



SI01: Connecting Standards from Design to Analysis to Submission: Finishing the CDISC 360 Vision

Peter Van Reusel

Sam Hume



Meet the Speaker

Peter Van Reusel

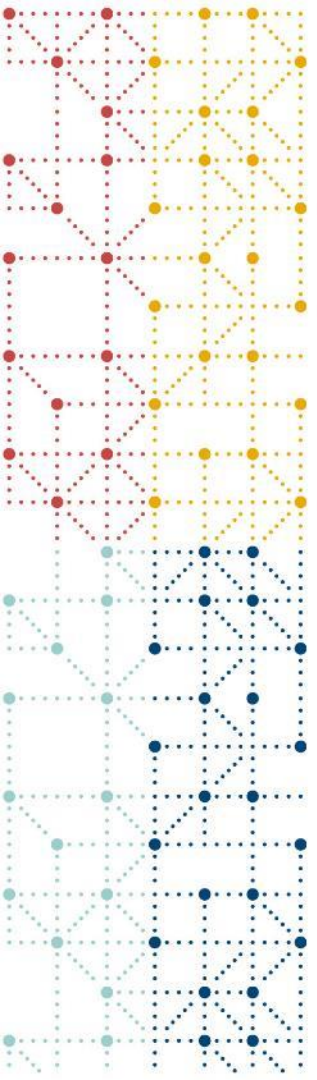
Title: Chief Standards Officer

Organization: CDISC



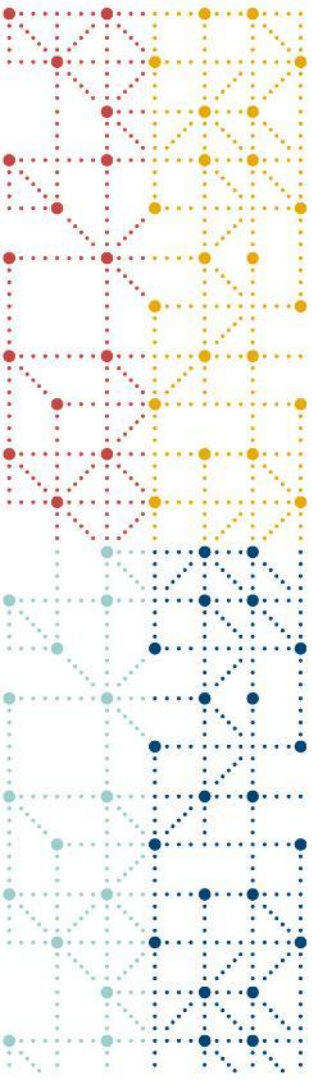
Peter Van Reusel provides executive leadership to the development and implementation of clinical standards in line with CDISC's strategy and operational plans, working closely with the President and CEO, as well as CDISC staff and stakeholders. He has over 20 years' experience in senior roles in pharma and at CROs, providing standards expertise and carrying out other standards work in various organizational settings. A long-time, CDISC-authorized instructor, Peter has helped significantly in developing CDISC training courses.

He previously served as CDISC's European Liaison, fostering relationships with key European regulatory, academic, and biopharma stakeholders. Peter is also an active PHUSE collaborator.



Agenda

- CDISC 360 lessons learned & where are we now
- CDISC 360i: implementing the vision



CDISC 360 lessons learned

What were we trying to solve

Two dimensional standards

- CDISC Foundational models provide much needed structure

- Normative Content
- 2 dimensional (tables, columns)
- Standard to represent data

- The Information itself is not defined

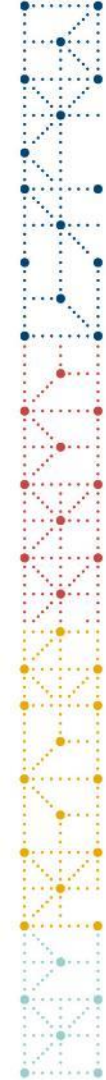
- We do not need new structures
- We need to define
 - Entities
 - Semantics (meaning)
 - Relationships between information
 - Rules in the data lifecycle

