Risk Management Department

NOMURA

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Risk and Capital Management Framework
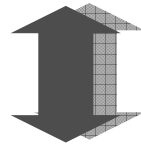
Enterprise Risk Management

Framework

■ Profit and loss management

- ■ Establish business plan for revenue earning
- ■ Monitor actual earned revenue
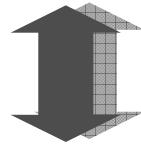
Evaluation of risk adjusted performance (capital efficiency)

■ Economic Capital management

- ■ Determination of total allocatable capital
- ■ Allocation to each business

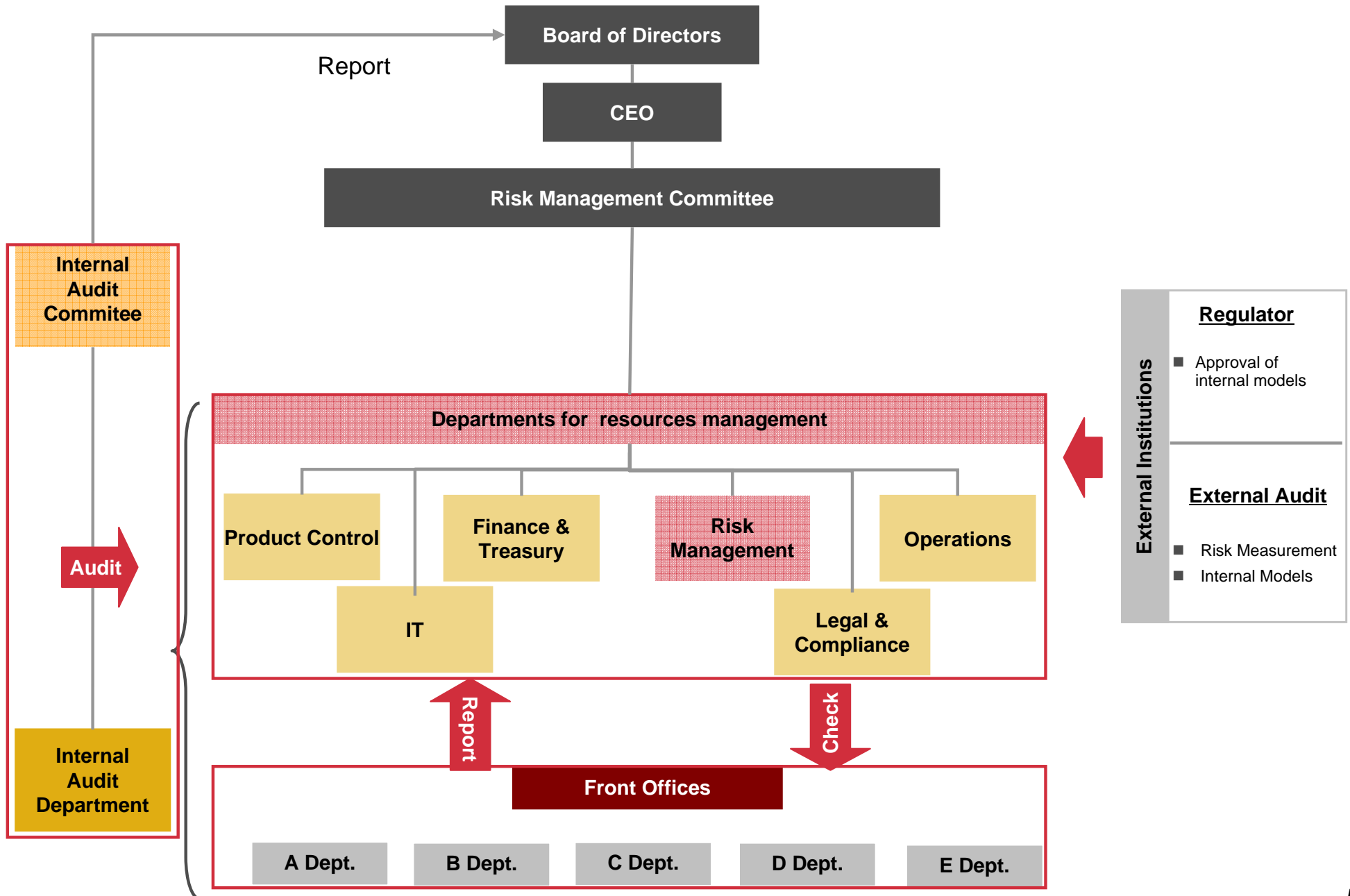*How much risk can we take? What is current risk profile?*
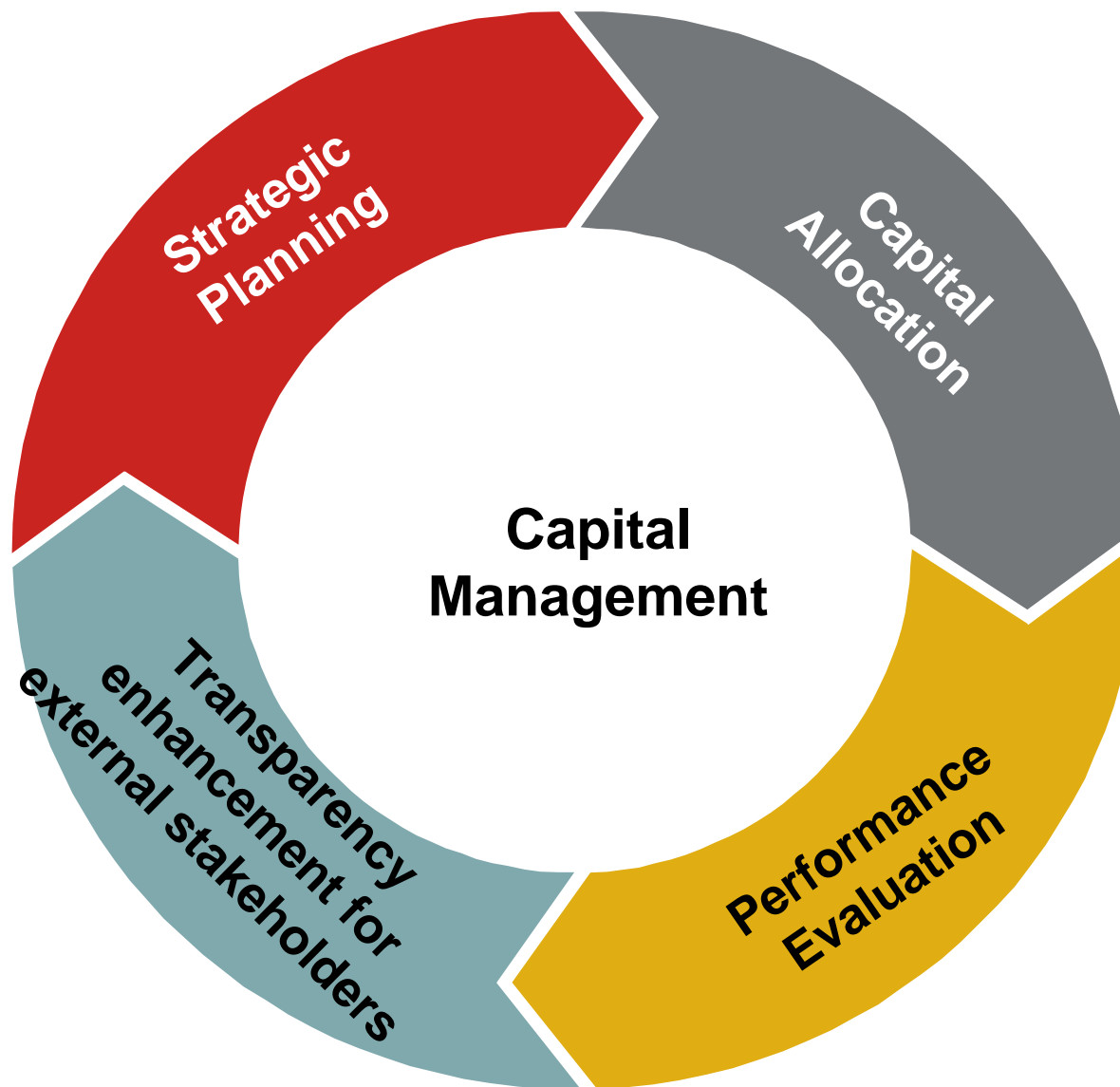
■ Risk Control

