



USDM & Digital Data Flow

OpenStudyBuilder Project
as Enabler

Agenda



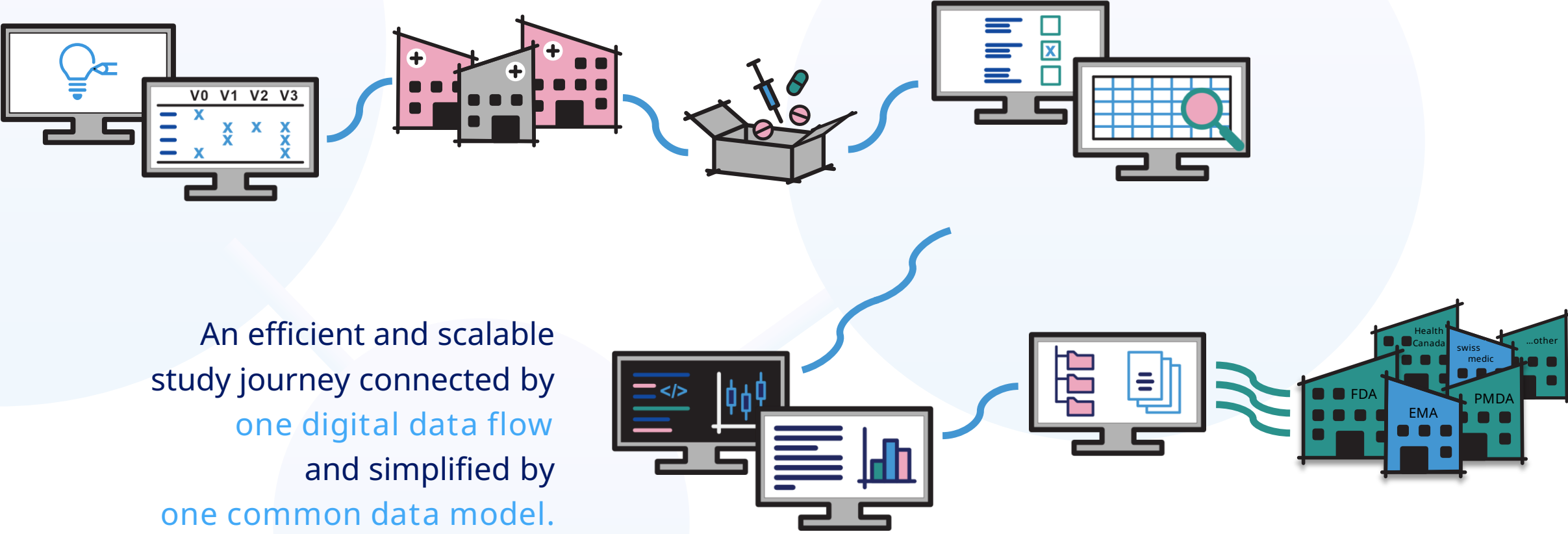
- Introduction
- USDM in OSB
- Adoption



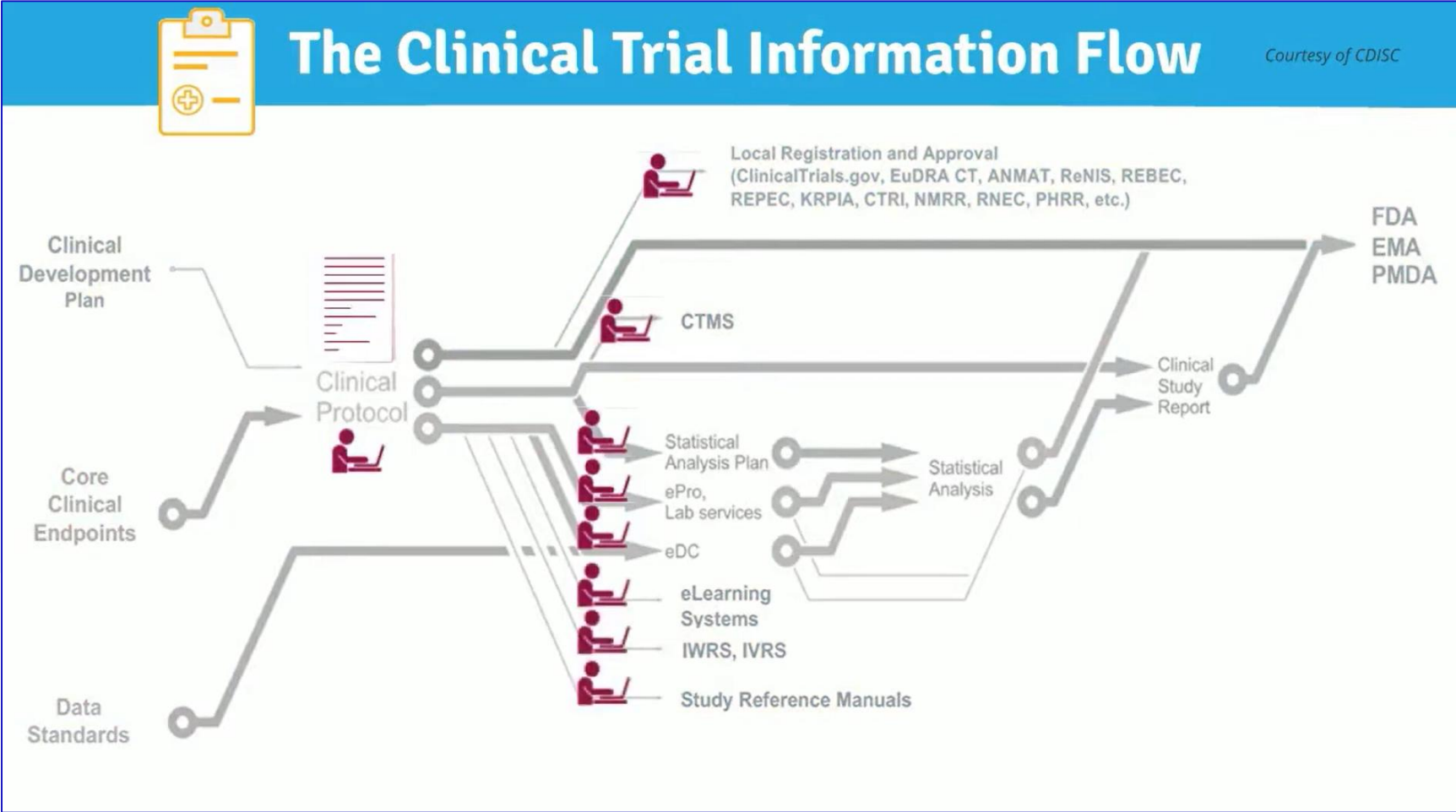
Introduction

Why do we need DDF
and the USDM Model?

