



大數據趨勢論壇暨 IBM產業專題高峰會

打造數據價值新藍海



Big Data and Smarter Risk Management

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GCG Risk Analytics

June 11, 2014

大數據趨勢論壇暨IBM產業專題高峰會
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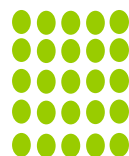
Big Data – The Next Natural Resource

Need to leverage more information more quickly to deliver better, more timely insights and better business outcomes

“We have for the first time an economy based on a key resource [Information] that is not only renewable, but self-generating.”

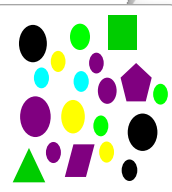
Running out of it is not a problem, but drowning in it is.”

- John Naisbitt



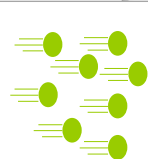
Volume

Use greater amounts of data



Variety

Use more types of data



Velocity

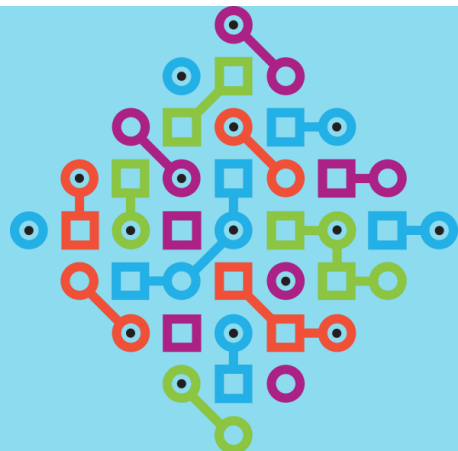
Use data more quickly



Veracity

Use uncertain data

What Is Smarter Risk?



Smarter Risks all about delivering trusted, context-rich intelligence that provides a holistic view of risk and uncertainty across organizational silos, when it is needed to support business decisions that maximize value for the enterprise.

Across-IBM initiative to bring to the market a single, **unified vision** to the market on IBM's commitment to **enterprise risk management** across risk types.

-  **Financial Risk**
-  **Operational Risk**
-  **Financial Crimes**
-  **IT Risk & Security**

