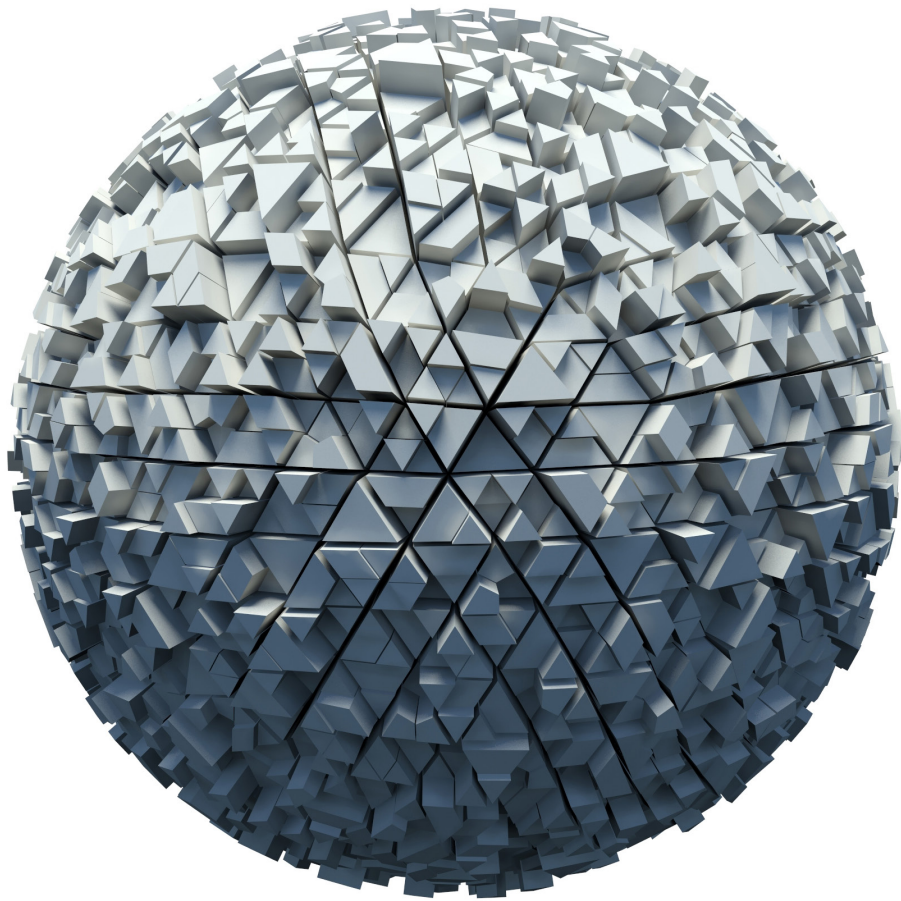


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Future of Post Trade—
shifting the cost curve

Executive summary

The derivatives market ecosystem today faces a wide range of challenges. This results in an overdependence on manual intervention across the front-to-back process and significant operating expenses. In general, there is no quick fix. However, recognizing industry challenges can be the first step toward addressing them.

Industry challenges:

- Increased margin requirements and revenue compression for traditional industry participants driven by slower-than-expected growth, reduction in proprietary trading and other risky businesses, and proliferation of technology that removes information asymmetry required to generate alpha
- Rising cost pressures from manual processes and legacy technology infrastructure, multiple intermediaries, unnecessary data reconciliations, and complex layer of handoffs within the ecosystem
- Increased regulatory pressures, including the use of more central counterparties for clearing and settlement, reporting requirements, and higher capital buffer requirements
- Proliferation of data available across multiple platforms but few programs in place to harness its potential and use its knowledge to better serve clients

Market participants should begin to pursue bolder opportunities to shift the cost curve and deliver target returns on equity. There are three key factors that can help organizations define success in this area:

- 1) Industry standards to facilitate the adoption and migration to sustainable digitization
- 2) Technology to support new digital business models and processes
- 3) Regulatory certainty