Question Test	Prompt	SDTM or CDASH Variable Name	BRIDG	Definition	CRF Completion Instructions	Information for Sponsors	Core
1	Were vital signs collected?	Vital signs collected?	VSPERF	Performed Observation Result: value	General prompt question regarding whether or not any VS were collected during the study. This provides verification that all other fields on the CRF were deliberately left blank. (NY) (See Section 2.2.)	Indicate if the vital signs were collected. If yes, include the appropriate details where indicated on the CRF. For the SDTM-based dataset, SDTMIG variable VSSTAT is derived from a "No" value in VSPERF. This field does not map directly to an SDTM variable.	O
2	On what date were the measurements performed?	Date	VSDAT	Performed Activity: dateRange*	Date of measurement.	Record date of measurements using this format (DD-MON-YYYY). The date of measurement can be derived from a collected date of visit and in such cases a separate measurement date field is not required. For the SDTM-based dataset, the SDTMIG variable VSSTAT is derived from a "No" value in VSPERF. This field does not map directly to an SDTM variable.	R/C

vs.xpt, Vital Signs — Findings, Version 3.2. One record per vital sign measurement per time point per visit per subject, Tabulation

Variable Name	Variable Label	Type	Controlled Terms, Codelist or Format	Role	CDISC Notes	Core
STUDYID	Study Identifier	Char		Identifier	Unique identifier for a study.	Req
DOMAIN	Domain Abbreviation	Char	VS	Identifier	Two-character abbreviation for the domain.	Req
USUBJID	Unique Subject Identifier	Char		Identifier	Identifier used to uniquely identify a subject across all studies for all applications or submissions involving the product.	Req
VSSEQ	Sequence Number	Num		Identifier	Sequence Number given to ensure uniqueness of subject records within a domain. May be any valid number.	Req
VSGRPID	Group ID	Char		Identifier	Used to tie together a block of related records in a single domain for a subject.	Perm
VSSPID	Sponsor-Defined Identifier	Char		Identifier	Sponsor-defined reference number. Perhaps pre-printed on the CRF as an explicit line identifier or defined in the sponsor's operational database.	Perm
VSTESTCD	Vital Signs Test Short Name	Char	{VSTESTCD}	Topic	Short name of the measurement, test, or examination described in VSTEST. It can be used as a column name when converting a dataset from a vertical to a horizontal format. The value in VSTESTCD cannot be longer than 8 characters.	Req

Variable Name	Variable Label	Type	Codelist/ Controlled Terms	Core	CDISC Notes
STUDYID	Study Identifier	Char		Req	DM.STUDYID
USUBJID	Unique Subject Identifier	Char		Req	DM.USUBJID
SUBJID	Subject Identifier for the Study	Char		Req	DM.SUBJID. SUBJID is required in ADSL, but permissible in other datasets.
SITEID	Study Site Identifier	Char		Req	DM.SITEID. SITEID is required in ADSL, but permissible in other datasets.
SITEGRY	Pooled Site Group y	Char		Perm	Character description of a grouping or pooling of clinical sites for analysis purposes. For example, SITEGR3 is the name of a variable containing site group (pooled site) names, where the grouping has been done according to the third site grouping algorithm, defined in variable metadata. SITEGR3 does not mean the third group of sites.
SITEGRY(N)	Pooled Site Group y (N)	Num		Perm	The numeric code for SITEGRY. One-to-one mapping to SITEGRY within a study.
REGIONY	Geographic Region y	Char		Perm	Character description of geographical region. For example, REGION1 might have values of "Asia", "Europe", "North America", "Rest of World"; REGION2 might have values of "United States", "Rest of World".
REGIONY(N)	Geographic Region y (N)	Num		Perm	The numeric code for REGIONY. Orders REGIONY for analysis and reporting. One-to-one mapping to REGIONY within a study.