- ■ Determination of risk limits
- ■ Risk Measurement
- ■ Risk Monitoring

■ Enhancing value of the corporation

- ✓ Ensuring financial soundness
- ✓ Connect growth, risk and return
- ✓ Rationalize capital
- ✓ Reliable reporting
- ✓ Compliance

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Risk Governance – Organization

Objectives That Can be Achieved By Appropriated Capital Management

Introduction to Risk Types

Market Risk Management

Market Risk: Risk of losses arising from movements in market prices

Market Risk Management is responsible for:

Ensuring all market risks are identified, understood, measured, monitored and captured by an appropriate metric

- Active risk exposure consulting with businesses

- Active consulting role in risk capital allocation/ risk-adjusted performance assessment

- Assisting senior management in the dialogue with rating agencies and regulatory bodies

- Administering limits and management action triggers

- Monitoring and reporting of the market risk of trading exposures

- Aggregating and analyzing market risk – Positions, Sensitivities

- Communicating large or unusual risk as appropriate

- Looking at Portfolio level risk management – diversification benefits.

- Developing market risk measurement methodologies in conjunction with Quantitative Risk Management such as VaR, VaR Back Testing, Scenario Analysis, Event Risk

Credit Risk Management

Credit risk: Risk of loss due to a debtor's non-payment of a line of credit (either the principal or interest or both)

Credit Risk Management is responsible for:

- Credit analysis and due diligence

- Preparing Credit Reviews on obligors which assess the obligor's strengths and weaknesses

- Assigning and maintaining Internal Risk Ratings

- Establishing Credit Limits for each family/obligor by legal entity, as well as at the individual product levels

- Monitoring credit exposures on a current and potential basis including usage of limits

- Establishing Country Risk limits

- Monitoring the Credit Portfolio on an ongoing basis which includes:

- Country updates

  - Industry reviews

  - Ongoing review of counterparties

  - Monthly fund performance reviews

  - Revising and updating risk ratings as appropriate

  - Understanding portfolio concentrations

Quantitative Risk Management

Responsible for:

- Developing, implementing and maintaining the risk methodologies and systems used to measure market, credit and operational risks, as well as validating the pricing and valuation models used by the business units of the Firm

- Market Risk Analytics: develops the quantitative methodologies to measure market risk (VaR); maintains the time series database; provides analyses and consultation on market risk quantification

- Credit Risk Analytics: develops the quantitative methodologies used to measure credit risk (Counterparty Exposure, Potential Exposure); generates exposure, country risk and ad hoc credit risk reports for senior management; provides analyses and consultation on credit risk quantification

- Operational Risk Analytics: develops the quantitative methodologies used to measure operational risk; provides analyses and consultation on operational risk quantification

- Model Validation: develops and implements the validation standards for the pricing models used in Firm; collects and archives documentation on the pricing models; reviews and approves the pricing models; participates in Model Review Committees (Fixed Income and Equities) with business units, Quantitative Research, Product Control and Technology

Operational Risk Management

Operational Risk: Risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events

- Identification
    - Define the risk category and clarify the scope to manage
    - Developed Policies and Procedures
- Assessment
    - Recognize the type and level of the risk
    - Conducting assessments regularly
- Control
    - Decide how to control and execute the action plan
    - Action plan is made by each department when decided to mitigate the risk
- Monitoring
    - Monitor not only losses but also assessment and indicators
    - Provide a holistic view of operational risk for senior management

Risk Control Process Framework

Risk Control Process

Identification of Risks

1. **Identify risks that can arise from the business operation**

Determine Risk Control Policy

2. **Determine risk control policy for the identified risks.**
   - **Takes risks outright**
   - **Control and reduce the risks**
   - **Mitigate risks to third party**

Determine Risk Control Methodology

3. **Establish specific methodologies for execution of the policies**
   - **Risk quantification, limit setup etc…**

Monitoring and Reporting

4. **Monitor risks with determined methodology and report results to appropriate level of management**

Check

5. **Check if the process (1 through 4) is performing as planned**

Initial process (May have to be revisited after checking phase)

Regular process

Periodic Process

(*)Appropriate organizational structure has to be established in order to ensure appropriate operation of above processes and senior management has to be actively involved in the processes.

Risk Control – Key Limit, Monitoring Limit, Local Limit

Risk Control limits are set in accordance with risk profile of each strategy (book)
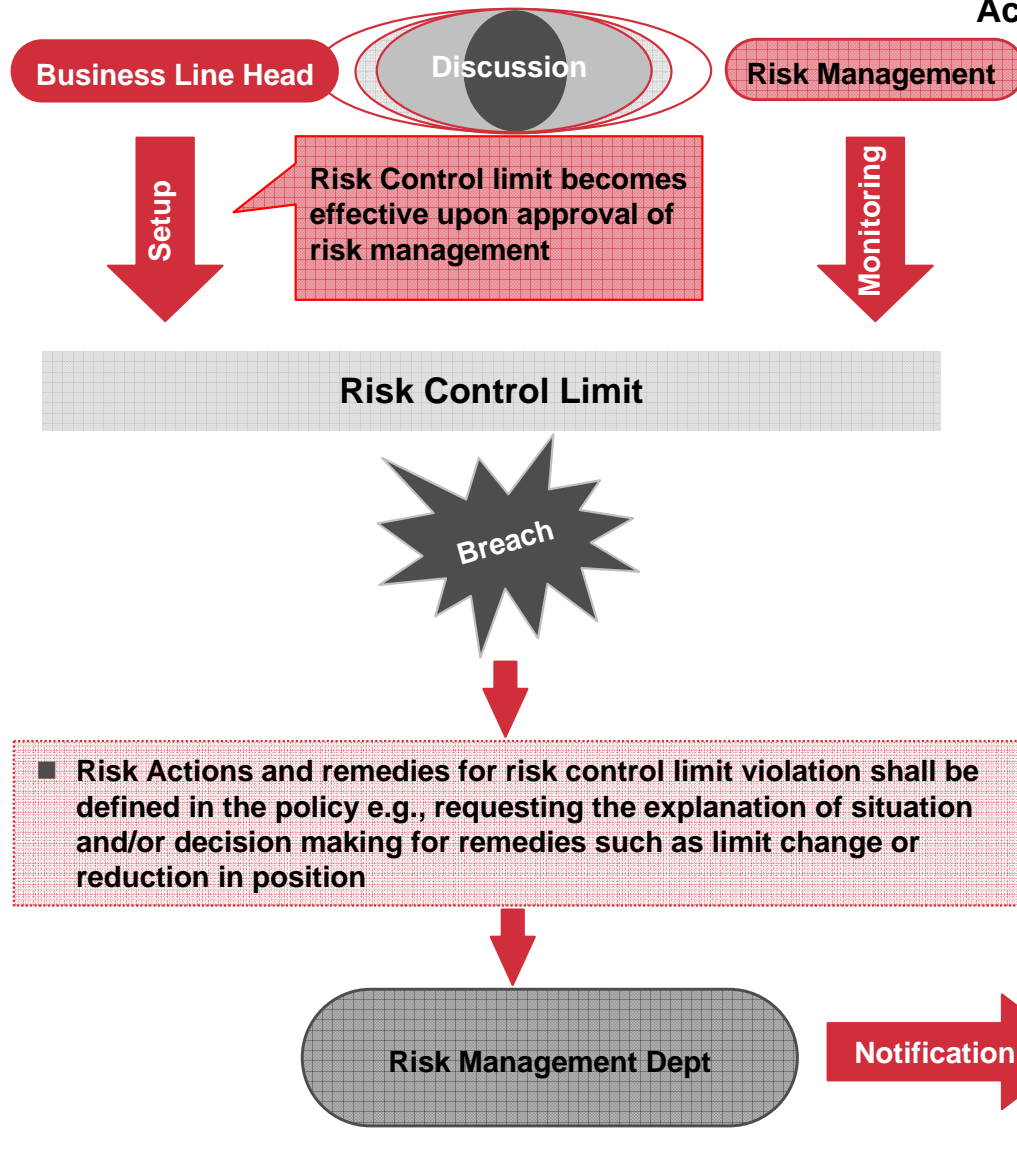
- For trading business with relatively high turnover the following strategy specific limits are applied.