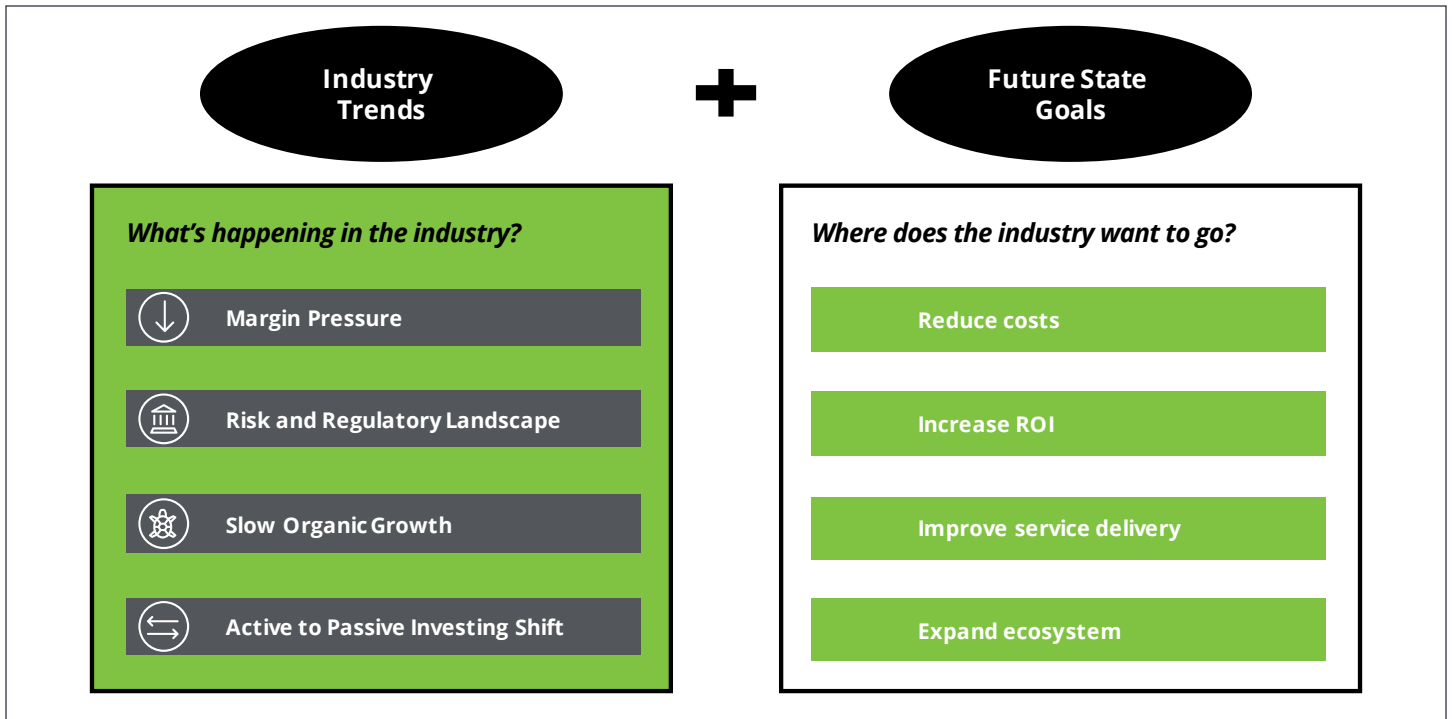
Changing the ROE dynamics

For the past decade, the derivatives industry has dedicated significant resources to cut costs when the real focus should have been on shifting the cost curve. To this end, the International Swaps and Derivatives Association (ISDA) has taken steps to create standards participants can leverage for digital adoption by creating a Common Domain Model (CDM). CDM provides a standards-based taxonomy for data, process, and life cycle management for traded products. If adopted by the entire industry, these standards could potentially unlock significant efficiencies in post-trade infrastructure.

Early studies by the ISDA and its member firms indicate the potential for an initial 50 percent to 80 percent cost savings across the industry in post-trade infrastructure by leveraging CDM and Distributed Ledger Technology (DLT). Examining the CDM and DLT opportunity through a cost-benefit lens reveals total benefits under a full target-

state scenario equates to an 80 percent to 85 percent reduction approximately from the dealer cost base of roughly \$3.2 billion within the primary functional areas directly impacted by CDM.

These estimates are merely a baseline and do not include the impact on functional areas, such as surveillance, fraud monitoring, anti-money laundering (AML), regulatory reporting optimization, and margin/risk opportunities realized from central valuation/mark to market (MTM). The total savings opportunity grows much larger when considering the inclusion of other market participants outside of the dealer community, benefits to regulators, and improvements in funding and balance sheet optimization. Clearly, the opportunity to fundamentally alter the cost curve within the derivatives industry is a goal worth pursuing and one that the Barclays CDM/DLT Hackathon in September 2018 demonstrated can be achieved.



