AMA Implementation: Where We Are and Outstanding Questions

David Wildermuth, Managing Director
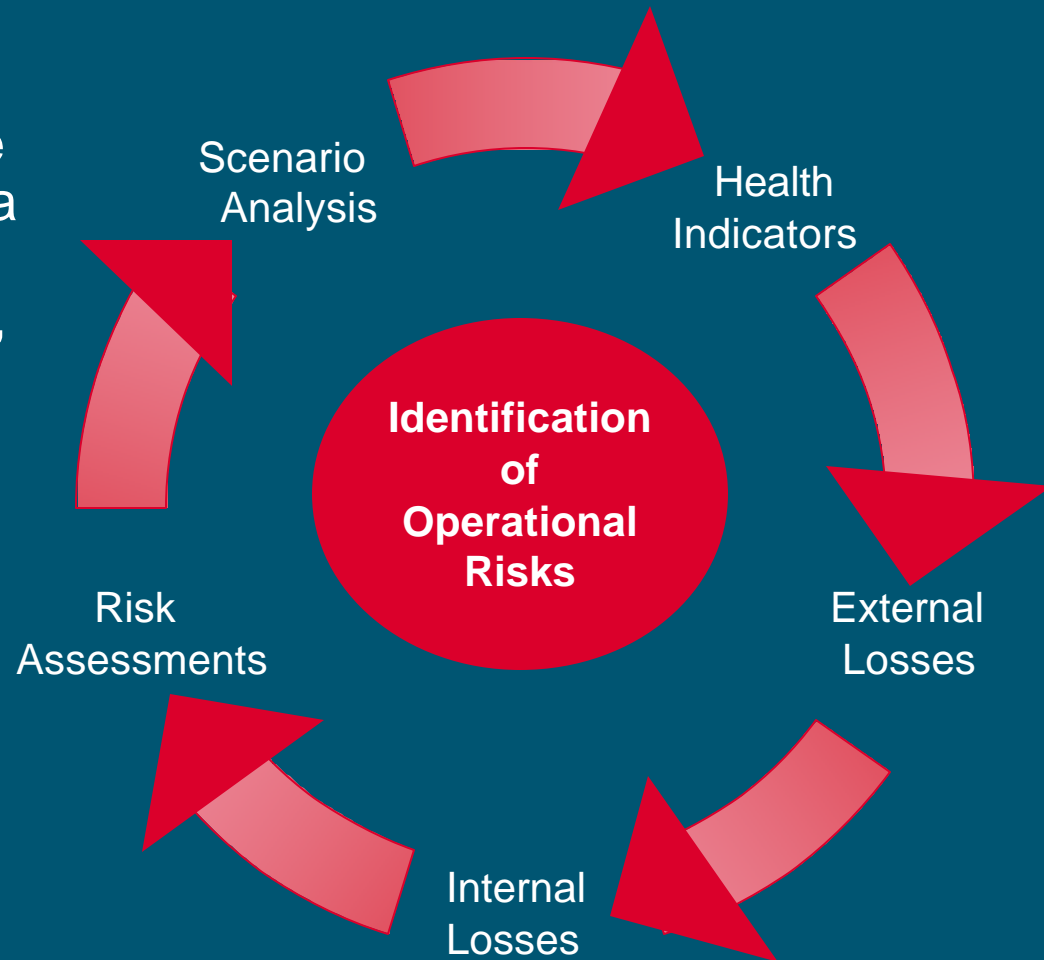**Goldman, Sachs & Co**

Agenda

- Goldman Sachs in perspective

- Operational risk framework

- Advanced Measurement Approach

- Implementation Challenges & Solutions

- 'Outstanding Questions'

Goldman Sachs in Perspective

	Goldman Sachs	Other Panelists
Size:		
Employees	20,722	> 160,000
Net Revenues	$ 21 bln	$ 43 - $86 bln
Equity Market Value	$ 53 bln	$97 - $243 bln
Nature of Business:		
Investment Banking	16%	
Trading & Principal Investments	65%	
Combined (1)	81%	19 - 27%
Net Revenues / Employee	$ 992 thd	<= $300 thd
North America / Total Net Revenues	63%	67 - 94+%
Other:		
Acquisitions last 3 years	Limited	Various
Operational Risk Dept. formalized	2000	
Consolidated Regulator	SEC	

