

*It's Harder Than You Think:*  
The New Reality for Managing Risk  
and Valuation of OTC Derivatives



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# *Section 1*

Point of view

## *Point of view*

Change is underway. With market, regulatory, and risk management factors converging, people are thinking differently about the risk management and valuation of OTC derivatives.

Given the challenges that have arisen during the financial crisis related to bankruptcies and near-bankruptcies of key derivative players, the adequacy of existing practices—such as the posting of collateral and the use of standardized contracts—has been brought into question.

Counterparty credit risk (CCR) management has long been one of the most actively discussed topics in over-the-counter (OTC) derivatives markets prior to, during, and after the onset of the financial crisis in 2008. Since the demise of Long Term Capital Management in 1998, three industry best practices publications have been issued under the auspices of the Counterparty Risk Management Policy Group. The Senior Supervisors Group and the Institute for International Finance have also weighed in. In June 2011, the “Interagency Supervisory Guidance on Counterparty Credit Risk Management” was published, further demonstrating that the regulatory community also continues to focus on the issue of CCR.

Additional considerations were introduced by FAS 157 (now ASC 820) and the requirement to consider the impact of nonperformance risk (including credit risk) in measuring the fair value of assets and liabilities, a.k.a. credit valuation adjustments (CVA). Lastly, there have been extensive proposals by regulators for increased capital requirements for bilateral settlement of OTC credit derivatives under Basel III issued in December 2010, as well as Dodd-Frank.

Practices commonly employed for years—such as the posting of collateral, the use of standardized contracts, (e.g., ISDA contracts) and faith in the legal validity and enforceability of netting provisions and other safeguards in these contracts in the event of bankruptcy—had allowed market participants to be comfortable with the credit risk arising from transacting in these markets. However, with the challenges that have arisen during the financial crisis related to bankruptcies—and near-bankruptcies—of key derivative players, the adequacy of these existing practices has been brought into question.

Consequently, financial institutions have been reassessing their practices and examining ways to reduce CCR for OTC derivative contracts. Solutions include the expanded use of centralized clearing counterparties (CCPs), enhanced processes to manage collateral more efficiently and effectively, and a greater focus on the terms under which derivatives are transacted.

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## *Point of view*

Critical questions are being posed about the way in which counterparty credit is measured and managed, and how to assess the costs and benefits of posting collateral.

### **Among the questions being asked are:**

- How can companies realize value through implementing new collateral and capital requirements, and what information is required to determine and achieve this optimum balance?
- To what extent does the use of collateral create value in a derivative transaction by mitigating credit risk?
- Should credit risk be actively managed in a manner similar to market risk, considering the expanded availability of credit derivatives? If so, how would this impact organizations and operations?
- How should the operational and liquidity costs associated with posting various types of collateral be assessed against the related capital benefits?

### **The interrelationships among these factors have made measuring, managing, pricing, and determining capital requirements for CCR a highly complex exercise.**

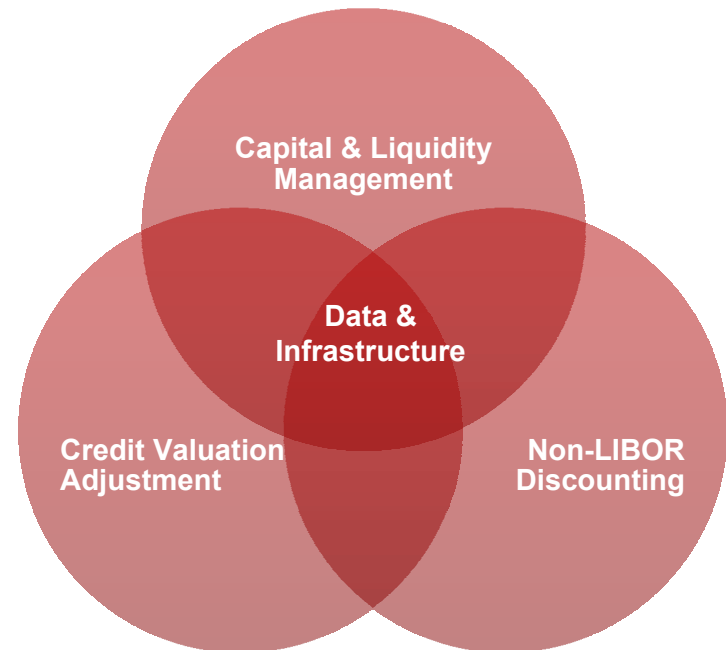
- It has become clear that institutions will have to carefully develop their responses to these issues. There are a number of benefits to be had if they are addressed under a single common framework, with an eye toward creating an enabling IT infrastructure.
- In the past, the credit, treasury, trading, and operations departments typically operated without the degree of coordination required to bring these various factors into alignment.
- As such, firms have had to revisit a number of historic processes and have determined that many of them were insufficient to capture these closely related considerations.

## *Point of view*

Leading institutions have launched a number of initiatives to address CCR issues.

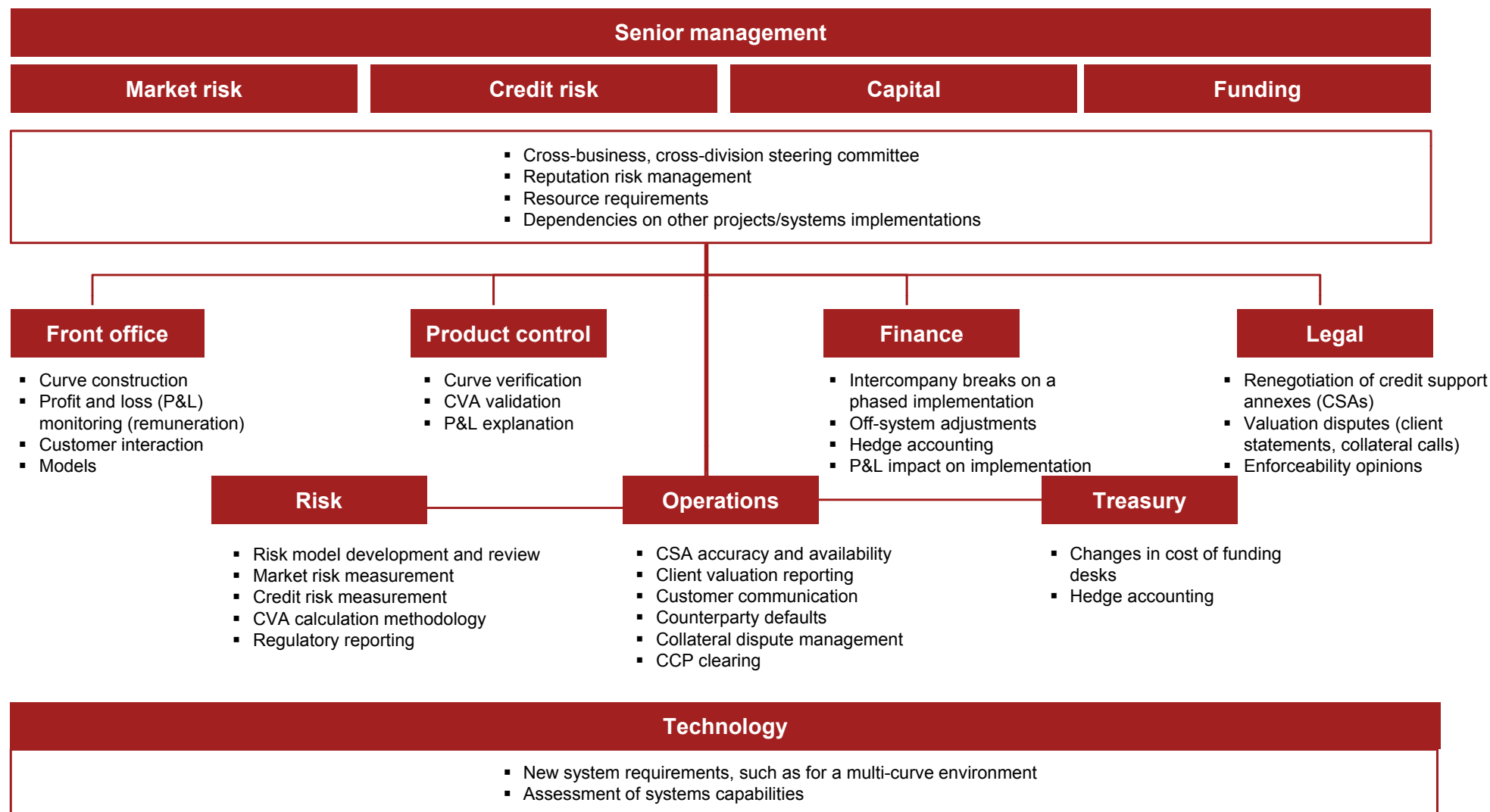
### **These initiatives include:**

- Refining counterparty credit exposure and CVA measurements to consider the potential future or expected exposure more completely within the derivatives portfolio.
- Incorporating or further refining the impact of collateral on valuation, counterparty risk measurement, funding costs, and liquidity management.
- Addressing changes to the market arising from evolving regulations, with a particular focus on regulatory capital and margin requirements for centrally cleared versus bilaterally settled OTC derivatives.