Process Automation



Digital Data Flow – Problem 1



Documents
instead
Data

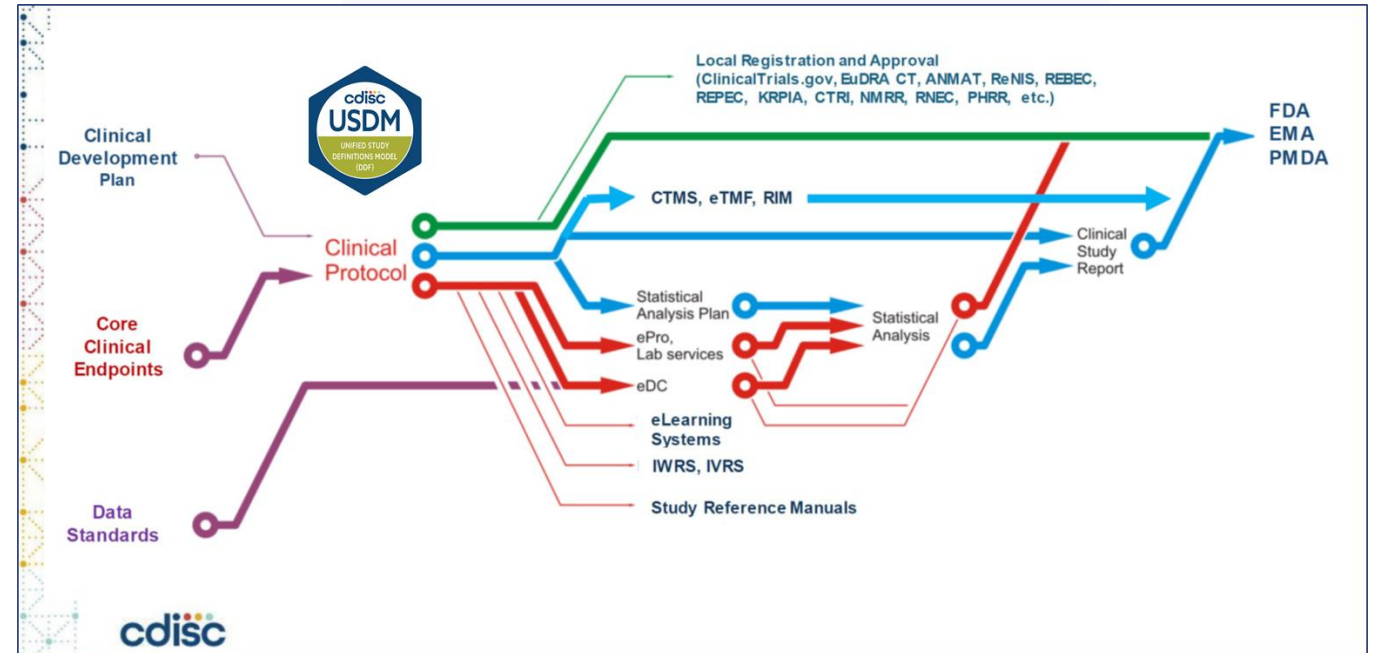
Digital Data Flow – Problem 2



Digital Data Flow – Solution

Data instead Documents

- Data Exchange Standard (USDM)
- Electronic Protocol (ICH M11)



Digital Data Flow – Solution

Graph Database with Semantic Information

- Biomedical Concepts (CDISC)
- Linked Data Model



Way to Connected Data Landscape

A Metadata Data Repository and a Study Definition Repository

End-to-end automation from structured protocol to submission deliverables using concept-based standards

Core Elements

- Clinical Metadata and Study Definition Repository
- API layer
- OpenStudyBuilder application / Web UI

