ISDA's Common Domain Model (CDM)



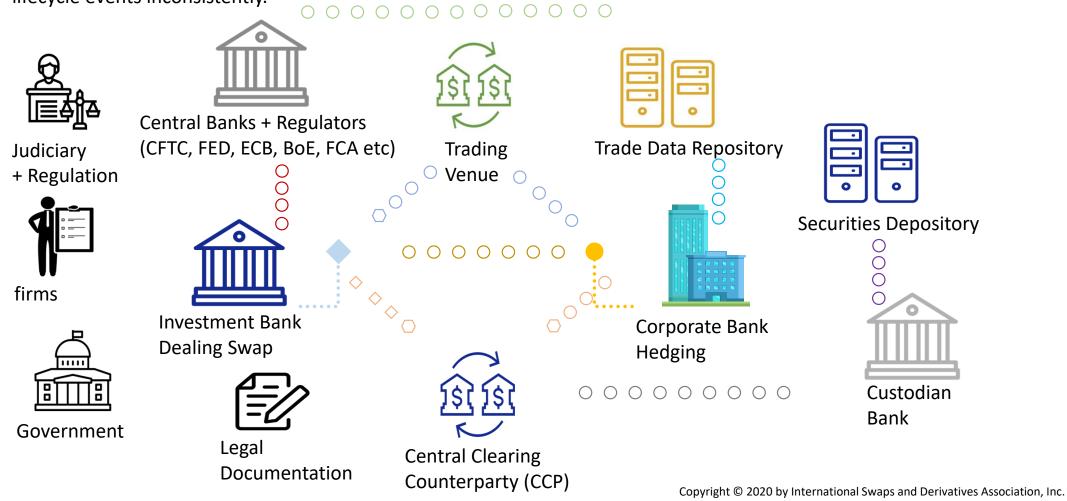
Technology Advisory Committee meeting, CFTC, Washington D.C., Wednesday, 26th February 2020

Ian Sloyan

Director, Market Infrastructure and Technology ISDA

What is the market infrastructure?

Thinking of the key entities, institutions, authorities and services we know make the markets function: all parties store trade data in bespoke formats and make changes to these records due to lifecycle events inconsistently.



Safe, Efficient



The ISDA CDM is just one part of ISDA's strategy to go from delivering market standards as documentation, to delivering standards as code?



Standardize

contracts/automation and publication of Guidelines docs

- ISDA Clause Library project
- Revision of ISDA Definitions (e.g. 2019) Rates Definitions)
- Publication of new documentation templates (e.g. CSAs for non-cleared margin)



Digitize

• Develop ISDA CDM to cover standard clauses and processes found in both ISDA documentation and market practices

• Enhance ISDA Create to cover more templates allowing negotiation and storage in digital form (i.e. ISDA CDM format)

 Maintain FpML data dictionary and model updated to contain updated definition and documentation terms for use in messaging and ISDA CDM



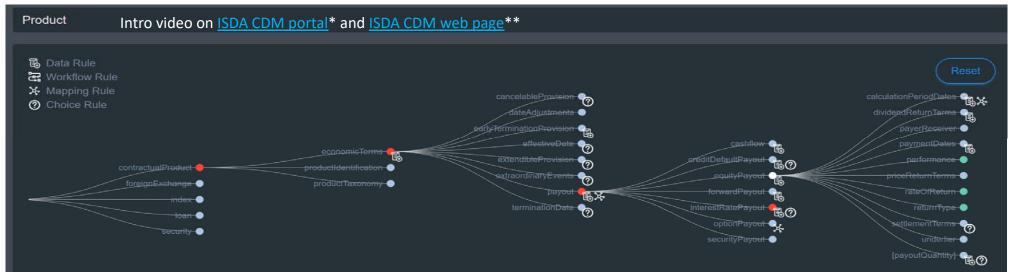
• Publish ISDA CDM in many languages to allow components be used consistently

> in all implementations

- digital documentation library in many formats
- Provide access to ISDA resources and reference data via **APIs**

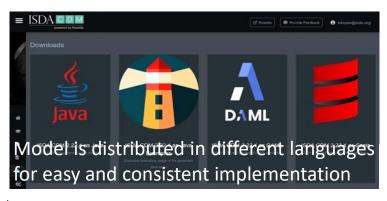


What is the ISDA CDM?



