CDISC Conformance rules and the CDISC Open Rules Engine
Continuing the Road to Adoption

Nick De Donder, CORE Product Owner

Meet the Speaker

Nick De Donder

Title: CORE Product Owner

Organization: CDISC

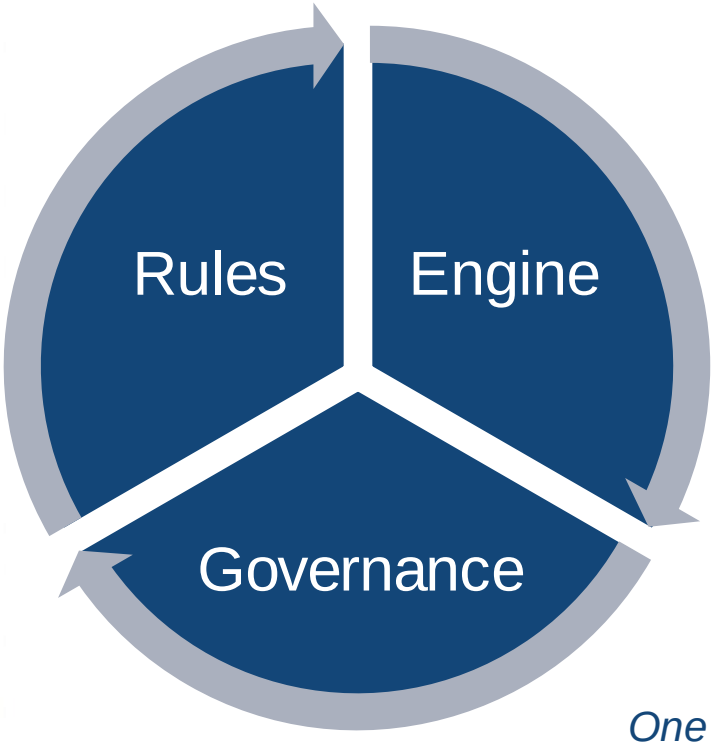
Nick De Donder graduated as a biomedical scientist from the University of Ghent, Belgium in 2007 and has been employed since 2008 by Business & Decision Life Sciences at their headquarters in Brussels. He has been moving from being a Data Integration Specialist to Project Manager to Line Manager for the Data Standards team. Since 2020 he is Head of Data Standards. Nick is a member of the SDS team, an authorized CDISC trainer for CDASH, SDTM and Newcomers and a PHUSE committee member since 2017. In 2019 he joined the E3C and is now co-chairing it. Since June 2021 Nick has been product owner of the CORE application.

Agenda

1. What, Why, and Value of CORE
2. CORE Engine and Deployments
3. Conformance Rules
4. Rules Governance Model
5. What’s Next

What, Why, and Value of CORE

What is CORE?



- **Rules:** Complete set of aligned, open and unambiguous machine-readable conformance rules for each standard including CDISC, Regulatory, and Industry needs
- **Governance:** Well-defined governance model for the evaluation, development, and publication of rules from all stakeholders
- **Engine:** Open-source rules engine available for testing and community use

One set of aligned and transparent conformance rules used across regulatory, sponsors, and vendors along with central curation and governance of the rules

CDISC Open-Source Rules Engine (CORE)

cdisc

Value to our Stakeholders

Regulatory

- Industry aligned rules
- Central and transparent rule management
- Support policy of transparency – rules available to all

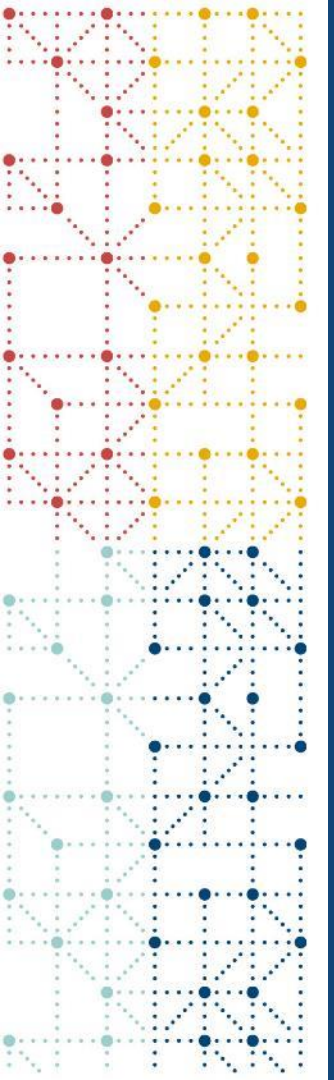
Sponsors

- Level the playing field for solutions leads to cost reduction
- Extensible supporting broad range of conformance use cases
- Convergence towards open source