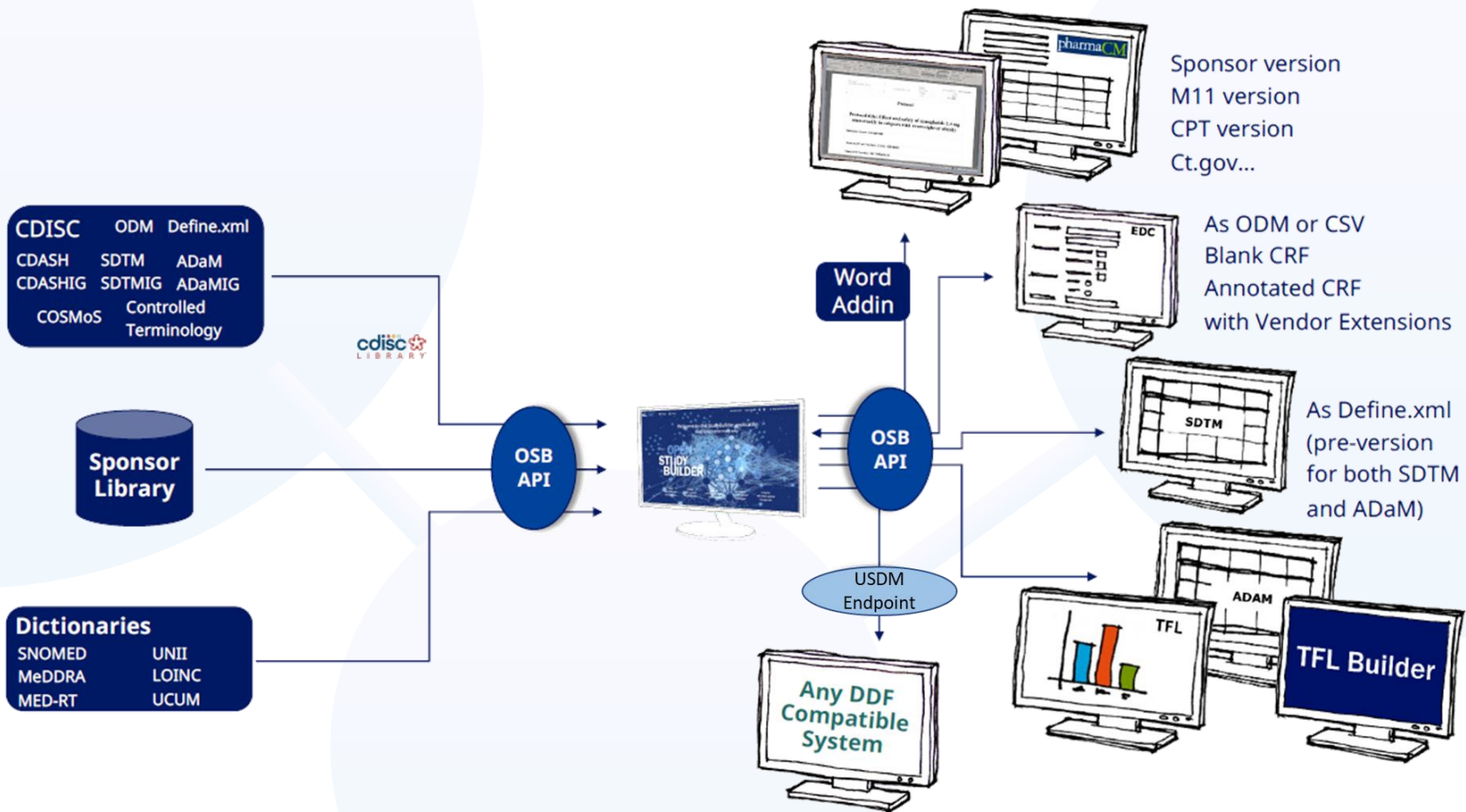


Open Source



MDR & SDR

Connectivity & Standards are Key



USDm

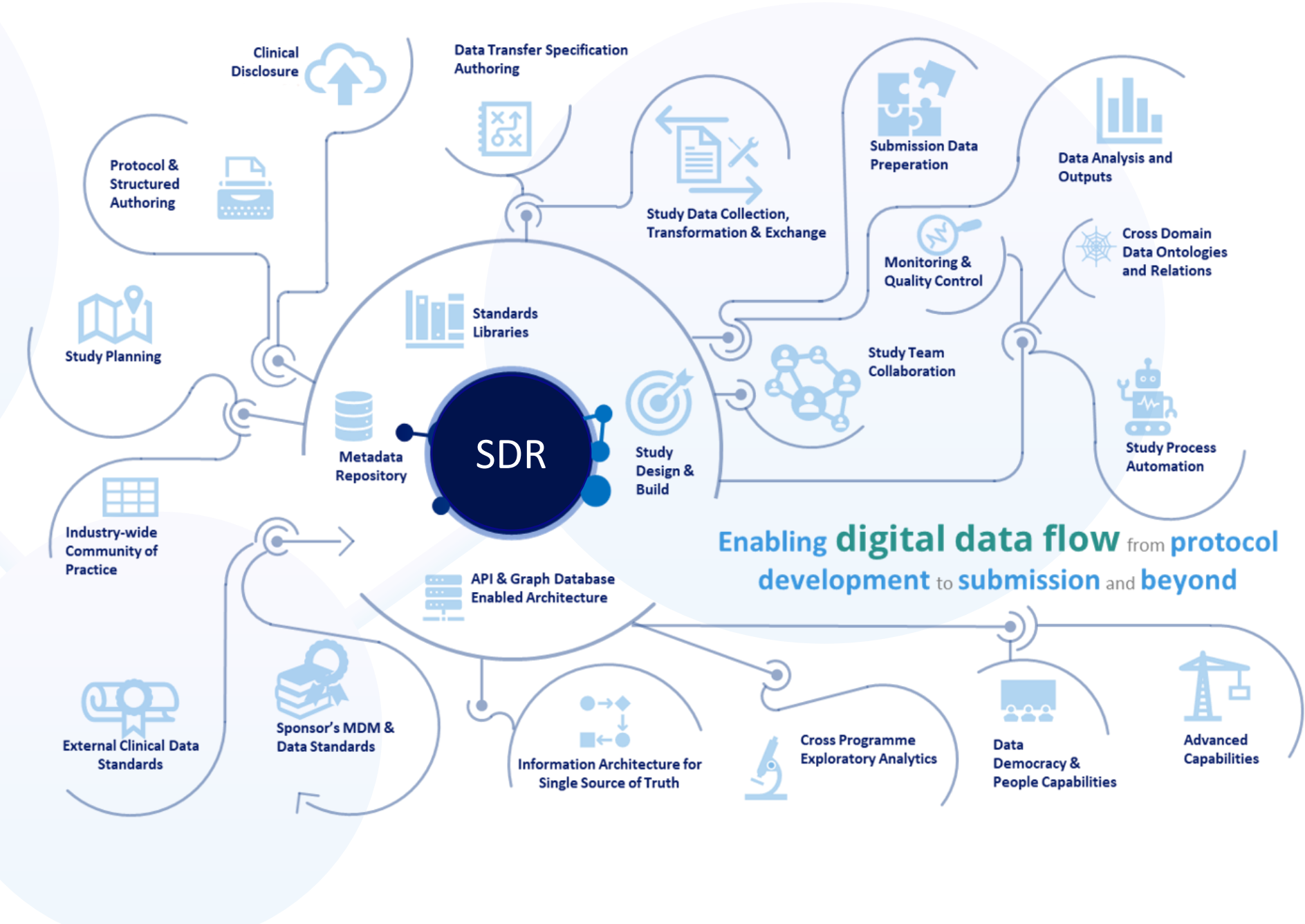
M11

CDISC

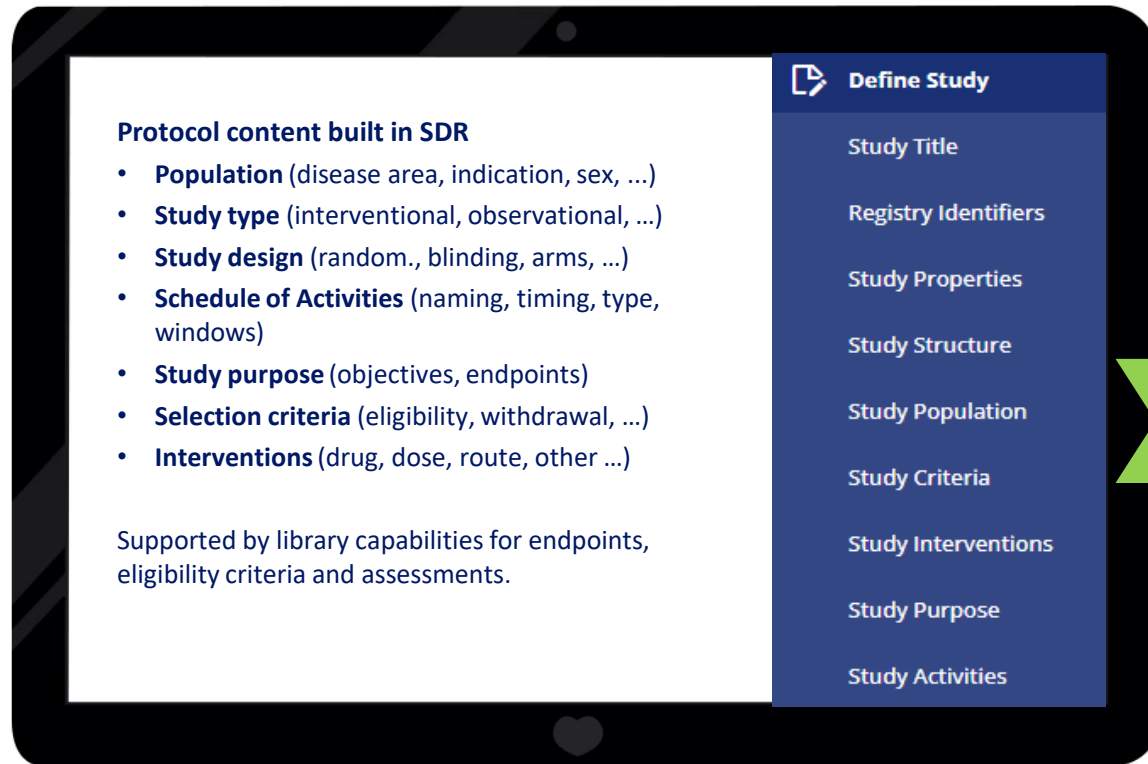
NCI

...

