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# If we build it, will they come? Developing and distributing digital standards for smart derivatives contracts

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## Introduction

"If you build it, they will come." So said Kevin Costner in the 1989 movie *Field of Dreams*. However, ISDA's experience in developing standards for the derivatives industry over the past 35 years has taught us that simply building a solution or product does not guarantee adoption. Building a baseball diamond in your back garden might entice the ghosts of old baseball legends to descend upon a remote cornfield in rural Iowa for one last game. However, the development and adoption of standards within the global financial markets demands a more comprehensive and proactive approach. Identifying a clear objective, facilitating consensus among a diverse range of stakeholders, and developing appropriate, broad-based delivery mechanisms are all fundamental components of any successful standardization (and implementation) strategy.

It is often assumed that the network effect associated with first-mover technology is sufficient to generate broad-based distribution and adoption of the standard(s) required for that technology to thrive within a particular industry. Consequently, there is less focus on how those standards should first be established and disseminated. In other words: if you build it, the market will come.

In this essay, I will contend that the advancement of computational law within global financial markets will rely on the development of interdisciplinary standards that can connect the disparate fields of law and computer programming. Further, I will argue that the means of distributing the standards underpinning the operation of these technologies is a question of fundamental importance. In fact, it may ultimately be determinative of the success (or failure) of industry efforts to effectively and efficiently deploy innovative new technology solutions. I will further argue that, with respect to smart derivatives contracts, this distribution gap can be solved through the development of mutualised industry platforms that can transform and translate unstructured legal agreement data into both structured data and operational, executable code for implementation within smart derivatives contracts.[1] Finally, I will explain how the ISDA Create platform, supported by ISDA's various standardization and digitization initiatives, performs this role within the global derivatives industry.

## The case for smart derivatives contracts

The Bank for International Settlements (BIS) has estimated that the gross market value of the global derivatives market is approximately $12.6 trillion.[2] ISDA's contractual framework, underpins the vast majority of these transactions.

ISDA documentation has become increasingly complex over the past decade, primarily due to the impact of the G20 package of financial regulatory reforms introduced in response to the 2008 financial crisis. These reforms have transformed the traditional operating structure of bilateral financial markets. Firms have implemented these regulations and associated requirements on top of existing infrastructure, placing significant new demands upon it. A by-product of these reforms has been the creation of vast amounts of unstructured data and ever-increasing volumes of bespoke, paper-based contracts.

The derivatives industry is now at a critical juncture in its efforts to develop and adopt improved derivatives processes. New technologies, such as DLT and smart contracts, will allow a fundamental reshaping of derivatives infrastructure, which could reduce operational risks, streamline increasingly cumbersome and time-consuming processes, and cut costs. If the industry does not embrace this potential, derivatives market infrastructure will become increasingly costly, risky and inefficient.

Smart and computable contracts could help revolutionise the derivatives market by creating much-needed efficiencies that would benefit the entire industry. In particular, the facilitation of automated straight-through processing of financial transactions could significantly reduce settlement times, lower transaction and maintenance costs, and eliminate much of the unnecessary complexity associated with manual processing.

Achieving this vision will require lawyers to reimagine how contracts are currently produced and expressed, with greater emphasis placed upon standardization and digitization. It will also require lawyers to work with technology and computing experts to determine how operational provisions within contracts can be both effectively and efficiently automated using smart contract technology.

## The role of computational law

ISDA documentation offers significant opportunities for the application of smart contracts. Many of the obligations within a derivative transaction are operational in nature and rely on conditional logic. Consider a simple interest swap transaction (see Figure 1). The terms of this transaction provide that a party will make a payment to the other party on a specific date. The quantum of such payment will often be determined by reference to a fixed rate or through the operation of some highly deterministic formula (e.g., a specified variable rate plus a fixed spread). [3]