<u>COMMON DOMAIN MODEL</u> - A DIGITAL <u>MODEL</u> OF PRODUCTS, CALCULATIONS AND EVENTS

- Presented as data and functions in the model
- Composable product model assembled with reusable components
 - o Product classification logic inferred from economic components
- Composable workflow and lifecycle event model assembled from *primitive* event components
 - o Primitive = state transition...with before and after state
 - Event classification logic inferred from primitive components
 - o Functions to define *primitive* state transitions
 - Function specifications: inputs, outputs, plus constraints
- Contract mechanics with functions specifying ISDA Definitions
 - Calculations and operational clauses



https://portal.cdm.rosetta-technology.io/#/login

https://www.isda.org/2019/10/14/isda-common-domain-model/



func FloatingAmount: <"2006 ISDA Definition Article 6 Section 6.1. Calculation of a Floating Amount: Subject to the provisions of Section 6.4 (Negative Interest Rates), the Floating Amount payable by a party on a Payment Date will be: (a) if Compounding is not specified for the Swap Transaction or that party, an amount calculated on a formula basis for that Payment Date or for the related Calculation Period as follows: Floating Amount = Calculation Amount × Floating Rate + Spread × Floating Rate Day Count Fraction (b) if "Compounding" is specified to be applicable to the Swap Transaction or that party and 'Flat Compounding' is not specified, an amount equal to the sum of the Compounding Period Amounts for each of the Compounding Periods in the related Calculation Period; or (c) if 'Flat Compounding' is specified to be applicable to the Swap Transaction or that party, an amount equal to the sum of the Basic Compounding Period Amounts for each of the Compounding Periods in the related Calculation Period plus the sum of the Additional Compounding Period Amounts for each such Compounding Period.">

ISDA Legal definition

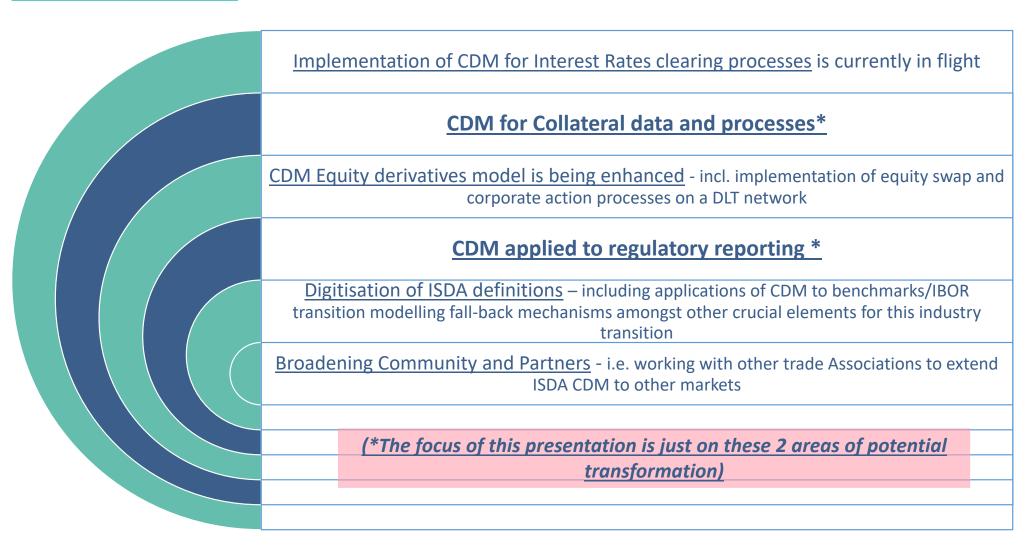
```
[calculation]
inputs:
    interestRatePayout InterestRatePayout (1..1)
    quantity NonNegativeQuantity (1..1)
    date date (1..1)
output: floatingAmount number (1..1)
alias calculationAmount: quantity -> amount
alias floatingRate: ResolveRateIndex(interestRatePayout -> rateSpecification -> floatingRate ->
    floatingRateIndex)
// TODO: question to group: why can a float rate calculation node in FpML contain multiple rate schedules?
alias spread: GetRateSchedule( interestRatePayout -> rateSpecification -> floatingRate ) -> initialValue
alias dayCountFraction: DayCountFraction(interestRatePayout, interestRatePayout -> dayCountFraction, date)
assign-output floatingAmount: calculationAmount * (floatingRate + spread) * dayCountFraction
```

CDM aims to bring consistent implementation of the market's standards for data, calculations, best practices, etc

> **ISDA CDM** for consistent implementation



Specific applications of ISDA CDM which are current priorities for ISDA



- ISDA CDM enables interoperability between systems/services, removing burden of setting up connections to different systems/entities, laying groundwork for STP.
 - E.g. collateral workflow management: A CSA shared with two collateral management systems, in different parts of the collateral process. If data + processes are defined in ISDA CDM, it allows for portability and easy interchange of information.