Opportunity Map



USDM & M11 Enabling Protocol Automation



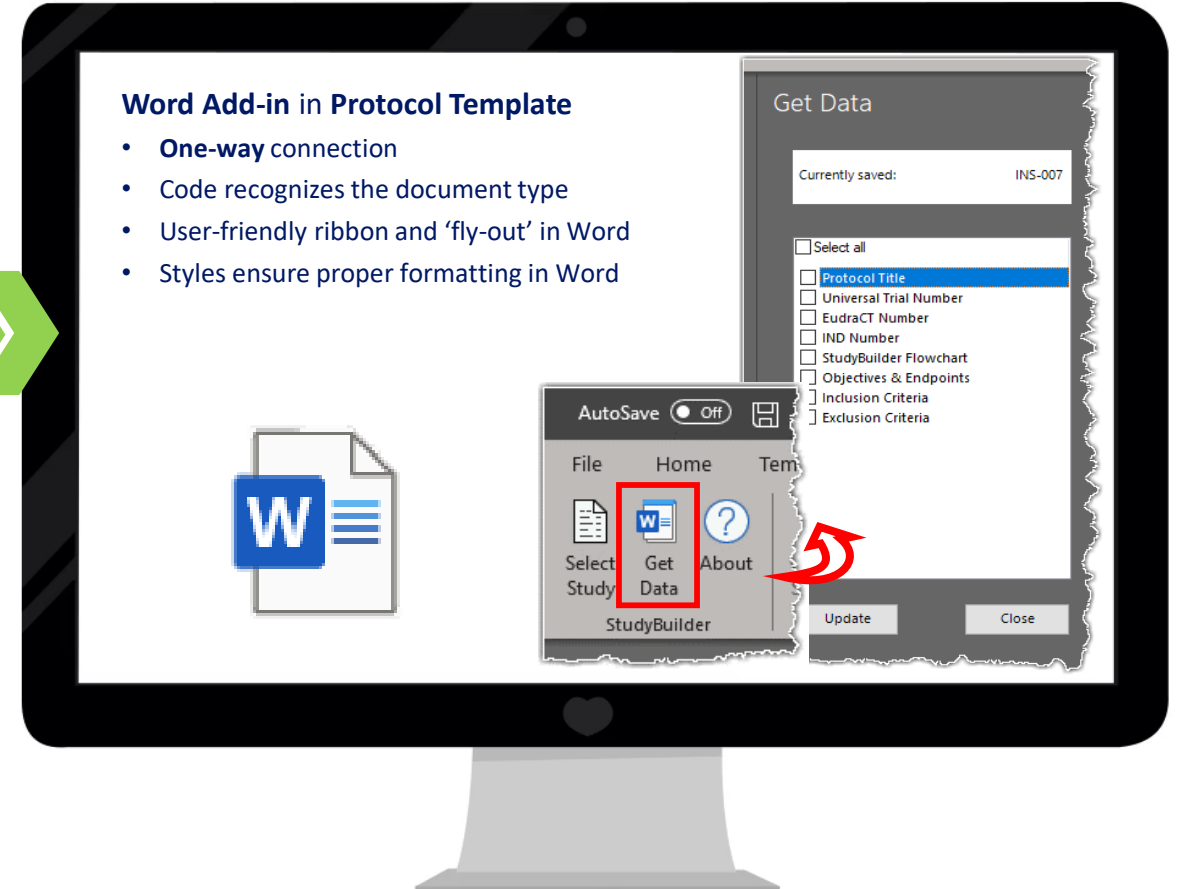
Define Study

- Study Title
- Registry Identifiers
- Study Properties
- Study Structure
- Study Population
- Study Criteria
- Study Interventions
- Study Purpose
- Study Activities

Protocol content built in SDR

- **Population** (disease area, indication, sex, ...)
- **Study type** (interventional, observational, ...)
- **Study design** (random., blinding, arms, ...)
- **Schedule of Activities** (naming, timing, type, windows)
- **Study purpose** (objectives, endpoints)
- **Selection criteria** (eligibility, withdrawal, ...)
- **Interventions** (drug, dose, route, other ...)

Supported by library capabilities for endpoints, eligibility criteria and assessments.



Word Add-in in Protocol Template

- **One-way** connection
- Code recognizes the document type
- User-friendly ribbon and 'fly-out' in Word
- Styles ensure proper formatting in Word