    - VaR, Delta, Vega, etc.

    - For long-term holding strategy with infrequent turn-over the following strategy specific limits are applied.

        - Loan Risk, Private Equity Risk, Position Size, Capital Allocation, etc.

    - Also for long-term holding strategy,
      process of investment decision and monitoring have to be clarified, documented and approved by an appropriate authority as qualitative risk controls.

Risk Control – Key Monitoring Limits (Actions upon Limit Breach)

Monitoring Process

Actions for Risk Control limit violation

Business Line Head   **Discussion**   **Risk Management**

Setup

Monitoring

Risk Control limit becomes effective upon approval of risk management

Risk Control Limit – sample display

Risk Control Limit

Breach

■ **Risk Actions and remedies for risk control limit violation shall be defined in the policy e.g., requesting the explanation of situation and/or decision making for remedies such as limit change or reduction in position**

Risk Management Dept   **Notification**   **Risk Management Committee**

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Risk Control – Credit Exposure

Scope of Credit Approval Process → All transactions that create credit risk exposure require an approved credit limit e.g. currency, interest rate, equity, credit and commodity derivatives, money market deposits, loans and bond inventory positions

Who approves credit limits → Two-tier approach – committee and individual risk manager. Risk Management Committee for products like loans, illiquid investments. Limits for counterparty and inventory risk delegated to risk managers based on authority level. Authority is based on experience and ability.

Credit Risk Appetite → "Overall Credit Limit" set by Credit Policy representing the firm's unsecured credit risk appetite per counterparty group. The firm's credit risk appetite reduces as tenor increases and ratings decline

How are credit limits set up → Credit limit is set up at group and obligor level and by each product (loan, inventory, derivative etc.)

Credit Rating → Assign internal credit ratings ranging from AAA to D; similar to those assigned by S&P.

Risk Control – Credit Exposure

Potential Exposure (PE) → For derivatives transactions, PE is calculated factoring in a specified confidence level for collateralized and non-collateralized. Refer Analytics for details

Exceptional Approval → Process for exceptions documented upfront – requires escalated business and risk approval

Watchlist Process → Obligors close to default managed with close supervision; frequency of review is higher

Portfolio Risk → Manage concentration at portfolio level – industry-wise, rating wise, product wise

Settlement Risk → Outside the Overall Credit Limit but important in capital market transactions. Risk of counterparty not delivering security or value in cash at the time of settlement

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Risk Control - Framework for Credit Analysis

Business & Management Risk

Industry & Operating Environment

- Sovereign Risk & Economic Environment , Industry Dynamics – Characteristics, Competitiveness, Success factors, Trends and Risks

Market Position

- Counterparty Size & Brand Image vs. Peers, Product & Service mix, Market share, Geographic spread
- Business Model - Economies of Scale, Supplier & Customer diversification, Supply Chain Mgmt

Management & Corporate Governance

- Corporate Strategy , Management Profile & ownership structure, Corporate Governance, Labour relations

Financial Risk

Profitability

- Revenue Sources, Trend & Consistency, Non-core Earnings, Cost Structure, One-time Charges, Profit Margins, Return on Equity, Return on Assets