Enhance interoperability & straight through processing



- ISDA CDM promotes transparency and alignment between regulators and market participants.
 - E.g. **regulatory** obligations, such as reporting or stress testing, could be met by specifying via code that certain CDM components or data should be collected in a certain way. This will drastically improve fidelity and integrity of regulatory outcomes.

Deliver better regulatory oversight



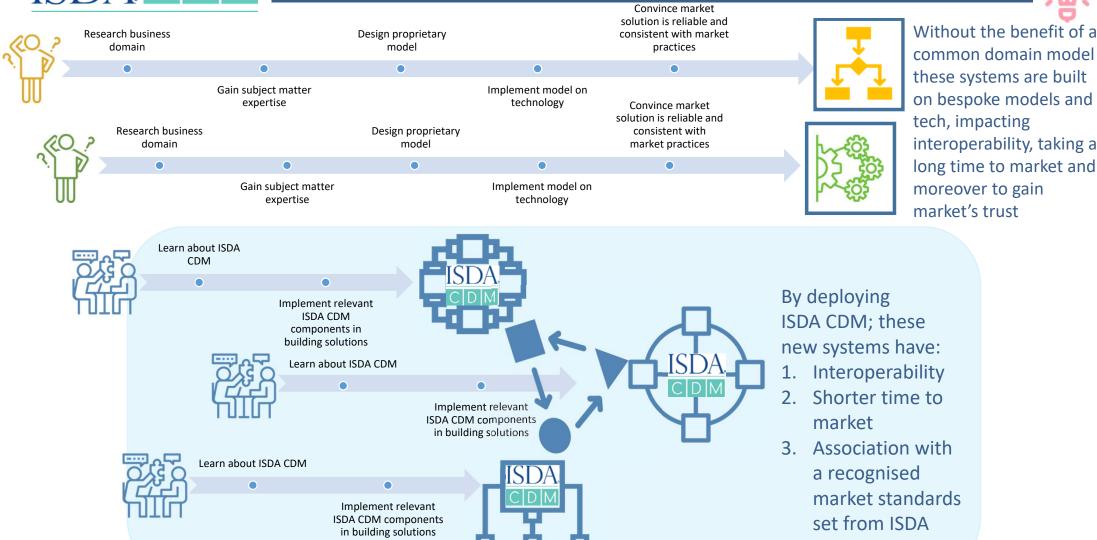
• ISDA CDM will speed up development of new solutions for the market by allowing providers to focus on what they specialize in - the technology – rather than requiring them to interpret and represent market events and processes individually. The resulting technology solution will also be interoperable with other offerings which are using ISDA CDM.