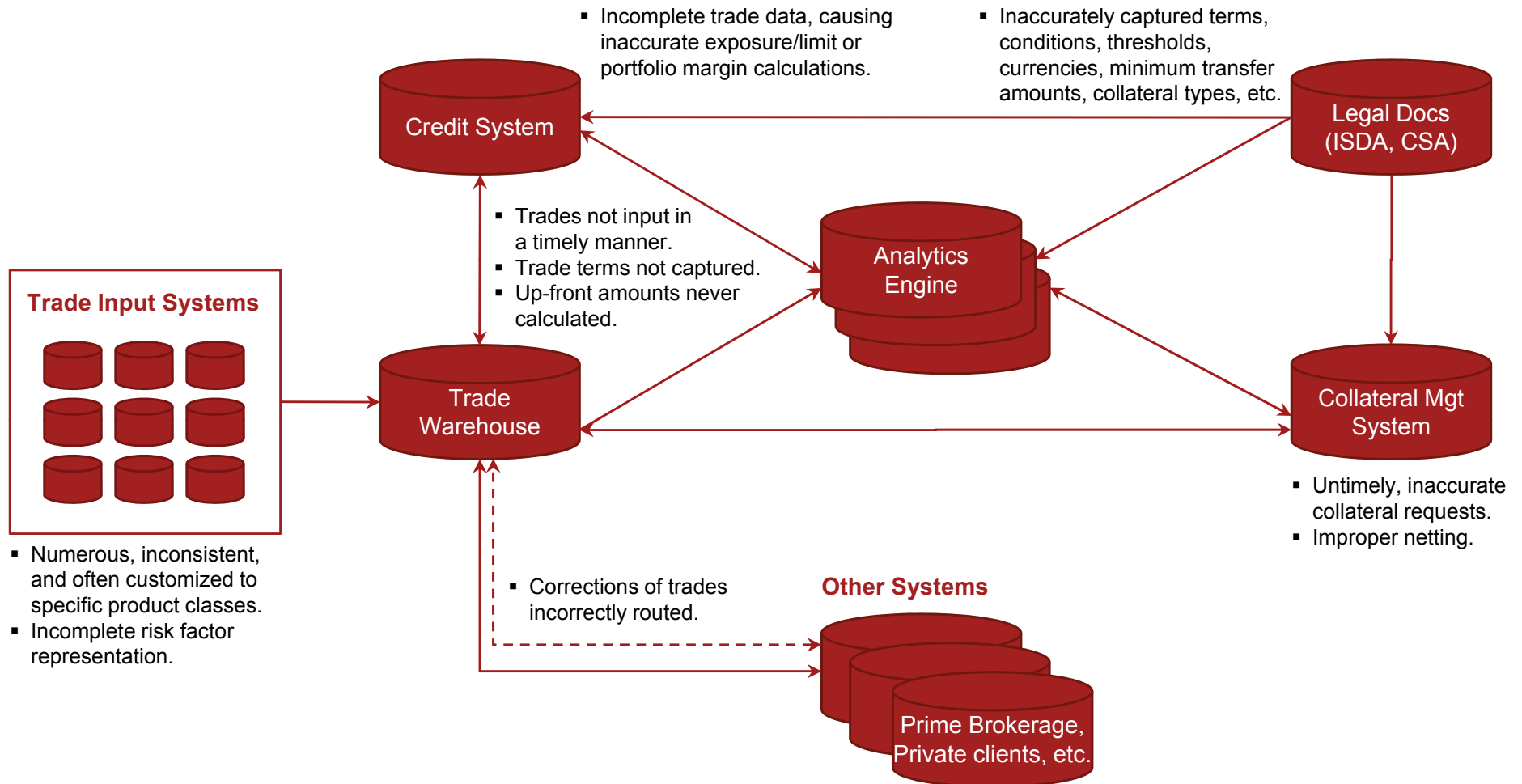
## Point of view

The process of enhancing calculation engines is fraught with complexity. In meeting these challenges, institutions have found it necessary to actively involve multiple functions across the institution.



## Point of view

Furthermore, a large number of legacy systems and data flows may need to be reevaluated, given the complex and diverse nature of the data and technology required to address CCR, CVA, and non-LIBOR discounting developments.





## *Point of view*

To make a long story short, an integrated response is critical to successfully address the competing challenges arising from the new regulatory, risk management, and market forces.

### **Quantification of CCR measurement and CVA**

- The OTC derivatives business presents multiple challenges related to measuring and managing CCR.
- Many institutions lack the capabilities to produce a timely, aggregated, firm-wide view of CCR by counterparty that considers netting, margining, and other related factors.
- CCR exposure quantification for CVA, regulatory, and economic capital purposes poses tradeoffs between accuracy and timeliness.
- Decisions around strategies to actively manage CCR are increasingly complex, particularly when the effectiveness of available instruments is limited.

### **Applicable discount rate: LIBOR versus non-LIBOR—e.g., Overnight Index Swap (OIS)**

- Prior to the credit crunch, market convention assumed that LIBOR was the appropriate discount rate for derivatives pricing.
- Due to significant concerns about the creditworthiness of large financial institutions, the spread between the LIBOR and the OIS rates was seen to diverge significantly for periods during the credit crisis.
- There has been an evolving shift in market practice to distinguish between collateralized and non-collateralized trades when pricing a derivative transaction.
- This shift imposes challenges in measuring, managing, and pricing CCR for both collateralized and non-collateralized trades due to requirements of systems and data.

### **Capital and liquidity (collateral) management**

- Under Dodd-Frank, financial services firms will be required to centrally clear certain standardized OTC derivatives.
- Swap entities not overseen by a prudential regulator will need to adapt to new minimum capital requirements and capital definitions under Dodd-Frank.
- Margin and collateral rules under Dodd-Frank will have a dramatic impact on the liquidity requirements for both dealers and end users.
- Additional capital requirements will be applicable to swap entities as defined under Basel II.5 and III, which puts increased pressure on profitability.
- Optimizing the use of strategies that mitigate risk in light of capital and liquidity needs is critical to remain competitive in the new regulatory environment.

### **Technology infrastructure and data quality**

- Quantification of CCR requires a diverse variety of information from disparate parts of the organization.
- Data and systems infrastructure requirements to achieve robust CCR measurement and management capabilities can be significant.
- The accuracy-versus-performance tradeoff is driven by the fundamental purpose, required calculation frequency, and complexity of the overall process.