State of the derivatives and financial markets industry

The derivatives trading landscape has changed since the 2008 financial crisis. In an effort to make the markets safer and more efficient, regulators globally have mandated stricter rules and demanded increased transparency in previously over-the-counter (OTC)-driven markets. As a result, most of the derivatives products that had been centrally cleared via central counterparty clearing houses (CCPs) and voice trading are moving to electronic venues, such as swap execution facilities (SEFs) or multilateral trading facilities (MTFs). Additional regulatory reporting and recordkeeping requirements are aligned to increase transparency and monitor systemic

risk by reporting derivatives transactions (cleared or uncleared) to registered swap data repositories (SDRs).

Central clearing of previously bilaterally held derivatives entails strict margin requirements from global CCPs. Furthermore, uncleared derivatives margin rules require meeting a unique set of requirements. In recent years, derivatives market participants have dedicated significant resources to comply with these requirements. While many of these changes are positive in terms of ensuring the safety and integrity of financial markets, they also create additional challenges to the derivatives infrastructure. These include a complex workflow to process derivatives

that is mired with manual processes, a lack of consistent and golden sources of data, siloed architecture by asset class, and archaic technology assets. Derivatives market participants must work with complex work flows and higher-cost infrastructure, as well as a greater operational risk that can lead to regulatory fines and P&L losses. At the same time, increased capital and liquidity requirements have reduced return on capital for liquidity providers and liquidity takers alike.

Efforts to undertake large-scale technology transformation to modernize infrastructure usually suffer from cost overruns and delivery risk. Additionally, as market structures evolve and business strategies

shift, human capital, application, and hardware spending costs tend to “creep back in,” primarily due to legacy business architecture and processes. To facilitate a path to a future-state vision for derivatives infrastructure, industry needs to agree on a simplified target state and develop data and process standards to realize it through technology enablers.

beginning with trade execution and ending with clearing and settlement. Standards development and implementation require broad consensus among market participants, often making them slow to implement. However, standards can yield widespread benefits that can lead to improved economics, reduced risk, and improving liquidity. Interestingly, the derivatives industry is familiar with similar

It is imperative for business and infrastructure leaders to focus on shifting down the cost curve for post-trade infrastructure.

Post-trade—Why standards matter

Traditional cost-reduction methods, such as outsourcing, offshoring and reducing headcount, will likely yield diminishing marginal returns going forward. Business, IT, and operations leaders face significant challenges to serve clients, support new product development, meet regulatory requirements, and adapt to evolving market structure, while keeping costs in check to deliver an acceptable return on capital to shareholders.

It is imperative for business and infrastructure leaders to focus on shifting down the cost curve for post-trade infrastructure. Historically, the derivatives industry and the wider capital markets players have attempted, at least to some degree, to mutualize costs related to non-differentiated functions within the post-trade ecosystem allowing them to focus on areas to realize competitive advantage—namely pre-trade functions. The idea of true cost mutualization has failed because this would require industry alignment on standardizing how derivatives are managed throughout their life cycle,

efforts to agree to and implement standards (see figure 1). Standards, such as credit support annex (CSA), master agreement (legal) Financial products Markup Language (FpML), and Financial Information eXchange (FIX) data protocols, have reduced cost and risk, and they share key principles required for sustainability and adoption.

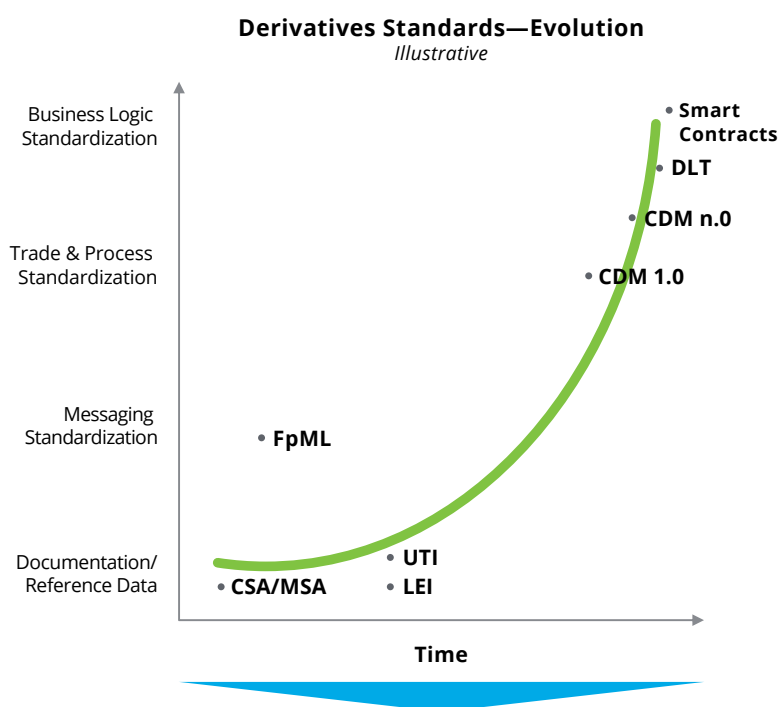
However, post-trade processes continue to increase in complexity. As such, in an environment of rapidly changing economics of global derivatives markets, more work needs to be done to create a taxonomy that represents the entire post-trade life cycle process. Standard classifications are vital to altering the industry's ROI dynamics. This can be explained, at least in part, by derivatives products and underlying post-trade processes having grown organically over time. In turn, this creates complex technology stacks that are typically expensive to operate and maintain. Such pain points will likely continue to magnify over time and increase stress on operational processes and risk management. This could also require retrofitting innovative fintech solutions with their inherent workarounds.