Creates an environment for innovation in financial markets



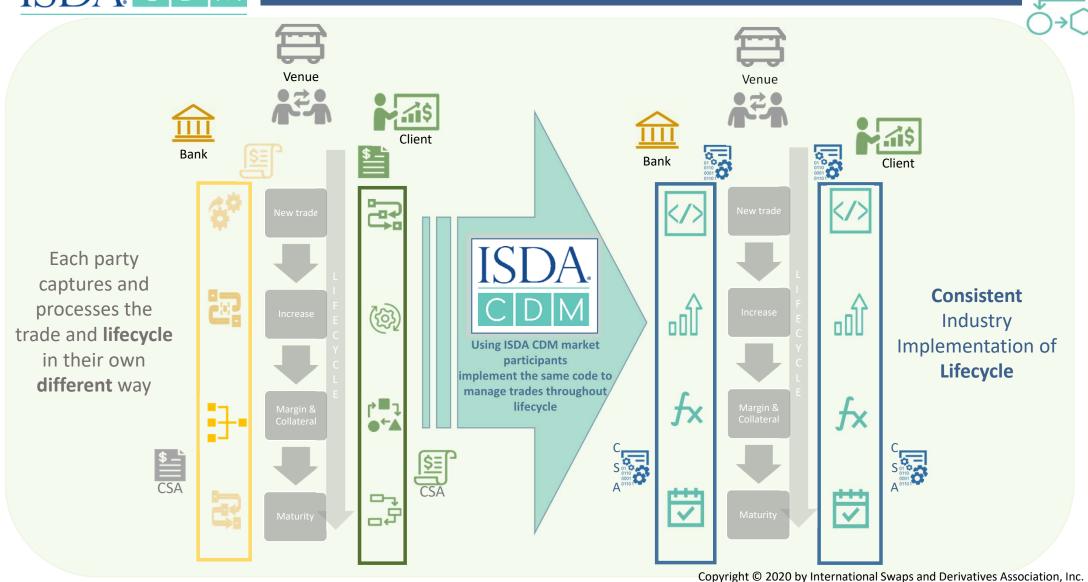
ISDA. CDM

Creates an environment for innovation in financial markets



ISDA. CDM

Enhancing interoperability, reduces reconciliation & promotes STP





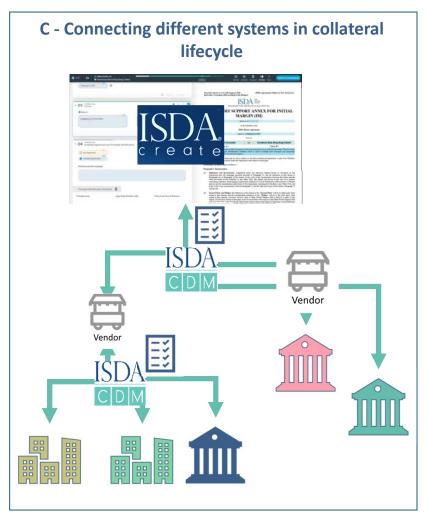


Focussing on CDM's potential on collateral processes in the lifecycle

CDM is being applied to Collateral workflows to improve efficiency by modelling collateral legal documentation in digital form, so a consistent model for the crucial reference data and calculations used in systems throughout collateral infrastructure can be achieved and implemented.

- A Reference data from CSAs and other collateral documentation needs to be in a consistent standard CDM models for collateral docs which can be executed on electronic platforms such as ISDA Create* solves for this
- B Collateral eligibility and the identification of eligible assets and instruments is a special case of above and important area where ISDA is seeking a standard and modelling this in CDM
- C Connecting different systems in collateral lifecycle with consistent data model is a prerequisite for automation- CDM solves for this (ISDA has been working with vendors on the same)
- D Inconsistent calculations cause breaks and disputes ISDA is working to model in CDM functions/calculations for clauses such as delivery amount found in documentation and processes such as margin calls

*ISDA Create is an electronic document negotiation and management system for amongst other docs ISDA margin CSAs







Focussing on CDM's potential on collateral processes in the lifecycle

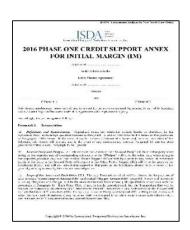
A - CDM models for collateral docs

ISDA CSA IM 2016 Japanese

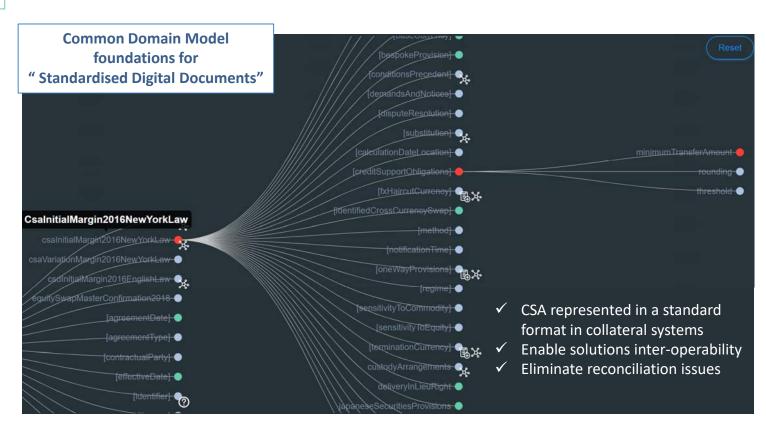
ISDA CSA IM 2016 New York

ISDA CSA VM 2016 New York

ISDA CSA IM 2016 English









\circlearrowleft

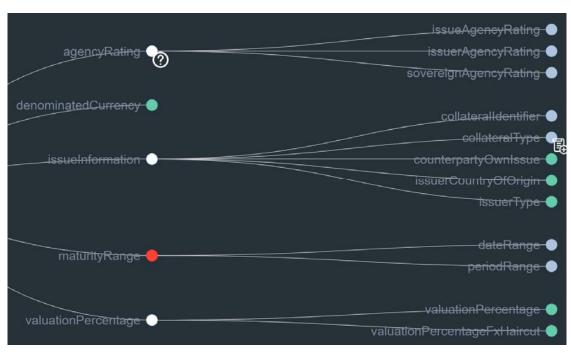
Focussing on CDM's potential on collateral processes in the lifecycle

B - Collateral eligibility and the identification of eligible assets

CSA Free Format Eligible Collateral Schedule No set standard open to misinterpretation