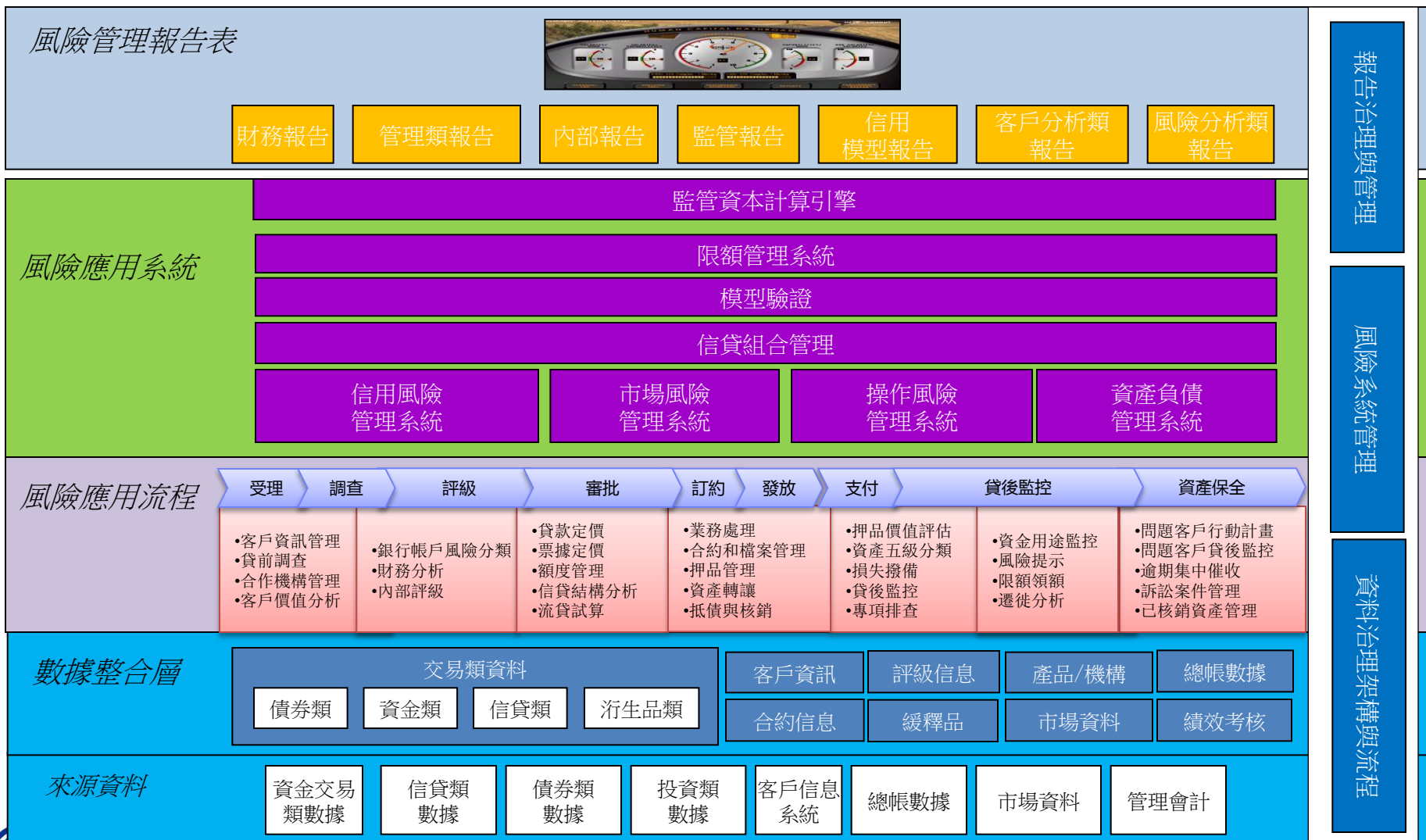
Supported by Big Data & Analytics



最終將搭建智慧化的整合風險管理業務和技術功能

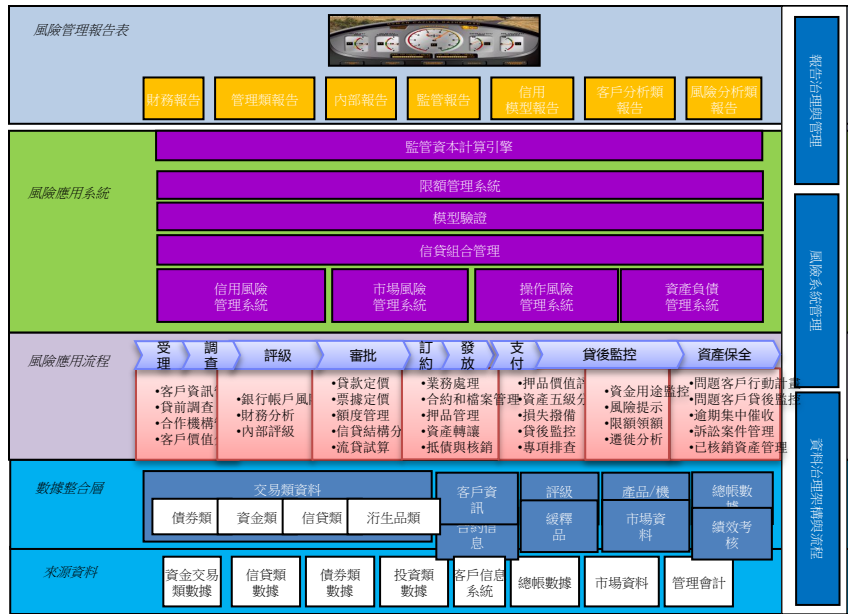


Bid Data & analytics platform enables risk analytics insights and offers business-IT aligned enterprise risk management solutions



What does a Big Data platform do?

*Extract insights from a large **volume** of data, including a wide **variety** of types, with high **velocity***



風險報告

風險模型

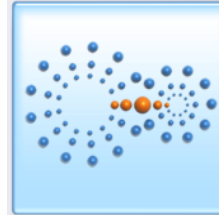
風險流程

風險數據



Analyze a Variety of Information

Novel analytics on a broad set of mixed information that could not be analyzed before



Analyze Information in Motion

large volume data bursts & ad-hoc analysis



Discover & Experiment

Ad-hoc analytics, data discovery & experimentation



Analyze Extreme Volumes of Information

Manage & analyze high volumes of structured, relational data



Manage & Plan

Enforce data structure, integrity and control to ensure consistency for repeatable queries