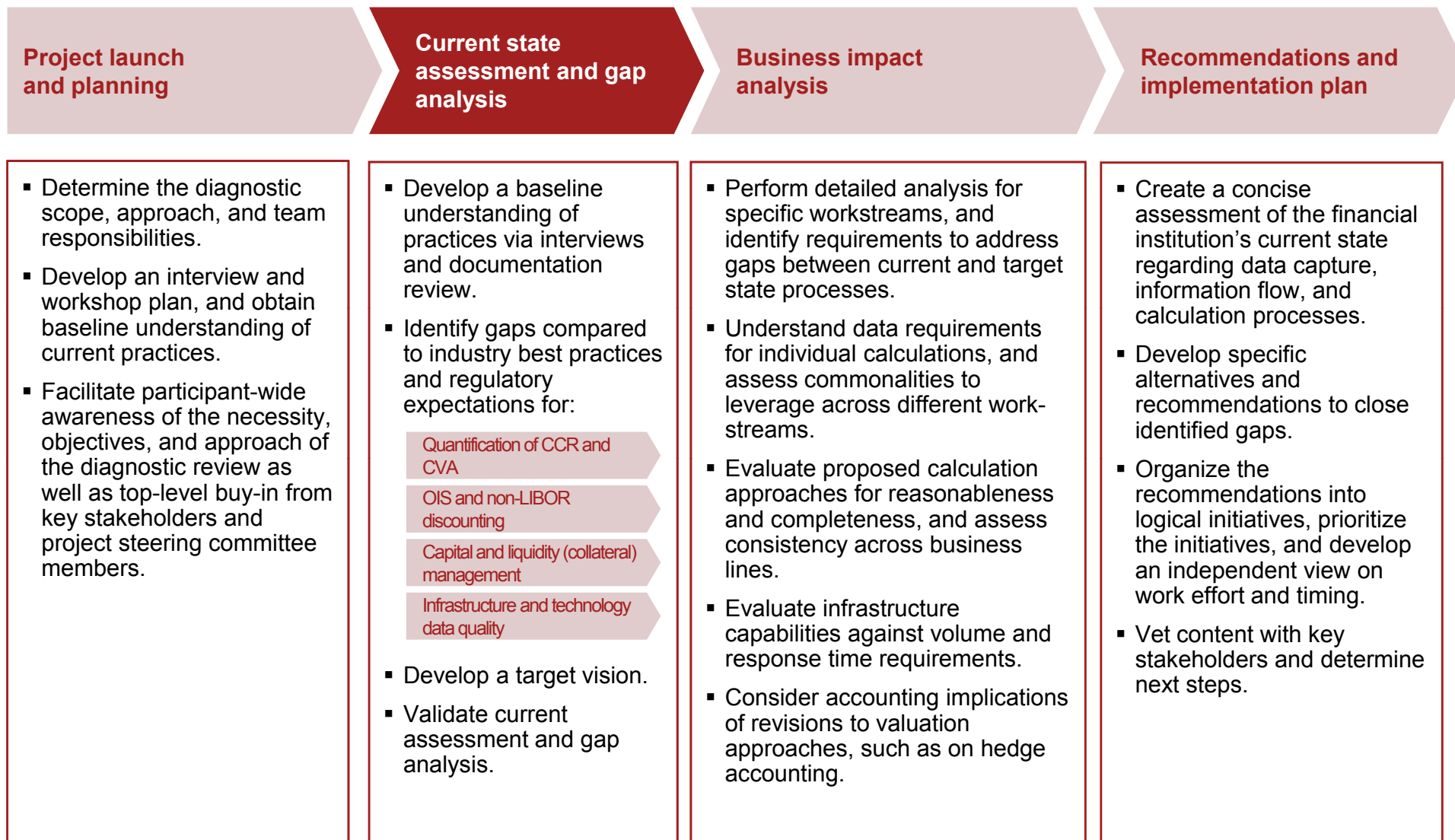
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## *Section 2*

A framework for response

## A framework for response

A comprehensive approach will enable an institution to assess its readiness to address an uncertain and rapidly changing OTC derivatives landscape.



## *A framework for response*

Institutions should identify and quantify contributing factors that impact CVA to enable them to assess counterparty credit risk.

The requirements and market practice for calculating capital charges for CCR and CVA are evolving and becoming more sophisticated. Among other things, there is a greater emphasis on forward-looking (toward potential exposure) approaches. Financial institutions need to consider how their models incorporate these attributes and their impact on how CCR is actively managed and monitored:

### Quantification of CCR and CVA

### OIS and non-LIBOR discounting

### Capital and liquidity (collateral) management

### Infrastructure and technology data quality

#### Counterparty Credit Risk

- Maximum potential exposure (MPE)/effective expected exposure (EPE/ENE), risk aggregation, exposure limits
- Probability of default (PD) and loss given default (LGD) assumptions by counterparty type, geography, and industry
- Wrong-way risk and concentration risk
- Margin, collateral, and close-out periods
- Optional early termination
- Correlation across risk factors
- Back testing and stress testing

#### Credit Valuation Adjustments

- Roles and responsibilities
- Front office versus risk management models
- Centralized versus distributed CVA hedging desks
- CVA hedging, P&L allocation, and pricing risk appetite and CCR limit implications
- Market risk and CVA management reports
- CVA capital charges

## *A framework for response*

The implementation of non-LIBOR discounting throughout the institution requires significant effort to minimize the impact to external and internal parties.

The implementation of non-LIBOR discounting requires changing multiple individual processes and coordinating the financial institution's response across different stakeholders, including front office, risk management, client valuations, product control, and financial and regulatory reporting, among others.

Quantification of  
CCR and CVA

OIS and non-LIBOR  
discounting

Capital and liquidity  
(collateral)  
management

Infrastructure and  
technology data  
quality

Institutions need to assess processes, identify key decisions, and then respond in the following areas:

- Business, product, and currency coverage
- Front-office pricing
- Client valuations
- Books and records valuations as off-system adjustments
- Books and records valuations in production
- Granularity of collateral/margin information

## *A framework for response*

### Understand and evaluate new capital and margin requirements under Dodd-Frank to assess the potential range of impacts on capital and balance sheets.

Swap entities and end users will be subject to new capital and margin requirements for OTC derivatives under Dodd-Frank, which will impact the economics of their businesses. In addition, derivative dealers, banks, and Futures Commission Merchants looking to offer clients clearing of OTC derivatives, as mandated by Dodd-Frank, need to make defensible, directional estimates of capital and balance sheet impacts for client CCP clearing to support the investment required and understand the funding costs and credit risks.

#### Quantification of CCR and CVA

Financial institutions and end users need to estimate the potential range of capital and balance sheet impacts of:

- CFTC and SEC capital requirements for non-bank swap entities
- FRB, OCC, and FDIC capital requirements for bank swap entities based on the Basel III framework
- Margin requirements for cleared and non-cleared swaps for swap entities and end users under CFTC and SEC rules
- Limitations on eligible collateral and opportunities for collateral “upgrade” services

#### OIS and non-LIBOR discounting

#### Capital and liquidity (collateral) management

In addition, end users should design a framework to evaluate clearing alternatives, including:

- Analysis of the current state of derivative activities, such as products, locations, markets, cleared versus not cleared transactions, operations, and accounting aspects
- Recommendations of clearing and execution alternatives based on economics
- Gap analysis of capabilities and infrastructure for available execution and clearing options, and development of implementation plan

#### Infrastructure and technology data quality

## *A framework for response*

**Institutions should develop a robust system and technology infrastructure that is capable of handling significantly increased computational requirements.**

An institution's response to the underlying business challenges requires significant amounts of additional data that may not exist in a form that is readily and systematically accessible. The system and technology infrastructure may require enhancements both in terms of connectivity among multiple systems as well as processing capabilities for handling significantly increased computational requirements.