	Items of Eligible Collateral (IM) and Eligible Currencies	[In respect of Party A's posting obligation]	[In respect of Party B's posting obligation]	[Valuation Percentage]		
(A)	[]	[]	[]	[]%		
(B)	[]	[]	[]	[]%		
(C)	[]	[]	[]	[]%		
(D)	[]	[]	[]	[]%		
	[FX Haircut Percentage]	[In respect of Party A's posting obligation: [8]% [, unless the Eligible Collateral (IM) is denominated in the Termination Currency specified with respect to Party B under the Agreement (including, without limitation, pursuant to this Annex), in which case, 0%-1. [In respect of Party B's posting obligation: [8]% [, unless the Eligible Collateral (IM) is denominated in the Termination Currency specified with respect to Party A under the Agreement (including, without limitation, pursuant to this Annex), in which case, 0%-1.				
		With respect to Party A: []. With respect to Party B: [].				
	[Termination Currency] ¹⁰	6(e)(ii)(2) in re resulting from a	a calculation pursus espect of an Early Te a Termination Event o Affected Parties: [rmination Date where there are		







$\bigcirc \rightarrow \bigcirc$

Focussing on CDM's potential on collateral processes in the lifecycle

D. Digitizing Collateral Documentation Calculations

From 2018 IM CSA Calculation Legal Text

Paragraph 3. Credit Support Obligations

- (a) **Delivery Amount (IM).** Subject to Paragraphs 4 and 5, upon a demand made by the Secured Party on or promptly following a Calculation Date (IM), if the Delivery Amount (IM) applicable to the Pledgor for that Calculation Date (IM) equals or exceeds the Pledgor's Minimum Transfer Amount (IM), then the Pledgor will Transfer to the Secured Party Eligible Credit Support (IM) having a Value as of the date of Transfer at least equal to the applicable Delivery Amount (IM) (rounded pursuant to Paragraph 13). Unless otherwise specified in Paragraph 13, the "Delivery Amount (IM)" applicable to the Pledgor for any Calculation Date (IM) will equal the amount by which:
 - (i) the Credit Support Amount (IM) applicable to the Pledgor

exceeds

- (ii) the Value as of that Calculation Date (IM) of all Posted Credit Support (IM) held by the Secured Party (as adjusted to include any prior Delivery Amount (IM) and to exclude any prior Return Amount (IM), the transfer of which, in either case, has not yet been completed and for which the relevant Regular Settlement Day falls on or prior to such Calculation Date (IM)).
- (b) Return Amount (IM). Subject to Paragraphs 4 and 5, upon a demand made by the Pledgor on or promptly following a Calculation Date (IM), if the Return Amount (IM) applicable to the Secured Party for that Calculation Date (IM) equals or exceeds the Secured Party's Minimum Transfer Amount (IM), then the Secured Party will Transfer to the Pledgor Posted Credit Support (IM) specified by the Pledgor in that demand having a Value as of the date of Transfer as close as practicable to (but not more than) the applicable Return Amount (IM) (rounded pursuant to Paragraph 13). Unless otherwise specified in Paragraph 13, the "Return Amount (IM)" applicable to the Secured Party for any Calculation Date (IM) will equal the amount by which:



To Equivalent ISDA CDM digital calculation code

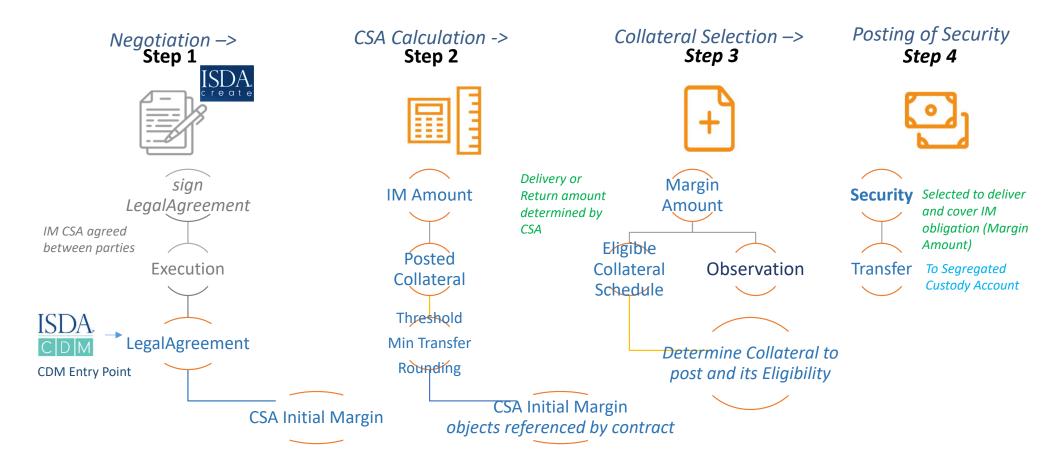
```
func DeliveryAmount IM:
   [calculation]
   inputs:
        creditSupportAmount Money (1..1)
        postedCreditSupportAmount Money (1..1)
        minimumTransferAmount Money (1..1)
        rounding CollateralRounding (1..1)
       baseCurrency string (1..1)
       result Money (1..1)
   alias deliveryAmount:
        Max( creditSupportAmount -> amount - postedCreditSupportAmount -> amount, 0.0 )
   condition:
        baseCurrency =
            ( creditSupportAmount -> currency
                and postedCreditSupportAmount -> currency
                and minimumTransferAmount -> currency )
   condition:
        creditSupportAmount -> amount exists
        and postedCreditSupportAmount -> amount exists
       and minimumTransferAmount -> amount exists
   assign-output result -> amount:
       if deliveryAmount >= minimumTransferAmount -> amount
       then RoundToNearest( deliveryAmount, rounding -> deliveryAmount, RoundingModeEnum -> Up )
       else 0.0
   assign-output result -> currency:
       baseCurrency
```