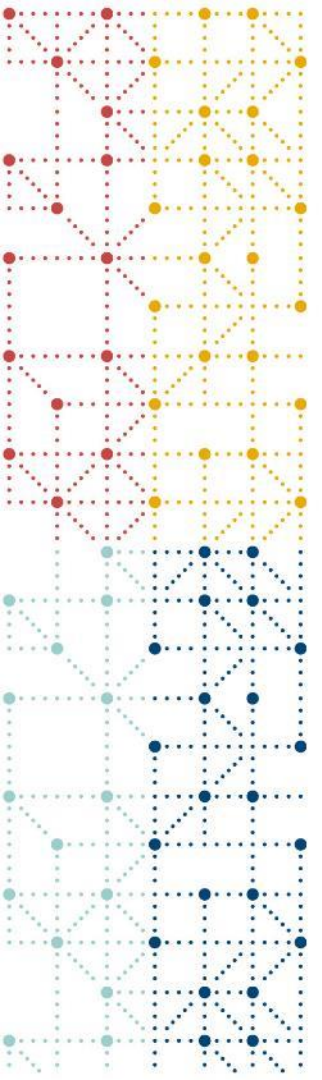


Biomedical Concepts

The CDISC 360 Proof of Concept: Adding a conceptual layer to standards

- Evolve from normative to informative standards
- Create and store standards as concepts which create meaning
- Electronically publish data standards as linked metadata
- Add computer executable process metadata which enables end to end automation
- Develop concept-based standard definitions, and test and demonstrate end-to-end automation of study specification, data processing, and analysis

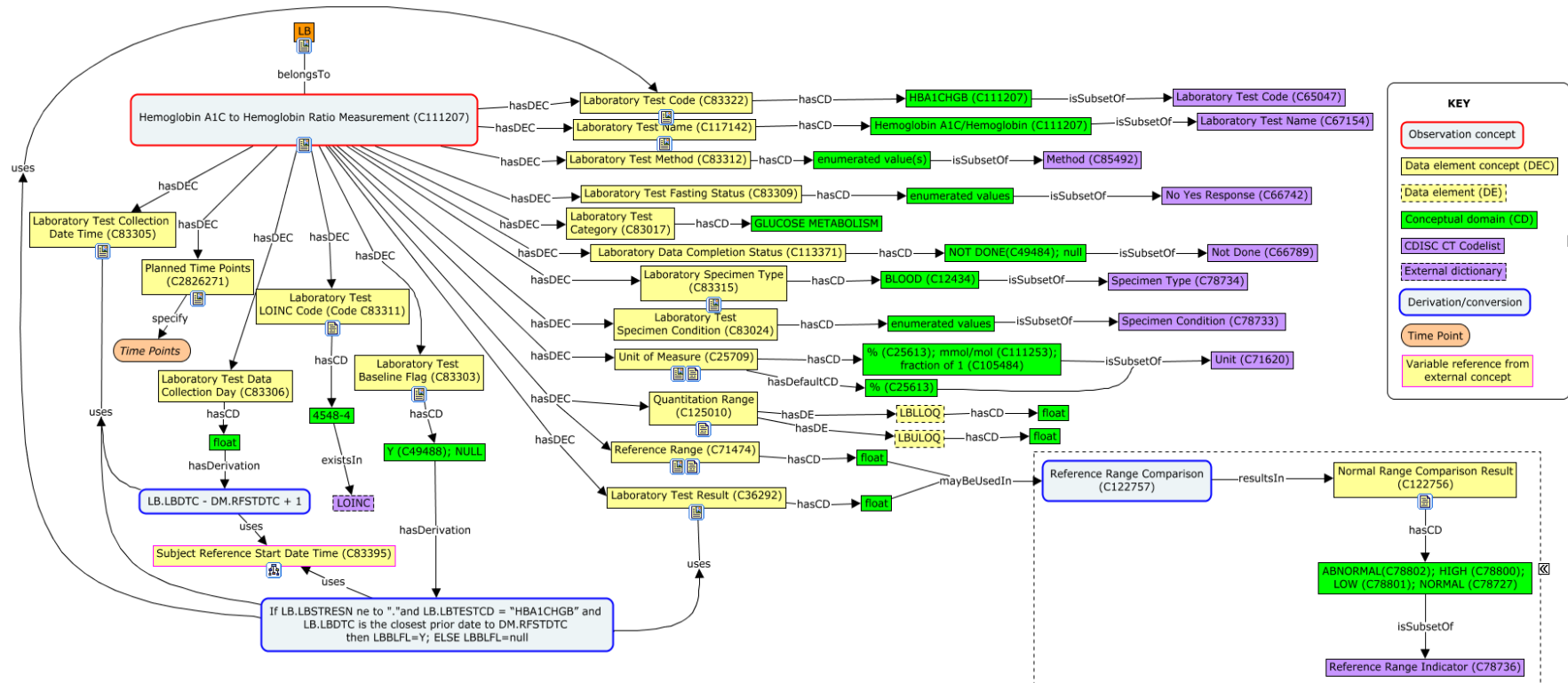
➔ *Test and demonstrate, but not building software*