Quantification of  
CCR and CVA

OIS and non-LIBOR  
discounting

Capital and liquidity  
(collateral)  
management

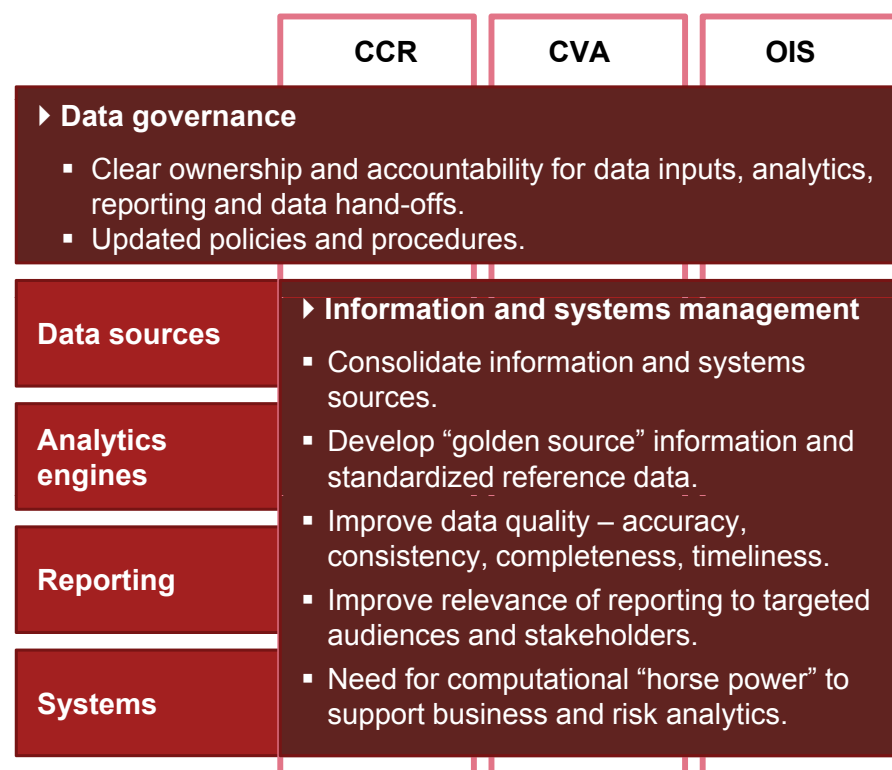
Infrastructure and  
technology data  
quality

Institutions should consider performing assessments and implementing enhancements across the following key areas:

- CCR, CVA, and OIS product coverage across systems
- Data flows covering front-, middle-, and back-office functions
- Systems capabilities and data ownership
- Management and regulatory reporting capabilities
- Migration strategy for consolidating system functions and calculations
- Systems computational capabilities

## A framework for response

A sound governance framework is required to meet the needs of multiple internal users while ensuring the ongoing validity, consistency, and completeness of data across the organization.



### Key considerations

- Shared responsibility** – Data governance does not reside in a single business unit or function; rather, it is a shared responsibility that must start in the front office and extend to the middle- and back-office functions
- Tone at the top** – Executive management needs to support the mandate that data governance is critical to their businesses, particularly given the increased regulatory scrutiny and reporting requirements
- Long-term vision and tactical delivery** – In developing a phased approach, institutions should evaluate:
  - Current capabilities versus planned business requirements
  - Current and planned initiatives for enhancing infrastructure components
  - Potential “low hanging fruit” or quick wins

A technology strategy and roadmap will not only provide clarity of scope, purpose, and tactical activities, but will also assign ownership and accountability.

- Focus and attention to data quality** – As part of the tactical delivery, organizations should evaluate the underlying data sources and systems to understand the sources and uses of data, physical infrastructure/systems, analytical engines, and business and regulatory reporting requirements.

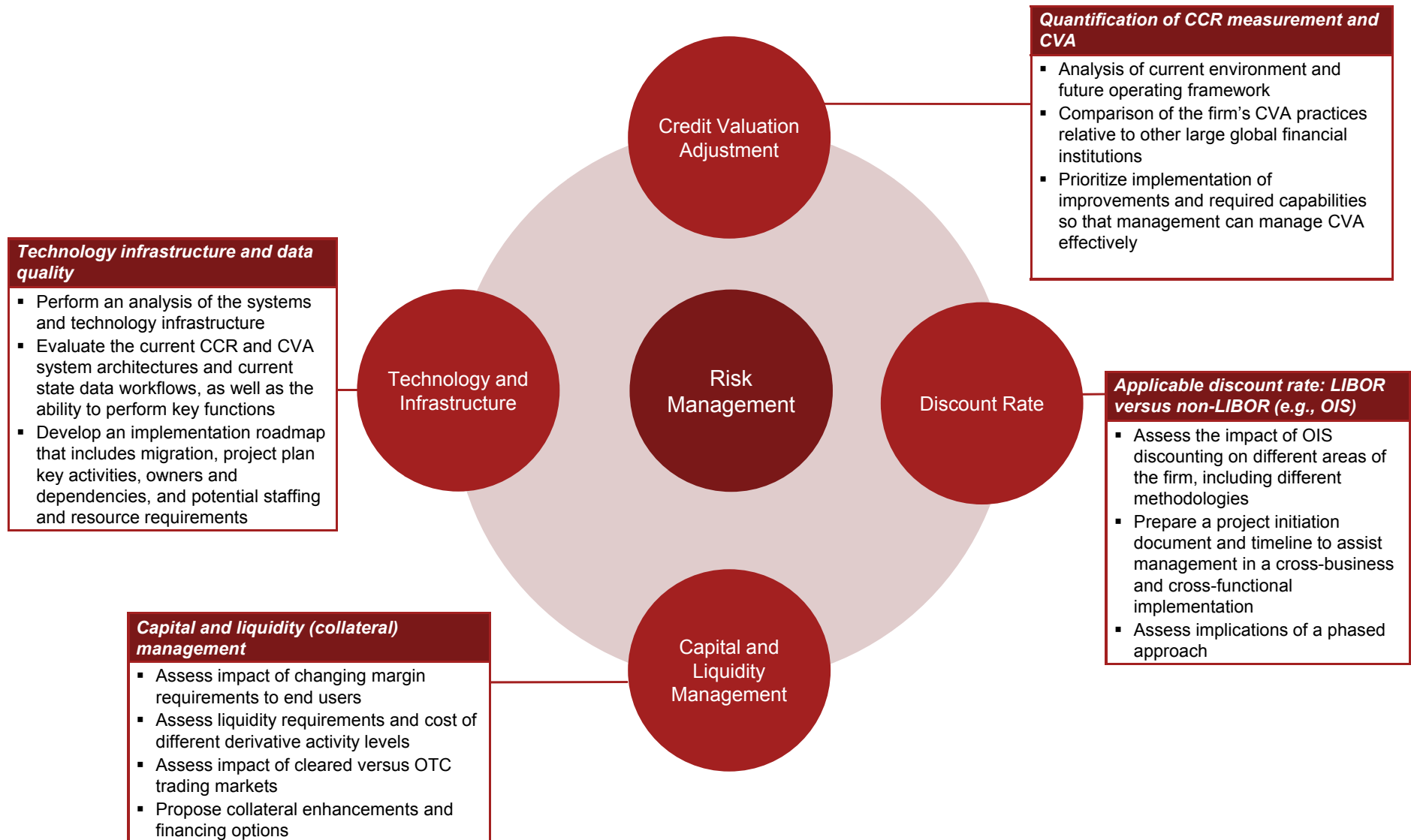
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## *Section 3*

How PwC can help

## How PwC can help

In addition to project governance and structure, PwC has the deep technical expertise in each of these topic areas, as highlighted in the following case studies.



## *How PwC can help*

### Case Study: Credit valuation adjustment

#### **Summary**

PwC analyzed the current environment and planned future operating framework for calculating and reporting the client's CVA for OTC derivatives and fair value option debt.

#### **Client issue**

Due to multiple demands from regulators, stand setters, and executive management, the client needed help in assessing its overall CVA calculation, risk measurement, and reporting practices. An integrated risk and finance technology architecture was not yet in place to cope with new enhanced CVA calculation and reporting requirements. The organization faced challenges in moving from its current state for calculating and reporting CVA to both interim short-term and long-term future states to comply with increasing demands from regulators.

#### **PwC approach and client benefits**

PwC analyzed the current state and the anticipated future state based on extensive discussions with management, a review of client documentation, and a comparison of the firm's CVA practices relative to other large global financial institutions. PwC provided the client with advice and practical insights on:

- Governance and organization for CVA among trading desks, risk management, and finance
- Managing CVA effectively through a centralized/decentralized approach
- Methodologies applied across the industry in calculating CCR, expected exposure, and CVA
- Overcoming the challenges faced by model validation teams
- Enhancing CVA public disclosures as well as internal reporting
- Improving components of the firm's CVA technology infrastructure for data acquisition, calculation, aggregation, and reporting of CVA

As a result of this work, the client gained an independent and structured perspective on the CVA capabilities of the firm, and was able to formulate a view on prioritizing required improvements.