Focussing on CDM's potential on collateral processes in the lifecycle

SUMMARY - Putting the model components together: CDM Collateral Initial Margin workflow





Delivers better regulatory oversight



How does the market implement regulation today?

REGULATORS & TRADE ASSOCIATIONS

Publish rules and develop best practices

INDUSTRY PARTICIPANTS

Implement their own solutions based on individual interpretations

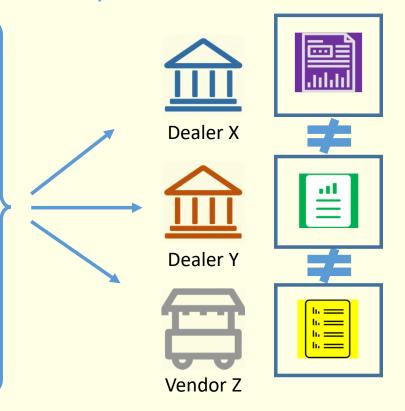
Example Artefacts:



Map of Trading Scenarios

	No. No. parent or the Superior of Th. St. units and a final of the safety state of Margaret registration of Adaptive registration and specialists of the safety and granting coefficies for constant		even stop of he stime shades amples, applicate or representation amples, application or representation and specific conditions to benefitted through	When I so that general or the congression of PTLAR south AAR (1906 I this time I STATE Angular space of STATE and AAR (1906 I this time I STATE Angular space of STATE and AAR (1906 I this time I STATE ANGULAR STA
	matria di persona manta	-	***	while the first reporting reports that building more distributions for their fing when a common first or appropriate having. We want to be the product of a positioning from place when the incomment time a first for the analysis of the comment from the second comments.
A	Name Andread San	-		Million State, The State Importing Adligation Applications of the Application State of the Appli
	Discount Spation like	(the equipment of the	-	Million and CRAC date coulous has been be the below becomes if the Northead Art and an U.S. advantages that are compared to the Country of Country against the
	Statement Represent		(myselvic) demonstrated	When and the orbits in the 'e hadeness are in which is then belonged in the description of the 'P benefits' in part to things that will be the description of behind and you the Section 19 (19) (19) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1
	Percentage tradeg reconstructed tradeg reconstructed to the property of transportage of the percent of the percent percent	PLE SERVICE SERVICES		What has been been an extensive that is a first constraint of the parties and because a second of the parties o
	What a fire patting from their sources has from selligation in page case from Small	Phil Separate Spiriters (see had paint spiriter)		Meand any other profit galaxie or has hippoint (by hell for accepting to the store to hallo does of a facility has been been as the first state of the facility of the store of the facility of the store of the stor
	And STORE or Indicated the Store Sto	No. A Annagement Statement		When the property of the prope
-	Sheety for the Services	Mil. September 1997		the first had beginning the private of the quartity that is the number of paths of the beauty between a the is developed to the numbers.
	Fig. 8 houses Tracker Sect Practices			

Reporting Sample per Scenario



Resulting in fragmented and inconsistent implementations & operational Inefficiencies

- Every industry participant left to implement their own version based on interpretation of artefacts
- Loss of inter-operability between solutions
- Pervasive reconciliation issues and other operational inefficiencies



Delivers better regulatory oversight



How can the market implement regulation with ISDA CDM?