Liquidity

- Current Ratio, Working Capital control, Balance Sheet Liquidity, Short-term repayments, Access to Capital Markets, Bank Credits
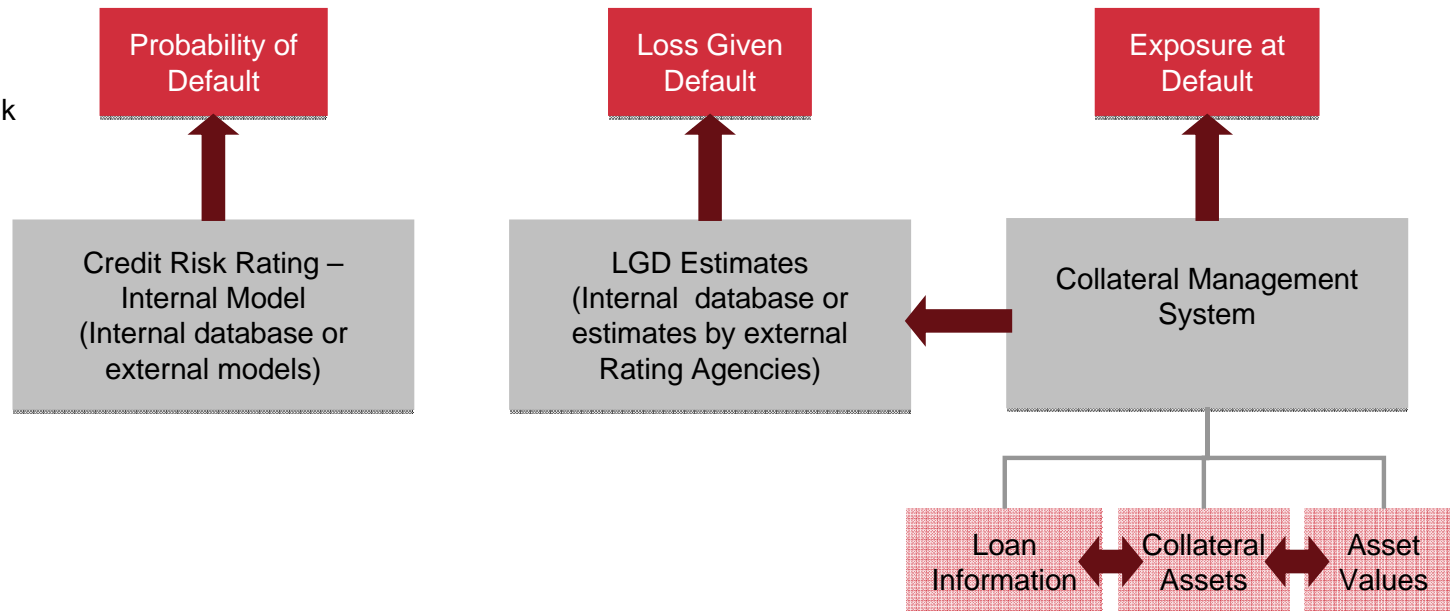
Cash Flow Protection

- Operating Cash Flows Levels vis-à-vis principal debt obligations, interest expense & internal growth requirements
- Dependency on Capital Markets

Capital Structure / Leverage

- Leverage levels and trends vis-à-vis industry average, Debt composition, Repayment profile, Off-balance sheet liabilities

Risk Control – Credit Risk linkage to Capital

PD, LGD and EAD are the building blocks of capital and risk adjusted performance management.

Probability of Default	Loss Given Default	Exposure at Default

Credit Risk Rating – Internal Model (Internal database or external models)	LGD Estimates (Internal database or estimates by external Rating Agencies)	Collateral Management System

Loan Information	Collateral Assets	Asset Values

- Probability of Default (PD)

    - PD is "the likelihood that a loan will not be repaid and fall into default"

    - PD is calculated for each counterparty by mapping the risk rating to an associated PD