## How PwC can help

### Case study: Applicable discount rate

#### Summary

PwC assisted a global investment bank in assessing the impacts of its OIS implementation across functions and processes.

#### Client issue

The client needed help in assessing the impact of OIS discounting on different areas of the firm, including consideration of the following key methodological issues:

- As the collateral thresholds are at the CSA level (netting agreement), decisions must be made regarding ways to incorporate counterparty-level adjustments in the trade level revaluation
- Determining whether uncollateralized portions of trades should be discounted at a different rate than collateralized trades (OIS or other non-LIBOR discounting). Assessment of the bank's cost of funding (including the suitability of LIBOR as a proxy), as well as assessment of the most efficient way to implement this dual discounting, should be performed early
- CSAs allow the posting of cheapest-to-deliver (CTD) collateral from different currencies. Implementation of OIS discounting will depend on the selected approach: standardized CSA terms, discount curves based on CTD at inception, or intrinsic valuation curves
- Evaluation of how OIS discounting will be handled for currencies for which OIS curves do not exist

#### PwC approach and client benefits

Based on PwC's experience, it is critical to have a cross-business, cross-functional governance structure for a successful implementation project. Leveraging extensive discussions with multiple stakeholders, PwC was able to assist management in:

- Preparing a project initiation document explaining the objectives of the project and the benefits that will be realized from undertaking the project
- Setting up an appropriate governance structure around the project, including a steering committee with representatives from all the key stakeholders
- Performing a quantitative impact analysis to determine which approach to take, such as a phased approach starting with one global desk/product (e.g., rates), or a full implementation across all desks/products
- Assessing the implications of a phased implementation, for example considering the impact of intra and intercompany breaks between desks. Such decisions should be strategic and consider the entire firm.
- Assessing readiness across businesses and functions to construct a realistic phased timeline
- Formulating a project plan that considers and incorporates all divisions and processes to ensure that all impacts and requirements are captured

## How PwC can help

### Case study: Capital and liquidity management

**Summary** PwC helped the client assess the impact of higher initial margin (IM) requirements on end users.

**Client issue** The impact of the proposed rules IM requirements will be significant, particularly for non-bank financial end users with unidirectional portfolios and minimal netting of positions.

	Cleared Contract	Non-cleared Contract
Contract Type	10-year LIBOR Interest Rate Swap	Purchased 5-year IG Index CDS
IM Requirement	5-day, 99% confidence level	10-day, 99% confidence level
Gross Notional Amount (\$000)	\$100,000	\$100,000
Minimum IM (\$000)*	\$5,508	\$11,071
IM to Gross Notional	5.5%	11.1%

\*IM estimated using a parametric VaR approach, assuming 100% net-to-gross notional ratio.

In addition, end users can only post collateral in the form of cash, government securities, Government Sponsored Entities (GSEs) obligations, or insured obligations of Farm Credit System (FCS) banks—unless they “upgrade” lower quality collateral to the accepted forms of margin through an arrangement with a dealer.

#### **PwC approach and client benefits**

PwC can assist end users of swaps in assessing the liquidity requirements and associated cost of their desired level of derivative activity. Based on the potential impact to their business, PwC can assist end users in designing strategies that balance cost and effectiveness and that consider:

- Volume and frequency of derivative activity
- Full versus partial risk transfer
- Execution through cleared versus OTC markets
- Use of collateral enhancement and financing services

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## *How PwC can help*

### Case study: Technology infrastructure

**Summary** PwC performed an analysis of the systems and technology infrastructure of a global financial institution. The organization was in the process of developing an implementation strategy for enhancing and integrating its CCR and CVA functions and analytics.

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**Client issue** Due to increased regulatory attention and the need for enhanced management and regulatory reporting, the client wanted to evaluate opportunities for enhancing its approach for CVA calculation, analytics, accounting, reporting, and governance. Disparate data sources, combined with siloed legacy systems, had created a complex network of data and technology infrastructure, which hampered the client's ability to develop a standardized approach for CVA calculations across its products and geographies. The client also sought to understand industry practices around CVA calculation, analytics, reporting, and governance.

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**PwC approach and client benefits** PwC performed a CVA benchmarking analysis to understand the client's current position relative to industry peers along the following dimensions: governance and organization; CVA calculation; technology and infrastructure; front-office responsibilities and CVA pricing; and financial reporting and controls.

Next, PwC evaluated the current CCR and CVA system architectures and current state data workflows for the rates, commodities, foreign exchange and Muni desks, including an analysis of the following:

- Completeness of the CVA trade population to understand business and product coverage across different CVA engines
- CVA size by business and systems to identify “low hanging fruit” integration efforts
- Financial analysis and reconciliation activities for CVA reporting
- Systems capacity and capabilities in supporting planned enhancements to CVA analytics and migration towards a near real-time analytics and reporting environment

Working closely with the client's business front-office, finance, risk, operations, and technology groups, PwC developed an implementation roadmap that included:

- Migration strategy timeline outlining prioritized schedule of product-specific transition activities over a multi-year period
- Project plan defining the key activities, owners, and dependencies across the migration strategy timeline
- Potential staffing/resourcing requirements given the expected changes in the CVA desk organizational structure in support of the migration strategy

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## *How PwC can help*

### Summary

The changing landscape in the OTC derivatives market with respect to valuation, capital requirements, and counterparty and liquidity management poses significant challenges to many financial services institutions.

Addressing these areas is particularly challenging, given the interconnected nature of these issues and the requirements for additional operational data that is not traditionally captured as part of valuation and risk management processes. Furthermore, in many cases there will be a need for significant infrastructure enhancements to support both the flow of information across the organization and the requirement to perform complex analyses on a frequent and timely basis.

PwC can help institutions in understanding their readiness for and managing their responses to the changing OTC derivatives landscape, including:

- Conducting an end-to-end assessment of existing processes, and designing a target state environment.
- Performing detailed diagnostic gap analyses with respect to processes in each of the areas of credit and counterparty risk management, CVA, non-LIBOR discounting, and evaluation of the related data and infrastructure requirements.
- Assessing the design of the project and data governance framework and supporting the project execution and management processes.
- Assisting in the development and implementation of solutions.

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*How PwC can help*

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## ***Section 4***

A deeper dive:

*Quantification of CCR measurement and CVA*

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## *A deeper dive: Quantification of CCR measurement and CVA*

### The OTC derivatives business presents multiple challenges related to measuring and managing CCR.

- CCR management groups at many financial institutions have not evolved to meet the challenges of a new environment in which credit and market risks are interrelated.
- Counterparty risk management and measurement choices can have a large impact on required capital and profitability under the new regulatory environment.
- Regulators have heightened expectations of the counterparty risk management capabilities of financial institutions, and are focused on counterparty risk as a driver of systemic risk.
- Under Dodd-Frank, a US-insured depository institution will only be able to engage in derivative transactions that reference interest rates, foreign currencies, certain metals, and cleared high-grade credit default swaps (CDSs).
- Technological platforms continue to be challenged by the need to calculate exposure for regulatory, CVA, and economic capital purposes.

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## *A deeper dive: Quantification of CCR measurement and CVA*

Many institutions lack the capabilities to produce a timely, aggregated, firm-wide view of CCR by counterparty that considers netting, margining, and other related factors.

- CCR measurement methodologies can be inconsistent across business units and geographies within the financial institution.
- The mapping of all legal entities of a single counterparty across geographies and jurisdictions is challenging and leads to missed netting opportunities or incorrect capital calculations.
- The speed with which an organization can produce aggregated exposure amounts, including all asset classes and entities, is critical under stress conditions.
- Computational and data constraints can typically limit the consideration of netting and collateral information to high-level approximations or averages.
- Inaccurate counterparty exposure quantification can directly impact a financial institution's ability to price OTC derivatives correctly and competitively.

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## *A deeper dive: Quantification of CCR measurement and CVA*

CCR exposure quantification for CVA, regulatory, and economic capital purposes poses tradeoffs between accuracy and timeliness.