Vendors

- Gold stamped rule set embedded into solutions
- Certified as a vendor who supports the rules
- Extensible to support specific product conformance needs

One set of open, unambiguous and machine-readable conformance rules used across regulatory, sponsors, and vendors



CORE Engine and Deployments

CORE Software: Engine and Rule Editor

- Each project
  - Has a public GitHub repository on the cdisc-org account and is listed on the COSA Directory
  - Has been released under the MIT open-source license
  - Development is led by CDISC
  - Still under development, but are being actively used
  - Can be extended (supports the development of software extensions)

- CORE Engine
  - Written in Python
  - Makes use of the Venmo Business Rule Engine

- CORE Rule Editor
  - Written in TypeScript
  - Makes use of the VSCode editor

Running the CORE Engine (Workshop Part I)

- Source Code
  - Available on GitHub using the MIT open-source license
- CLI executable available in GitHub
  - Cached rules
  - Windows, Mac, and Linux install packages
  - Unzip and run
  - Will need datasets to validate
- Engine available on PyPI
  - Engine is a component that can be used in your own code
- Desktop versions
  - Vendor released versions of CORE
  - Includes a user-friendly UI
  - Easier for non-technical users to evaluate
- View a short CORE demonstration
  - https://www.cdisc.org/core
  - See CORE on GitHub tab

Third-party Desktop Deployments

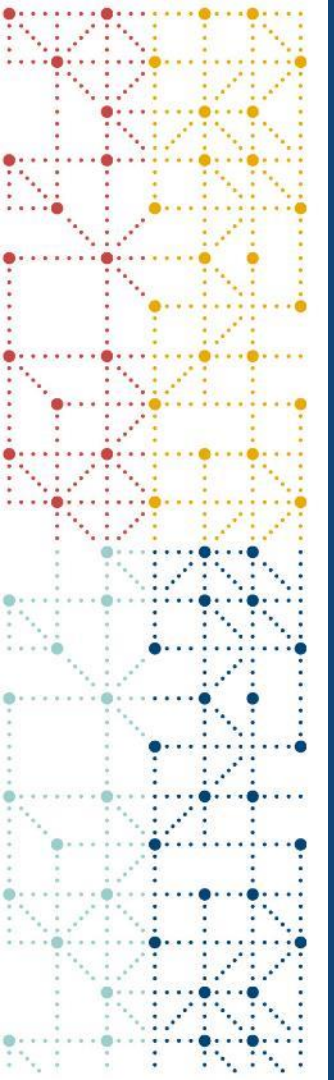
- Early discussions with vendor community for provision of standalone CORE Engine desktop version
  - Simple to install and use
  - Provide a UI
  - Will make it easier for the CDISC community to evaluate CORE without IT support

- CORE is a Reference Implementation
  - The principle is commonly used in the software industry
  - Provides a concrete example on how the standard should be implemented

Drive adoption

Latest updates

- Release 0.7 (19APR2024)
- New and advanced operators
- New exporting capabilities
- Support for Dataset-JSON
- Support for USDM



Conformance Rules

EDIT TEST DIFF

```yaml
# Variable: EXMETHOD
# Condition:
# Rule: EXMETHOD not present in dataset
Authorities:
  - Organization: CDISC
    Standards:
      - Name: SDTMIG
        References:
          - Citations:
              - Cited Guidance: Method of administration of the treatment. Not to be used with
                  human clinical trials.
                Document: Model v1.7
                Item: EXMETHOD
                Section: Table 2.2.12.1
            Origin: SDTM and SDTMIG Conformance Rules
            Rule Identifier:
              Id: CG0568
              Version: '1'
            Version: '2.0'
        Version: '3.3'
Check:
  all:
    - name: EXMETHOD
      operator: exists
Core:
  Id: CORE-000326
  Status: Published
  Version: '1'
Description: Trigger error when EXMETHOD exists in the EX dataset for human clinical trials
Executability: Fully Executable
Outcome:
  Message: EXMETHOD is not to be used with human clinical trials
Rule Type: Record Data
Scope:
  Classes:
    Include:
      - INTERVENTIONS
  Domains:
    Include:
      - EX
Sensitivity: Record
```

CORE Rule Editor (Workshop Part II)

- Web-based application, no software to install
- Structured document, 1 CORE rule per file containing rule's metadata & check logic
- Real-time syntax checking