    - Large amount of information required to capture sufficient historical default examples that are used to build PD models
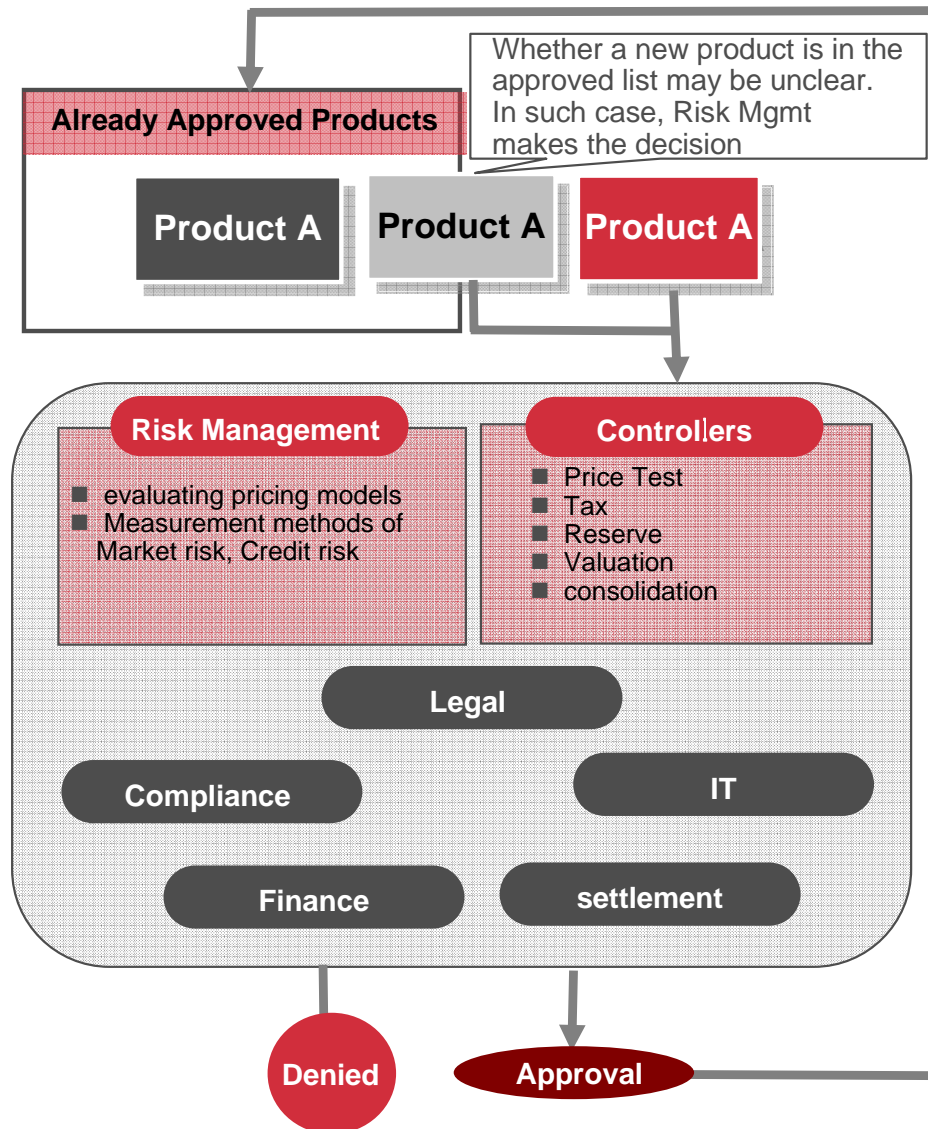
- Loss Given Default (LGD)

    - LGD is the percentage magnitude of likely loss on exposure

    - LGD is determined based on the scenario that evolves after the counterparty has defaulted

    - Unlike PD, different exposures to a particular borrower may have different LGD profiles given facility-specific features.

- Exposure at Default (EAD)

    - EAD is the dollar amount outstanding in case of default.

    - May include potential exposure arising from financing facility provided to the counterparty including loans, working capital facilities, potential exposures arising out of guarantees, derivative trades and collaterals posted on any transaction

- PD and LGD combined to determine risk weights for each exposure and transformed into risk weight asset by multiplying with EAD

Risk Control – New Product Approval Process

Whether a new product is in the approved list may be unclear. In such case, Risk Mgmt makes the decision

Already Approved Products

Product A   Product A   Product A

Risk Management
- evaluating pricing models
- Measurement methods of Market risk, Credit risk

Control ers
- Price Test
- Tax
- Reserve
- Valuation
- consolidation

Legal

Compliance   IT

Finance   settlement

Denied   Approval

Evaluation - New Product & Pricing Model

- Any new products requires prior approvals from Risk Management, controllers, legal, and etc… Risk Management notifies approval to department CEO, CFO and relevant heads of businesses

- It is responsibility of risk management to validate pricing models for mark-to-model products at the new product approval

Risk Control – Model Risk (Model Approval Process)

- Models to calculate derivative's mark to market and various hedging parameters are developed in front offices. Risk Management performs an independent validation test on the developed models and confirms appropriateness of the models

- The following items are considered at the model validation process:

    - Validity of model assumption. Check applicability of assumption to target products and market.

    - Validity of accuracy for numerical methods adopted in the model

    - Elimination of program bugs at the implementation

    - Validity of input parameters (e.g. correlations, volatility, etc…) for the model

Analytics

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Potential Exposure

- Potential Exposure (PE) – Estimate of the credit exposure of a portfolio of trades with a counterparty at a future time point conditional on a simulated market scenario. Sometimes it is referred to as *Potential Future Exposure*. Negative mark-to-market values of the portfolio of trades with the counterparty generate PE equal to zero.