Trade life cycles can be broken down to their most basic elements, which are defined as “states or events” and have a predecessor and a successor. When modeled as an end-to-end transition from states or events, a complete representation of a trade life cycle can be derived. This representation can be product and technology agnostic with standard data definitions. A consistent definition of processing building blocks that make up the derivatives life cycle will serve as a blueprint for the entire industry, including technology and service providers. To continue the evolution of standards via an initiative undertaken by ISDA, derivatives market participants have collaborated to create a CDM. CDM is a standardized digital representation of derivatives products, along with an agreed set of business events in a machine-readable format that can enable the following features of the target state:

- Product and asset class agnostic trade representation
- Consistency via standard data representations and event processing
- The elimination of reconciliations in the post-trade processing life cycle
- Processing steps from the current state could be optimized or potentially eliminated
- Accelerated alignment across in-flight industry initiatives
- Promoting the adoption of emerging technology enablers

Figure 1. Common Domain Model (CDM)—Principles

ISDA’s CDM is the next big step in standardizing derivatives and trade processes by leveraging industry’s established standards; CDM lays the foundation for further standardization along the continuum.



Specific Success Factors	Specific Principles
Foundational	<ul style="list-style-type: none"> • Design consistent with existing industry standards • Based on existing FpML specs and legal /documentations
Adoption	<ul style="list-style-type: none"> • Standard product, event and process and definitions • Enables process transformation & standardization while maintaining competitive advantages • Reduces complexity and cost for market participants
Interoperable	<ul style="list-style-type: none"> • Technology agnostic • Integration with legacy and fintech innovation
Rules based	<ul style="list-style-type: none"> • Product agnostic • Modular architecture
Industrialized	<ul style="list-style-type: none"> • Design tested for asset class specific use cases and post trade functions (cleared / uncleared) • Digitize with “best of breed” solutions
Global	<ul style="list-style-type: none"> • Applicability to regional regulatory requirements and derivatives market structures

Common Domain Model—The value proposition

In October 2017, ISDA introduced its CDM to create a standard blueprint for an end-to-end post-trade life cycle. This blueprint will deliver common standards for data formats, reference data, transactional data, and business processes. CDM is meant to be technology agnostic yet at the same time can be leveraged with emerging technologies, such as smart contracts and DLTs.

A consistent model that defines all life cycle events and processes for traded products can position firms to achieve simplification and scale in post-trade while preserving freedom of technology choices and interoperability between technology solutions.

With the advent of blockchain and smart contracts, the inefficiencies and costs in derivatives trading due to multiple handoffs and complex processes were

supposed to decrease. However, before banks and industry participants can rely on any distributed ledger as the new holy grail or “single source of truth,” better standardization is required. Most participants today use a complex set of processes, data structures, and reporting formats to track trade life cycles in order to satisfy internal and external regulatory and compliance norms. Thus, without a common language or format it may not make sense to adopt a common ledger.