Volume and Breadth of Conformance Rules

Over 1900 Unique Conformance Rules

Covers multiple different versions of the Implementation Guides

Includes Regulatory Rules

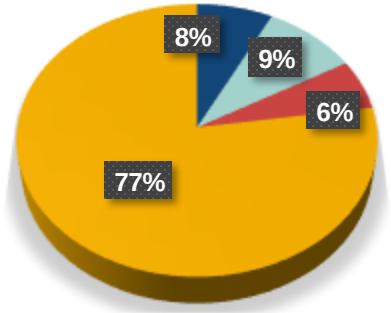
SDTMIG v3.2, v3.3, v3.4

ADaMIG v1.0, v1.1, v1.2, v1.3, PopPK

SENDIG v3.0, v3.1, v3.1.1, DART v1.1, v1.2, GeneTox v1.0

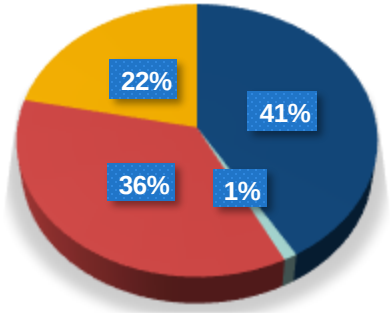
State of the rules

SDTMIG v3.4

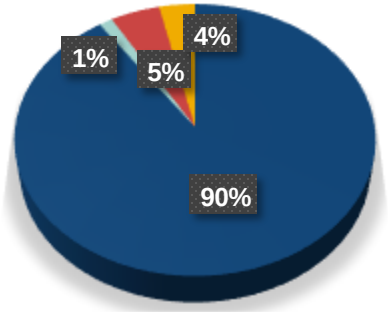


Open
Blocked
Ongoing
Published

SENDIG v3.1.1



ADaMIG v1.3



Research Collaboration Agreement with US FDA CDER & CBER

CDISC and FDA working together to develop executable formats of the FDA Business Rules and on the development and ongoing governance of this set of executable rules within CORE that can be used by industry

The benefits of creating a single source of truth for all FDA validation needs increases transparency for all stakeholders on how FDA checks data for conformance to CDISC standards and to existing FDA Business Rules

CDISC is Proud to Announce a Research Collaboration to Incorporate FDA Business Rules into CORE

ustin, TX – January 16, 2024 – CDISC is proud to announce a research collaboration with he U.S. Food and Drug Administration's Office of Translational Sciences in the Center for rug Evaluation and Research and Office of Regulatory Operations in the Center for iologics Evaluation and Research to incorporate FDA Business Rules into CDISC's Open ules Engine (CORE).

CDISC's CORE project provides an open-source version of the CDISC Conformance Rules s a machine-executable format. These rules, published and managed by CDISC, create a ingle source for conformance rules and allow external vendors and sponsor companies to mplement and extend these rules within their tools. FDA Business Rules are currently ritten in a plain text, non-machine executable format and describe the business equirements for regulatory review to help ensure that clinical trial study data is compliant nd useful and supports meaningful review and analysis.

he goal of this effort, which began on November 3, 2023 and has term of three years, is to ollaborate on providing input on machine-executable formats of the FDA Business Rules nd on the development and ongoing governance of this set of executable rules within CORE

FDA Business Rule ID	FDA Business Rule
[redacted]	[redacted]

FDA business rules

- 70 business rules translated into 250 (and counting) executable rules
- Rules reviewed by CROG and FDA by end of May
- Creation of all rules by end of the year

Additional Standards

- TransCelerate Digital Data Flow
  - Conformance Rule Proof of Concept on Unified Study Definition Model (USDM)
  - 100 rules defined and partially created
  - Moving into Phase 4

- Tobacco Implementation Guide
  - Creating new TIG-specific rules
  - Aligning with existing conformance rules
  - 1240 rule defined

- Define-XML and JSON schema checking

Moving forward with additional implementations

Rules Governance Model

CORE Rules Governance

Rules Governance Team

(CDISC; Regulatory Agencies; Community)

Rule Specifications

CORE Rules (executable)

cdisc Standards

Provide rule specs

Regulatory Agencies

Provide business rules

Community

Propose new / updated rule specs

Rules Gov Team Activities

- Receive specifications
- Load to central catalog

Rules Gov Team Activities

- Govern specs content
- Curate content
- Mark rules for dev.
- Prioritize rules for dev.

Central Specifications Catalog

Freely Available

Rules Gov Team Activities

- Govern CORE Rules dev. process
- Assign Rules for development
- Review /approve Rules for release

