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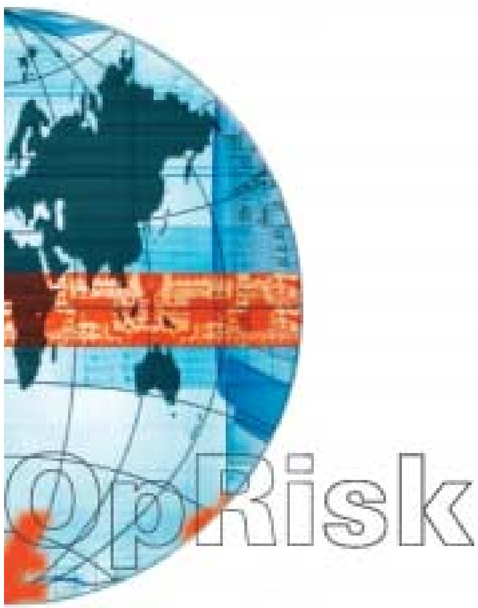
CAPITAL ALLOCATION for OPERATIONAL RISK



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Capital Allocation for operational risk

Understanding the challenge

Principles governing our capital model

Building blocks to risk measurement

Linking measurement with risk management

Conclusion

Developing specific measures for operational risk is part of a broader challenge

The challenge: deliver "better, faster & cheaper"

Competitive pressures:	Client expectations for operational sophistication, speed and accuracy
	Focus on operations has moved from back office to the front office
Shareholder expectations:	Pressure to manage significant expenditures on technology / operations
	Reduce losses / improve efficiency
Complexity of operations / risk:	Increasing complexity of products and support requirements
	Increasing dependency on technology
Regulatory focus:	Initiatives have mobilized the industry

A new operational risk model is part of the solution to this challenge

Improving operational risk management requires a new model

Old Model	New Model
• Op Risk considered a by-product of market / credit risk	• Op Risk is a primary risk discipline with similar tools / approaches as other risk
• Accountability for Op Risk diffused across front / middle / back office	• Transparency and accountability established for Op Risk
• No understanding of Op loss levels	• Op losses measured and analyzed
• Op Risk not systematically measured at business or firm-wide level	• Op Risk systematically measured with capital assigned to each risk
• No cross business / industry performance measures available	• Benchmarking performance both internally and externally

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Improved risk management, not precise risk measurement, is the goal

Four key principles:

Risk-based measures:	business-specific risk metrics forward looking perspective dynamically reflects changing environment
Incentives for improvement:	facilitates better risk management cost benefit assessment is positive improves overall financial performance
Disciplined and rigorous:	owned by business managers consistent definitions and implementation integrated into other key processes
Pragmatic approach:	directionally correct integrated with credit / market risk transparent to all stakeholders consistent with regulatory requirements

Approach must be compatible with capital framework and integrated into business management

Credit Risk

Market Risk

Operational Risk

Business Risk

Other Factors

→

Risk Parameters & Tools

Economic Capital Model

Diversification Benefits

→

Capital Charges & Allocations

<u>Success:</u>

+ risk based
+ forward looking
+ owned by businesses
+ imbedded incentives
+ assigning accountability
+ integrated with governance

<u>Failure:</u>

- residual capital
- assigning blame
- overly complex
- inconsistent with other risks
- owned by staff function
- regulatory focus only

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Our "first generation" calibration model for operational risk involves four key quantitative inputs

Operational Loss Data	
• firm-wide data collected & analyzed • consistent definitions / process • supplemented with external data	• loss distributions development & adjusted • scenario / stress testing tools utilized • internal / external benchmarks created

Quality of Control Environment	
• rigorous self assessment process • focus on key, business-specific risks • consistent risk templates	• specific scores developed • changes in score reflected in capital • becomes dynamic, nonlinear measure

Business Complexity	
• business model assessed • process maps developed • risks / interdependencies analyzed	• graded on 5 - 7 specific measures • consistent with Self Assessment / Audit • back-tested vs. loss experience

Business Performance Measures	
• key risk indicators identified • key performance indicators • consistent with Self Assessment	• dynamic measure (growth, capacity, etc.) • risk specific metrics (e.g., nostro breaks) • provides incentive for corporate objectives

The calibration and allocation of op risk capital is a multi-step process

Calibration of Risk	Loss Distribution Parameters	Adjust for Data Gaps / Out-sized Events	Adjust for Changes in Control Quality	=	**Initial Op Risk Capital**
Calibration / Allocation of Capital	Initial Capital Charge	Allocation Based on Business Complexity	Adjust for Performance Measures	=	**Adjusted Op Risk Capital**
Firm-wide Capital Adjustments	Adjusted Op Risk Capital	Correlation Diversification Analysis	Risk Mitigation Reduction	=	**Net Op Risk Economic Capital**

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We are at the second stage of our four-stage model

Ad Hoc

No firm-wide data / business specific

- traditional Audit & Financial reviews
- operational risk management mostly reactive

Risk Orientation

Begin loss quantification Robust self assessment

- Rigorous self assessment model
- standard loss data reporting
- governance framework