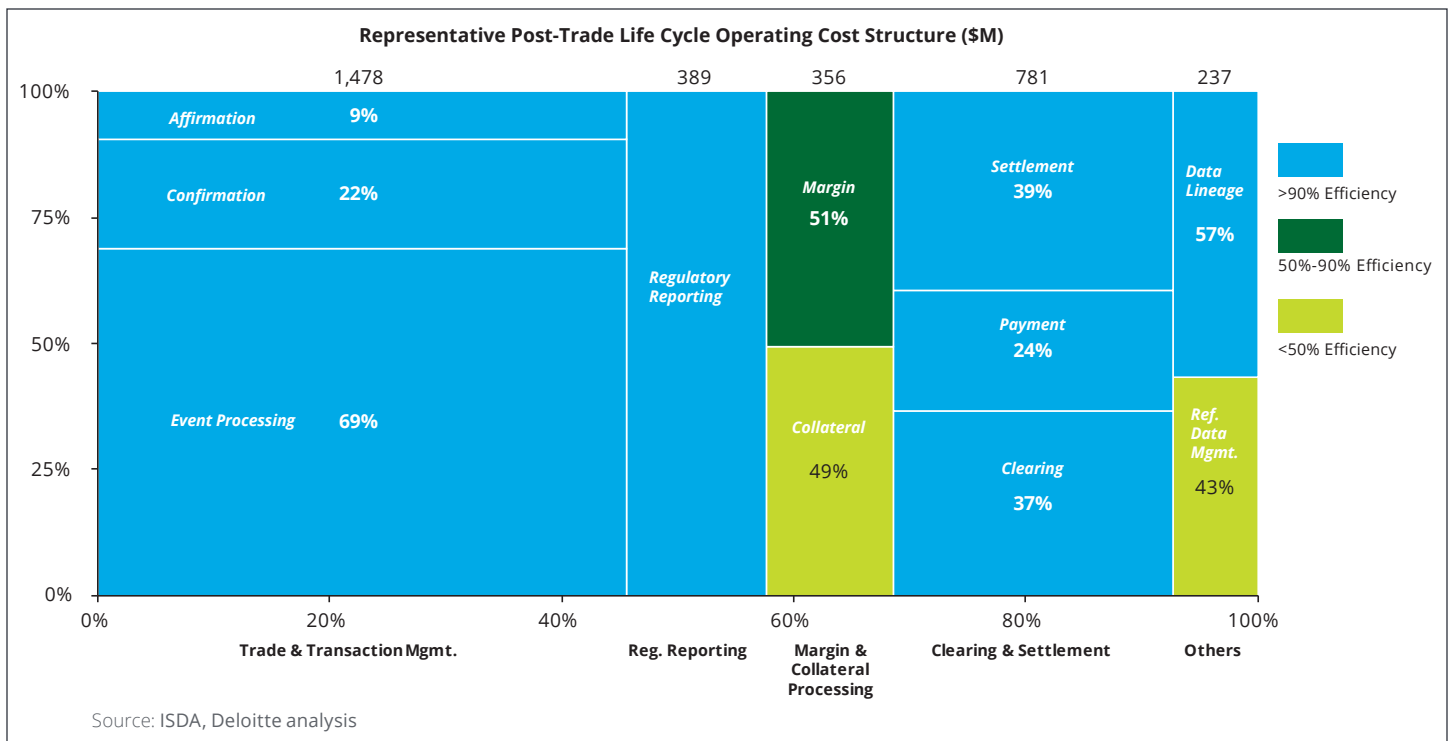
In the past several years, a common problem in post-trade has attracted increased attention: A highly fragmented and duplicative representation of trade data across trading counterparties and service providers, such as clearinghouses and custodians. Distributed Ledger Technology can help address this issue by managing trade representation in a common ledger across market participants. CDM can serve a valuable purpose as well: It can function as an interoperability link among

DLT solutions—a design issue that most DLT technology providers are trying to tackle. Without this interoperability, the vision of common and singular trade data representation might be difficult to achieve.

ISDA's introduction of CDM and its push to adopt a common standard for data formats, reference data, transactional data, and business processes are big steps in helping to ensure compatibility between different blockchain and DLT platforms. Banks have formed their own consortia to test proof of concepts (PoCs) leveraging DLT and blockchain techniques, which could lead to significant breakthroughs in post-trade optimization. However, to reach the full potential of DLT, blockchain platforms will ultimately need to interoperate, which, in turn, is only possible without complex workarounds if the underlying data is standardized through industry initiatives, such as the ISDA CDM.