Sources: Public financial statements for last fiscal year end, GS estimates

(1) JPM - "Investment Banking" business line, BAC - "Global Capital Markets and Investment Banking" business line

C - combined "Global Corporate and Investment Bank" and "Proprietary Investment Activities" business lines

Operational risk framework

Qualitative and quantitative information is integrated in a global framework that facilitates risk identification, measurement and management

Scenario Analysis

Health Indicators

Identification of Operational Risks

External Losses

Internal Losses

Risk Assessments

AMA approach considerations

- Our AMA approach needs to take into consideration our business and organization

  - More 'wholesale' business lines with high capital reliance on tail events

  - Leading positions and long history in primary business lines

  - Strong control culture with Firmwide mandates

  - Embedded risk management practices in the business areas

  - Broad awareness of benefits and limitations of models

  - Senior and business-line management support and buy-in of approach

AMA Scenario Approach

- We decided on the scenario approach since it …

  - is transparent and allows us to understand the types and magnitudes of operational risk losses that most importantly contribute to the operational risk loss distribution

  - relates to our current levels of control, allows for assessment of the control infrastructure and uses all the available operational risk data as input

  - is forward looking and relatively sensitive to changes in the external and internal environment

  - uses well established statistical tools and techniques for modeling purposes

  - creates appropriate incentives to manage and mitigate operational risk

  - is more stable than our LDA benchmark model and less prone to extreme reaction to modest changes in modeling assumptions
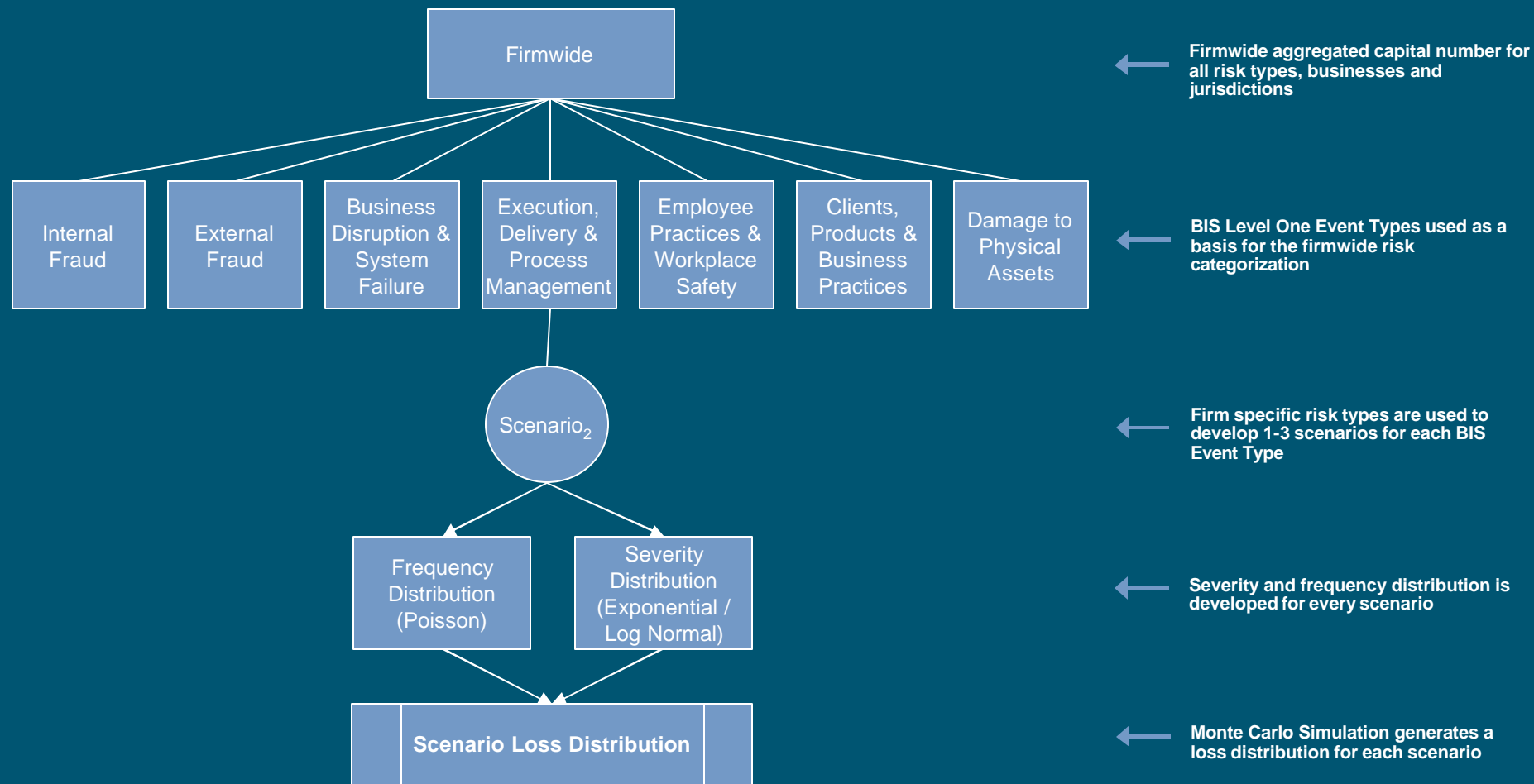
AMA Approach – Overview