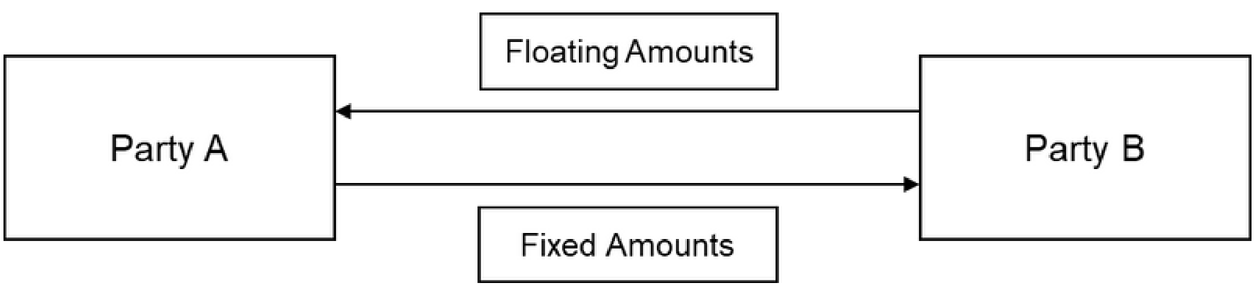


Figure 1

These types of provision can be easily distilled into “if/then” logic and expressed in executable code. However, it is not sufficient to simply automate these operational aspects of the contract; the broader contractual relationship must also be considered (See Figure 2 below). In the context of ISDA documentation, the broader contractual relationship is typically governed by a negotiated form of ISDA Master Agreement. The ISDA Master Agreement contains a range of provisions, determining how and when parties should make payments, how payment obligations might be impacted by the occurrence of events and how disputes between the parties should be resolved.

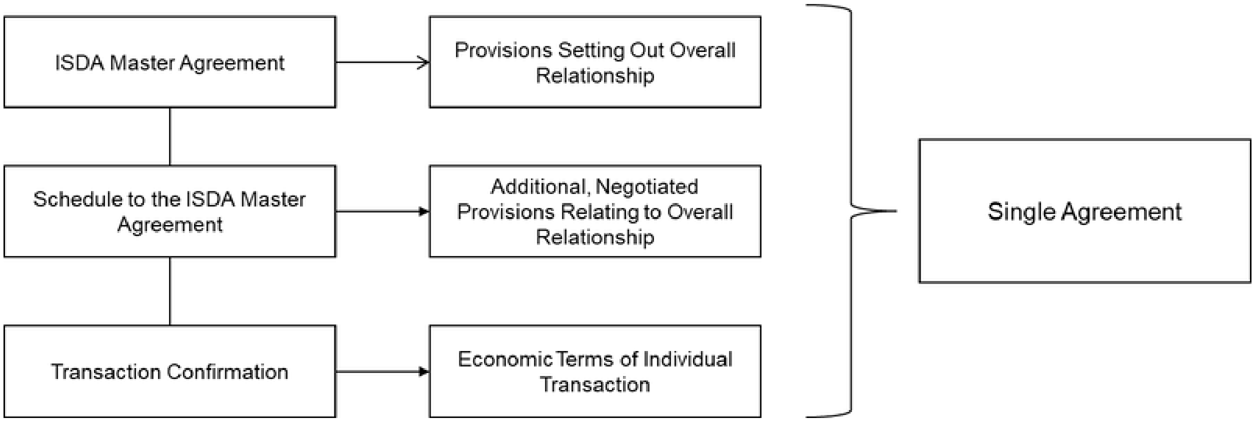


Figure 2

As the author has written previously[4], the form and purpose of the language contained in these contracts can be contrasted with that of computer code. The ISDA Master Agreement (and similar contracts) aims to provide a permissive framework for responding to events that are generally unknowable at the point of execution[5]. In doing so, it necessarily allows parties to exercise some level of discretion to maintain the integrity of the contract in the face of unexpected events or circumstances. This can be contrasted with computer code, which must be precise and predictable at the point of execution.[6]

Our vision for smart derivatives contracts will therefore require consideration of many computational law-related issues, with overlap among many different legal disciplines and standards. These include:

- Which contractual terms could or should be automated?
- How should these terms be expressed, formalised, and then combined into functions for efficient automation?
- How can lawyers validate these automated terms as having the same legal effect as the underlying contract?

## The centrality of standards

Central to these questions are the development of standards. For over 35 years, ISDA has worked with market participants to develop global standards for the derivatives market. These standards have fostered safe, efficient, and liquid derivatives markets. ISDA's documentation standards allow for more efficient negotiation. They also reduce basis risk in contractual terms across otherwise similar products. This allows market participants to transact with greater confidence.

In 2018, ISDA and King & Wood Mallesons published a white paper called '*Smart Derivatives Contracts: From Concept to Construction.*' [7] This paper argues that compatibility with several different standards is necessary to ensure the reliable, consistent, and safe operation of smart derivatives contracts:

1. **Legal standards.** These standards provide certainty that contractual arrangements are enforceable as a matter of law.