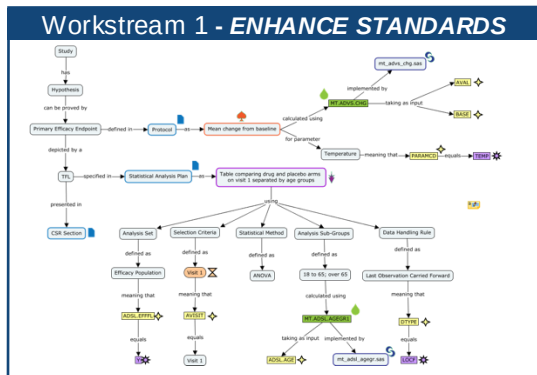
CDISC 360 lessons learned

Project approach

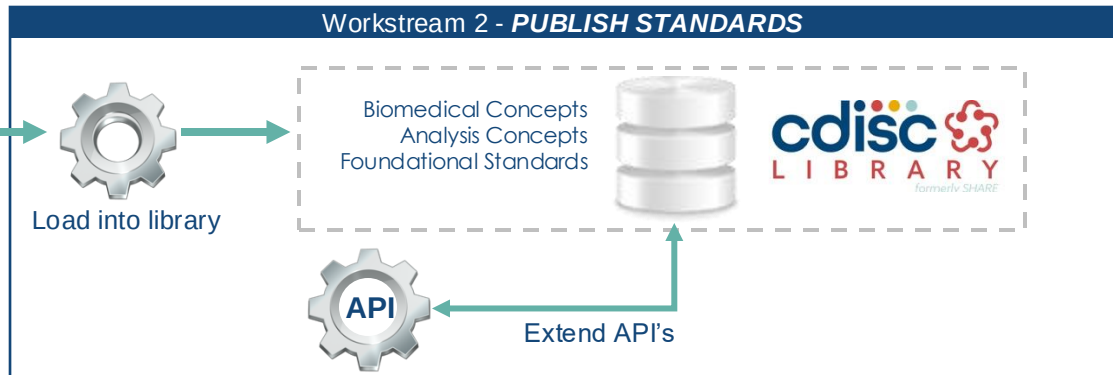
Early ideation of a Biomedical Concept



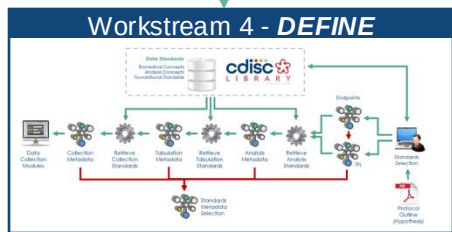
CDISC 360 Workstreams



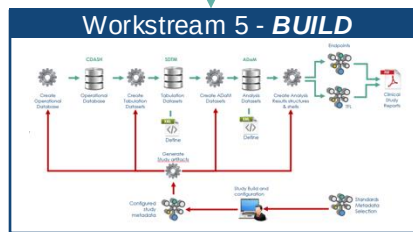
Create concepts in knowledge graphs



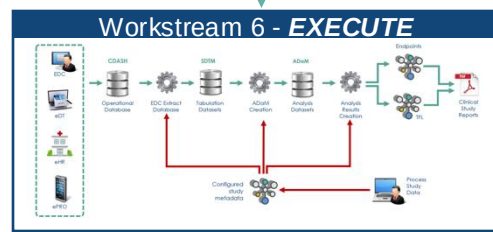
Transform concepts in machine readable form



Identify and select standards specification (Use Case 1)



Configure study specification and create artifacts (Use Case 2)



Automatically process and transform data (Use Case 3)

CDISC 360 Workstreams



*Enhance
Standards*



Bess LeRoy,
CDISC Head of Standards

*Publish
Standards*



Sam Hume,
CDISC VP Data Science

Study
Metadata
Library



Define



Mikkel Traun,
Novo Nordisk

Build



Tianna Umann,
Microsoft

Execute



Bhavin Busa,
Vita Data Sciences

Industry



360 Participation Summary

Project Kickoff:

36 Resources specified

20 Organizations

Execution Phase:

107 Resources specified

38 Organizations

- Pharma-Biotech Sponsor: 20
- CRO: 6
- Technology Provider: 11
- Regulatory: 1



abbvie

 Allergan

AMGEN®

AstraZeneca 

 Bayer HealthCare

 BeiGene

 Biogen

B:OMARIN®

 C&R
RESEARCH

 Celgene

 Cytel
STATISTICAL SOFTWARE & SERVICES

Deloitte.