- BIS level one event types are used as the core of our risk categorization for the scenario based capital model

- For each BIS event type we have identified several firm specific risk types that we use to develop one or more scenarios for that event type

- All available operational risk information, including expert judgment, is then used to derive a frequency and a severity distribution for each scenario

- Monte Carlo simulation is then run to generate a cumulative loss distribution for each scenario

- Individual scenarios are at last aggregated into a firmwide loss distribution, providing the operational risk capital at the appropriate confidence interval

AMA operational risk capital

- All available operational risk information is used to generate the frequency and severity distributions

  - Empirical evidence (internal loss & external loss history)

  - Business environment and control factors (metrics and risk assessment)

  - Expert judgment incorporating inputs from senior business experts

  - Econometric and other risk based models, such as from the insurance industry

- Substantial documentation of modeling and input decisions and rationale relative to all available information
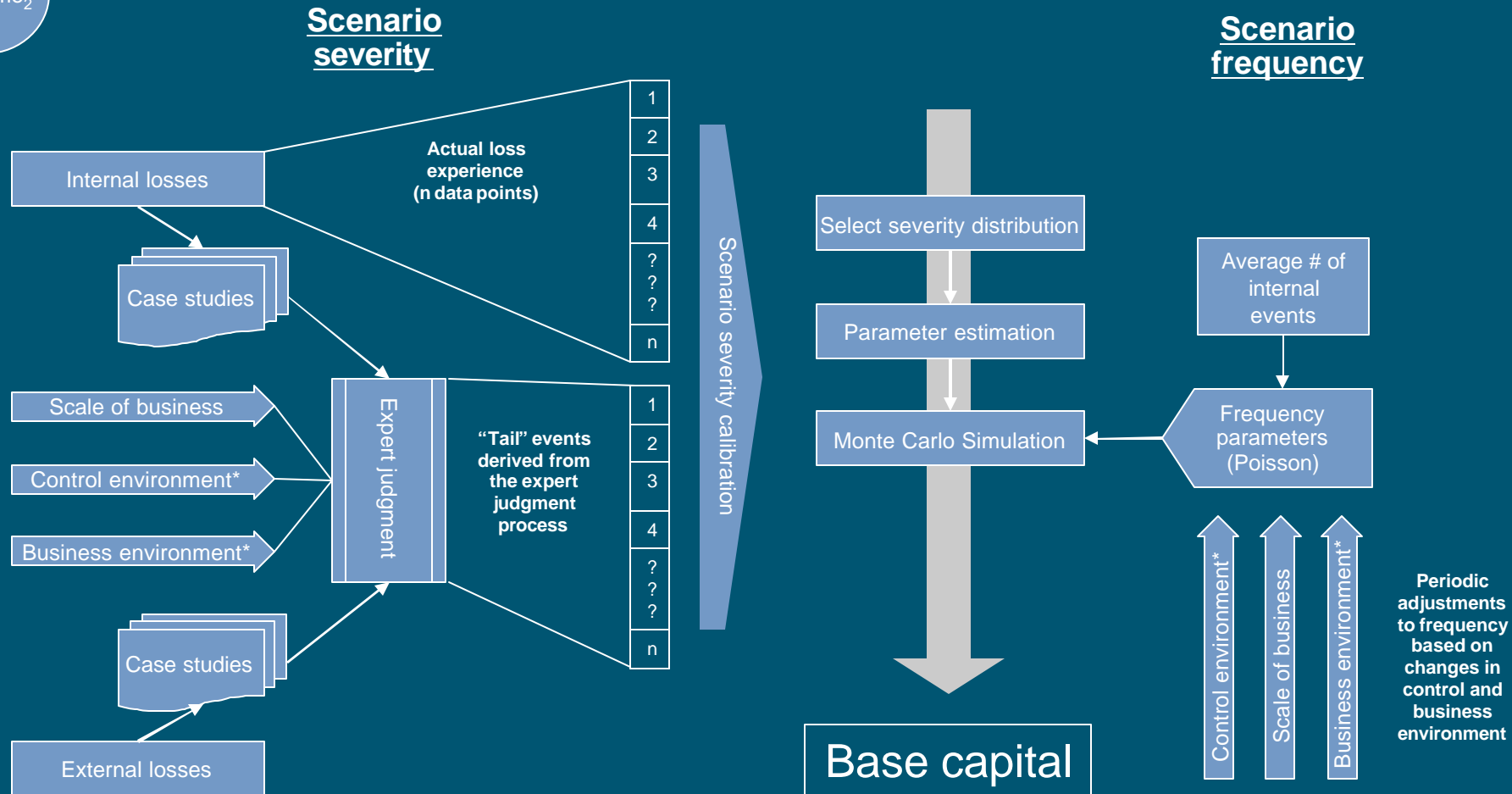
Our scenario methodology

Firmwide → Firmwide aggregated capital number for all risk types, businesses and jurisdictions

Internal Fraud | External Fraud | Business Disruption & System Failure | Execution, Delivery & Process Management | Employee Practices & Workplace Safety | Clients, Products & Business Practices | Damage to Physical Assets → BIS Level One Event Types used as a basis for the firmwide risk categorization

$Scenario_2$ → Firm specific risk types are used to develop 1-3 scenarios for each BIS Event Type