AutoSave Off

File Home Tem

Select Study **Get Data** About

StudyBuilder

Get Data

Currently saved: INS-007

Select all

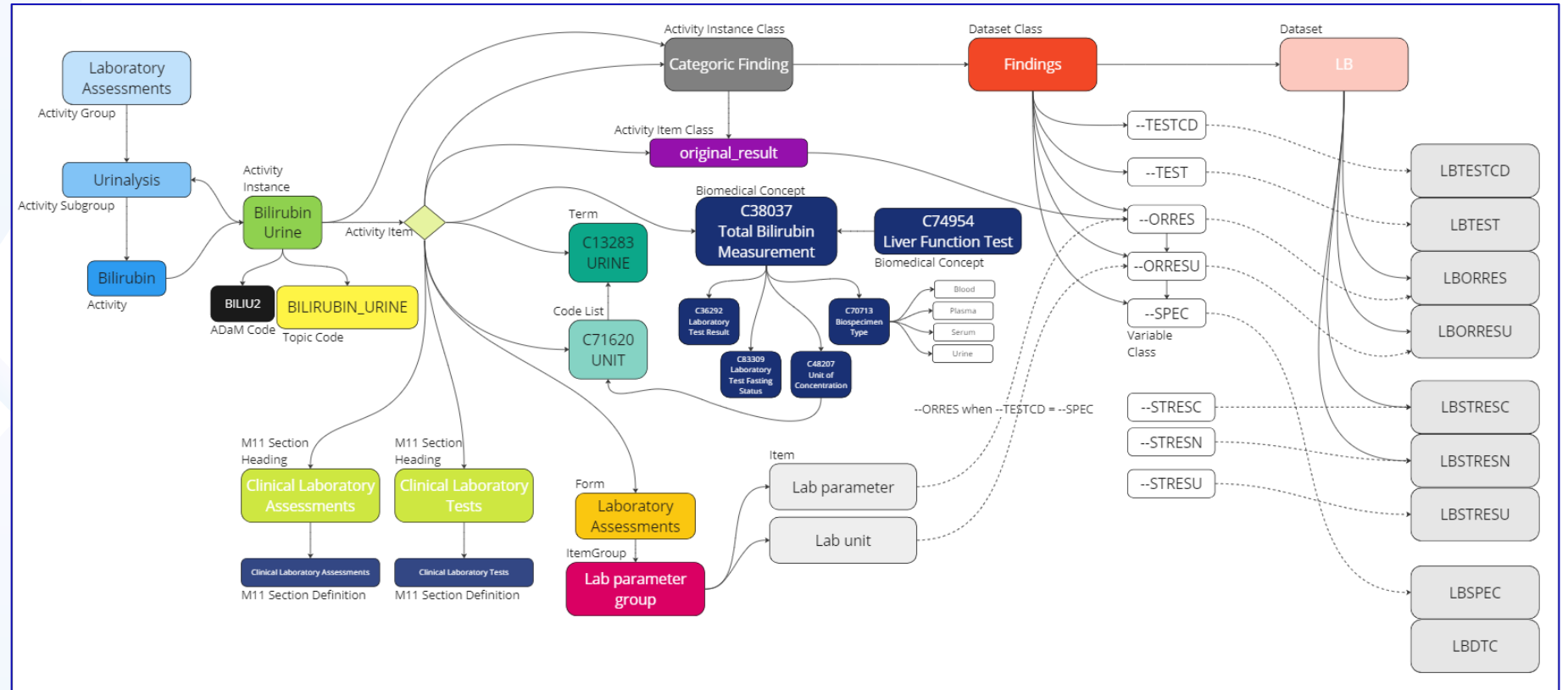
- Protocol Title
- Universal Trial Number
- EudraCT Number
- IND Number
- StudyBuilder Flowchart
- Objectives & Endpoints
- Inclusion Criteria
- Exclusion Criteria

Update Close

Biomedical Concepts drive Digital Data Flow

Connect to **Flow** - define once & use many

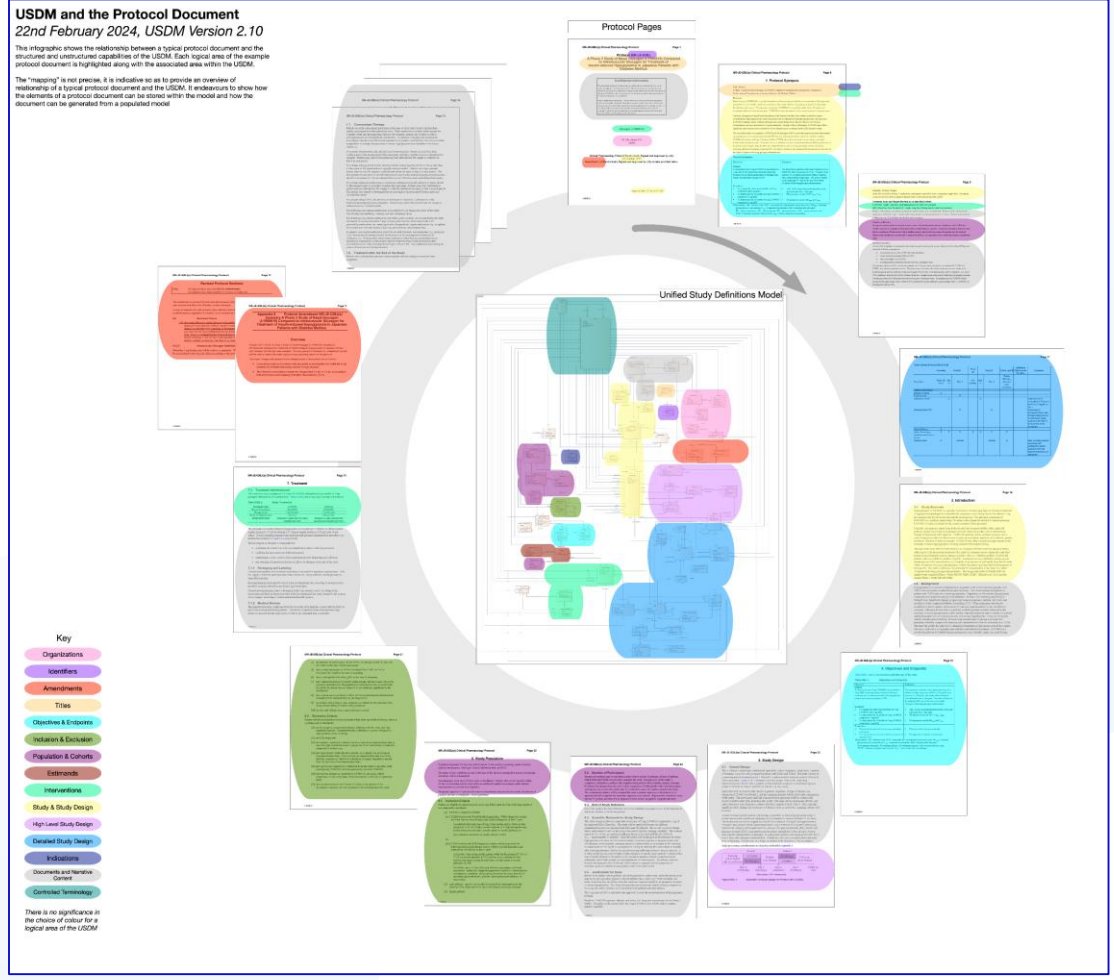
- Protocol definition
- CRF utilization
- EDC specification
- SDTM definition
- ADAM definition





USDM in OpenStudyBuilder

The USDM Model



Key

- Organizations
- Identifiers
- Amendments
- Titles
- Objectives & Endpoints
- Inclusion & Exclusion
- Population & Cohorts
- Estimands
- Interventions
- Study & Study Design
- High Level Study Design
- Detailed Study Design
- Indications
- Documents and Narrative Content
- Controlled Terminology

There is no significance in the choice of colour for a logical area of the USDM

USDM Endpoint Enabling new Use Cases

USDM Export enables:

- Downstream structured content management
 - For documents: Protocol, SAP...
- Downstream data consumption
 - Clinical & Ops Systems
 - EDC/CDMS, CTMS, ...
- Upload to DDF-compliant SDR for data sharing



API – The DDF Endpoint

DDF endpoints

GET /ddf/v3/studyDefinitions/{study_uid} Return an entire study in DDF USDM format

State before:

- Study must exist.

State after:

- no change.

Possible errors:

- Invalid study-uid.