- The complex simulation-based approaches used by leading institutions produce more accurate results but require the ability to model millions of trades across thousands of paths on an almost real-time basis.
- Methodological choices that simplify CCR quantification may exclude benefits from factors such as optional early termination, netting and collateral—resulting in excessive capital requirements and the loss of competitiveness.
- Wrong-way risks may not be explicitly modeled or quantified, thereby limiting a financial institution’s ability to meet regulatory expectations and/or explicitly manage them.
- Exposure models should also be able to model stress scenarios, using sensitivity-based or full revaluation approaches.
- Finally, the engines used for calculating exposure for risk management, financial, and regulatory purposes may be different from one another.

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## *A deeper dive: Quantification of CCR measurement and CVA*

Decisions around strategies to actively manage CCR are increasingly complex, particularly when the effectiveness of available instruments is limited.

- Although there are single-name CDS contracts that cover a significant number of companies, the cost of actively managing CCR may offset the benefit.
- For certain asset classes, hedging may be limited to the volatility of the exposure, as counterparty risk cannot be both effectively and economically hedged.
- While indices may be cheaper, they may not provide solutions for default of a single company.
- CVA hedging programs provide stability of earnings from an accounting perspective, but they may provide limited protection against economic losses.
- Dynamic hedging can be extremely costly and labor-intensive due to illiquidity and other frictional costs that may not be captured by pricing models.
- Decentralized hedging decisions may result not only in inconsistencies, but also in inefficient or insufficient hedges from a firm-wide perspective.

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## *Section 5*

A deeper dive:

*Applicable discount rate—LIBOR versus non-LIBOR?*

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## *A deeper dive: Applicable discount rate—LIBOR versus non-LIBOR?*

Prior to the credit crunch, market convention assumed that LIBOR was the appropriate discount rate for derivatives pricing.

### **LIBOR**

LIBOR is the rate at which an individual contributor panel bank is able to borrow funds, by requesting and then accepting interbank offers in reasonable market size, just prior to 11 a.m. London time. “Funds” are unsecured interbank cash or cash that is raised through the primary issuance of interbank certificates of deposits.

### **OIS**

OIS is an interest rate swap where the periodic floating rate of the swap is equal to the geometric average of an overnight index (i.e., a published interest rate which is also called Overnight Rate) over every day of the payment period.

### **The difference between OIS and LIBOR**

The OIS rate is based on the rates set by central banks that are accepted by the market as “risk-free” as they are or are seen as agencies of the governments. The LIBOR curve represents the lending rate between major banks. LIBOR was viewed effectively as risk-free before the credit crisis, but now the market views this as a risky rate.

### **Discounting for derivatives pricing**

To price a swap, standard valuation models determine the cash flows that the counterparties have agreed to pay each other over the life of the contract. These cash flows should be discounted at the rate at which each counterparty will fund them. Standard derivatives pricing theory has historically assumed the LIBOR curve to be the cost of funding for derivative trades. This means that future contractual cash flows on derivative trades are discounted back, using the LIBOR curve in estimating the current value of the trades.

## *A deeper dive: Applicable discount rate—LIBOR versus non-LIBOR?*

Due to significant concerns about the creditworthiness of large financial institutions, the spread between the LIBOR and the OIS rates was seen to diverge significantly for periods during the credit crisis.

### **During the financial crisis**

LIBOR-OIS spreads, which had typically been between 5 and 10 basis points, widened approximately 10-fold and spiked to over 360 basis points in the fall of 2008.

### **March 2010**

Some LCH.Clearnet (LCH) members bid for transactions within the Lehman swap portfolio, using pricing that was based on mid-OIS rather than mid-LIBOR.

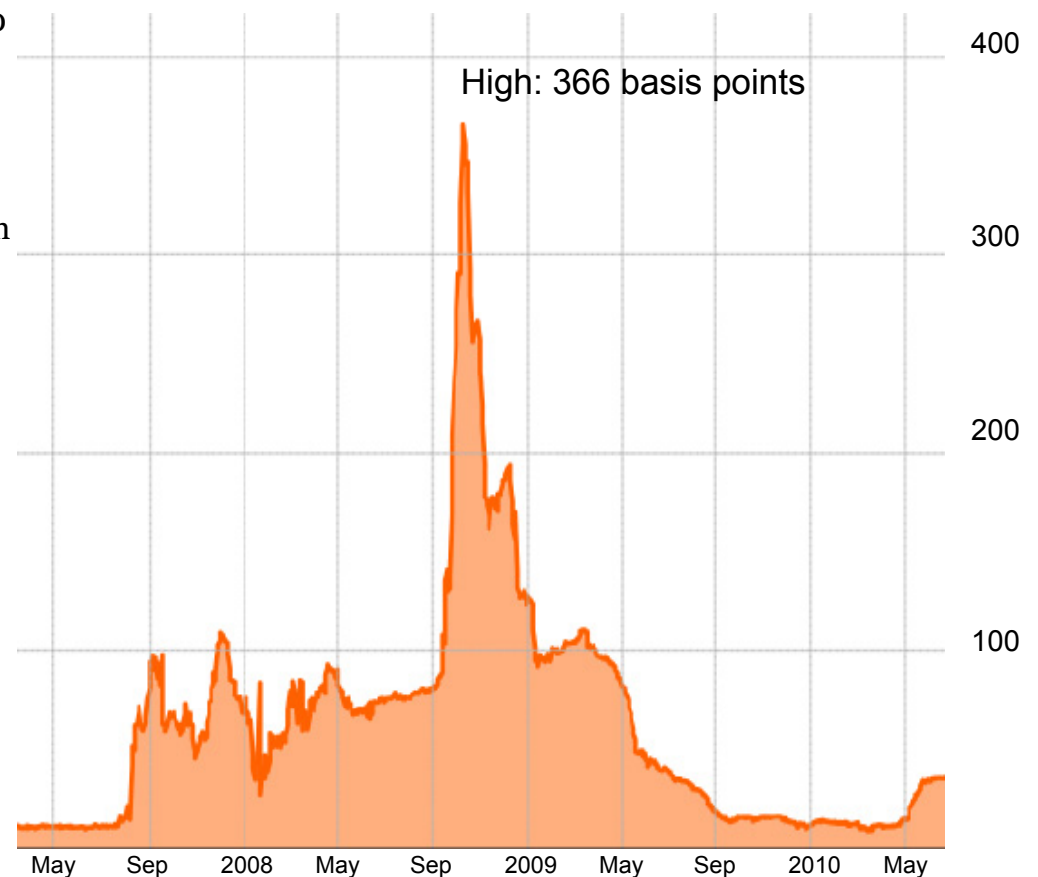
### **June 2010**

LCH changed its margining basis for its \$218 trillion IRS SwapClear portfolio of USD, EUR, and GBP vanilla IRS from LIBOR to OIS basis.

### **Late 2010 to the present**

Non-UK markets begin to transition pricing of certain derivatives from LIBOR to OIS as the applicable discount rate for collateralized OTC derivative transactions.

*LIBOR-OIS spread*



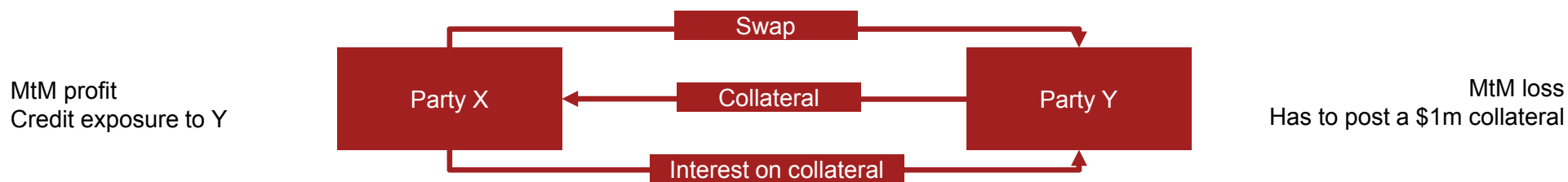
Source: Bloomberg

## A deeper dive: Applicable discount rate—LIBOR versus non-LIBOR?

There has been a shift in market practice to distinguish between collateralized and non-collateralized trades when pricing a derivative transaction.