2. **Regulatory standards.** These standards ensure that parties are transacting in compliance with the relevant rules and regulations that are applicable to the derivatives markets and its participants.[8]
3. **Commercial standards.** These standards set out the market practice for how commercial arrangements are reached and performed.
4. **Technological standards**. These standards establish a common framework for development and for achieving consistency between results.

Compatibility with all standards is necessary. For example, technologically sophisticated smart contracts may be unenforceable as a matter of law. They may breach regulatory requirements in one or more relevant jurisdictions, introducing increased risk into the financial system. Smart contracts that are developed with only legal standards in mind may not be technologically efficient or operable. This may render them useless as a practical matter.

No single or dominant standard exists in any of these areas. Contractual arrangements can take very different forms without impacting their legal enforceability. Contracts can be drafted in very different ways while achieving similar commercial outcomes. It is possible to achieve identical commercial outcomes using different programming languages. These languages can be implemented within different systems and platforms. Indeed, there is a very large (and ever increasing) number of smart contract languages, data schemas and DLT platforms, all designed for different products and use-cases. Conceptually, therefore, there is a many-to-many relationship among each of these different standards, and the contracts, models and languages that implement them (see Figure 3 below).

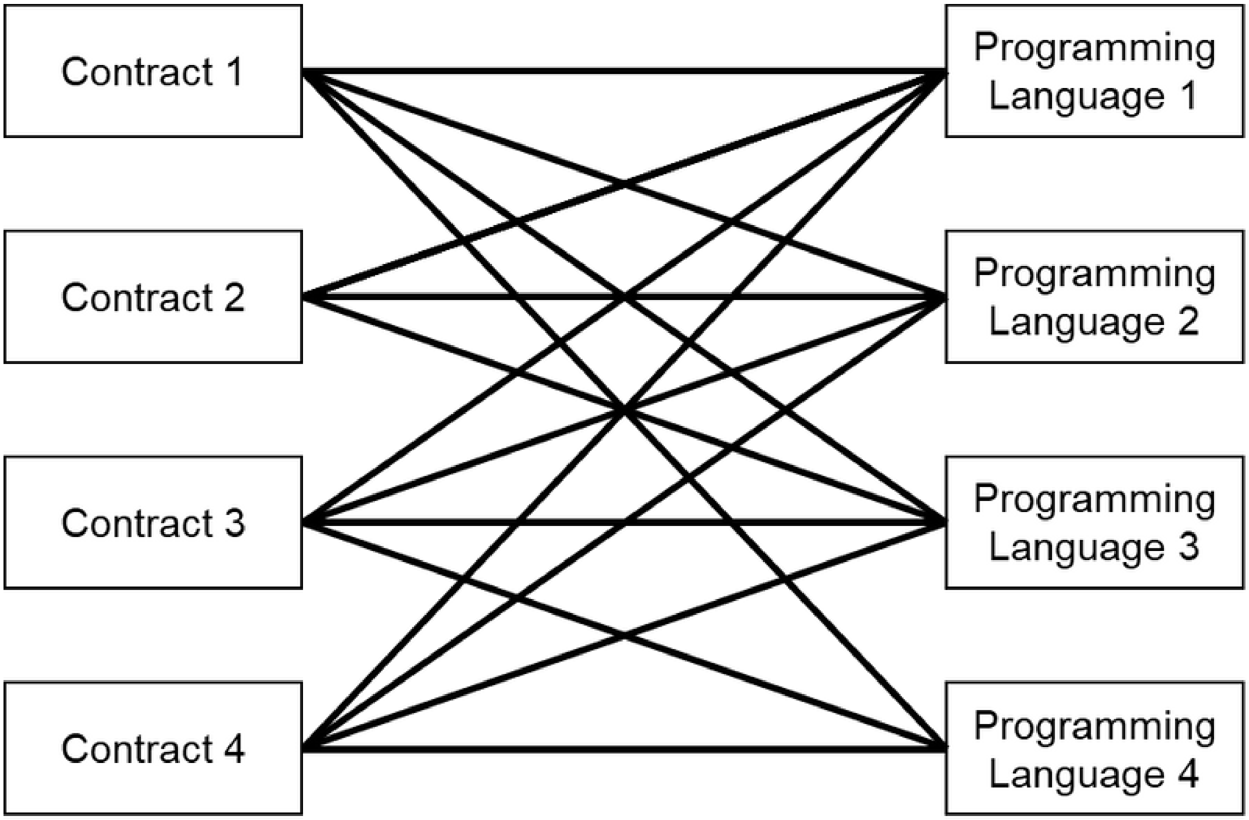


**Figure 3**

The interplay (and occasional tension) among each of these standards creates a considerable challenge for development of smart derivatives contracts. Developing rigid, pro-forma and non-negotiable contracts will inevitably impede the ability of market participants to effectively allocate risk. Demanding that the entire market adopt a single programming language will impede competition and stifle innovation.