Integrated market and credit risk requires a common framework

風險數據

類比分析
模型

信用風險和市場風險的交叉資料，頭寸，評級，抵押品，等
動態時間，風險因數的多維度類比和模型分析類比

Example risk factors

Interest Rates

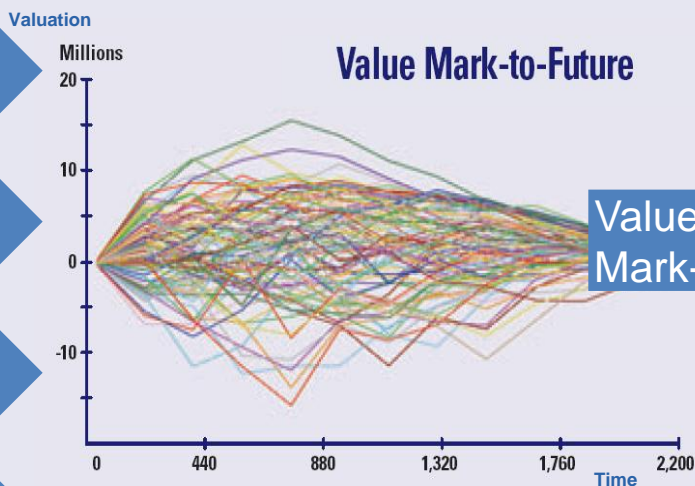
Spreads

Equity values

Foreign
exchange rates

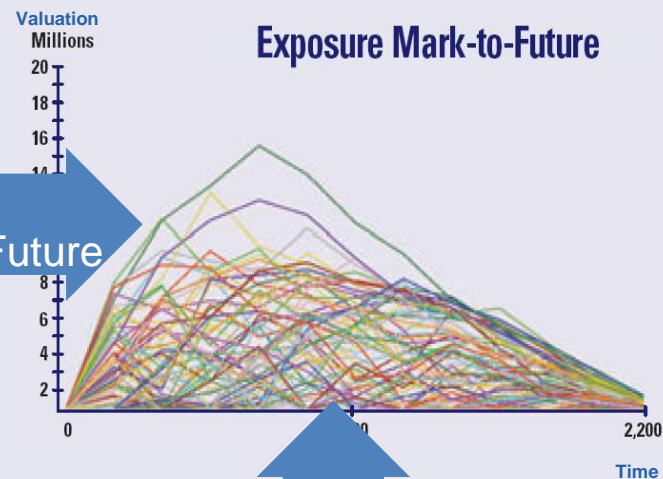
Commodity
prices

Market Risk simulation through time



Value
Mark-to-Future

Credit Risk simulation through time



Netting and collateral

Market valuations
impact Credit risks

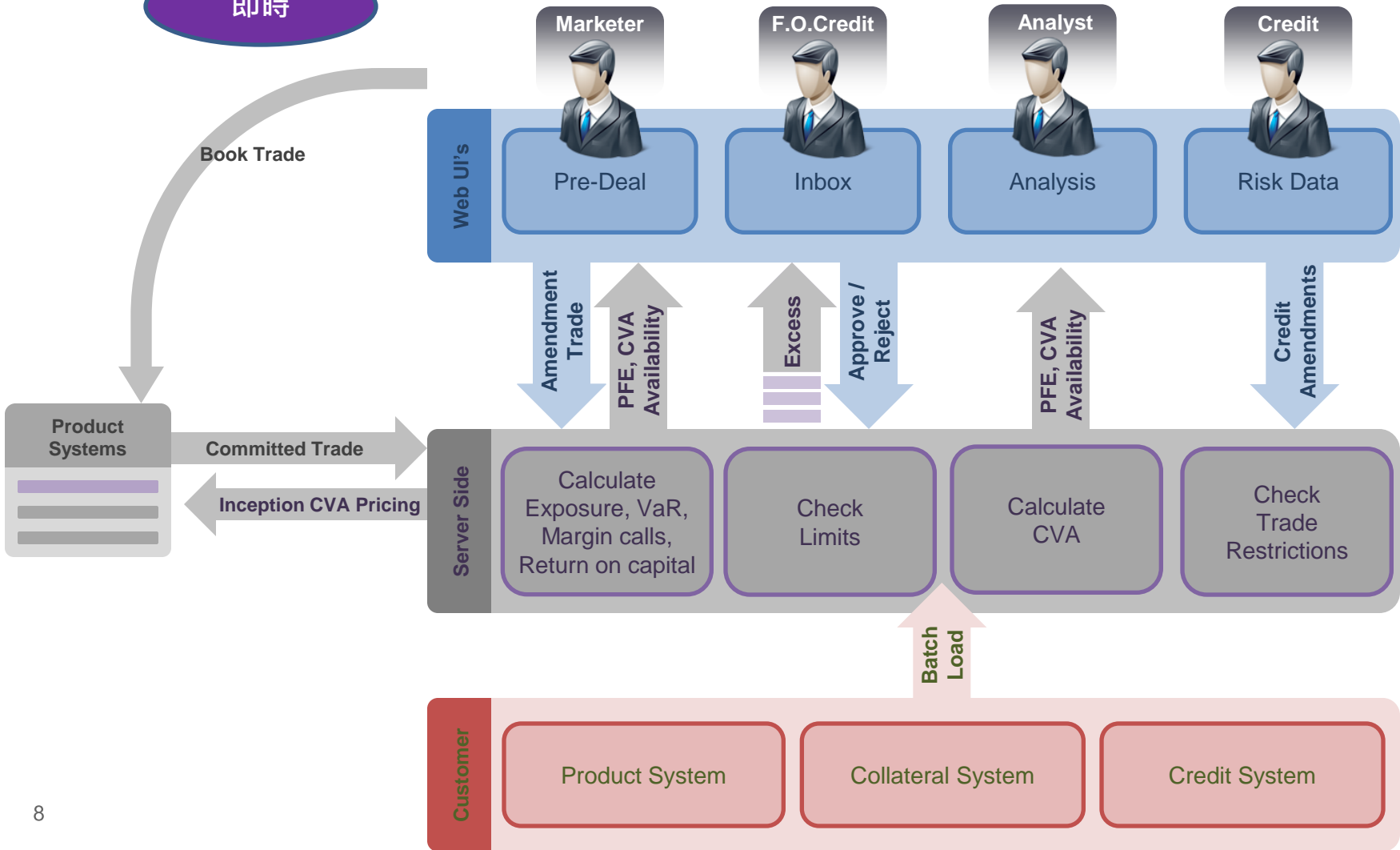
Credit risks are mitigated by netting and collateral because both help to reduce the amount a bank can lose in the event of a counterparty default

Deal-time Decision Support



- 風險數據
- 風險計量
- 即時

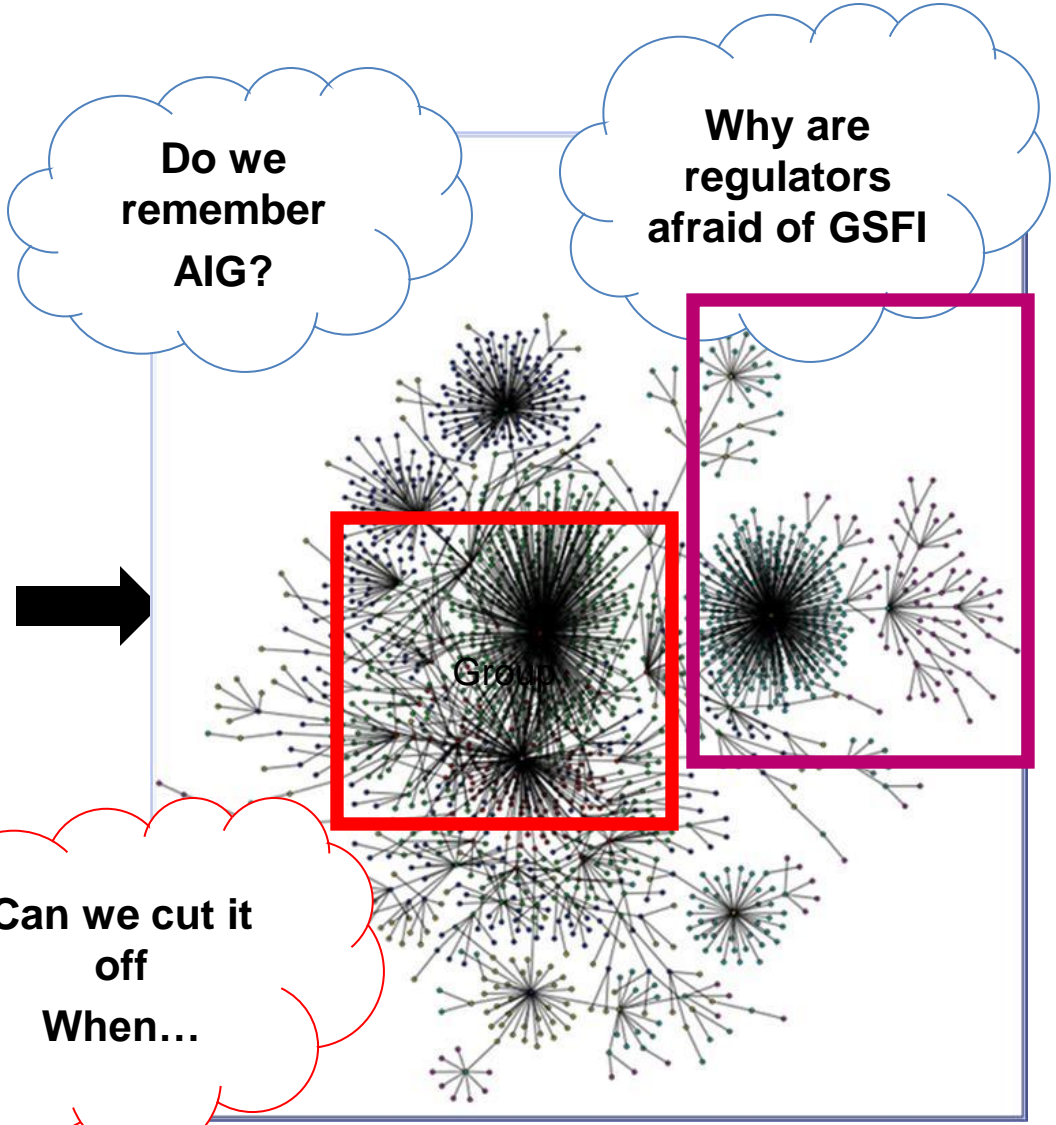
即時的交易和相關的市場，信用風險資訊是CVA計量的基礎；
同時也是交易員對交易盈利，限額和組合管理決策的根據