### New discount rate for derivative pricing

- As a result of the widening of the LIBOR-OIS spread, market participants reevaluated whether it remained appropriate to discount positions using LIBOR. The choice of the appropriate discount rate is driven by the implied funding rate on the transaction. The funding rate will vary depending on whether a market participant can fund the derivative position leveraging collateral and, hence, fund at OIS, or fund based on unsecured funding in the open market, for which LIBOR had been an assumed proxy.
- In addition, market participants also considered the evolving capital rules, their impact on the economics of individual transactions, and the associated liquidity requirements and capital charges.
- This can be illustrated below in the example of a swap between Party X and Party Y, where the fair value of the swap at a given point in time is an asset of \$1 million to Party X.



### Model challenges to derivative pricing

- The need to factor in rates other than LIBOR for discounting immediately poses challenges to valuation models:
  - Valuation models may not be designed to apply different discount curves within the same currency.
  - Valuation models may not be designed to apply one rate to project cash flows and a different rate to discount the cash flows. For example, an interest rate swap may have cash flows that are contractually designated based on LIBOR. As a result, the valuation model applies a LIBOR-based forward curve to determine the underlying cash flows, but requires discounting based on an OIS curve.
- In addition, further evaluation of how non-LIBOR discounting should be implemented results in identifying a large number of policy decisions that need to be made. For example, which rates need to be used for different transactions, and what additional data feeds are necessary to provide the inputs into making those decisions?

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## *A deeper dive: Applicable discount rate—LIBOR versus non-LIBOR?*

This shift imposes challenges in measuring, managing, and pricing CCR for both collateralized and non-collateralized trades due to requirements of systems and data.

### **Impact of CSA terms on pricing methodology**

- Pricing of collateralized trades: A CSA can have different clauses and various options related to the nature of collateral to be posted, adjustments to collateral thresholds, and independent amounts based on credit ratings. There is no standard applicable to all CSAs, and specific terms need to be taken into account for pricing purposes:
  - A call for one, both, or neither of the two counterparties to post collateral
  - Collateral thresholds and their variability over time due to ratings
  - Pricing for optionalities on currency and assets for collateral

### **Pricing of uncollateralized trades**

- Applicable rate to discount cash flows: Future cash flows in non-collateralized trades should be funded at the rate that a market participant's treasury desk would be expected to be able to borrow money in the market, rather than assuming LIBOR
- An overlap exists between the pricing of funding and the pricing of credit

### **Systems and data**

- External data limitations: availability of OIS reference data for all currencies and term structure of the curve
- System limitations: multiple curves for collateralized versus non-collateralized trades
- Internal data limitations: existing and new transactions being noted as collateralized or uncollateralized; whether the details of CSAs are known at the time of pricing a new deal, or for valuing existing deals
- Complexity: considering whether the currency of the collateral differs as to the currency or currencies of the trade

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## ***Section 6***

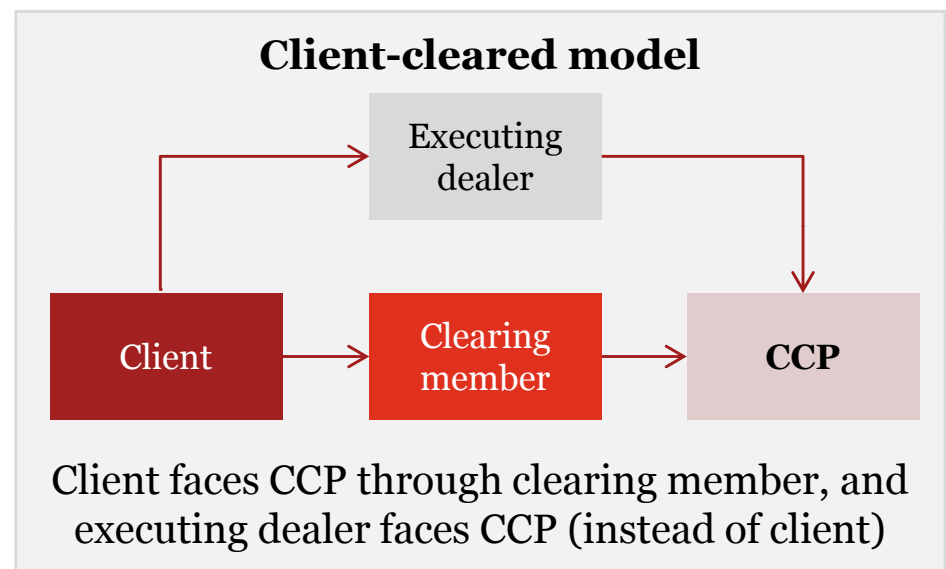
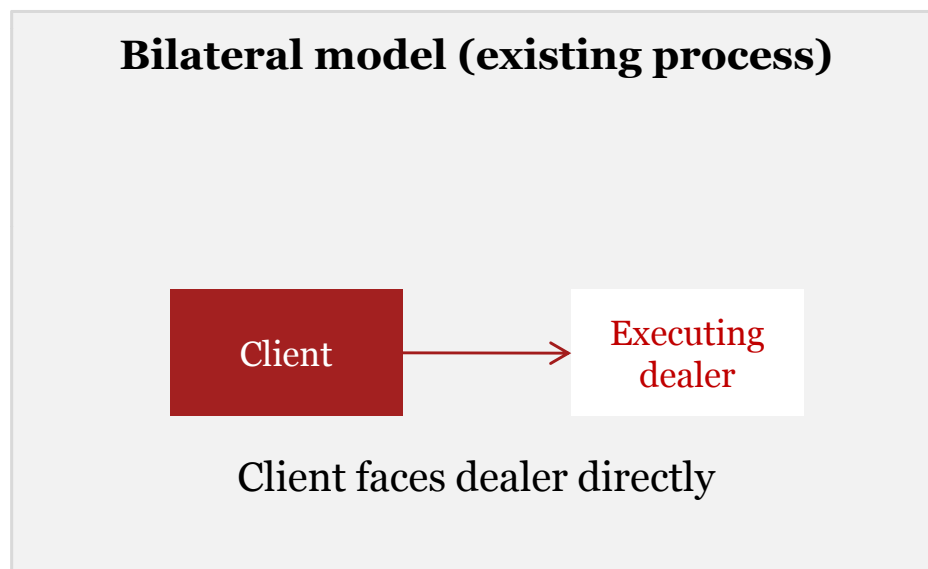
A deeper dive:

*Capital and liquidity management*

## A deeper dive: Capital and liquidity management

Under Dodd-Frank, financial services firms will be required to centrally clear certain standardized OTC derivatives.

- All clearable swaps must be centrally cleared (e.g., standard, liquid, single-name contracts, and indices). A number of credit and interest rate swaps are currently eligible for central clearing.
- All clearable swaps must be executed through a regulated exchange or central clearing entity, unless there is no exchange that lists the swap or security-based swap, or if the swaps qualify for end user exceptions from mandatory clearing.
- While financial services firms must centrally clear eligible derivative contracts, non-financial firms and certain captive finance companies may elect, but are not required, to participate in central clearing, as illustrated below.



Note: CCP requires that clearing members both post collateral (initial and variation margin) for all cleared trades and contribute to a guarantee fund.

## A deeper dive: Capital and liquidity management

Swap entities not overseen by a prudential regulator will need to adapt to new minimum capital requirements and capital definitions under Dodd-Frank.