Flexible legal and contractual standards are essential. These standards must be capable of achieving most of the commercial outcomes expressed within derivatives contracts. These standards must also be capable of being mapped to many different technological standards. This will allow for downstream implementation within different systems and applications.

Of course, developing these standards does not guarantee adoption. Broad-based market adoption requires a mutualised distribution mechanism. This distribution mechanism should be capable of providing consistent legal and contractual standards to the market, while providing a translation layer to effectively transform legal agreement data into operational data.

ISDA Create acts as this distribution mechanism within the derivatives market. ISDA Create is an online contract negotiation and management tool developed by ISDA and Linklaters Nakhoda. It allows firms to produce, negotiate and execute derivatives documentation completely online. ISDA Create dramatically reduces the time it takes to negotiate documentation. It also allows firms to digitally capture, process and store the data within those negotiations and documents.[9] ISDA Create can also act as a conduit for the standards required to develop effective smart derivatives contracts.

## Standardization

ISDA Create can transform complex contractual data into operational data. This operational data can then be implemented within a smart contract. However, the legal agreement data input must first be standardized. As mentioned above, this standardization must be achieved in a way that retains flexibility for market participants to achieve their desired commercial objectives. ISDA's standardization initiatives address this problem.

ISDA has developed a taxonomy (the ISDA Clause Taxonomy) for industry-standard documentation, including the ISDA Master Agreement. ISDA analysed thousands of agreements and clauses and worked with over one hundred market participants to identify the most common clauses. The ISDA Clause Taxonomy assigns a formal meaning to each of these clauses by defining and categorising each clause variant. Importantly, this process focussed on the substance of each clause, rather than its form. In other words, the analysis focussed on the commercial outcome of each clause rather than the words used to express it.

The ISDA Clause Taxonomy was used as the basis for development of the ISDA Clause Library.[10] The ISDA Clause Library creates a modular drafting framework for each identified commercial outcome. This allows users to construct clauses by combining standardized fragments of text to achieve a desired outcome. Users can incorporate standardized variables and values to make each clause operative. The ISDA Clause Library therefore provides a flexible means of achieving most commercial outcomes using industry-standard drafting.

Consider the following example. The ISDA Master Agreement contains a clause called 'Termination Currency.' This clause specifies the currency that any close-out amount[11] will be denominated in. The ISDA Clause Taxonomy identifies a relatively small number of commercial outcomes. One of those outcomes is that the Termination Currency will be selected by the Non-Defaulting (or Non-Affected Party)[12] upon termination of one or more transactions. This outcome is defined broadly and allows for a small number of conditions or restrictions to be imposed on the selection of a Termination Currency.

Consider a scenario where the parties agree that:

1. The Termination Currency should be selected by the Non-Defaulting or Non-Affected Party;
2. The currency chosen must be a currency in which payments under one or more transactions is denominated;
3. In a scenario where there are two Affected Parties (i.e., a termination event has occurred with respect to both parties) and where the parties cannot agree, the Termination Currency should be USD; and
4. If USD is not freely available, the Termination Currency should be EUR.

This is a complex clause with many operations, variables, and conditions. Before the ISDA Clause Library there was no industry standard way of drafting it. However, using the Clause Library framework, users can now construct a standardized version of this clause (see Figure 4 below).[13]