 dMed
締脉

FDA

formediX

 frontier
science foundation

 GILEAD

 Inductive Quotient
Research . Bigdata . Analytics

Johnson & Johnson

Lilly

 Mel
Consulting

 MERCK

 Microsoft

novo nordisk 

ORACLE®

Otsuka 

 Pfizer

 PharmaStat®

PINNACLE²¹

 POINT
CROSS

 S-CUBED

 SANOFI

 sas

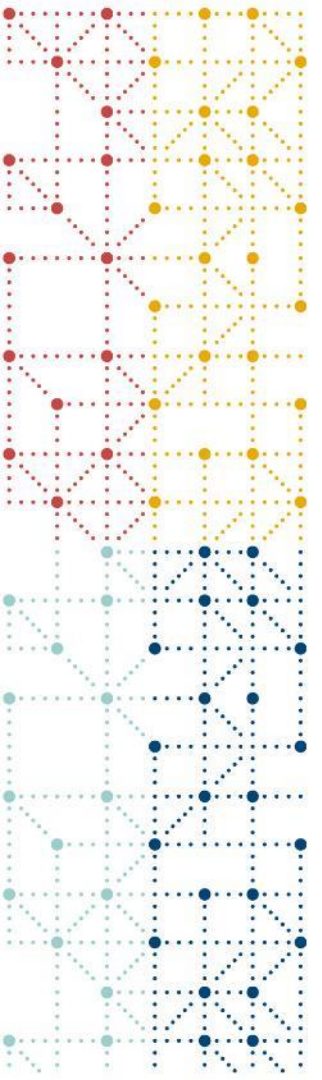
 Syneos.
Health

TALENT MINE 

VITA DATA SCIENCES
a division of SOFTWAREWORLD

 xclinical

 Clinical
Solutions
Group



CDISC 360 lessons learned

Where are we today

Standards Development

- **Complete end to end standards**

- ☒ ☒ • Data Collection instruments
- ☒ • Analysis Results
- ☒ • Endpoint definitions
- ☒ • Digital protocol and study design
-  • Trial Master File



- **Enrich existing standards**

- ☒ ☒ • Refine and test Biomedical Concepts
- ☒ ☒ • Link concepts to standard implementation
- ☒ • Understand Analysis Concepts and link to Biomedical Concepts
- ☒ ☒ • Add transformations and derivations content



➔ *Digitalize Therapeutic Area Guides*

Standards Delivery

- Evolve **library** technology and schema

- ☒ ☐ • Refine and test the BC models
- ☒ ☐ • Refine and deploy BC software tools
- ☒ • Load BC content into the CDISC Library
- ☒ • Surface BC content via APIs and the Library Browser



→ *Support Automation*

- Evolve toward collaborative **curation**

- ☒ • Develop and rollout governance process
- ☐ • Create CDISC Library curation tools
- ☒ • Develop standards curation training
- ☐ • Enhance CDISC Library to load community standards implementations

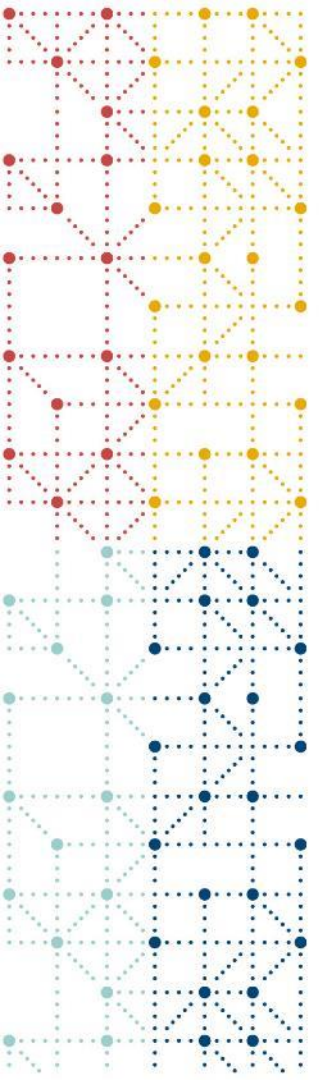
→ *Crowdsource standards*



Software Tools since the CDISC 360 POC*



Study Design	Data Collection	SDTM	ADaM	Define-XML	ARS
Open Study Builder 	odmLib 	sdtn.oak 	admiral 	OpenCST 	TLF Designer** 
Study Definitions Workbench 	ODM XML Stylesheet 	Dataset-JSON Tools 	Dataset-JSON Tools 	defineR 	cards 
BC Browser 		CORE 	carver 	odmLib 	gtsummary 
DDF SDR 		Smart Dataset Viewer 		Define XSL Stylesheet 	JMP Clinical** 