交易對手信用風險(an example)

Foundational Data Domains

- **Products** - Securities and Financial Instruments
- **Counterparty** - Clients, Counterparties, and Issuers
- **Hierarchies** - the web of relationships throughout the financial markets



A graphical view of one of the world's leading financial institutions



Data Architecture & Data Integration Model



Corporate and Institutional Banking

Small Business Banking & Merchant Services

Lending
Leasing
Insurance
Credit Cards

Personal Banking

Lending
Leasing
Insurance
Credit Cards

Risk Analytics

Investment Risk
Credit Risk
- Creditor Default
- Credit Ratings
- Credit Limits
Counter Party Risk
Operational Risk
- Failed Trades
Market Risk
AML
Fraud Detection

Real Time Transaction Data Flows
Banking Transactions – Insurance – Lending – Credit - etc
Trades -Life Of A Trade - Fails, Cancels, Rebooks -Holdings
Profit and Loss –Hedging – FX - Repo

Markets & Investment
Performance Reporting
Asset/Portfolio Management

Capital Markets
Brokerage
Exchange Specialist

Fund Management

Foreign Exchange

Custody

Regulatory Compliance

Geo, National, Regional
Basel II, SOX, Tax
Surveillance
Reporting
Compliance
Order, Quote, Bid
Market-Street Side
Employee Code of Ethics/Trading

Reference Data

Legal Entity Hierarchy

Securities Master
Markets
Traders

Hierarchy Management

Products/Offerings
Assets/Collaterals
Credit Derivatives
Credit Ratings
Individual Ratings
Security Ratings
Loss given default (LGD)
Exposure
Probability Of Default
Netting Agreements
Geographic domain
Legal domain
Rules of Compliance
Rates (interest)
Foreign Exchange
Exchanges
Risk Ratings
Tax Rates
Insurance

Legal Entity
Customer
Issues
Issuers
Counter Party
Involved Party
Brokers
Dealers

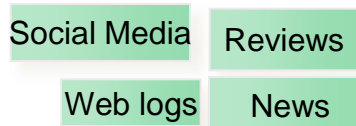


Big Data Use Cases – SME Credit Risk

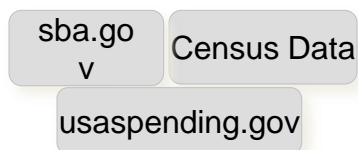


Build SME 360 views from social media data for credit risk evaluation

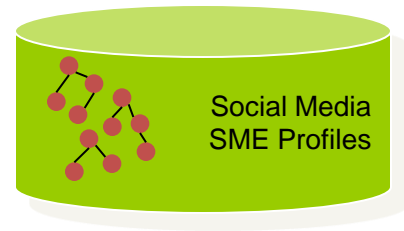
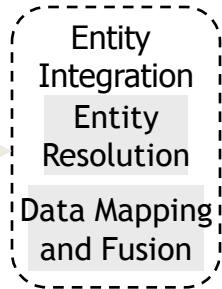
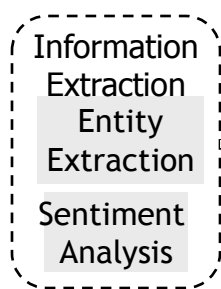
Web Data



Public Data



Private Data

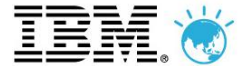


Helping banks develop better risk profiles of SME customers and prospects using data from public data, social media data and market data.

- Better understanding of exposure to various types of risk :
Financial, Reputation, Legal and Market Risk
- Augmenting existing credit risk models with social media SME profiles



Big Data Use Cases – SME Credit Risk



Example Analysis: Integrating SME information across multiple sources

The image displays three overlapping screenshots of a doctor's profile for Dr. Mark D. Kaufmann, MD. Red boxes highlight specific data points across the different sources:

- Address Information:** 189-04 Union Tpke, Fresh Meadows, NY 11366. This information is highlighted in red boxes in the top-left, top-middle, and bottom-right screenshots.
- Education and Experience:** New York Univ Sch Of Med, New York NY 10016; Albert Einstein College of Medicine of Yeshiva University. This information is highlighted in red boxes in the top-middle and bottom-right screenshots.

Two callout boxes at the bottom provide context for the highlighted information:

- Address information needs to be resolved across multiple sources** (pointing to the address highlights)
- Education and experience information needs to be extracted and integrated** (pointing to the education highlights)

Big Data Use Cases – Institutional Credit Risk

Comprehensive view of publicly traded companies and related people based on regulatory filings



Over 1 Million documents

Filing timeline

2005 2010

SEC/FDIC Filings of Financial Companies (SIC Codes 6000- 6799)
(Forms 10-K, 8-k, 10-Q, DEF 14A, 3/4/5, 13F, SC 13D SC 13 G FDIC Call Reports)