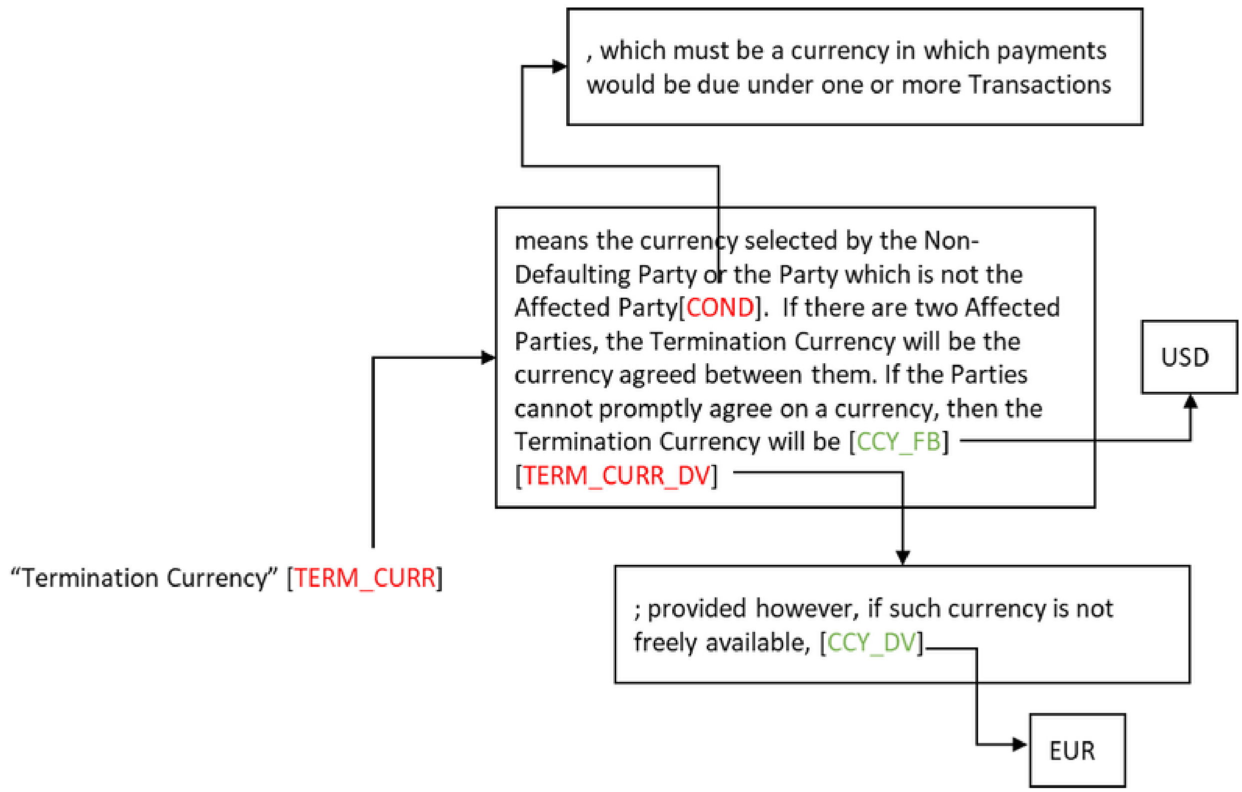


**Figure 4**

Using this framework, every party seeking to achieve this commercial outcome will use an identical narrative expression of the clause:

> *"Termination Currency means currency selected by the Non-Defaulting Party or the Party which is not the Affected Party, which must be a currency in which payments would be due under one or more Transactions. If there are two Affected Parties, the Termination Currency will be the currency agreed between them. If the Parties cannot promptly agree on a currency, then the Termination Currency will be USD; provided however, if such currency is not freely available, EUR."*

The Clause Library is integrated within ISDA Create. Users can construct clauses using a series of dropdown menus to select each clause and the relevant variables and values. This allows for a single, digital representation of each agreement created, negotiated, and executed on the platform. This includes a structured list of all utilised clause tags.[14] Users can use these data to determine which clauses appear within their agreement and the precise formulation of words used to achieve them (see Figure 5 below).

| ISDA Create Output | Narrative clause |
|---|---|
| MA02_TERM_CURR_V1 | (This tag denotes that the Termination Currency clause appears in the contract) |
| TERM_CURR -> TERM_CURR_V3 | “Termination Currency means currency selected by the Non-Defaulting Party or the Party which is not the Affected Party, [TERM_CURR -> TERM_CURR_V3 -> COND]. If there are two Affected Parties, the Termination Currency will be the currency agreed between them. If the Parties cannot promptly agree on a currency, then the Termination Currency will be [TERM_CURR -> TERM_CURR_V3 -> CCY_FB -> USD] [TERM_CURR -> TERM_CURR_V3 -> TERM_CURR_DV -> TERM_CURR_DV_V1] |
| TERM_CURR -> TERM_CURR_V3 -> COND | which must be a currency in which payments would be due under one or more Transactions |
| TERM_CURR -> TERM_CURR_V3 -> CCY_FB -> USD | USD |
| TERM_CURR -> TERM_CURR_V3 -> TERM_CURR_DV -> TERM_CURR_DV_V1 | ; provided however, if such currency is not freely available, [TERM_CURR -> TERM_CURR_V3 -> TERM_CURR_DV -> TERM_CURR_DV_V1 - > CCY_DV -> EUR] |
| TERM_CURR -> TERM_CURR_V3 -> TERM_CURR_DV -> TERM_CURR_DV_V1 - > CCY_DV -> EUR | EUR |