CDISC 360i: implementing the vision

Realizing the CDISC Mission

CDISC Strategic Plan & Roadmap



Expand & Connect

Expand, Connect, and
Digitize Our Standards



Enable & Automate

Reduce Variability, Enable
Interoperability, and
Increase Automation



Engage & Adopt

Focus on Community
Needs and Deliver
Business Value

Strategic Goal:

Expand and Enable standards-driven automation across end-to-end study information lifecycle from study design through results.

CDISC will expand and realize the original 360 vision.



CDISC 360i

- Define end to end standards
 - Digitalize information from protocol to reporting
 - Link concepts to representation standards
 - Forms definition, eDTs, DHT, SDTM specs, ADaM specs, TFL specs, ...
 - Enrich with transformation & derivation logic
- Study design & build
 - Select concept and concept groups in digital Schedule of Activities
 - Automates study builds
 - Forms definition, SDTM specs, ADaM specs, TFL specs, ...
 - Provides derivation & transformation algorithms
- Automate data flow
 - Demonstrate end to end automation
 - Starts with linking Schedule of Activities to Concepts (and Concept Groups)
 - Automates transformations & derivation between data states
 - Collection, tabulation, analysis, results



360i Study Package

Metadata

- Publish a complete study metadata package that covers the full study data pipeline from study design through TLFs.

Data

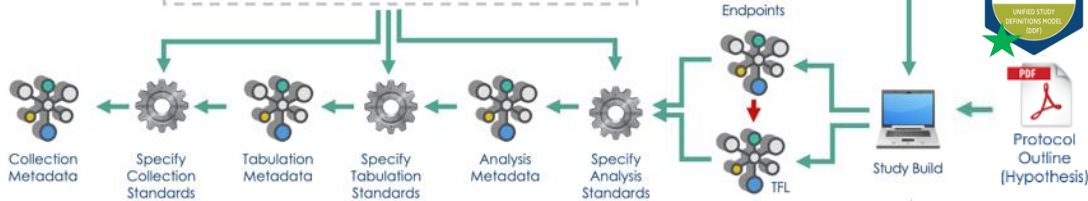
- Publish the complete set of raw datasets for the test study to execute the automated study data pipeline.

Software

- Publish a pre-configured set of open-source software tools that consume the study metadata and data to execute the study design using the test data.

Demonstration

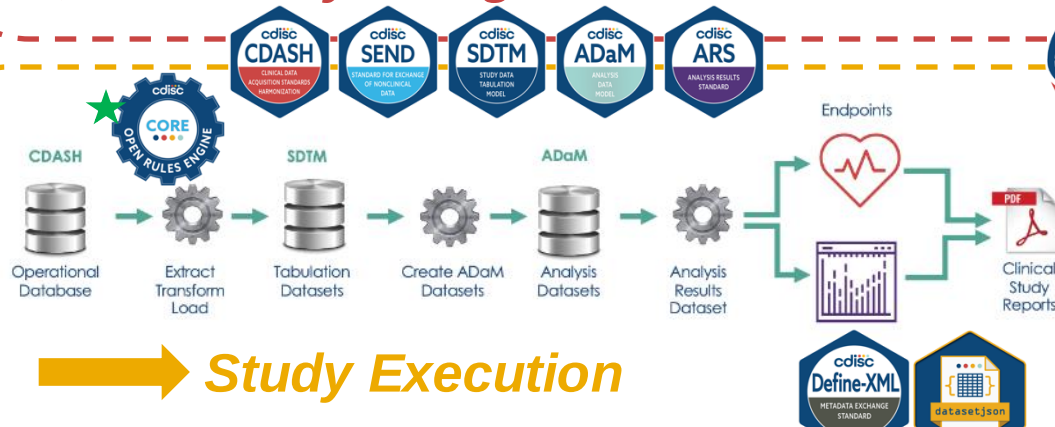
- Execute the study build and data pipeline automation in a Connectathon event to demonstrate generating analysis results from a study design.