Parameters

Name	Description
study_uid * required	The unique uid of the study.
string (path)	

study_uid

Try it out

Responses

Curl

```
curl -X 'GET' \
  'https://openstudybuilder.northeurope.cloudapp.azure.com/api/ddf/v3/studyDefinitions/Study_000001' \
  -H 'accept: application/json' \
  -H 'Authorization: Bearer eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiIsImtpZCI6IjN0YUUsOjRmZS5QK5RdTNDdGpZc2EzZW10UTVFMCI'
```

Request URL

```
https://openstudybuilder.northeurope.cloudapp.azure.com/api/ddf/v3/studyDefinitions/Study_000001
```

Server response

Code	Details
200	<p>Response body</p> <pre>{ "id": "483e94ee-1c13-4d27-a09d-8cad4751be47", "description": null, "label": null, "versions": [{ "id": "41c68aa1-1424-4cff-a05c-d15be56c977f", "versionIdentifier": "None", "rationale": "", "studyType": { "id": "70a6fb49-f23a-4991-b49a-188364fe120e", "code": "C98388_INTERVENTIONAL", "codeSystem": "openstudybuilder.org", "codeSystemVersion": "", "decode": "Interventional", "instanceType": "Code" }, "studyPhase": { "id": "db765cd8-0c0f-464d-8ccd-9372101d8370", "standardCode": { "id": "7360a2be-b088-4698-a22d-7d4143bbfa84", "code": "C15602_PHASE_III_TRIAL", "codeSystem": "openstudybuilder.org", "codeSystemVersion": "", "decode": "Phase III Trial", "instanceType": "Code" } } }] }</pre> <div style="text-align: right; margin-top: 5px;"> Download </div>

API – The DDF Endpoint

#	Epoch name	Epoch type	Epoch subtype	Start rule	End rule	Description	Number of visits	Assigned colour
1	Screening	Pre Treatment	Screening	ICF submitted	ICF signed	Screening epoch to start	1	Light Blue
2	Treatment	Treatment	Treatment	RDM ok	Dosing complete	Treatment epoch without dosing esca...	9	Light Green
3	Follow-up	Post Treatment	Follow-up	Treatment ok	Last follow-up o	Follow-up epoch to follow the subje...	1	Light Red

OSB with USDM API endpoint

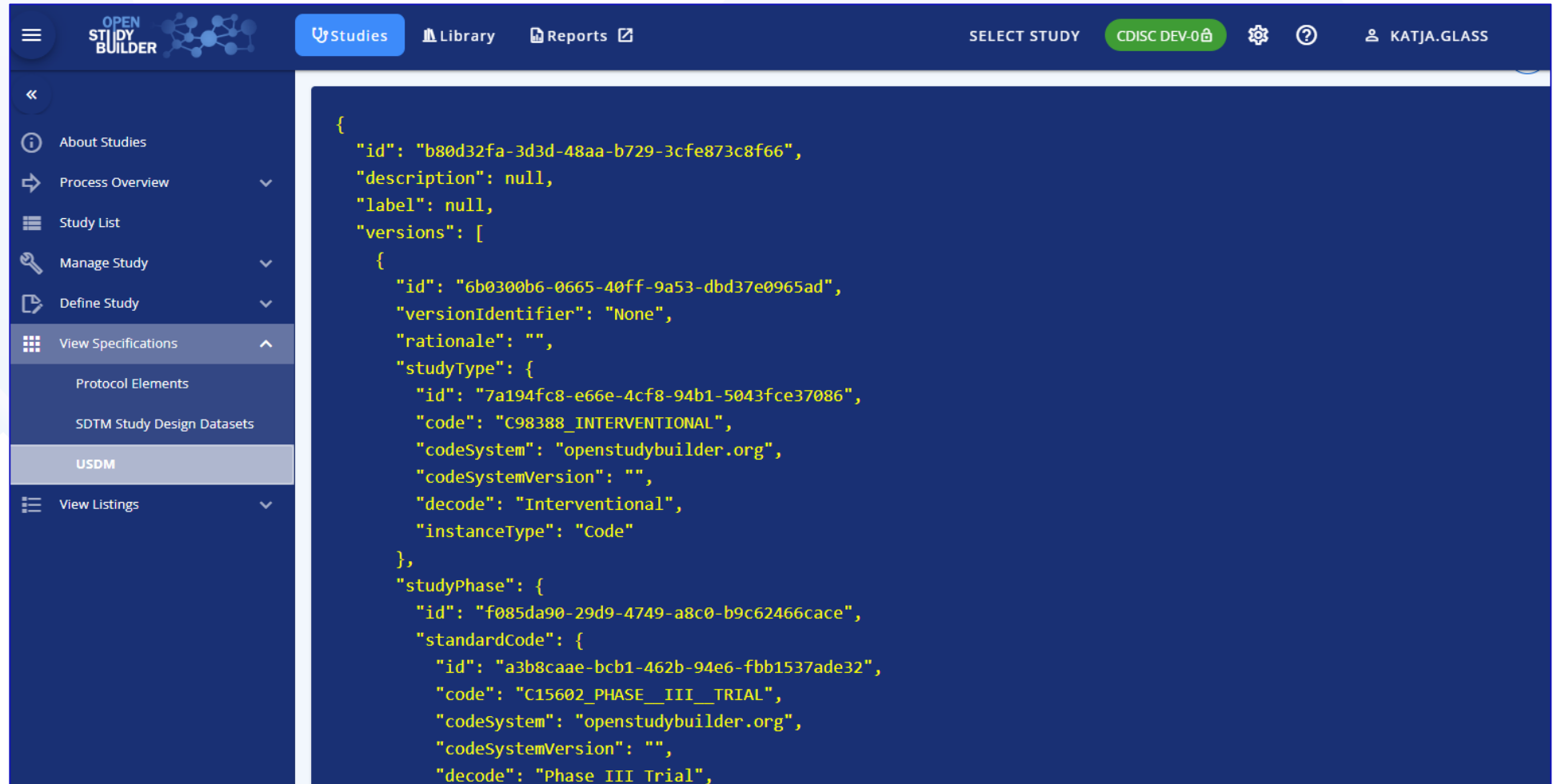


```
epochs: [
  {
    "id": "StudyEpoch_000001",
    "name": "Screening",
    "label": null,
    "description": "Screening epoch to start",
    "type": {
      "id": "2785a39f-c632-490e-9dea-d8ede4b6e5ca",
      "code": "CTTerm_000003",
      "codeSystem": "openstudybuilder.org",
      "codeSystemVersion": "",
      "decode": "Pre Treatment"
    },
    "previousId": null,
    "nextId": "StudyEpoch_000002"
  },
  {
    "id": "StudyEpoch_000002",
    "name": "Treatment",
    "label": null,
    "description": "Treatment epoch without dosing escalation",
    "type": {
      "id": "f04010d7-7c95-4b18-94f0-a6391fb7a190",
      "code": "C101526_TREATMENT",
    }
  }
]
```


