance metrics in order to make them more effective, timely and more meaningful to stakeholders as in this formulation of the enterprise’s overall risk:

\[
\text{Enterprise Risk (ER)} = \text{Capital} \sum \text{VaR} + \text{Exposure} \sum \text{RU}
\]

...where the sum of the diversified effects of operational, market, credit and liquidity risk capital (VaR) - a measure of the potential for the magnitude of future losses - is combined with a current and dynamically changing measure of risk exposure denominated in a new unit of measure, the Risk Unit (RU). The RU is a mechanism to translate all manner of diversified internal processes described under the general term operational (business) activities into a common risk measurement framework, in much the same way as all manner of externally focused market and credit risks have been mapped into a common risk measurement framework, Value-at-Risk, using stochastic calculus.

While separate and distinct in terms of managements’ and regulators’ use (capital is future looking, exposure is immediate and actionable) VaR and RU are parallel measures and, in fact, can be correlated over time by assigning a monetary value to the RUs using a scaling factor associated with the financial dimension of the enterprise. For example, in a top-of-the-house view of enterprise risk, using the standard correlation formula:

\[
\text{Correlation Coefficient } R = \frac{n \sum \text{Var} \times \text{RU} - (\sum \text{Var}) \times (\sum \text{RU})}{\sqrt{n(\sum \text{Var}^2 - (\sum \text{Var})^2)} \times (n \sum \text{RU}^2 - (\sum \text{RU})^2)}
\]
The introduction of a risk exposure metric, the Risk Unit, is necessitated by business managers’ need to report in quantitative terms how the risks they manage are impacted by operational factors, i.e. high transaction counts, non-reconciled position values, failure counts and values of undelivered securities, overtime hours, absenteeism rates, systems down time, number of unauthorized accesses, number of password changes per employee, number of internal non-client accounts opened and a myriad of other business level metrics. The RMA\(^{22}\) has documented nearly 2000 such Key Risk Indicators (KRIs) for financial organizations. These KRIs supplement the accounting records and are a major part of the performance evaluation framework available to management and the Board. Some of them find their way into the annual report as commentary and footnotes, and some are used by security analysts and external auditors to further assess the performance prospects of the organization.

Some of these operating metrics become de-facto industry best practice benchmarks upon which firms gauge their performance in addition to the GAAP performance results published in the audited financial statements. They are, however, unavailable in aggregated form for executive management in a manner that equates changes in these operating factors to real-time or near real-time measures of risk exposures and, in turn, to operational loss predictions and capital requirements which is the desired result of the method of Risk Accounting proposed in this paper.

Today, best practices for the mapping of an organization’s granular knowledge of its operating environment to the risk management systems is done, in the main, through a continual (typically annual or quarterly) people-intense risk assessment process. Questionnaires are used by risk managers to facilitate meetings with operating management and the management group at the top of each of the business silos. Questions and discussions are focused on the status of key risks and controls and the range of expected losses, estimating their magnitude and frequency within the timeframes required for input to the capital models of the firm, including the largest expected loss usually at the 99.9% confidence level (a 1 in 1000 year occurrence). Past losses are viewed in context, projects that are in place to manage risk are assessed, and new targets for further risk mitigation are planned.

\(^{22}\) RMA – Risk Management Association, http://www.rmahq.org/RMA/
All of these discussions and projections of future losses (really ‘guesstimates’) are summarized and subjected to a number of iterative review sessions until the capital number for operational risk for the firm is agreed and each business silo is comfortable with its own allocation of the top of the house number.

The reporting of all these review sessions, loss projections and risk mitigation projects are formalized in a Risk & Control Self Assessment (RCSA) system characterized by the reporting of: item counts of loss events, dates of audits and audit ratings, historical losses per activity of a particular business silo, capital assigned to each department, and a color coded scheme indicating progress in risk mitigation projects. An example of such a report is included as Figure 2. The senior management and Board are presented with a filtered view of all of these reports, highlighting the few key projects and high priority risks determined quite subjectively by the risk management officer after input from the key risk management staff and a review of the RCSA reports.