Extract Integrate

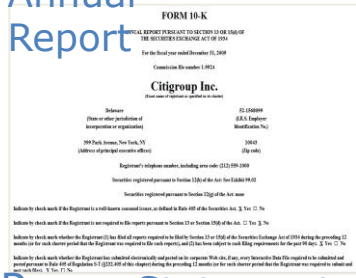
Person

Company

Over 32000 key officials in financial companies

Over 2200 financial companies

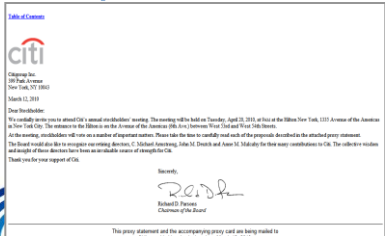
Annual Report



Loan Agreement



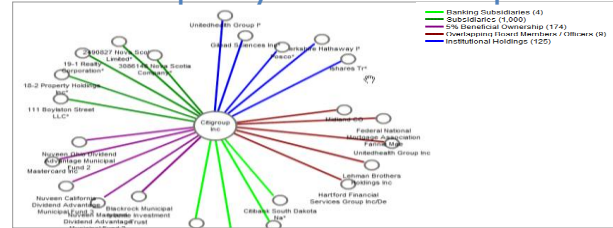
Proxy Statement



Insider Transaction



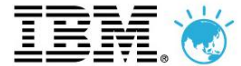
Counterparty Relationships



Loan Exposure



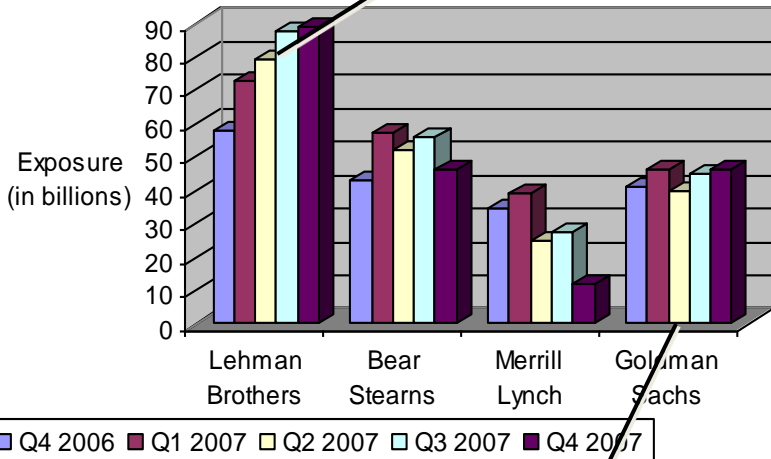
Big Data Use Cases – Counterparty Credit Risk



Example Qualitative Insight : Providing insights into a bank's exposure to various securities (e.g., MBS/ABS)

Significant increase in Lehman's exposure between Q4 2006 and Q3 2007

Mortgages, Mortgage-backed & Asset Backed security exposure



More stable portfolio for Goldman during same time period

Goldman Sachs 10-Q Reports from several quarters

	As of	
	February 2007	November 2006
	(in millions)	
Mortgage whole loans and collateralized debt obligations (1)	\$46,259	\$ 41,017
Bank loans (2)	28,171	28,196
High-yield securities	12,310	11,054
Emerging market debt securities	2,748	2,291
SMFG convertible preferred stock	4,662	4,505
ICBC ordinary shares (3)	5,898	5,194
Other corporate principal investments (4)	4,878	3,675
Other private equity and restricted public equity securities	4,735	3,736
Real estate principal investments (4)	1,141	588

Lehman Brothers

In millions Financial Instruments and Other Inventory Positions	Owned		Sold But Not Yet Purchased	
	2007	2006	2007	2006
Mortgages and mortgage-backed positions (1)	\$ 72,929	\$ 57,726	\$ 87	\$ 80
Government and agencies	47,764	47,293	75,499	70,453
Corporate debt and other	48,807	43,764	12,559	8,836
Corporate equities	52,471	43,087	34,868	28,464
Derivatives and other contractual agreements	22,586	22,696	17,823	18,017
Real estate held for sale	9,017	9,408	—	—
Commercial paper and other money market instruments	3,064	2,622	67	110
	\$ 256,638	\$ 226,596	\$ 140,903	\$ 125,960

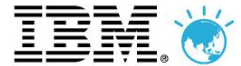
Bear Stearns

	February 28, 2007	November 30, 2006
(in thousands)		
<S>		
FINANCIAL INSTRUMENTS OWNED:		
U.S. government and agency	\$ 5,246,453	\$ 6,136,191
Other sovereign governments	2,456,191	1,371,713
Corporate equity and convertible debt	36,423,135	28,892,588
Corporate debt and other	35,208,016	33,924,116
Mortgages, mortgage- and asset-backed	57,549,272	43,226,699
Derivative financial instruments	10,281,472	11,617,144
	\$ 147,164,539	\$ 125,168,451

Merrill Lynch

In millions	Owned		Sold But Not Yet Purchased	
	May 31, 2007	November 30, 2006	May 31, 2007	November 30, 2006
Mortgages and mortgage-backed positions (1)	\$ 79,634	\$ 57,726	\$ 119	\$ 80
Government and agencies	44,705	47,293	79,822	70,453
Corporate debt and other	55,298	43,764	13,258	8,836
Corporate equities	58,252	43,087	50,976	28,464
Derivatives and other contractual agreements	28,335	22,696	24,001	18,017
Real estate held for sale	15,890	9,408	—	—
Commercial paper and other money market instruments	3,270	2,622	39	110
	\$285,684	\$226,596	\$168,015	\$125,960

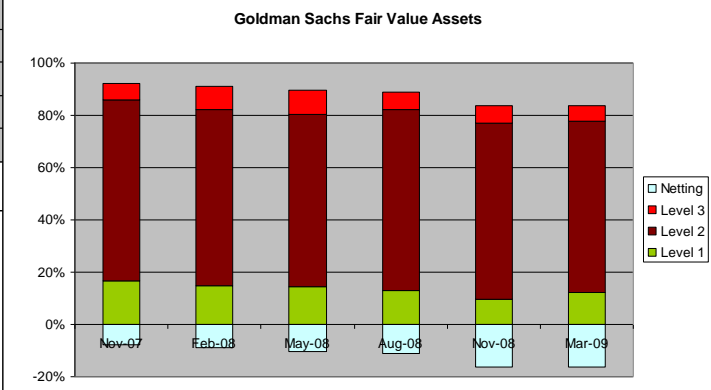
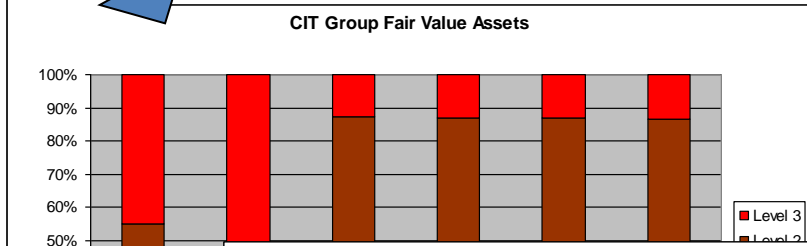
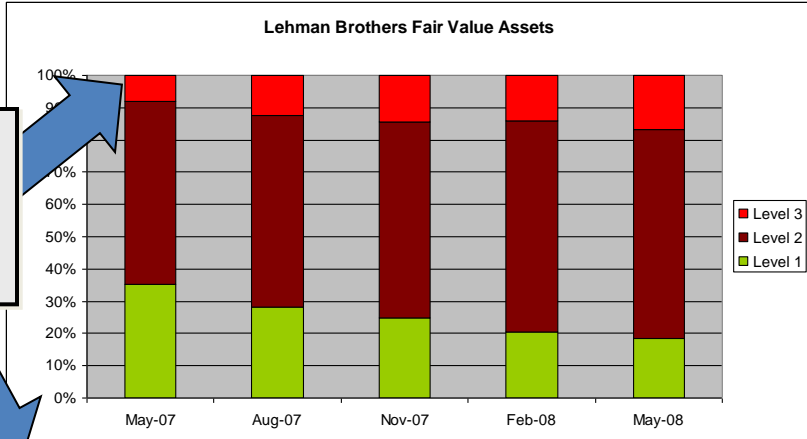
Big Data Use Cases – Counterparty Credit Risk