DDF Endpoint in UI

Raw USDM
display

M11
Rendering



The screenshot shows the Open Study Builder interface. The top navigation bar includes the logo, 'Studies' tab, 'Library', 'Reports', and user information 'KATJA.GLASS'. The left sidebar has a menu with 'View Specifications' selected. The main content area displays a JSON object representing a DDF endpoint.

```
{
  "id": "b80d32fa-3d3d-48aa-b729-3cfe873c8f66",
  "description": null,
  "label": null,
  "versions": [
    {
      "id": "6b0300b6-0665-40ff-9a53-dbd37e0965ad",
      "versionIdentifier": "None",
      "rationale": "",
      "studyType": {
        "id": "7a194fc8-e66e-4cf8-94b1-5043fce37086",
        "code": "C98388_INTERVENTIONAL",
        "codeSystem": "openstudybuilder.org",
        "codeSystemVersion": "",
        "decode": "Interventional",
        "instanceType": "Code"
      },
    },
    {
      "id": "f085da90-29d9-4749-a8c0-b9c62466cace",
      "standardCode": {
        "id": "a3b8caae-bcb1-462b-94e6-fbb1537ade32",
        "code": "C15602_PHASE_III_TRIAL",
        "codeSystem": "openstudybuilder.org",
        "codeSystemVersion": "",
        "decode": "Phase III Trial",
      }
    }
  ]
}
```

DDF Controlled Terminology



OPEN STUDY BUILDER
Studies **Library** Reports
SELECT STUDY **CDISC DEV-006** ?
NDJZ (NICOLAS DE SAINT JORRE)

- About Library
- Process Overview
- Code Lists
- Dashboard
- CT Catalogues**
- CT Packages
- CDISC
- Sponsor
- Sponsor CT Packages
- Dictionarys
- Concepts
- Syntax Templates
- Template Instantiations
- Template Collections
- Data Exchange Standards
- Admin Definitions
- List

Library / Code Lists / CT Catalogues / DDF CT

CT Catalogues

All ADAM CT CDASH CT COA CT **DDF CT** DEFINE-XML CT GLOSSARY CT PROTOCOL CT QRS CT QS-FT CT SDTM CT SEND CT

Search Search with terms or Select rows

	Library	Sponsor preferred name	Template parameter	Code list status	Name modified	Concept ID	Submission value	Code list name	NCI Preferred name	Extensible	Attri
	CDISC	Environmental Setting	No	Final	Apr 18, 2024, 9:45 AM	C127262	SETTING	Environmental Setting	CDISC SDTM Environmental Setting Terminology	Yes	Fir
	CDISC	Mode of Subject Contact	No	Final	Apr 18, 2024, 9:53 AM	C171445	CNTMODE	Mode of Subject Contact	CDISC SDTM Mode of Subject Contact Terminology	Yes	Fir
	CDISC	Study Arm Type Value Set Terminology	No	Final	Apr 18, 2024, 9:53 AM	C174222	Study Arm Type Value Set Terminology	Study Arm Type Value Set Terminology	CDISC Protocol Study Arm Type Value Set Terminology	No	Fir
	CDISC	DDF Entity Terminology	No	Final	Apr 18, 2024, 9:58 AM	C188698	DDF Entity Terminology	DDF Entity Terminology	CDISC DDF Entities Terminology	No	Fir
	CDISC	DDF Clinical Study Attribute Terminology	No	Final	Apr 18, 2024, 9:58 AM	C188699	DDF Clinical Study Attribute Terminology	DDF Clinical Study Attribute Terminology	CDISC DDF Clinical Study Attribute Terminology	No	Fir
	CDISC	DDF Study Protocol Version Attribute Terminology	No	Final	Apr 18, 2024, 9:58 AM	C188700	DDF Study Protocol Version Attribute Terminology	DDF Study Protocol Version Attribute Terminology	CDISC DDF Study Protocol Version Attribute Terminology	No	Fir
	CDISC	DDF Study Identifier	No	Final	Apr 18, 2024, 9:58 AM	C188701	DDF Study Identifier	DDF Study Identifier	CDISC DDF Study Identifier	No	Fir

Rows per page 10 1-10 of 54

USDM to ICH M11

Integration of ICH M11 Template in OBS:

- Leverages USDM JSON metadata
- Generates HTML version of M11 protocol
- Conversion to PDF document
- Aligns with industry standards
- Enhances efficiency, accuracy, and compliance
- Empowers researchers and stakeholders

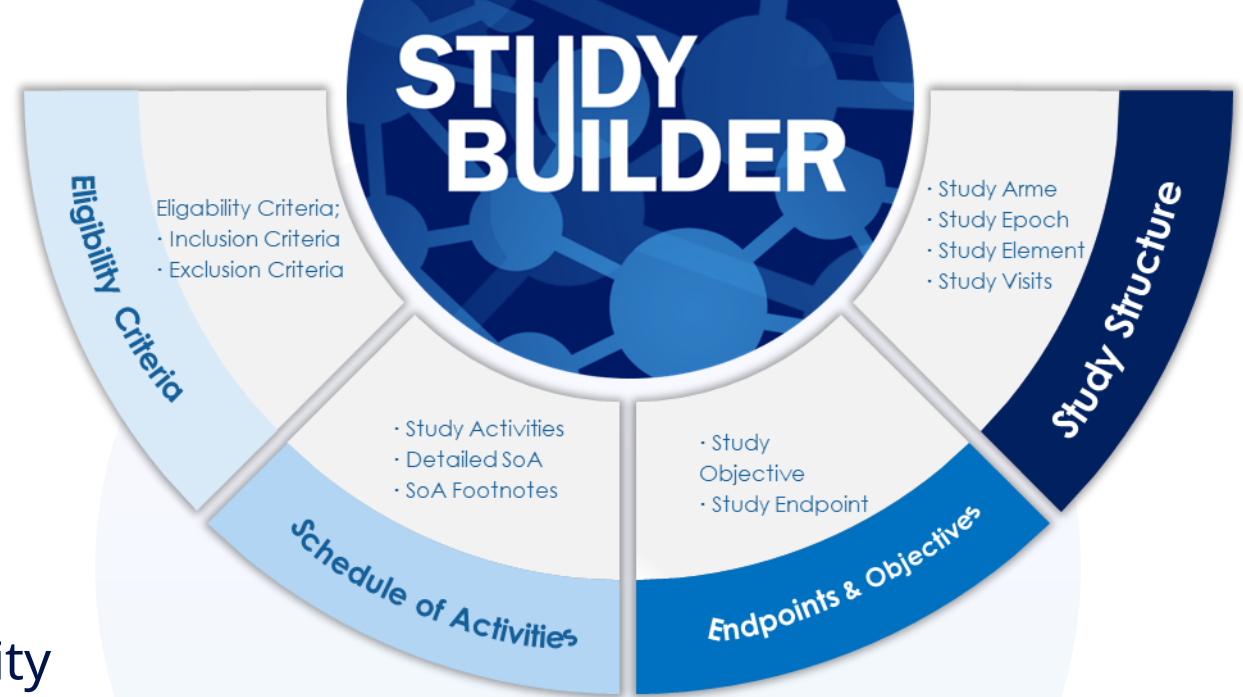
ICH M11 Template Coming from the OpenStudyBuilder