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**Business Component Overview**

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall Score</th>
<th>Weight</th>
<th># of Controls</th>
<th>Yellow / Red</th>
<th># of Projects</th>
<th>On Time</th>
<th>Overdue</th>
<th>Complete</th>
<th>Amount ($m)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>87</td>
<td>100%</td>
<td>68</td>
<td>9</td>
<td>13.2</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>548m</td>
</tr>
<tr>
<td>Processing</td>
<td>88</td>
<td>40%</td>
<td>28</td>
<td>4</td>
<td>14.1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>549m</td>
</tr>
<tr>
<td>Management</td>
<td>90</td>
<td>20%</td>
<td>18</td>
<td>2</td>
<td>11.1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Environment</td>
<td>84</td>
<td>34%</td>
<td>22</td>
<td>3</td>
<td>13.6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>55m</td>
</tr>
</tbody>
</table>

**Top 5 Loss Events**

- Payments: 42,967 22/04/2009 Theft and fraud
- Payments: 35,221 15/01/2009 Theft and fraud
- Global Nostros: 22,009 16/09/2008 Write-offs
- Loans Processing: 20,438 30/08/2019 Processing errors
- Messaging: 15,722 14/03/2005 Processing errors

**Risk Assessment Heat Map - Processing**

- Overall: 66, 92, 74, 89, 78
- Execution: 54, 100, 80, 90, 80
- People: 62, 88, 72, 80, 90
- Business Continuity: 100, 100, 100, 100, 100
- Risk Monitoring: 87, 82, 86, 84, 82
- Systems Security: 89, 96, 84, 75, 78

**Loss Predictions 2009**

- Expected: $1.0m, $1.8m, $750k, $600k, $800k
- Extreme: $25.0m, $40.0m, $1.5m, $6.5m, $15.0m

Figure 2 – Sample Risk & Control Self Assessment report
In this RCSA approach neither senior management nor the Board has the ability to observe operational level risk metrics in any granular manner, or in the aggregate, or be able to drill down to the details of the operational risk status or issues being presented. If one were to undertake such a task it would require a review of each of the reports at the departmental level to interpret them, which requires granular knowledge of the activities of each of the business units. This, in turn, would require interaction with departmental personnel in combination with internal audit, risk management and, perhaps, the business process reengineering team, to assess the interpretations being presented. In fact, this process does occur, typically on a retrospective basis when a significant loss occurs.

Our proposed method of Risk Accounting is offered as a substitute for this backward looking approach, providing a prospective method to observe risk exposures at both an aggregate and granular level, with the ability to drill down to the root causes of any observed increase in risk exposures. Actions can then be taken to both examine the effects of risk mitigation projects underway and to initiate new projects before exposures turn into losses.

The proposed method of Risk Accounting is directed to transactions to which risk weightings and scaled values are assigned. By engaging with the business line managers across the entire enterprise both the historical and current knowledge of the operating metrics used at the business level are interpreted into the risk metrics of the proposed Risk Accounting system. A method to achieve this has already been published and piloted in a number of institutions.23

In developing the Risk Accounting system an organization deploys its risk management team in each operating department to interact with operating personnel. Together they develop risk scores that represent the department’s exposure to risk and the risk mitigation effectiveness of each of the business processes that comprise their operating environment. Risk scores and / or risk weightings are determined for each business process based on three sets of standardized tables and templates that relate to risk drivers present in all business processes; ‘Exposure’, ‘Value’ and ‘Risk Mitigation’. The resulting risk scores and weightings are applied in a scorecard where operational metrics are computed, consolidated and aggregated. The risk drivers and their respective tables and templates are described below:

Risk Tables (RT) – ‘Exposure Driver’