Example Qualitative Insight : Providing Insights into fair valuation of a bank's assets and liabilities by categories

10-Q Reports from several quarters

Notice the Level 3 distribution for Lehman and CIT group



FORM 10-Q
 QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

THE GOLDMAN SACHS GROUP, INC. and SUBSIDIARIES
 THE GOLDMAN SACHS GROUP, INC. and SUBSIDIARIES
 THE GOLDMAN SACHS GROUP, INC. and SUBSIDIARIES
 NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (Continued)
 (UNAUDITED)

	Level 1	Level 2	Level 3	Netting and Collateral	Total
Commercial paper, certificates of deposit, time deposits and other money market instruments	\$ 7,680	\$ 6,303	\$ —	\$ —	\$ 13,983
U.S. government, federal agency and sovereign obligations	67,839	57,642	—	—	125,481
Mortgage and other asset-backed loans and securities	—	3,802	11,644	—	15,446
Bank loans and bridge loans	—	11,345	9,896	—	21,241
Corporate debt securities and other debt obligations	223	17,052	7,584	—	24,859
Equities and convertible debentures	15,340	14,174	13,620	—	43,134
Physical commodities	—	1,102	—	—	1,102
Cash instruments	91,082	111,500	42,684	—	245,266
Derivative contracts	211	240,837	16,378	(153,101)	104,325
Trading assets, at fair value	91,293	352,337	59,062	(153,101)	349,591
Securities segregated for regulatory and other purposes	22,077	(4)	23,462	—	45,535
Receivables from customers and counterparties (1)	316	1,720	—	—	2,036
Securities borrowed (2)	—	88,816	—	—	88,816
Securities sold, not yet purchased (3)	—	(44,664)	—	—	(44,664)
Total financial assets at fair value	\$ 113,686	\$ 608,992	\$ 69,062	\$ (153,101)	\$ 638,639
Level 3 assets for which the firm does not bear economic exposure (3)			(4,402)		
Level 3 assets for which the firm bears economic exposure			\$ 64,660		

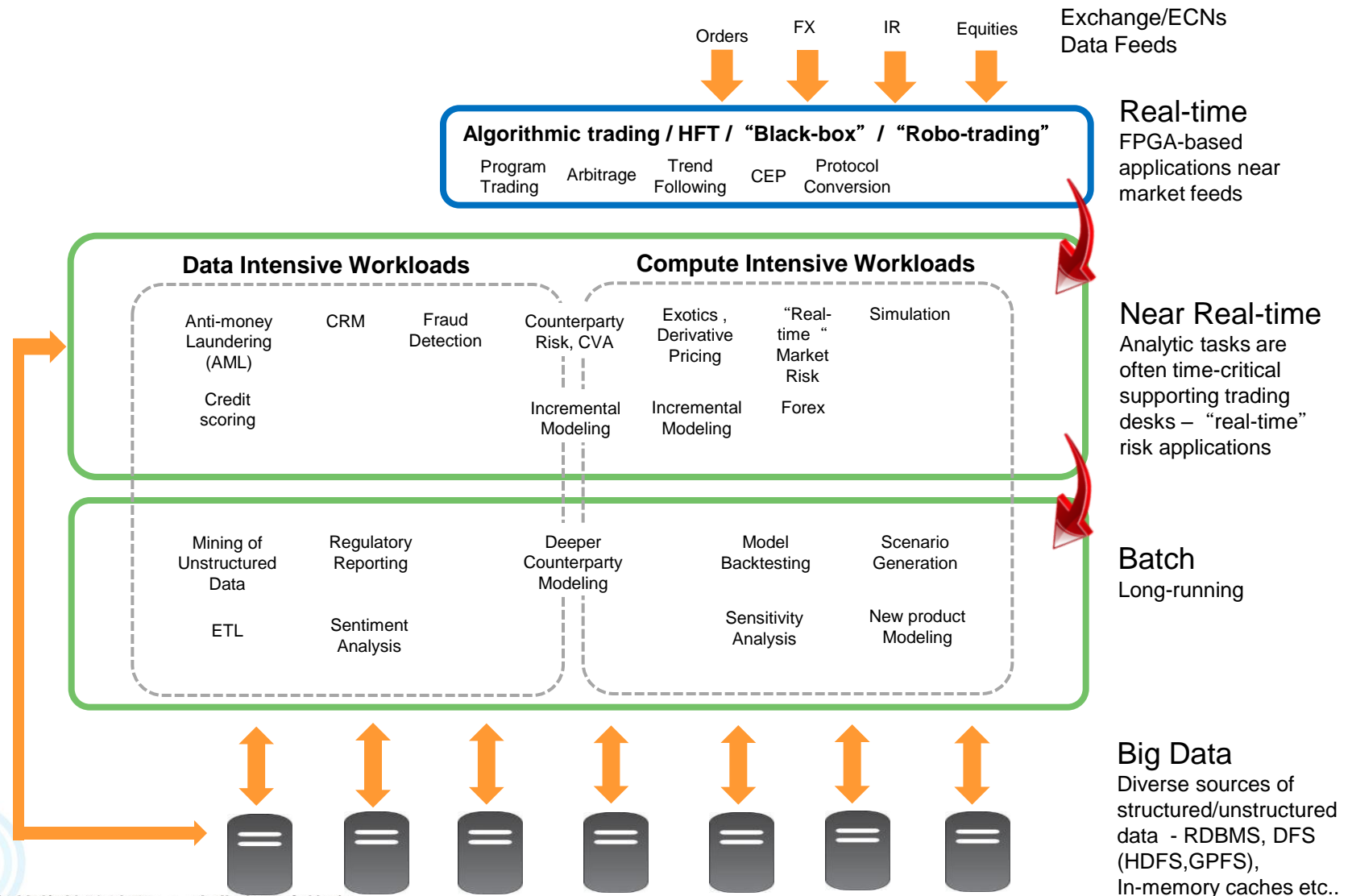
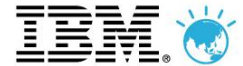
(1) Primarily consists of certain margin loans, transfers accounted for as secured loans rather than purchases under SFAS No. 140 and prepaid variable share forwards.
 (2) Consists of securities borrowed within Trading and Principal Investments. Excludes securities borrowed within Securities Services, which are accounted for based on the amount of cash collateral advanced plus accrued interest.
 (3) Consists of level 3 assets which are financed by nonrecourse debt, attributable to minority investors or attributable to employee interests in certain consolidated funds.
 (4) Consists of U.S. Treasury securities and money market instruments as well as insurance separate account assets measured at fair value under American Institute of Certified Public Accountants (AICPA) Statement of Position (SOP) 03-1, Accounting and Reporting by Insurance Enterprises for Certain Nontraditional Long-Duration Contracts and for Separate Accounts.
 (5) Primarily consists of securities borrowed and resale agreements. The underlying securities have been segregated to satisfy certain regulatory requirements.
 (6) Consists of private equity and real estate fund investments.