Figure 2. CDM feasibility—opportunity potential



Barclays DerivHack 2018

To validate CDM and its application across derivatives post-trade processing, Barclays organized a two-day hackathon in collaboration with ISDA, Thomson Reuters, and Deloitte. The event was held in September 2018 at the Barclays Rise facilities in London and New York with 33 technology firms participating in teams of no more than four people. Deloitte participated in the event as an independent observer. Teams represented banks, fintechs, technology platforms, and independents across the two locations. On-site technical support was provided by experts in CDM, DLT platforms, and Thomson Reuters,

which provided the Oracle for market data. The event featured SMEs, judges, and DLT platforms to help address participant queries as they worked through use cases. Participants were evaluated by an independent panel of judges from peer banks, academia, and trade associations. Each judge was an expert in his/her field, representing diverse skills, including the CDM, blockchain, and derivatives post-trade processes. Teams met with judges to showcase their solutions, be scored, and receive valuable feedback on their solution designs. ISDA observers also attended judging sessions and took feedback on the CDM to help shape its future development.

In addition, participants also could pitch their solutions in front of a live audience that included Barclays, industry reps, and members of the press. Prizes were awarded in four categories: Overall Winner, Completeness, Solution Architecture, and Best Pitch.

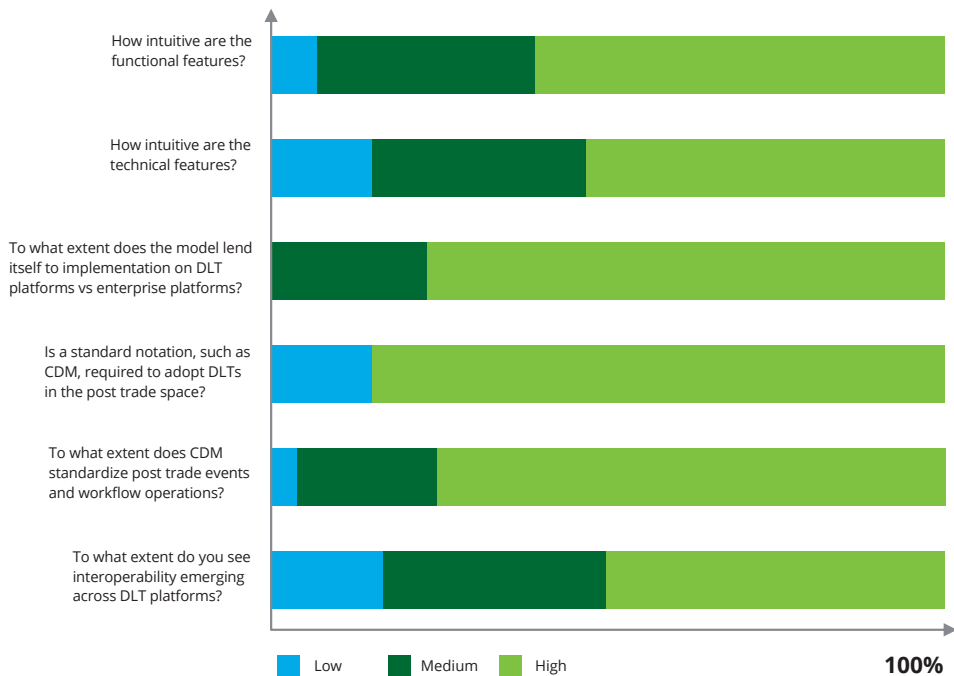
The judges chose six use cases (see table 1) representing post-trade process to implement CDM-based solutions and assess feasibility, practicality, and potential to alleviate common pain points and find efficiencies in the process (see figure 2).

Table 1. Barclays DerivHack 2018—Six use cases

Use case	Key objectives of the proof of concept
1. Set up counterparty data	Client onboarding is a key step to establish business networks, and contract information data needs to be registered and maintained in a standardized format to be used as static reference data for future transaction.
2. New trade event/ process new trades	A new trade event initiates the post-trade life cycle of a contract. In the context of the event, traded products under consideration included vanilla IRS and CDS.
3. Process negotiated trade events that change existing trades	Explore how primitive events can potentially change a contract’s state—linking such events and resulting states to demonstrate lineage—and design workflows that model the events. Trade events included partial termination, termination, partial novation, and three- and four-way innovations.
4. Process life cycle events for contracts	Set to evaluate a significant portion of trade processing workflow in the current derivative post-trade landscape, these events are triggered by the payout features defined in the contract and are modeled as “dependent” events in the CDM. Life cycle events considered: observations for trade resets, accrual calculations to define payments, and payments to process negotiated fees in the contracts.
5. Process and settle payments	The payment settlement task is a critical element within post-trade processing with significant implications on capital management for participating organizations. The goal of this use case was to leverage details at a trade level and propose linkages to settlement processes while exploring opportunities to extend the CDM by considering portfolio operations. The focus was aggregating trades to portfolios, netting of payments, transacting a payment to settle, and tracking settlement finality as included in trade details.
6. Trade data reporting	Trade reporting addresses several requirements arising from trading, risk, finance, regulatory, and control functions. Leveraging data and output from the previous use cases, the tasks included reporting on all transactions on a given date and reporting transactional history of a single contract.