Type of swap entity	Applicable capital definition	Proposed minimum capital requirements
Bank swap entity	No change. Requirements as currently established by the corresponding regulator, but expected to align with Basel III in the future.	
Bank swap entity or non-bank swap entity that is futures commission merchant (FCM)	Adjusted net capital	Greatest of: <ul style="list-style-type: none"> <li>▪ \$20 million</li> <li>▪ If OTC retail FX dealer: \$20 million plus 5% of liabilities to retail FX participants &gt; \$10 million</li> <li>▪ 8% of customer risk margin</li> <li>▪ Futures association requirement</li> <li>▪ If securities broker/dealer: SEC requirement</li> </ul>
Non-bank swap entity that is subsidiary of bank holding company (BHC) but not FCM	Tier 1 capital	Greatest of: <ul style="list-style-type: none"> <li>▪ \$20 million</li> <li>▪ 8% total capital and 4% Tier 1 ratios</li> <li>▪ Futures association requirement</li> </ul>
Non-bank swap entity that is not FCM or subsidiary of BHC	Tangible net equity	Greatest of: <ul style="list-style-type: none"> <li>▪ \$20 million plus market and credit risk charges</li> <li>▪ Futures association requirement</li> </ul>
Security-based swap entity*	Adjusted net capital	Greatest of: <ul style="list-style-type: none"> <li>▪ 6 <sup>2</sup>/<sub>3</sub>% of the firm's aggregate indebtedness</li> <li>▪ \$250,000</li> <li>▪ If also an FCM, requirement under CFTC rules</li> <li>▪ If using alternative capital requirement calculation, 2% of combined aggregate debt</li> </ul>

\*New rules not yet available

## A deeper dive: Capital and liquidity management

Margin and collateral rules under Dodd-Frank will have a dramatic impact on the liquidity requirements for dealers and end users.

	Proposed rules	Likely impact of new requirements
Initial margin minimum	<ul style="list-style-type: none"><li>10-day, 99% confidence level (CL) initial margin (IM) requirements for non-cleared swaps</li><li>5-day, 99% CL IM requirement for swap execution facility (SEF) cleared swaps</li><li>1-day, 99% CL IM for designated contract markets (DCM) cleared</li></ul>	<ul style="list-style-type: none"><li>Shift of liquid, standardized swap trading demand to DCMs to reduce burdensome margining costs.</li><li>Prohibitive cost to transfer complex risks. Parties originally bearing risks retain-the risks. Reduced investor/lender appetite.</li><li>Significant increase in liquidity needs for end users, for both non-cleared and SEF-cleared swaps.</li></ul>
Collateral requirements	<ul style="list-style-type: none"><li>For a bank swap entity (BSE), eligible collateral is limited to:<ul style="list-style-type: none"><li>Cash</li><li>Government securities</li><li>Government-sponsored entity (GSE) obligations</li><li>Insured obligations of Farm Credit System (FCS) banks</li></ul></li></ul>	<ul style="list-style-type: none"><li>Increased demand for financing, securities loan/borrow arrangements, or term repos from users who seek to obtain sufficient quantities of eligible collateral.</li><li>Shift of counterparty risk away from the swap legs and onto private lending arrangements.</li></ul>
Two-way margin	<ul style="list-style-type: none"><li>Two-way margining required for inter-dealer/inter-MSP (major swap participant) swaps</li></ul>	<ul style="list-style-type: none"><li>Higher cost, possibly significant, to end users of customized swaps, when end user legs are not required to be cleared or margined.</li><li>For dealers offering customized swaps to customers, a shift toward increased hedging through cleared products, preferring basis risk to the IM cost of inter-dealer swaps.</li></ul>

## A deeper dive: Capital and liquidity management

Additional capital requirements will be applicable to swap entities as defined under Basel II.5 and Basel III, which puts increased pressure on profitability.

### Basel II.5 and Basel III

Basel II.5 and Basel III		
<b>OTC Derivatives</b>	<b>Exposure at default (EAD)</b>	<p><i>Credit Risk</i></p> <ul style="list-style-type: none"> <li>▪ Effective expected potential exposure (EPE) as the basis for EAD determination, but with parameters (e.g., volatility and correlation) using stressed period data</li> <li>▪ Considering wrong-way risk and 1.25 asset value correlation (AVC) multiplier for large institutions</li> <li>▪ New requirements for large netting sets, margin disputes and extended close-out periods</li> </ul> <p><i>Market Risk</i></p> <ul style="list-style-type: none"> <li>▪ Add-on charge to cover for loss of the creditworthiness of counterparties or CVA</li> <li>▪ Advanced and standardized CVA risk capital charges</li> </ul>
	<b>Risk-weighted assets (RWA)</b>	<ul style="list-style-type: none"> <li>▪ Risk weight based on the combination of probability of default (PD), loss given default (LGD), and maturity of trades</li> </ul>
<b>Listed Derivatives</b>	<b>EAD</b>	<p>Capital charges for exposures to centralized clearing counterparties (CCPs)</p> <ul style="list-style-type: none"> <li>▪ EAD = initial and variation margin</li> <li>▪ Default fund contributions</li> </ul>
	<b>RWA</b>	<ul style="list-style-type: none"> <li>▪ Risk weight of 2% for recognized CCPs for EAD</li> <li>▪ Risk weight of 20% for default fund contributions</li> </ul>

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## *A deeper dive: Capital and liquidity management*

Optimizing the use of strategies that mitigate risk in light of capital and liquidity needs is critical to remaining competitive in the new regulatory environment.

- Netting should be applied across all asset classes and legal entities that represent exposure to the same counterparty, if allowed under the CSA.
- Exposure limits should be actively monitored, and guidelines regarding the unwinding of trades for exposure reduction should be clear.
- High-quality data on both margin agreement and CSA terms in exposure calculation systems allow the financial institution to exercise its full collateral and margining rights in a timely manner at all times.
- The increased cost of customized hedges will lead some participants to hedge by using cleared products, increasing basis risk, and reducing the liquidity of non-standardized contracts.

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## *Section 7*

A deeper dive:

*Technology infrastructure and data quality*

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## *A deeper dive: Technology infrastructure and data quality*

Quantification of CCR requires a diverse variety of information from disparate parts of the organization.

- For any given financial product, there may be differences in the pricing and valuation models used by the front office and the risk and finance departments. This may result in different sets of assumptions and/or data inputs, with some provided internally and others provided by third-party data sources.
- However, disparate systems and fragmented/incomplete counterparty information limits the ability for timely and accurate reporting of counterparty exposures.
- Further, ISDA and CSA terms and conditions contained in the documentation are not readily available for use in valuation and scenario analysis, thereby limiting the accuracy of pricing and the valuation models.

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## *A deeper dive: Technology infrastructure and data quality*

### **Data and systems infrastructure requirements to achieve robust CCR measurement and management capabilities can be significant.**

- Exposure information needs to be centralized and standardized. Spreadsheet-based, off-systems models that are manually run and not aggregated on a timely basis should be migrated to the main exposure analytics engine. Further, terms from derivative contracts should be appropriately captured into systems and taken into consideration for exposure estimation.
- Data across geographies, asset classes, counterparty legal entities, and internal legal and business units needs to be of sufficient granularity, consistent, and homogeneous. Key input parameters and assumptions need to be consistent if multiple platforms are used for accounting and economic views of exposure.
- Finally, computational power should be enough to support timely (i.e., almost real-time) and accurate quantification of counterparty exposure.

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## *A deeper dive: Technology infrastructure and data quality*

The accuracy-versus-performance tradeoff is driven by the fundamental purpose, the required calculation frequency, and the complexity of the overall process.

- For the front office, pre-trade approval for limit utilization and pricing, including CVA requires efficient real-time information as opposed to overnight batch Monte Carlo simulations. The distinction in models for decision-making is driven by the front office focus on CVA and P&L attributions at the desk level, rather than at the aggregate level. For risk management, the focus is on the portfolio view while maintaining acceptable batch simulation run-times.
- The ability to hedge dynamically requires market and credit risk factor sensitivities (such as CS01, delta, vega, gamma, and cross-factor sensitivities, etc.) to be computed with precision, often at a desk/product level. The accuracy for such measures used for hedging is greater than that used for limit management.
- Tradeoffs are also seen with respect to the purpose of the reporting. Regulatory or economic capital measures will yield different results due to the fundamental differences in approach and permitted factors. The measures will define both the data and the number of reconciliations that are required at certain input and output nodes.

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"It's Harder Than You Think: The New Reality for OTC Derivatives," PwC FS Viewpoint, October 2011.  
[www.pwc.com/fsi](http://www.pwc.com/fsi)

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