**Figure 5**

We have seen that ISDA Create is capable of natively transforming unstructured legal agreement data into structured legal agreement data. A further step is necessary to translate structured *legal* data into *operational* data.

## Digitization

The data captured by ISDA Create allow users to establish the precise drafting used within a contract. This may be useful at the point of negotiation, for reconstituting a contract within the platform, or in other specific use-cases (e.g., litigation). However, these data must then be decoded into the commercial outcomes that they describe to allow for their implementation within a computable or smart contract.

ISDA Create solves this problem by mapping clause data captured within the platform to a legal data schema expressed within the ISDA Common Domain Model (CDM)[15]. The CDM is an ISDA initiative that aims to enhance consistency and to facilitate interoperability among market participants and platforms. It does so by providing a single, common digital representation of derivatives trade events and actions. The CDM also provides a framework for creating digital representations of the legal agreements that govern these transactions.

ISDA Create can map clause data to the CDM-based legal agreement model. This creates a consistent representation of the operational functions and data embedded within each clause (see Figure 6 below).

| Narrative Clause | ISDA Create Output | CDM Representation | Operational Outcome |
|---|---|---|---|
| *"Termination Currency means currency selected by the Non-Defaulting Party or the Party which is not the Affected Party, which must be a currency in which payments would be due under one or more Transactions. If there are two Affected Parties, the Termination Currency will be the currency agreed between them. If the Parties cannot promptly agree on a currency, then the Termination Currency will be USD; provided however, if such currency is not freely available, EUR."* | MA02_TERM_CURR_V1 | TerminationCurrency: | The Termination Currency Clause exists. |
| | TERM_CURR -> TERM_CURR_V3 | partyOptionTerminationCurrency: | The Termination Currency will be selected by the Non-Defaulting or non-Affected Party. |
| | TERM_CURR -> TERM_CURR_V3 -> COND | terminationCurrencyCondition : PaymentsDue | The Termination Currency must be a currency in which one of more Transactions are denominated. |
| | TERM_CURR -> TERM_CURR_V3 -> CCY_FB -> USD | bothAffectedTerminationCurrencyOption: USD | If there are two Affected Parties and the parties can't mutually agree a Termination Currency, the Termination Currency will be USD. |
| | TERM_CURR -> TERM_CURR_V3-> TERM_CURR_DV-> TERM_CURR_DV_V1 -> CCY_DV -> EUR | notFreelyAvailableFallback: EUR | If there are two Affected Parties and the parties can't mutually agree a Termination Currency and USD isn't freely available, the Termination Currency will be EUR. |

**Figure 6**

The CDM representation of this clause can then be mapped to many different programming and smart contract languages. Of course, the selection of language(s) will depend on the specific use-case or system. However, developers will have confidence that they can rely upon a consistent operational representation of commercial outcome expression within the underlying contract.

ISDA Create plays a central role in this process. It transforms unstructured legal agreement data into structured data. It then translates this structured data into operational data for implementation within computable or smart contracts (see Figure 7 below).