Integrated Analytics

Projections, analysis, capital allocation

- OpVar capital
- 6 sigma driven
- “risk driver” analysis
- root cause analysis

Integrated Framework

Integrated risk management focused on continuous improvement

- business level capital
- predictive models
- correlations across risk classes
- risk mitigation tools

Error Avoidance

Risk Orientation

Integrated Framework

1998 2000 2002 2004

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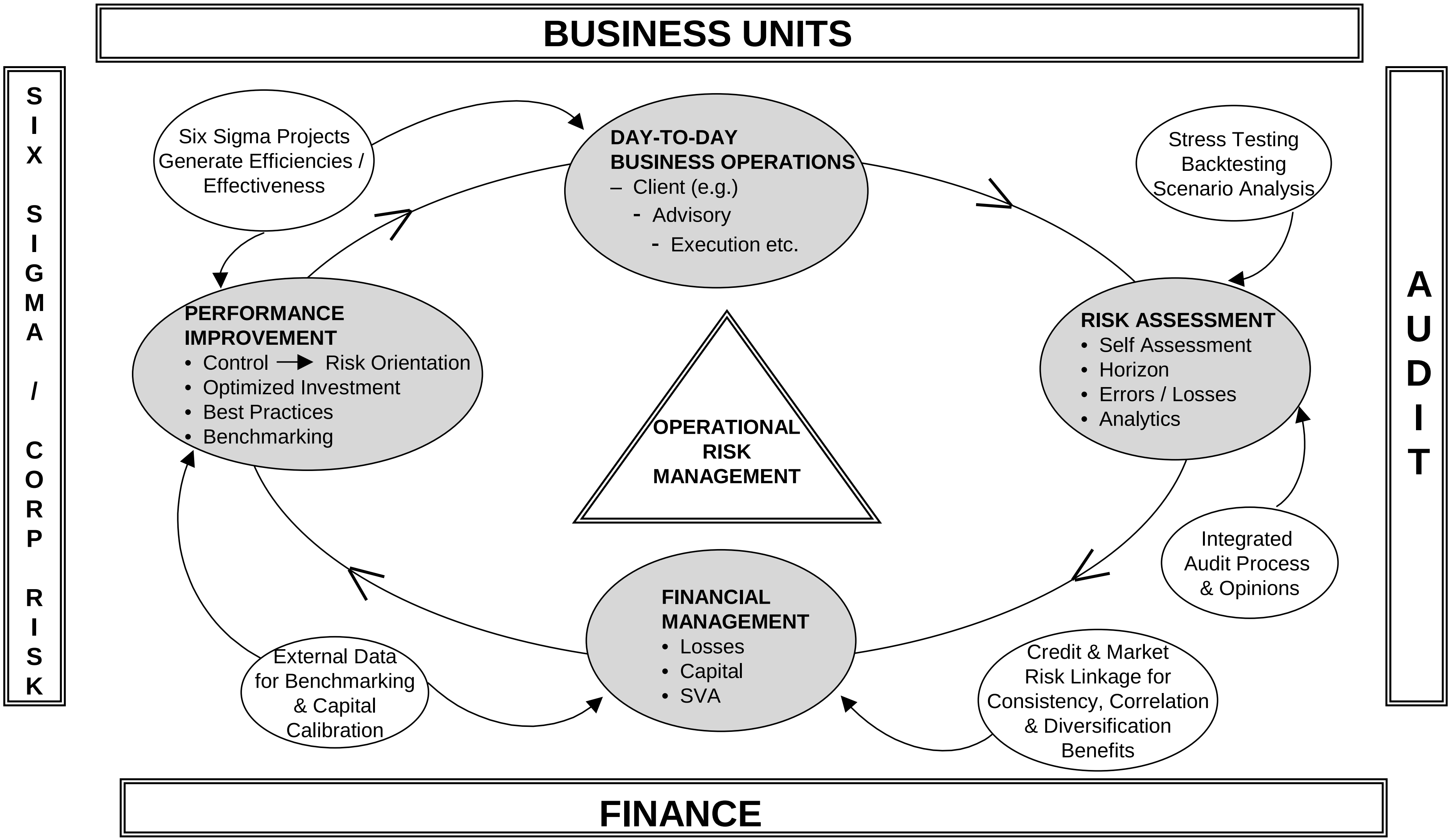
Our goal is an integrated framework and a virtuous circle of continuous self-improvement



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If successful, such a framework can deliver value

1. **Greater relevance to businesses**
   - risk-based self assessment process
   - tailored to business characteristics

2. **Increased efficiencies**
   - web-based data reporting
   - elimination of bureaucratic requirements

3. **Enhanced analytics**
   - linkage of self assessment and losses
   - backtesting, scenario analysis, stress testing
   - loss pattern analysis by risk, activity, etc.
   - correlation / diversification analysis

4. **Improved risk management**
   - improved understanding of risks
   - greater transparency / accountability
   - performance benchmarking
   - enhanced, relevant dashboards
   - shared best practices
   - continuous self improvement

5. **Improved financial performance**
   - lower operational losses
   - increased productivity
   - capital efficiency
   - imbedded incentives
   - insurance / risk mitigation tools