TABLE 1 - DERIVATIVE FINANCIAL INSTRUMENTS

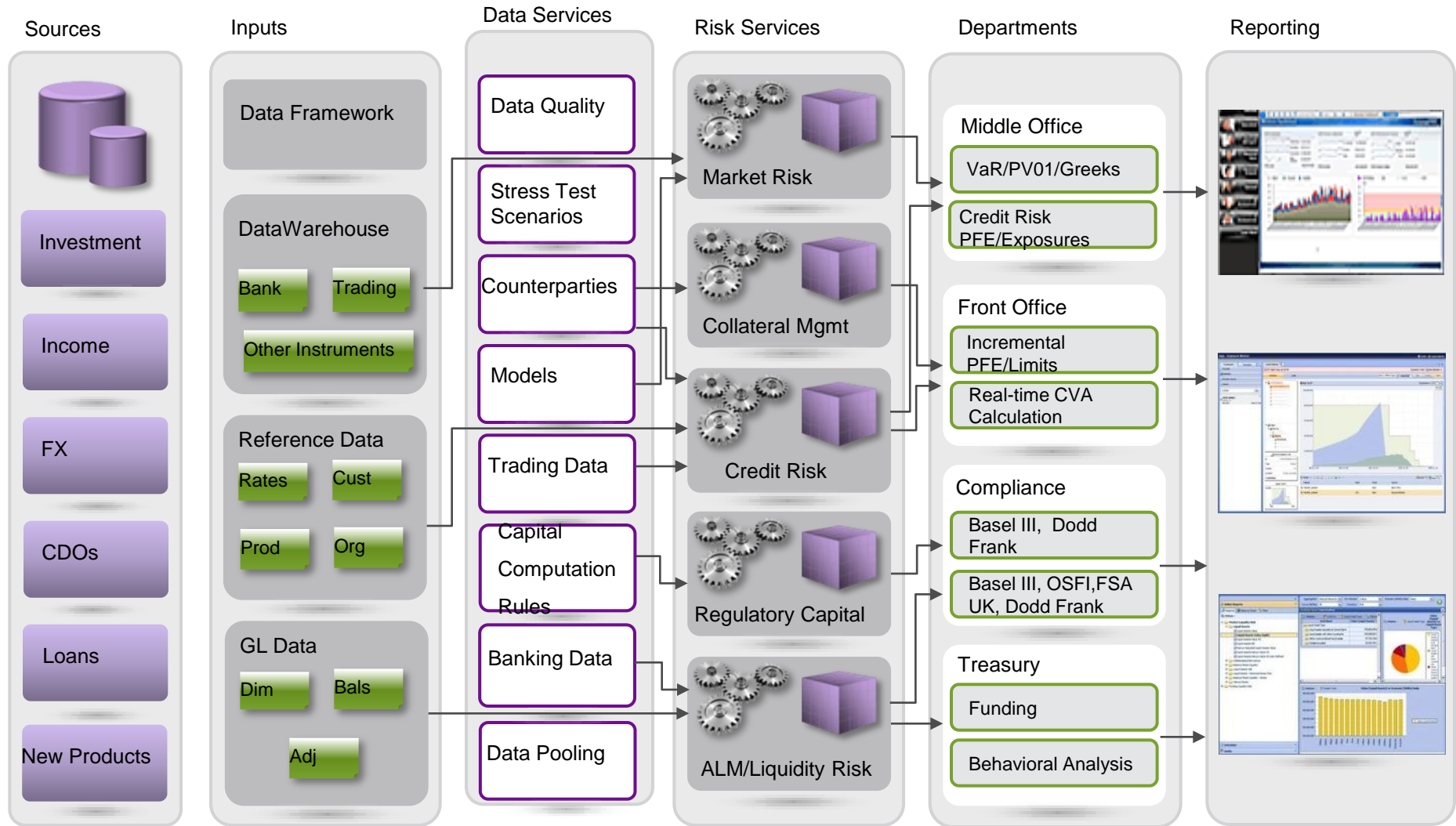
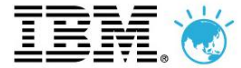
	Three Months Ended		Nine Months Ended	
	September 30	Percent	September 30	Percent
(in millions)	Total	Level 1	Level 2	Level 3
Balance at June 30, 2007				
Trading assets	\$ 7,280	\$ 1,608	\$ 5,214	\$ 467
Securities available for sale	72,179	58,619	11,546	2,014
Mortgages held for sale	30,175	—	30,175	—
Mortgage servicing rights (residential)	18,733	—	—	18,733
Other assets (1)	231	229	—	2
Total	\$ 129,077	\$ 60,556	\$ 47,102	\$ 23,242
Other liabilities (1)	\$ (4,953)	\$ (2,470)	\$ (2,081)	\$ (392)
Balance at June 30, 2008				
Trading assets	\$ 9,681	\$ 703	\$ 8,429	\$ 549
Securities available for sale	91,331	49,752	32,975	8,604
Mortgages held for sale	29,940	—	17,664	8,276
Mortgage servicing rights (residential)	19,333	—	—	19,333
Other assets (1)	1,437	831	669	37
Total	\$ 144,722	\$ 61,286	\$ 59,637	\$ 33,799
Other liabilities (1)	\$ (6,964)	\$ (4,107)	\$ (2,414)	\$ (443)

(1) Derivatives are included in this category.
 (2) Non-rated asset-backed securities collateralized by auto leases represent most of this balance.