REGULATORS & TRADE ASSOCIATIONS

Example Artefacts:

					Bert Brentin Brenned for 1	en 1 il en 1 Bennesie etc. and annualist of E	CONTRACTOR DISCOUNTY BY THE PARTY BY BY THE PARTY BY BY THE PARTY BY BY THE PARTY BY BY THE PARTY BY
Es metal sissessi dialem, Milleron el ECF ha nel promoti i ETF ha homo inc mpi de proves le desensing s'ilo primero de ETC he di anni dines.	Best/mails /more full full full full full full full ful						
the Party concerning the CTS based inscription to CTS his new of regioning, then the Notice based report using that concerned collections. When the ETS is agreed, the hard-desired in placed only in operand.							
to self-produced transfers. If there is a LTM, reprint philystee, a LTM, required. To mad by proposal, in the one 16/150 modElfs and a fig. 171, it had follow been a proving obligation, and read is discount who province to LTM, the unit for positions.	whose LE	state with the	e first velo	ue bund in the list o	will be the Payer of Leg 1	first LEI. For the avoidance of doubt, the order is 2	
- lees		-		-	ing 1 (ing 1 Proposed	And the Company of th	and the land of th
- ALTE	1000	200	_		101-705-0	Parciaria	Access of the Child
- m	-100		335	E.	Tall - Child Call S. F. Sang Sang Stand S. F. Sang Sang Stand Sang Sang Sang Sang Sang Sang Sang Sang Sang Sang	Part of self-bit. Part of self-bit. Agencing S	Name of Section Section of Section Section of Section
	Marine San	F 100	-		age to age with this prival	Page (Fright	Section of cag t
	American April	P tree	(man)	346	Self-long-box	Page - Page 1	Second of start 1
-	- Married State				The survey, but against his place would distribute the last of the survey last had a	forth secting in casing street, at the control with against the about	
The second secon	the same of the sa	The Parket	-		Name and Address of the Owner, when the Owner, which the	The property of the last of the country of the paper and the	of an artist agraphical, by the 60' design.
Total Control of the	demonstrate being	(Section)	han.		became carriery fractificate	Party months in carrie more on the common what appear the other	They believe by mining above as he served what ages
the first contract co	Total Sale				rig 1 - rig partitio from:	Share - Farth whose St. Is formed to demand country country	Select Park whose ID is hard ground through Televator right
i, constitue for 100.0 cm (1000) agreeming record by (1000), on Finance (in 2015) activates a agreeming agreement in 17 ff generators in 10 francis of N. Statigue 100 control of the last energies of the agreement for generator for generator of the control proceeding a security of the control of the cont	-	Matte			STAN ATM NO AND THAN SHOTHAN STAN ATM TO AND THAN SO	S. Fagil J. Facilities S. Son Phony State	Charles (Fine) 640 Charles Stop See
						Panisteries	Studies of Parcifolis
per or all no. 4 is exceptable in follow the ETT but process or distribute the ETT processing		Make Ma		January.	p. of long hart.	Programming to the common the same	Section Con. 1
ato for CHER squelling. Moreover, if the protection's squeec from the transaction provertically:				January .	And .		
ONE to the CALL would spale. As the EMINE approach is found on PC spacetic bandwaters, it is paid to consider details, therefore spaces, an impropriate to before the EMI							
bookstan, it must be consider private, therefore parties an increasing in Advantas 111. If practice						The part had be spire owner to price.	Book Charles