Rules Development

Community

Publish

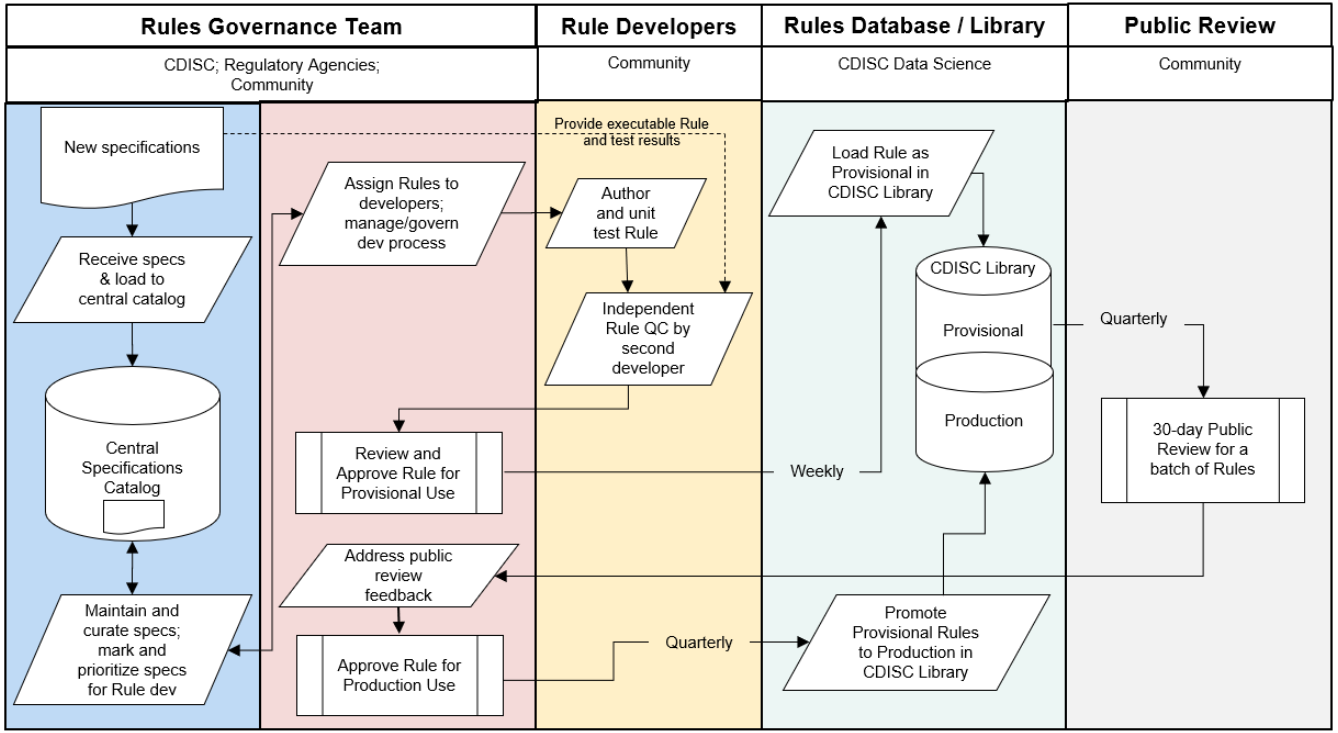
CDISC Library

API

3rd Party Applications

CORE Engine

Conformance Rules: Governed Development Process



Governance model is complete; implementation is in progress

What’s Next

CORE Registered Solution Provider

- Program purpose
  - For CORE vendors (solution providers)
    - Certify with CDISC that their solutions correctly use the Conformance Rules
  - For CDISC
    - Treat all CORE vendors equally
    - Achieve a level playing field regarding use of any Engine with the Conformance Rules
    - Inform the community which solutions have been certified

- Testing for certification will include
  - Generating results with Conformance Rules and test study data reflecting an “average study”
  - No system functionality testing

Developing CORE Rules in the Future

- Plan to draft the rule logic within the CORE Rules Editor
- Use the Rule Description and Outcome Message to review rule during Internal and Public Review
- Cited Guidance is part of the Rule
- Rule Logic is transparent

Next Milestone

- The complete ruleset for
  - SDTM 3.3 and SDTM 3.4
  - Define.xml crosscheck rules
  - FDA business rules v1.5 (that apply to SDTM 3.3 and SDTM 3.4)
  - FDA Technical Rejection Criteria

- CORE Engine Stable Release
  - Engine can run all the rulesets above
  - Thorough testing and validation documentation

- Purpose
  - Test with real study data and roll out rule governance process

Implementers can integrate this stable version
Drive adoption and test with real study data

In Summary

- Rules
  - Full set of executable rules for submission standards (SDTM, SDTMIG, SENDIG, ADaMIG)
  - Including Regulatory-specific rules
  - Including Define.xml cross-check rules

  → *Continuing volunteer engagement is critical!*

- CORE is the Reference Engine
  - Engine with all basic functionality for full set of machine-executable rules
  - Includes a validation package

- CDISC will establish a CORE certification program
  - To verify output of different applications versus the CORE Reference Engine
  - CDISC conformance rules are the single version of the truth

Rules are part of the Standards!
Expect Regulatory Agencies to mandate use of CDISC Conformance Rules

Thank You!