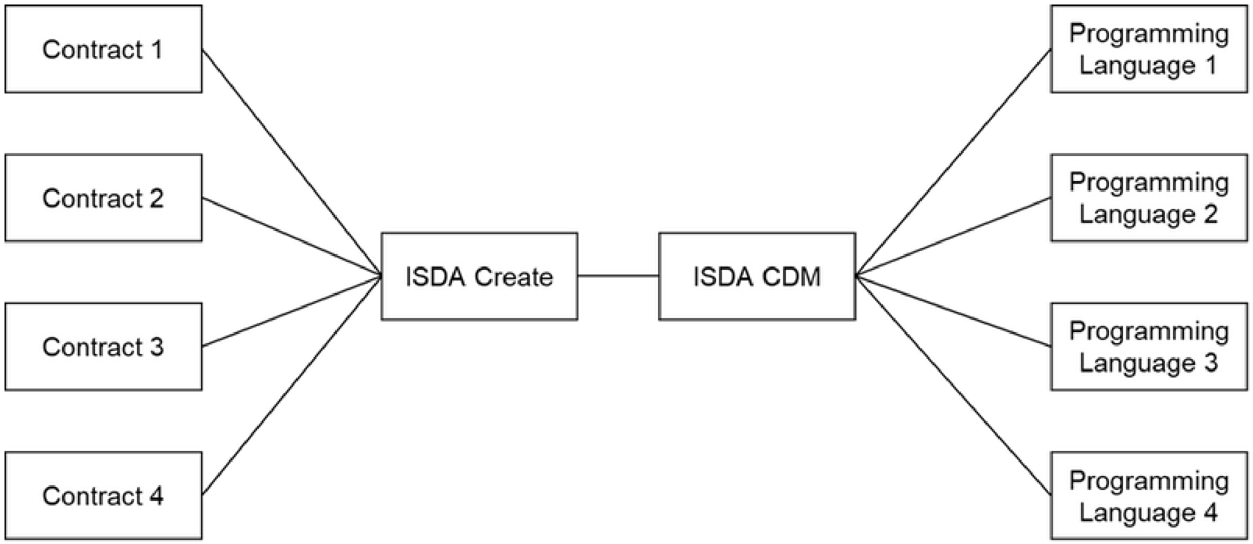


**Figure 7:** Graphical user interface, diagram Description automatically generated with medium confidence

ISDA Create is the central hub. It ensures that negotiated contracts are compatible with applicable legal and commercial standards. It then maps these standards to CDM for subsequent translation into many different languages and technological standards for implementation in systems.

Today, ISDA Create can map to the CDM representation of certain collateral agreements.[16] ISDA is developing a more holistic 'legal agreement model' to connect ISDA Create with other forms of ISDA documentation. This model will serve as the basis for the development of smart derivatives contracts.[17]

## Conclusion

The development of effective and efficient smart derivatives contracts will be a multi-disciplinary endeavour, requiring input from (and the expertise of) a range of stakeholders, including lawyers, technology developers, commercial and business leaders, infrastructure providers and regulators. The developing field of computational law can provide an important bridge across each of these disciplines, informing vital decisions concerning which parts of a contract can (or should) be automated and how existing contractual frameworks and representations might be adapted to support this.

In this article, I have argued that the development of standards – legal, commercial, regulatory, and technological - will play a central role in the advancement of computational law in the field of complex financial contracts and transactions and in the successful implementation of smart and computable contracts in the derivatives market.

Lawyers must continue to ensure that contracts identify and manage legal risk appropriately, while acknowledging the benefits of greater standardization and digitization. Market participants and other users of these contracts must be able to reply upon the robust legal protections provided by contracts, while also considering how greater contractual digitization and automation can provide the basis for greater efficiency and innovation within their organisations. Technology developers must be able to continue to innovate new products and solutions, while having confidence that their implementation will be legally robust and regulatorily compliant. And regulators must continue to have comprehensive oversight of the markets and to have confidence that any emergent systemic risks are identified and managed appropriately.

Our challenge therefore is to consider how the development and evolution of computational law will interact with (and potentially enhance) prevailing standards within the financial markets. Doing so will provide us with a sound basis upon which to develop effective and efficient smart derivatives contracts, while avoiding fragmented, duplicative, and incompatible platforms and solutions.

This article has explored some of ISDA's standardization and digitization initiatives that will support this development. Through initiatives such as the ISDA Clause Taxonomy and Library, we have created standardized narrative representations of commonly negotiated clauses within the industry standard contractual framework underpinning trillions of dollars of gross notional value. With development of the CDM, we have developed a common digital model that can express the operational functions within these clauses, contracts and transactions in a uniform manner, allowing for their consistent implementation within automated technology solutions.

Central to each of these initiatives is ISDA Create. ISDA Create is the only platform that distributes ISDA's documentation standards to derivatives market participants, and which is capable of natively transforming these standards into operational logic. In this way, ISDA Create acts as the centralised distribution mechanism for each of the standards that will underpin the development of smart derivatives contracts. Collectively, these initiatives will help to advance and embed the interdisciplinary field of computational law within existing industry practices and promote its use as a fundamental component of future market developments.