Methodologies

- Portfolio-based Monte Carlo simulation (MC):
    - Based on future scenarios: simulation models are calibrated to forward curves and implied volatilities.
    - The portfolio of trades "ages" over its life.
    - Exposure calculation reflects legal netting and collateral provisions.
- Portfolio-based Value-at-Risk (VaR):
    - VaR is calculated either via Historical or Variance-Covariance simulation.
    - The VaR calculation reflects legal netting and is scaled appropriately to account for margin provisions.
- Individual-trade-based Stress Scenario Analysis (SSA):
    - Measures the MPE created by each individual trade.
    - MPE is the maximum of aggregated longs and shorts.
- Risk factors
    - Used for non-modeled trades.
    - Conservative add-ons simply added to the MPE profile. No diversification benefit.
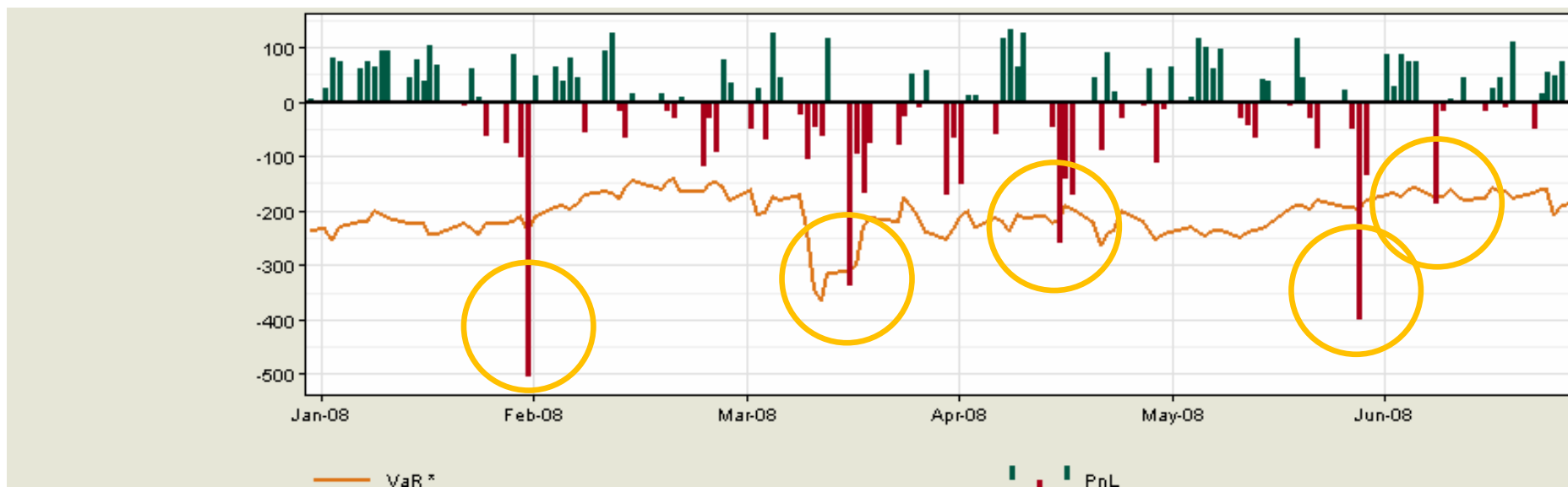
Value-at-Risk

- Value at Risk (VaR) is a widely used measure of the risk of loss on a specific portfolio of financial assets. For a given portfolio, with some degree of confidence (say 95%) and time horizon (say 1year), VaR is defined as a threshold value such that there is a 95% probability that the mark-to-market loss on the portfolio over the given time horizon (1 year) does not exceed this value.

- In recent years the VaR-concept has become a heavily used Risk Management tool and also an important method for setting capital requirements for banks. One of the main advantages of the VaR-method is, that it works across different asset classes such as stocks and bonds. Traditionally there are different risk measurements, such as duration for fixed income and the beta-factor for equities. Now with the VaR-method it is possible to measure the aggregated risk on a portfolio level.

- There are three approaches to calculate VaR:

- Each of these methods estimate portfolio distribution and tail of distribution is cut at desired confidence level to obtain VaR number

  - Variance-covariance-approach: Uses estimation of the volatility of asset returns and correlations between these asset price movements to model portfolio distribution.

  - Monte Carlo simulation : Uses an approach to artificially generate asset returns which are aggregated to arrive at portfolio distribution.

  - Historical simulation : This approach uses historical asset returns and applies it to current portfolio to arrive at portfolio distribution

Stress Testing

- Portfolios are subjected to a number of coherent macro-economic scenarios in which pertinent market factors are shocked by extreme, although plausible amounts

- The pricing across stress grids are made available typically through Front office systems and are fed into Risk systems

- Testing can be done either across Historical or Hypothetical Scenarios:

- Re-runs of historical episodes of extreme market moves are performed daily to evaluate the impact on the current portfolio of a repeat of these stressed time periods. For example:

  - 9/11 terrorist attacks

  - Russia default contagion and LTCM

  - November 2001 volatile bond market

  - October 1987 stock market crash

- Hypothetical scenarios used to evaluate the potential P&L impact on a portfolio due to shocks that have some probability of occurrence and are driven by macro fundamental shifts. For example:

  - Oil price increase leading to cost-push inflation

  - Yield curve steepening due to potential inflationary expectations

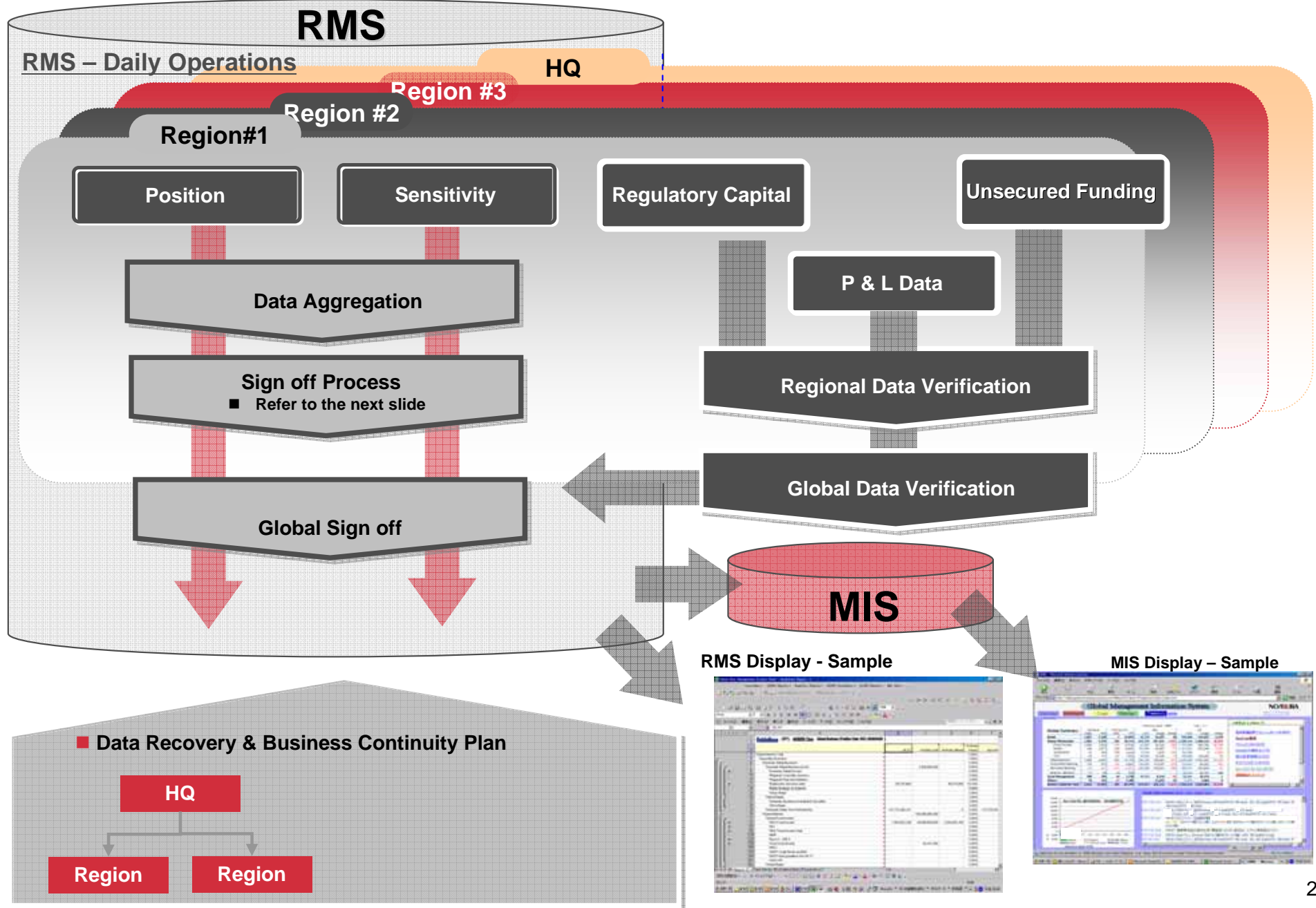 - Credit spreads widening due to an increase in defaults

Back Testing

- Compare internal Value at Risk (VaR) model forecasts against the subsequent actual P&L systematically on a daily basis

- At each level of hierarchy, VaR calculated for positions as of the close of business on day T will be compared with the subsequent P&L outcome for day T+1 on a daily basis. All losses exceeded the VaR forecast will be termed "potential back-testing exceptions" and individually investigated as to the cause

- If there are more than a certain number of genuine exceptions in any 12-month period, VaR calculation process is examined to ensure that methodology addresses any short-comings that allowed VaR to be understated

Approach to Systems & IT

Risk Management System

RMS

RMS – Daily Operations

HQ

Region #3

Region #2

Region#1

Position	Sensitivity	Regulatory Capital	Unsecured Funding

Data Aggregation

P & L Data

Sign off Process
- Refer to the next slide

Regional Data Verification

Global Sign off

Global Data Verification

MIS

RMS Display - Sample

MIS Display – Sample

■ Data Recovery & Business Continuity Plan

HQ

Region   **Region**

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