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An extract from the Ops Activity Risk Table relating to Payments & Settlements is shown in Figure 3. The Risk Tables are comprised of pre-identified process / product characteristics by risk category with a risk weighting attached within a scale of 1 to 10, 10 being the highest risk. For example, if a new debt instrument has been approved for trading, the processes that comprise the end-to-end transaction processing cycle for the new product will be mapped to the Ops Activity Risk Table and the weightings accumulated according to the relative risks of the operational activities performed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Activity Risk Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release value items (including standard settlement instruction and standing order / direct debit maintenance) to guaranteed counterparties</td>
<td>2</td>
</tr>
<tr>
<td>Intercompany and intracompany</td>
<td></td>
</tr>
<tr>
<td>Guaranteed settlement (e.g. central exchanges / Continuous Link Settlement)</td>
<td></td>
</tr>
<tr>
<td>Delivery versus payment agreements</td>
<td></td>
</tr>
<tr>
<td>Release value items (including standard settlement instruction and standing order / direct debit maintenance) to financial market counterparties</td>
<td>5</td>
</tr>
<tr>
<td>Banks and other financial institutions</td>
<td></td>
</tr>
<tr>
<td>Release value items (including standard settlement instruction and standing order / direct debit maintenance) to other parties</td>
<td>10</td>
</tr>
<tr>
<td>Non-financial market counterparties</td>
<td></td>
</tr>
<tr>
<td>Third parties</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3 – Activity Risk Table Extract – Payments & Settlements

If a process involves transaction capture, amendment and/or enrichment the other risk tables (credit, market and liquidity) are triggered. If it is a traded product then the transaction will have been pre-coded to pass through the Market Risk Table and risk weightings will be accumulated for factors such as the maturity of the product (a new product attracts a higher weighting), complexity, market liquidity etc. The product will attract further weightings if it has credit risk or liquidity risk relevance.

The Risk Tables are set for each product / transaction type and are updated by Risk Management whenever there are product or process changes.

**Value Table (VT) – ‘Value Driver’**

The Value Table is shown in Figure 4 and is a logarithmic expression of the relationship between transaction values and risk. In general, operational sophistication increases as transaction volumes increase primarily due to enhanced automation. The relative quality and effectiveness of risk mitigation also increase as transaction volumes increase. The net result is that the rate at which operational risk exposure is created decelerates relative to the rate at which transaction volumes increase. An approach, therefore, to measuring
operational risk recognizes this relationship and progressively reduces the rate at which risk exposure is valued relative to increased transaction volume. Activity Table Transactions are categorized and grouped on a daily basis and mapped to the Value Table and the applicable value band weighting is extracted. Depending upon the granularity desired the Value Table can be recalibrated to fit smaller size organizations and can be related not only to revenue but to position value.

Figure 4 – Value Table

Best Practice Templates (BPST) – ‘Risk Mitigation Driver’

Two sample Best Practice Templates are shown in Figure 5 relating to ‘Execution’ (benchmark based) and ‘Business Recovery’ (best practice statement based). Each template is scored whereby each score represents the actual status relative to best practices.
Scores are updated upon changes or dynamically through automated interfaces, e.g. ‘People’ scores via the Human Resources (HR) system. Best practice scores are blended with other weightings: 1) each best practice template is weighted according to its relative risk mitigation impact, for example, ‘Control’ has a high impact weighting whereas ‘Policies & Procedures’ has a lower impact weighting; and 2) the exposure in Risk Units (RUs) representing risk weighted transactions that interact with the best practice template.

From the above inputs the risk metrics are calculated (a sample scorecard demonstrating the calculation and aggregation of RU’s and %BP’s is presented in Figure 6) using the formulae below where, RT = Risk Table entry, VT = Value Table entry, BPT = Best Practice Table entry, W = Weightings and S = Scores.

\[
\text{Exposure RU's (ExpRU)} = \text{RTW x VTW}
\]

\[
\text{% Best Practices (%BP)} = \frac{\sum (\text{BPTS x BPTW x ExpRU}) x 100}{\sum (100 x \text{BPT W x ExpRU})}
\]

\[
\text{Risk RU's (RiskRU)} = \frac{(100 - \%BP) x \text{ExpRU}}{100}
\]
The operational metrics are aggregated at key points in the operating environment’s organizational hierarchy and are available by transaction type, geography, risk type, best practice category, etc. and represent information on the size and distribution of the enterprise’s exposures to risk (in RUs) linked to their respective causal factors (in %BPs).