## Footnotes

1. In this essay, the term "smart derivatives contracts" means a derivatives contract that contains some terms that are capable of being automatically executed or performed. Such contracts may contain terms that are expressed in a form that enables their automation. Other terms that are not intended to be automated may continue to be expressed in natural language. ↩
2. Bank for International Settlements, OTC derivatives statistics at end-June 2021 (www.bis.org/publ/otc_hy2111.htm) ↩
3. Of course, the economic terms of a transaction do not exist in isolation. They must be considered in conjunction with the overarching contractual terms that derive from the broader legal relationship. For example, an event of default might occur at any time. This could impact the timing or quantum of a payment, or even the obligation to make a payment at all. The development of smart contracts in the

derivatives market must take this contractual complexity into account. For further explanation, see: ISDA Legal Guidelines for Smart Derivatives Contracts – Introduction: https://www.isda.org/a/MhgME/Legal-Guidelines-for-Smart-Derivatives-Contracts-Introduction.pdf↩

4. See: C. McGonagle, Translations: creating legally effective smart derivatives contracts, JIBFL (https://www.lexisnexis.co.uk/blog/docs/default-source/loan-ranger-documents/jibfl_2021_vol36_issue08_sep_pp540-543.pdf?sfvrsn=652ef6df_2 ) ↩

5. The word "execution" is used here to mean the putting into effect of a legal instrument, such as a contract. ↩

6. The word "execution" is used here to mean the performance of an instruction within a computer program. ↩

7. See: https://www.isda.org/a/cHvEE/Smart-Derivatives-Contracts-From-Concept-to-Construction-Oct-2018.pdf ↩

8. Regulatory standards are promulgated by national authorities and regulators. Despite the existence of international standards, there continues to be a lack of harmonization in the implementation of regulations at a national level which can create jurisdictional complexity. ISDA routinely works with its members to advocate for greater harmonisation in regulatory requirements applicable to derivatives markets. Of course, regulatory standards, while nascent, may also apply to smart contracts and associated technologies. As these standards emerge, it is important that smart derivatives contracts continue to be compatible with them. Detailed discussion on the application of regulatory standards to smart derivatives contracts is beyond scope of this essay. ↩

9. For further information on ISDA Create, see: https://www.isdacreate.org/ ↩

10. For more information on the ISDA Clause Library, see: https://www.isda.org/a/u6TgE/ISDA-Clause-Library-factsheet-2021.pdf ↩

11. The close-out amount is the net amount payable by a party following termination of all (or some) transactions under the ISDA Master Agreement. ↩

12. The ISDA Master Agreement contains the similar, but distinct, concepts of "Defaulting Party" and "Affected Party". The Defaulting Party is the party with respect to whom an Event of Default has occurred. An Event of Default in the context of ISDA documentation is a fault-based event (for example, a failure to make a payment). An Affected Party is a party with respect to whom a Termination Event occurs. Termination Events are distinct from Events of Default as they are not necessarily fault-based events. Examples include force majeure and illegality. Depending on the event, it is possible that both parties might be Affected Parties (if, for example, it becomes illegal for both parties to trade derivatives). The close-out

amount is generally determined by the Non-defaulting Party or Non-affected Party, using the close-out mechanism specified in the ISDA Master Agreement. The ISDA Master Agreement must therefore provide for scenarios where one or more transactions are terminated and both parties are Affected Parties. ↩

13. The Clause Library allows users to populate clauses using Drafting Variables (produced in red font) and Allowable Values (produced in green font). The inclusion of a Drafting Variable will typically be determinative of the overall meaning of the clause. For example, they may point to additional conditions or functions that impact the operation of the clause in some way. Allowable Values are static data points that are used to include certain defined datapoints, for example numbers, ordinal numbers, dates etc. ↩

14. This data is produced and is consumable in JSON format. ↩

15. For further information on the ISDA CDM, see: https://www.isda.org/2019/10/14/isda-common-domain-model/ ↩

16. https://www.linklaters.com/en/about-us/news-and-deals/news/2021/october/common-domain-model-integrated-into-isda-create ↩

17. It is worth noting that application of the CDM is not limited to derivatives agreements. ISDA is collaborating with the International Capital Market Association (ICMA) and the International Securities Lending Association (ISLA) to expand CDM to other types of financial transaction. For further information on this cross-association collaboration, see: https://www.isda.org/2021/08/02/isda-icma-and-isla-sign-mou-on-the-common-domain-model/ ↩