Figure 3. DerivHack 2018—Participant Feedback
% of participants



Source: Barclays, Deloitte analysis

Key findings from use cases

(see figure 3)

a) Establishing a common standard—

Participants successfully established a standardized format for the post-trade life cycle. It allowed full traceability from pre-trade to delivery versus payment (DVP), thus bridging the multiple messaging standards used today across contracts. CDM potentially can deliver more than standardized data formats as it ties processes back to contracts. As such, it should not be expected to replace FpML, which was originally developed to standardize the communication of complex derivatives contract information between counterparties

and succeeded in simplifying messaging of key data. Instead it should provide market participants with middleware to build compatible systems that can communicate with each other. Future versions are expected to evolve, and backward compatibility will help ensure that adoption is meaningful and sustainable. In other words, CDM achieved the objective of becoming a standard that supports post-trade in a DLT environment.

b) Bridging different DLT formats—

Using CDM to standardize messaging tied directly to the contract allows for more effective tracking across the life cycle of derivative assets without

betting on a single infrastructure. Given interoperability challenges and the nascent nature of DLT, this approach should allow the technology to mature—unlike other technologies in the past. Fintech participants successfully created solutions that communicated with each other—regardless of the language that built the chain (e.g., general purpose and domain-specific functional languages) or platforms leveraged (e.g., Ethereum, Quorum, Fabric, Corda, Digital Asset). Distributed ledgers are designed to automate processes and synchronize state, so layering a CDM on that infrastructure can help enable counterparties to synchronize the state of their derivatives contract.

c) Interoperability with existing platforms—

Like any new technology, integrating existing architecture is necessary to ensure a smooth transition and to avoid creating and managing yet another separate technology stack. Several fintechs succeeded in applying CDM in use cases leveraging non-DLT, which confirmed that its application potential can be broader than just post-trade processing. Adoption models are not green-space projects; they need to work with existing legacy infrastructure to transition to the target state. Further, the pace is expected to vary by participants. CDM supports legacy and emerging technologies and is crucial to ensure a phased transition.

d) Ability to reduce cost and complexity—

The greatest promise of DLT adoption is the efficiency gained by rationalizing duplicated infrastructure

and reducing costly reconciliation processes as well as realizing near- or real-time settlement finality. A single shared version of trade data across the derivatives industry could drastically reduce costs by as much as one-third. This savings is significant, especially for an industry struggling under the weight of increased regulatory oversight and searching for ways to improve compressed ROEs (potential cost estimates for post-trade life cycle ranges from \$230 billion to \$260 billion annually across middle and back offices).

- e) **Meeting regulatory guidelines**—Standardizing events and the resulting change of trade state could help standardize processes to incorporate into CDM-based solutions. Aspects of CDM, such as data lineage, potential availability of time stamps, standardized access to data, storage of historical values, could help simplify processes, including those around regulatory reporting. This should make it possible to capture rules in a systematic way. One of the greatest promises of DLT adoption hinges on allowing regulators direct access to transaction data and the ability to produce higher quality, more accurate, and more timely reports. Industry participants will remain responsible for meeting mandated regulatory reporting requirements, though there is certainly an opportunity to eliminate duplicative reporting processes. This will likely lead to efficiency gains in reporting as well as reduce duplication of efforts required to

satisfy multiple regulatory requirements. This is clearly a use case that can yield significant cost optimization in the near term; the ISDA estimates a 40 percent reduction in regulatory reporting costs from CDM alone.

- f) **Barriers to adoption**—In our view, CDM is potentially a game-changer in reducing cost and complexity across the post-trade cycle states. That said, we believe that adoption hinges on several key factors:

1. More asset classes and functionality should be included in the CDM to maintain momentum to achieve the desired target state. Additional potential across other use cases, such as collateral management, ISDA master agreements and CSAs, integration with market data, valuations, and corrections, as well as privacy-related functionality among counterparties, need to be tested and explored as PoCs.
2. These standards will likely require an open-source environment to support current-state and future-state standards evolution. To this end, ISDA will need to work with a broader audience of fintech and DLT providers.