Big Data Use Cases – Platform vs Big Data

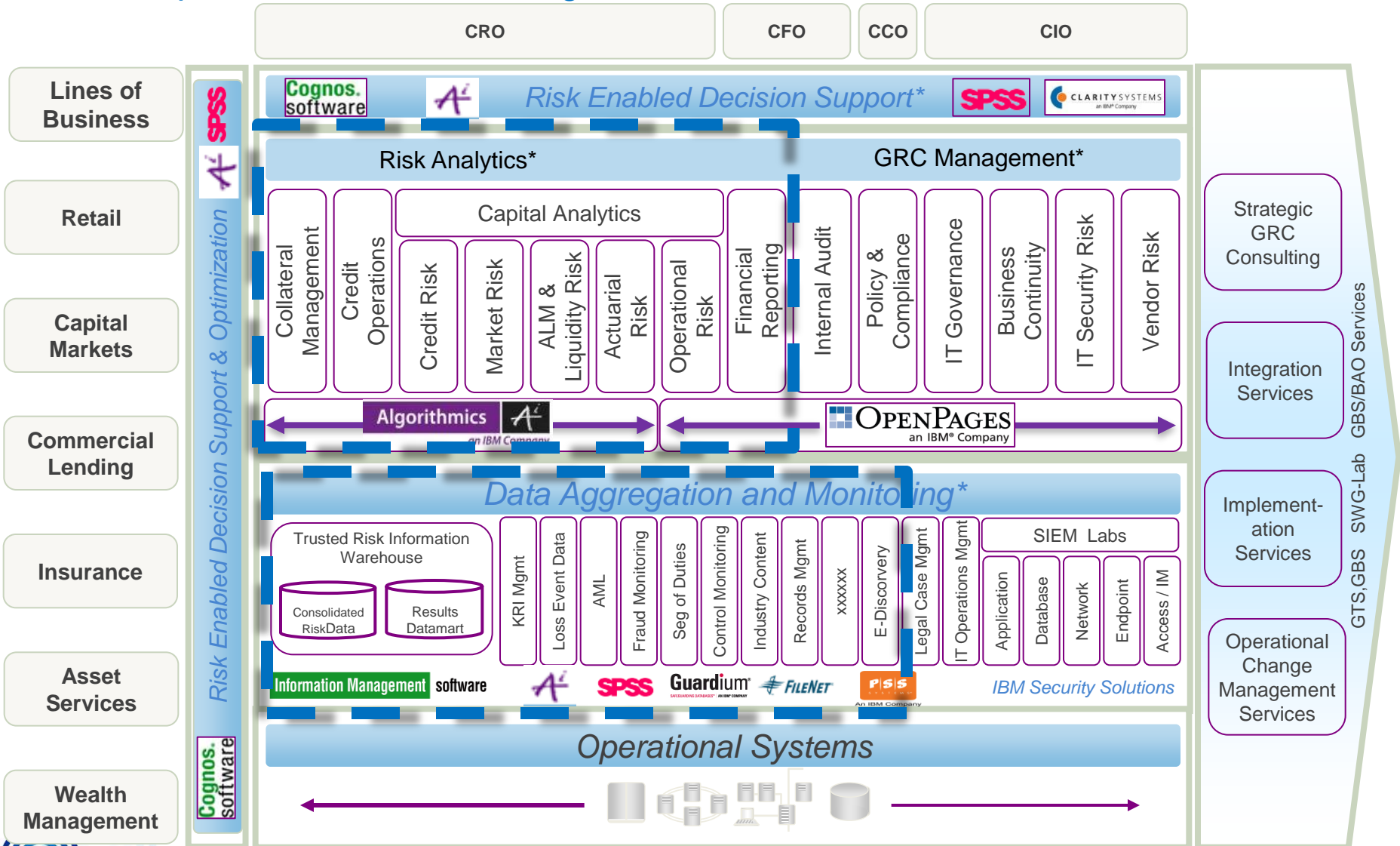
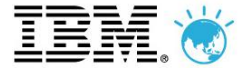


Big Data Risk Architecture



The Algorithmics solutions

a critical part of IBM's Risk Management Solution and...



大數據趨勢論壇暨IBM產業專超高峰會
 打造數據價值新藍海

IBM 全面的風險計量解決方案

風險戰略性業務規劃(ASBP)

Visualize current status quo across the bank's structure

Impact analysis on capital and profitability of lending policies, portfolios/business lines

Optimize for RAROC and capital consumption
Economic Value

The effect from integrated stress testing on Reg. Cap. Ec. Value, Credit and Liquidity

信貸流程管理 (CLM)

Origination, Modification & Renewal; Master Limit & Facility Management; Litigants Management; Credit Data Management

資產負債&流動性(ALM/LR)

資本管理 (RWA和EC)

抵押品管理(CM)

Net income and cost analysis
Net Margin
FTP, CVA, LVA,
Profitability analysis
Scenario analysis

Funding liquidity analysis
Liquidity stress testing
LCR, NSFR, Haircut,
Buffers, CBC, Survival
Horizon
Regulatory reporting

Regulatory Capital (RWA)
Economic Capital (EC)
VaR, CaR

Customer Centric
Consolidated Limits & Exposure
Covenant Monitoring
Relationship Profitability

操作風險(OP)

Risk & Control Self Assessments
Internal Loss Event Data
Key Risk Indicators
Structured Scenarios
Sarbanes-Oxley

整合的市場與信用風險(IMCR)

Credit Exposure Calculation
Simulated PFE exposures
Pre-deal limit checking
Trade Restrictions & Rules
Intra-day Excess Management

CVA Calculation
Unilateral and bilateral
Pre-deal incremental CVA
CVA sensitivities

Pricing
Sensitivities
VaR
Stress Testing

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Thank You