Protocol Full Title:	<u>[Protocol Full Title]</u> The protocol should have a descriptive title that identifies the scientific aspects of the trial sufficiently to ensure it is immediately evident what the trial is investigating and on whom, and to allow retrieval from literature or internet searches.
Sponsor Confidentiality Statement:	<u>[Sponsor Confidentiality Statement]</u> Insert the Sponsor's confidentiality statement, if applicable, otherwise delete.
Protocol Number:	<u>[Protocol Number]</u> A unique alphanumeric identifier for the trial, designated by the Sponsor, is a standard part of trial data, and should be included for most trials.
Version:	<u>[Version]</u> An optional field for use by the Sponsor at their discretion.
Amendment Number:	<u>[Amendment Number]</u> Enter the amendment number. If this is the original instance of the protocol, indicate Not Applicable.
Amendment Scope:	<u>[Amendment Scope]</u> <u>[Country/Region Identifier]</u> Acceptable entries for amendment scope are: "global" or "Country-specific/Regional" Use the ISO-3166 region or country identifier (for example, DE or EU). For global trials delete the Country/Region Identifier field.
Compound Number(s):	<u>[Compound Number]</u> Enter the Sponsor's unique identifier for investigational compound(s) in the trial. Add or delete additional fields as needed.



DDF Adoption

DDF Adoption



Structured Protocol vs. Free Text Flexibility

- Adopt to predefined template blocks instead of free writing
 - Select and manage template blocks in another tool (not Word)
 - Loss of writing flexibility for the purpose of standardization & reuse
 - Complex study design modelling in standard context difficult
 - Adoption for Protocol Writers need time, understanding and continuous enhancements based on feedback
-

DDF Adoption - Scoping

October
2023

May
2024

End
2024

First business release (MVP*):

- All interventional ph 2-4 studies
- Users within Clinical Operations, Clinical Reporting & Data Management Systems and Standards
- Key protocol metadata (SoA**, Study Structure, Eligibility criteria, Endpoints & Objectives)

Focus on limiting the operational burden

- Support all studies (currently pending ph 1)
- Reduction in parallel work needed
- Expansion of library content
- Connectivity to other systems (resuability)

Reduced scope due to adoption challenges:

- Schedule of Activities (SoA) & Study structure (mandatory)
- Eligibility criteria, Endpoints & Objectives (optional)

* MVP = Minimal Viable Product

** SoA = Schedule of Activities

DDF Adoption – Lessons Learned

People

- Early **involvement** of end users is key
- Data instead of documents requires a large **change management** effort
- Sufficient **resources** within management, product team and impacted business areas is crucial
- Continuous **user feedback** is essential

Process

- **Standardization** and sharing of meta data is needed, but difficult to implement
- Keeping releases **small** and **frequent**
- **Pilot** studies speed up the identification of issue, but might prolong the first release
- Clear project **ownership** is important when implementing a cross functional product

Technology

- Clear **business value** – short term and long term – is essential
 - System **performance** key
-

DDF Adoption – Key to Success

Address Challenges

Share Opportunities

Integration Support

Gather Feedback

Harmonize Standards

Collaborate on Open Source

DDF Adoption – Key to Success



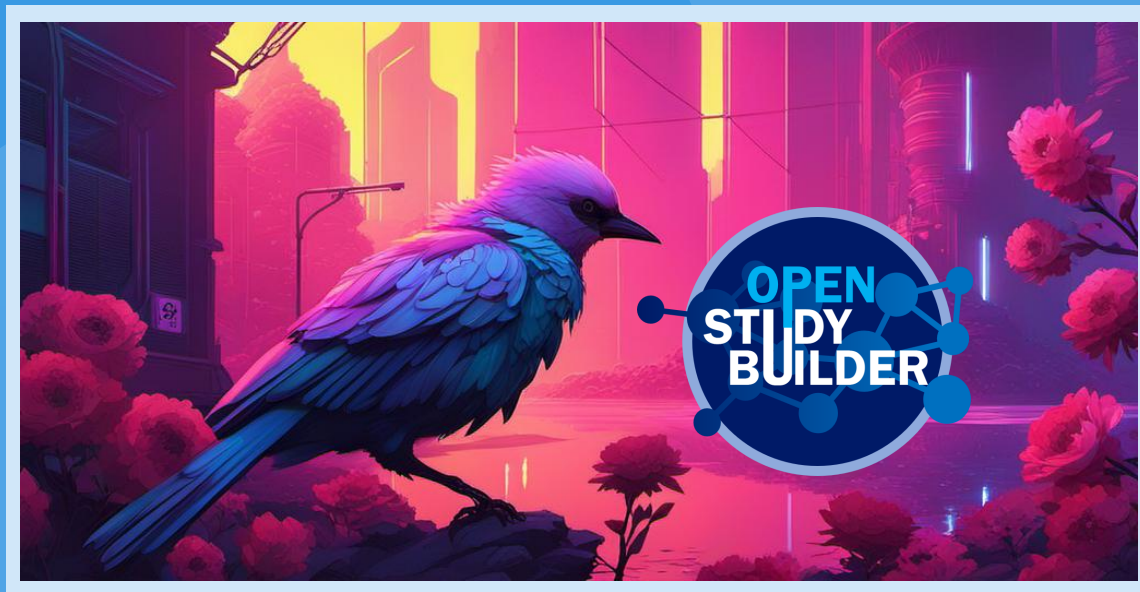


Community
OpenStudyBuilder@gmail.com

Community manager
katja.glass@glacon.eu

Developer (Nicolas)
ndjz@novonordisk.com

Thanks!



OpenStudyBuilder Links

- Project Homepage: <https://openstudybuilder.com/>
- Newsletter: <https://www.linkedin.com/newsletters/openstudybuilder-6990328054849916928/>
- YouTube Demonstration (30'): <https://youtu.be/dL5CY0BwfEs>
- GitLab (Solution, Description): <https://gitlab.com/Novo-Nordisk/nn-public/openstudybuilder>
- Slack: https://join.slack.com/t/openstudybuilder/shared_invite/zt-19mtauzic-Jvrhtmy7hGstgyilvB1Wsw
- E-Mail: openstudybuilder@gmail.com

Sandbox:

- Mail openstudybuilder@neotechnology.com – Subject “Request Sandbox access”
 - Note: when add/modify/delete, you mail might be exposed in the version history
-