3. Strong governance will be essential for CDM to succeed and generate the anticipated benefits, with or without DLT, for end users to have confidence in leveraging the standard for commercial solutions ISDA cannot do it alone, and close collaboration with other industry associations will be necessary. For example, in the OTC derivatives space, DLT will likely be delivered via multiple ledgers supported by different underlying technologies. CDM offers a unique solution in driving compatibility across systems; however, a disciplined approach is required to coordinate and commit to such common standards across the industry.
4. To avoid market fragmentation and fear of vendor lock, localized solutions should be avoided. To this end, the industry should consider rolling out MVPs and ecosystems to iterate, test, and evolve core functionality over time.

From the DLT provider perspective, the migration to DLT adoption will require a symbiotic relationship within the derivatives industry. Several hurdles remain that will necessitate solutions from ISDA members. Creating interoperable DLTs that are scalable for enterprise adoption hinges on support for open standards. In short, this promising technology will likely achieve traction only with the cooperation of both industry and fintech DLT providers.

Future outlook

The derivatives market ecosystem faces challenges from a sub-scale post-trade infrastructure marred by inadequate risk controls. Traditional cost-saving opportunities have already been fully explored, and new solutions don't effectively address the end-to-end process. Current pain points will likely magnify over time, increasing stress on operational processes and risk management, as well as leading to the need to retrofit innovative fintech solutions with inherent workarounds. A standard blueprint for the entire post-trade can significantly reduce inefficiencies. However, real digital transformation is only possible through common underlying standards.

To maximize the efficiency of global capital markets infrastructure, a protocol that standardizes trade life cycle events and actions will likely be necessary. Only then can the true potential materialize from new technologies, such as blockchain/DLT, smart contracts, machine learning, AI, and robotic process automation. At the same time, standards-based innovative solutions must be interoperable with existing infrastructure. Technology service providers can leverage CDM as a design feature in respective solutions, which will greatly enhance interoperability across new and legacy technology, digitize the middle and back office, and fundamentally streamline trade-flow processes.

For example, bridging the gap between legacy infrastructure and DLT will take time and must prove to be robust around hardened solutions before full-scale DLT adoption is possible. But quick wins are

possible. Many hackathon participants cited the need for further development beyond the limited current model to include more complex derivatives products to allow for collateral management, for example. Looking ahead, many hackathon participants suggested open sourcing the ISDA CDM code would allow for greater scrutiny and testing. Open sourcing would also raise the prospect of non-DLT solution providers contributing to the model, thereby creating more value and hardening the CDM to cover more asset classes. From an industry perspective, the question then becomes when will the CDM be considered stable enough for wide-scale adoption?

Viewing the total CDM and DLT opportunity through the cost-benefit lens reveals total benefits under a full target-state scenario equates to approximately 80 percent to 85 percent reduction from just the dealer cost base of approximately \$3.2 billion within the primary functional areas directly impacted by CDM. These estimates are the minimum benefits and are not inclusive of the impact on functional areas, such as surveillance, fraud monitoring, AML, regulatory reporting optimization, and margin/risk opportunities realized from central valuation/MTM. The total opportunity becomes much larger when considering the inclusion of other market participants outside the dealer community, benefits to regulators, improvements in funding, and balance sheet optimization. While ISDA believes these initial cost-reduction estimates are conservative, there remain several challenges to be addressed to fundamentally shift the cost curve by leveraging digitization.

While 75 percent of participants believe meaningful adoption will happen within three to five years, they also pointed out having a CDM standard is positive but without DLT standards they believe adoption will remain difficult—a challenge faced by many other industries considering the technology. As one hackathon participant suggested, “The adoption of CDM by one or more major market infrastructure providers would prove the catalyst for broad market adoption.” This raises a chicken-and-egg scenario, but to this end, there are currently several infrastructure providers working toward this goal (e.g., DTCC).

ISDA should therefore be encouraged to continue development of the CDM as a catalyst for DLT adoption with v1.0 proving a logical, positive, and worthy platform for iteration, as Barclays DerivHack 2018 clearly demonstrated the need for the CDM standard. Participants agreed that CDM is a step in the right direction with no fundamental design flaws—an impressive feat for such an undertaking in this first version. Given the interest the CDM generated with the fintech and DLT community, it is imperative that ISDA proactively expands and refines the CDM to include additional asset classes. The next step will be creating DLT protocols and engaging solution providers, which will then be incentivized to find methods of standardization for enterprise-grade adoption across industries and ecosystems.

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