Map of Trading Scenarios

			Control of the last	Agencies MICC 1/ Wild Prog	
1	No rise galaxies on the balagorithm of ETL III to calling entry at 100 of the METE (planting distinguished regulation on cognitional regulations), and generally conditions for investment beau.		(No replaced a EX	Artis (10) of the SITS SWIFF antiques regulation on representational requestions and spending conditions for beachined time.	When I is still galletin on the requirement PET IVE within shallon (SIG) of the SME SAME disapport report operational origination and quantity contributes to branchest from the contribute SME still produced by the contribute of the contribute SME still produced by the c
				mi	With the first hash reporting electric that hashing armon should provide the Will figure has become the bit.
	Married or her part wheeling		One regions of WY		dipolition hading does the flag dead only be published by Tuding Version when their insurance Torout had be on see increasing excluded here for each?
				Selegated in the assessment color	Miles has his man reporting different start.
	In Assessment, Transferral States		Other requirements as 675;		Million date the listful is fluorescent and registration seed to be complete typ? Million date the listful decembe of trade block during the
	It Assessment Transferral Sense		Difer explorately at Wh.	foregond ash to ammonature used	ephane and COMM later marked data from for the indial Assessment !
5.	Differential Market Sales		Ohn Ingerment of Etc.	bright At It Street, and	43) the bast that we can be to it is instrument that we call to expert to that beath one framewhat particle places the or liquid planting and the enterprise a set transcriptional. 4 and the basis of the liquid of the an of transcription to all including these planting of the liquid of
				Semantical National Assessment	MAN CONTRACTOR OF THE RESIDENCE AND THE THE PROPERTY AND
	Sitemanni Reproduct/ (ortoines		(Mar requirements or 875)		W) this copyring class or fashions or by NOA Consenses, I NOA (14 No.). As an interprise of this is applied in the copyring of the Class hand has regarded on responsible. Whench the consensation of the day of the Class hand or the Consensation of the Consensation or the Consensation of the Consensation or the Consensation of the Consensation or the Consensation or the Consensation of the Consensation or
	Real-country tracking services are not tracking amounts for the purpose of frameworks.		ETLY Assessed reported		Withor Security Reported Indicators, "Analogies of Notice country tracing water that performs contact function in a regularity or published to provide the property of the Particle of Companyons, I. Note on approved that only Not. Not one of the published on the country of the Particle of Companyons, I. Note on approved that only Not. Not one of the published on the country of the cou
	1000111				efficiel an about profit politics in her to provide the health' for according to the error for hade, does in a set
	What is the publication throughout after has the obligation to propose the head?		NO. I berganna reprince per halo path reprince		for CTC Stades had the description of the field replace solvenant to securior time after with a description that is created to 8 time field. At the appointment in those strategy industrial fields and off figure the data section the content of the field with the
					Admitish also and there for the facility is supply where an agent parties for that Table happening account when the real of their during an independent season from the control of admitishest that are not considered. Therefore any training except "(100% and of admitishest that are not considered in the control of admitishest that are not considered in the control of admitishest that are not of a facility and a season of the control of a facility and a season of the control of a facility and a season of a facility and a facility and a season of a facility and a facility and a facility and a season of a facility and a facili
•	the of 2006 as an indication of the distribution layer for the distribution		\$10.) Supporting regulating		Amounts for an INT way and it follows to deal of the New York
	Specify for Its James and		RS J. Sangaresy represent		Was had high highesting the definition of the sporting had a the repetitor of parts of the francial inclusions or the na defination seemed in the lapton that
		Practices 1 (G)			

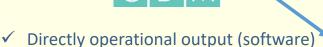
Reporting Sample per Scenario

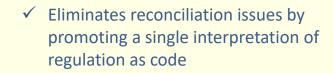
INDUSTRY PARTICIPANTS

Implement the same code in their solutions

Implement rules and best practices in ISDA CDM





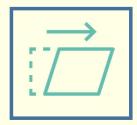


Enables inter-operability of solutions

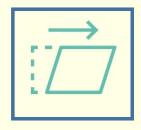






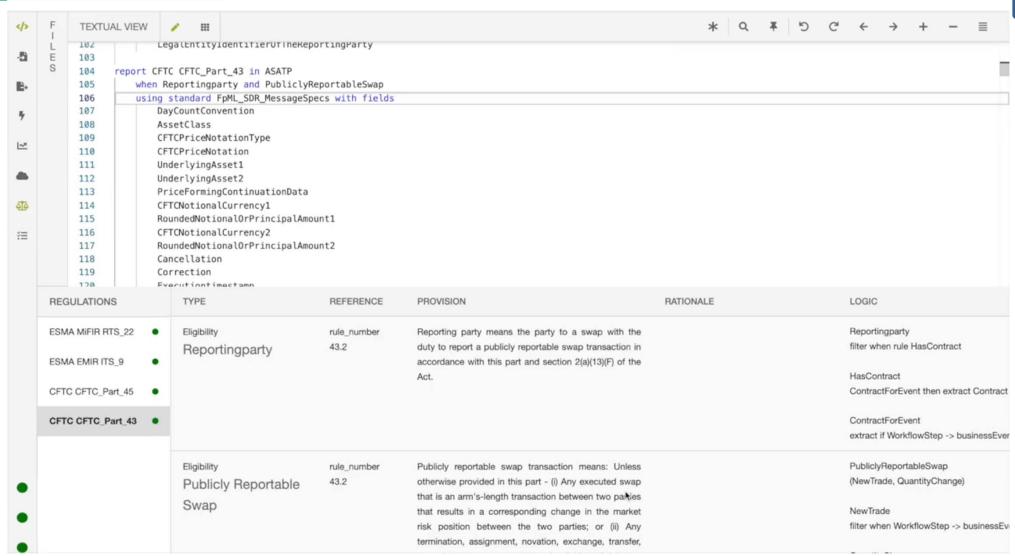








ISDA. C D M A working implementation: CFTC Part 43 Reporting generated from CDM





QUESTIONS?