Frequency Distribution (Poisson) | Severity Distribution (Exponential / Log Normal) → Severity and frequency distribution is developed for every scenario

Scenario Loss Distribution → Monte Carlo Simulation generates a loss distribution for each scenario

Our scenario methodology

Our scenario methodology

- Internal losses

    - Used directly as data points in the distribution for each scenario

    - Also used indirectly through the expert judgment process

- External losses

    - Not used directly as data points for the distributions

    - Used as one of key inputs into the expert judgment process

    - We have developed external loss case studies analyzing the key operational risk themes of financial services firms

- Business environment and control factors

    - Examples are our Health Indicators & Risk Assessments

- ▪ **Approach to incorporating external data**

  - • Inherent data quality and relevance issues (accuracy, completeness, business and control environments, scaling, etc.) would require expert judgment adjustments

  - • Solution: Incorporate as a consideration in broader expert judgment analysis whereby obtain benefits of this valuable information through a single more transparent process

- ▪ **Ongoing risk sensitivity of capital calculation**

  - • Capital calculation needs to be sensitive to changes in risk

  - • Too frequent recalibration of most senior expert judgments may impact management focus and value

  - • Solution: update capital calculations based on internal losses on an ongoing basis and update specific expert judgments annually and upon material changes to any of our risk inputs

"Outstanding Questions"

- Focus areas
  - "Use Test"
  - Comparability to Credit and Market risk standards
  - "Home/Host"
  - Model 'validation'
  - Hybrid approach and allocation
  - Correlation / Diversification
  - Expected Loss
  - Disclosure standards