Study Design & Build



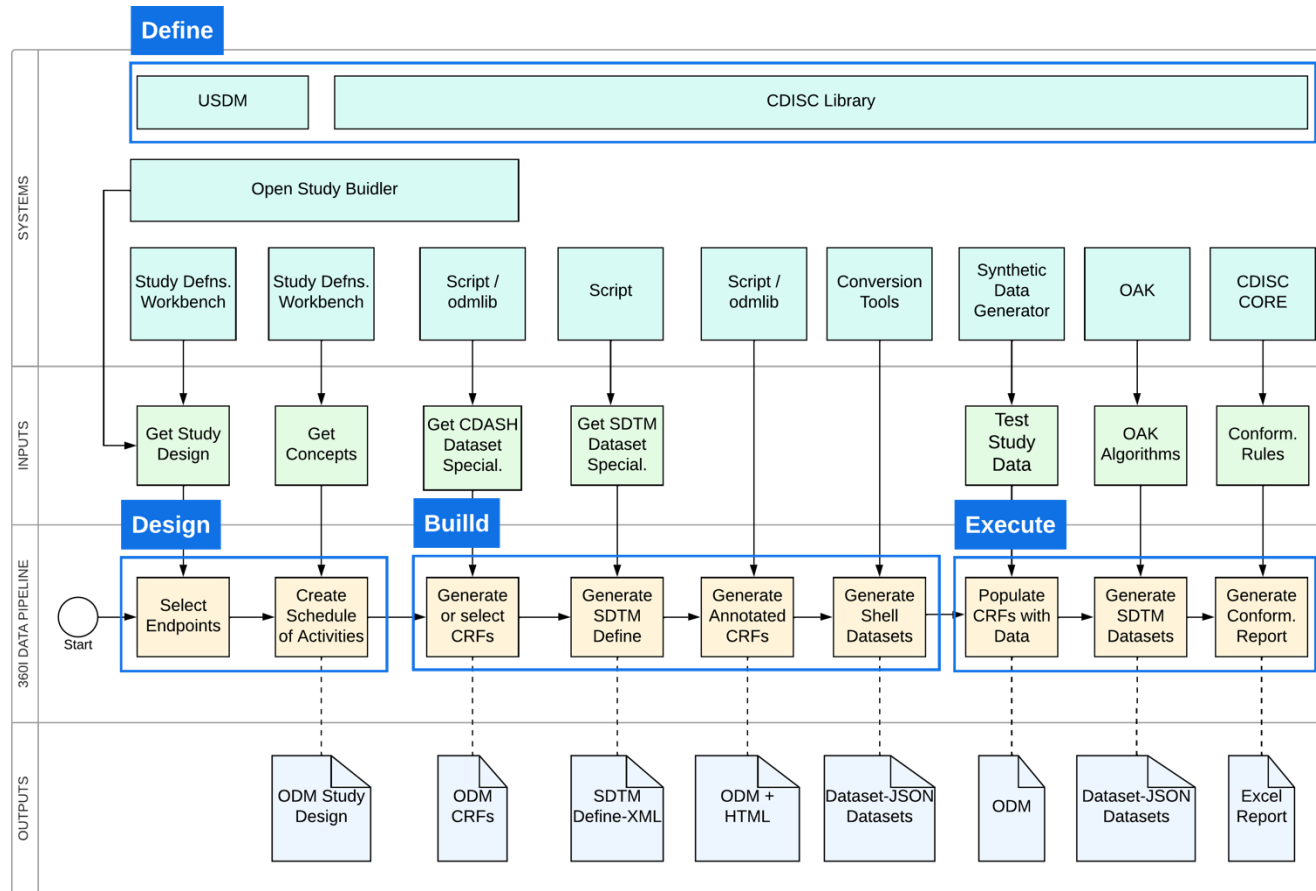
Data Sources



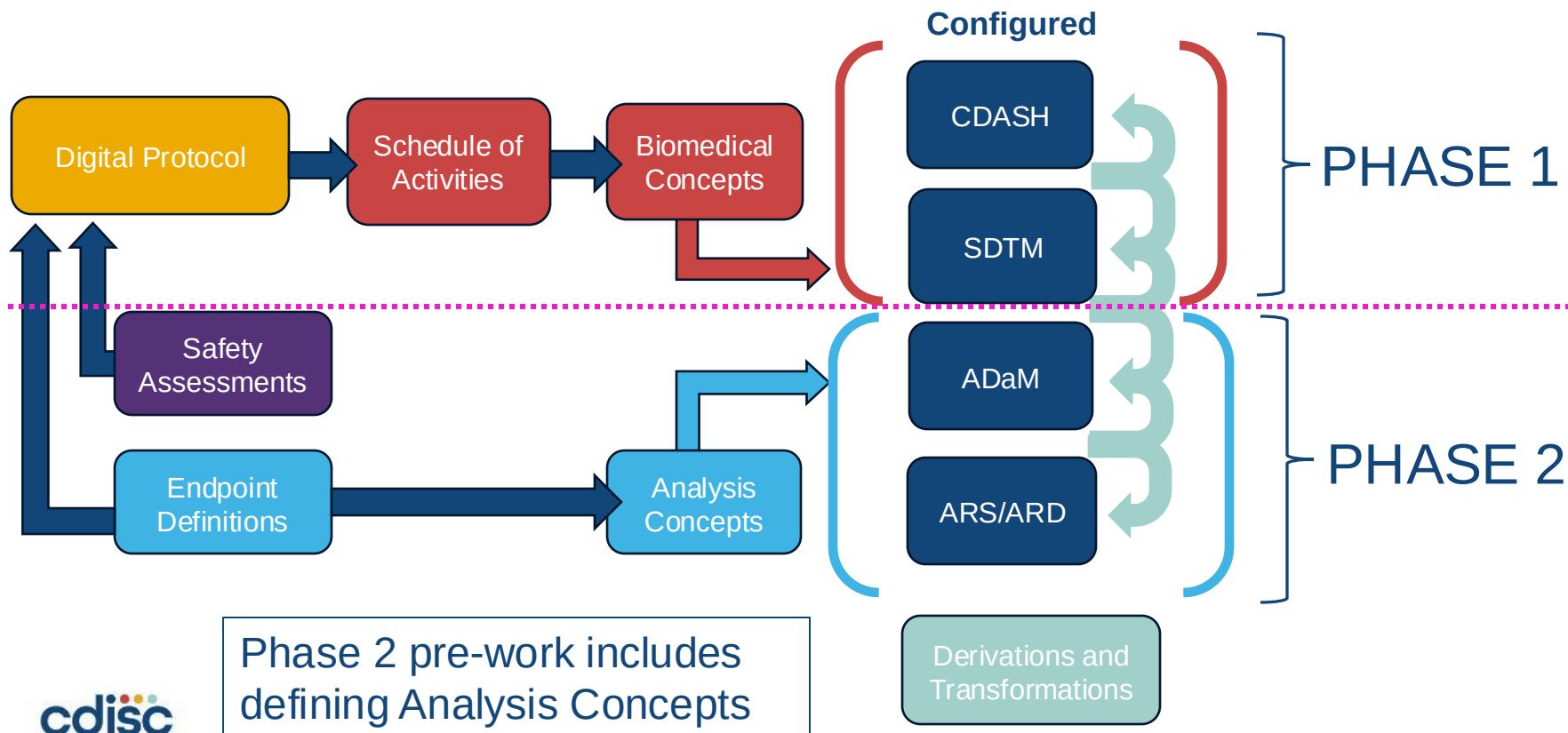
Study Execution

CDISC 360i Phase 1: Generating SDTM

Technical Process



360i Phase 2: Generating Analysis Results





Standards driven automation: Faster Innovation at Reduced Costs

- Community development
 - Reduced development and maintenance costs
 - Applies to data standards and open-source software
 - Reduced Total Cost of Ownership - free as in puppy, not as in beer
- End to End standards provide faster innovation
 - Reduce unnecessary variability
 - Focus on research instead of data wrangling
- Open-source software
 - Higher tolerance for risk
 - Support sustained development and innovation
 - Planning Connectathons that include open-source and commercial software tools
- Path of least resistance
 - Path of least resistance – easier and cheaper than using a proprietary approach
 - Easy on ramps – make it easier for newcomers to get started with CDISC
 - Lower barriers to entry for researchers and academic research

Thank You!

We Want Your Feedback!