The process described above represents a risk accounting approach similar to financial accounting systems as it is transaction based. Transactions are captured, categorized, translated into a common currency (the ‘Risk Unit’) and posted to ‘risk accounts’ by passing them through tables and templates owned and maintained by Risk Management.

The Risk Accounting approach described in this paper also incorporates a budget module so that risk appetite can be denominated, allocated and monitored in RUs and %BPs.

**CONCLUSION**

The method described in outline in this paper addresses the recent academic literature and the regulatory agenda in bank risk reporting. It achieves this by offering, in conjunction with current top down practices, a bottom up transactional method that offers tractable managerial information in conjunction with established methods, and an extension of current financial reporting through additions to the underlying accounting system.

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**Figure 6 – Sample Scorecard**

The key risk categories are structured as follows:

- **Control Evaluation**
- **People**
- **Execution**
- **Business Recovery**
- **Risk Culture / Management Oversight**
- **Application Security**
- **Physical Access**
- **Policies & Procedures**

The table below provides a breakdown of risk exposure for different processes and teams:

<table>
<thead>
<tr>
<th>Category Weightings</th>
<th>Control</th>
<th>Evaluation</th>
<th>People</th>
<th>Execution</th>
<th>Business Recovery</th>
<th>Risk Culture / Management Oversight</th>
<th>Application Security</th>
<th>Physical Access</th>
<th>Policies &amp; Procedures</th>
<th>% Best Practice</th>
<th>Risk Exposure</th>
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<tr>
<td>Production Team A</td>
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<td>45</td>
<td>15</td>
<td>50</td>
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<td>100</td>
<td>50</td>
<td>47.8</td>
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<td>54.7</td>
<td>40.4</td>
<td>9.1</td>
<td>43.1</td>
<td>51.6</td>
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<td>100.0</td>
<td>29.8</td>
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| Production Team B   |         |            |        |           |                   |                                      |                      |                |                       |                |               |
| Process 1           | 70      | 70         | 50     | 100       | 100               | 100                                  | 100                  | 100             | 100                   | 79.7           | 18            | 90           |
| Process 2           | 70      | 70         | 50     | 100       | 100               | 100                                  | 100                  | 100             | 100                   | 79.7           | 20            | 100          |
| Process 3           | 70      | 60         | 85     | 80        | 60                | 85                                   | 75                   | 100             | 80                    | 75.3           | 54            | 220          |
| Total - %BP         | 70.0    | 64.6       | 68.8   | 89.3      | 78.5              | 92.0                                 | 72.7                 | 100.0           | 89.3                  | 77.3           | 93            | 410          |
| Total Dept - %BP    | 47.0    | 59.0       | 52.7   | 43.9      | 58.5              | 69.1                                 | 69.1                 | 100.0           | 55.6                  | 58.2           | 395           | 945          |

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If techniques can be applied for the better management of risk factors, as herein described in our view of a Risk Accounting method and system, their disclosure and audit should add value from the perspective of the stakeholder community. Investors potentially face a ‘market for lemons’ problem,\(^\text{24}\) in which they have difficulty discerning effective management processes from the ineffective. Such problems might be compounded insofar as specialist and technical disclosures have no information content for outside investors.\(^\text{25}\) There is thus a quality signalling rationale for disclosures that effectively convey the truth of superior processes to non-specialist investors.\(^\text{26}\) At the same time, the process and the information generated by the Risk Accounting method outlined in this paper can both be subject to audit and external scrutiny, and correlated to actual loss experience over time adding to their consistency and credibility.

To the extent that our method of Risk Accounting is successful there is reassurance for regulators and a ‘better markets’ solution which, in the face of the current financial meltdown, is surely needed. These authors humbly suggest that new directions are possible, and that this proposed method, perhaps in its minimalist contribution, would simply stimulate others toward further research into these new directions.

