



StudyBuilder - Leveraging the Graph for Clinical Standards and Trials

GraphSummit Copenhagen, 2022-09-08

Henrik Enquist, PhD

HNEU@novonordisk.com

What is a clinical trial?

- Two goals:
 - Efficacy - prove that a new drug or treatment works.
 - Safety - prove that a new drug or treatment is safe.
- Initiated by a sponsor (typically a Pharma company).
- Performed at several sites, usually in different countries.

How it's usually done

- Write a clinical trial protocol
 - Specify very(!) detailed how the trial should be done
 - Planned visits
 - Planned treatments and assessments at visits
 - What data to collect, and in what format
 - ...
- Prepare material (reporting forms, instructions, ...) for sites
 - May be in different languages
- No connection between protocol (a Word document) and the rest, all developed and updated manually.

StudyBuilder workflow

- Write a clinical trial protocol
 - Specify very(!) detailed how the trial should be done
 - Planned visits
 - Planned treatments and assessments at visits
 - What data to collect, and in what format
 - ...
- Prepare material (reporting forms, instructions, ...) for sites
 - May be in different languages
- Done automatically from the definition entered in StudyBuilder

StudyBuilder

STUDY BUILDER

Studies Library

ADD NEW STUDY SELECT STUDY CDISC DEV-9999

JOHN DOE

Welcome to the StudyBuilder application

Study Specification made easy

STUDY BUILDER

- Build your study in a consistent way
- Comply with standards including CDISC
- Reuse specification elements across studies
- Get insights via user-defined dashboards
- Integrate with other systems via open API

LICENSE

StudyBuilder

STUDY BUILDER

 ADD NEW STUDY SELECT STUDY CDISC DEV-9999 JOHN DOE

<< About Library Process Overview Code Lists Dictionaries Concepts Activities **Units** CRFs Compounds Syntax Templates Template Instantiations Template Collections Data Exchange Standards List

 Studies Library

Library / Concepts / Units

Units ?

Select rows
 + ▾ 📄 📥

Search

 Unit dimension: Weight...

	Library	Name	Master unit	Display unit	Unit subsets	UCUM unit	CT Unit terms	Convertible unit	SI unit	US conventional unit	Unit dimension	Legacy
⋮	Sponsor	LB	No	Yes		[lb_av]	Pound	Yes	No	Yes	Weight	LB
⋮	Sponsor	oz	No	Yes	Dose Unit	[oz_av]	oz	Yes	No	Yes	Weight	oz
⋮	Sponsor	kg/mol	No	Yes		kg/mol	kg/mol	No	Yes	No	Concentration	kg/mol
⋮	Sponsor	g/mol	No	Yes			g/mol	No	Yes	No	Concentration	g/mol
⋮	Sponsor	titer	No	Yes		{titer}	titer	No	No	No	Concentration	titer
⋮	Sponsor	ng	No	Yes	Dose Unit	ng	ng	Yes	Yes	Yes	Weight	ng
⋮	Sponsor	ugEq/L	No	Yes			ugEq/L	No	No	No	Concentration	ugEq/L
⋮	Sponsor	ng Eq/mL	No	Yes			ugEq/L	Yes	No	Yes	Concentration	ng Eq/ml
⋮	Sponsor	ugEq/mL	No	Yes				Yes	No	Yes	Concentration	ugEq/mL
⋮	Sponsor	mmol/L^2	No	Yes				No	No	No	Concentration	mmol/L^2

Rows per page: 10 1-10 of 51 < >

StudyBuilder

The screenshot displays the StudyBuilder interface. The top navigation bar includes 'ADD NEW STUDY', 'SELECT STUDY', and a lock icon for 'CDISC DEV-9999'. The user 'JOHN DOE' is logged in. The left sidebar lists navigation options such as 'About Studies', 'Process Overview', 'Manage Studies', 'Define Study', 'Specification Overview', 'Study Title', 'Registry Identifiers', 'Study Design', 'Study Population', 'Study Criteria', 'Study Interventions', 'Study Purpose', 'Study Activities', 'Terminology', 'View Specifications', and 'View Listings'. The main content area is titled 'Study Design (CDISC DEV-9999)' and features tabs for 'Study Type', 'Study Arms', 'Study Branches', 'Study Cohorts', 'Study Epochs', 'Study Elements', 'Study Visits', and 'Design Matrix'. The 'Study Arms' tab is active, showing a table with two rows of study arms. The table has columns for '#', 'Type', 'Arm name', 'Arm short name', 'Randomisation group', 'Arm code', 'Number of subjects', 'Connected Branches', 'Description', 'Colour', 'Modified', and 'Mo'. The first row is for an 'Investigational Arm' with arm code 'A' and description 'top one'. The second row is for an 'Investigational Arm' with arm code 'B' and description 'lower one'. Below the table, there is a pagination control showing 'Rows per page: 10' and '1-2 of 2'.

Studies / Define Study / Study Design

Study Design (CDISC DEV-9999) ?

Study Type Study Arms Study Branches Study Cohorts Study Epochs Study Elements Study Visits Design Matrix

Select rows Reorder content

Search

#	Type	Arm name	Arm short name	Randomisation group	Arm code	Number of subjects	Connected Branches	Description	Colour	Modified	Mo
1	Investigational Arm	A	A		A			top one	●	Aug 31, 2022, 11:56 AM	unk
2	Investigational Arm	B	B		B			lower one	●	Aug 31, 2022, 11:56 AM	unk

Rows per page: 10 1-2 of 2

StudyBuilder

- Neo4j database
- FastAPI backend
- Vue.js frontend
- Will be released as open source
 - see: <https://cosa.cdisc.org/directory/openStudyBuilder>

Clinical standards

- Controlled terminology
 - Make sure everyone is describing the same thing in the same way
- Several sets, managed by different organizations
 - CDISC, SNOMED, NCI, UCUM, MED-RT, ...

Clinical standards

Example: Blood pressure = 120 / 80

- Two values: Systolic and diastolic

C25298, C25299

- Unit? mmHg

C49670

- Position? Standing, sitting, supine

C62166, C62122, C62167

- Taken where? Arm

C32141

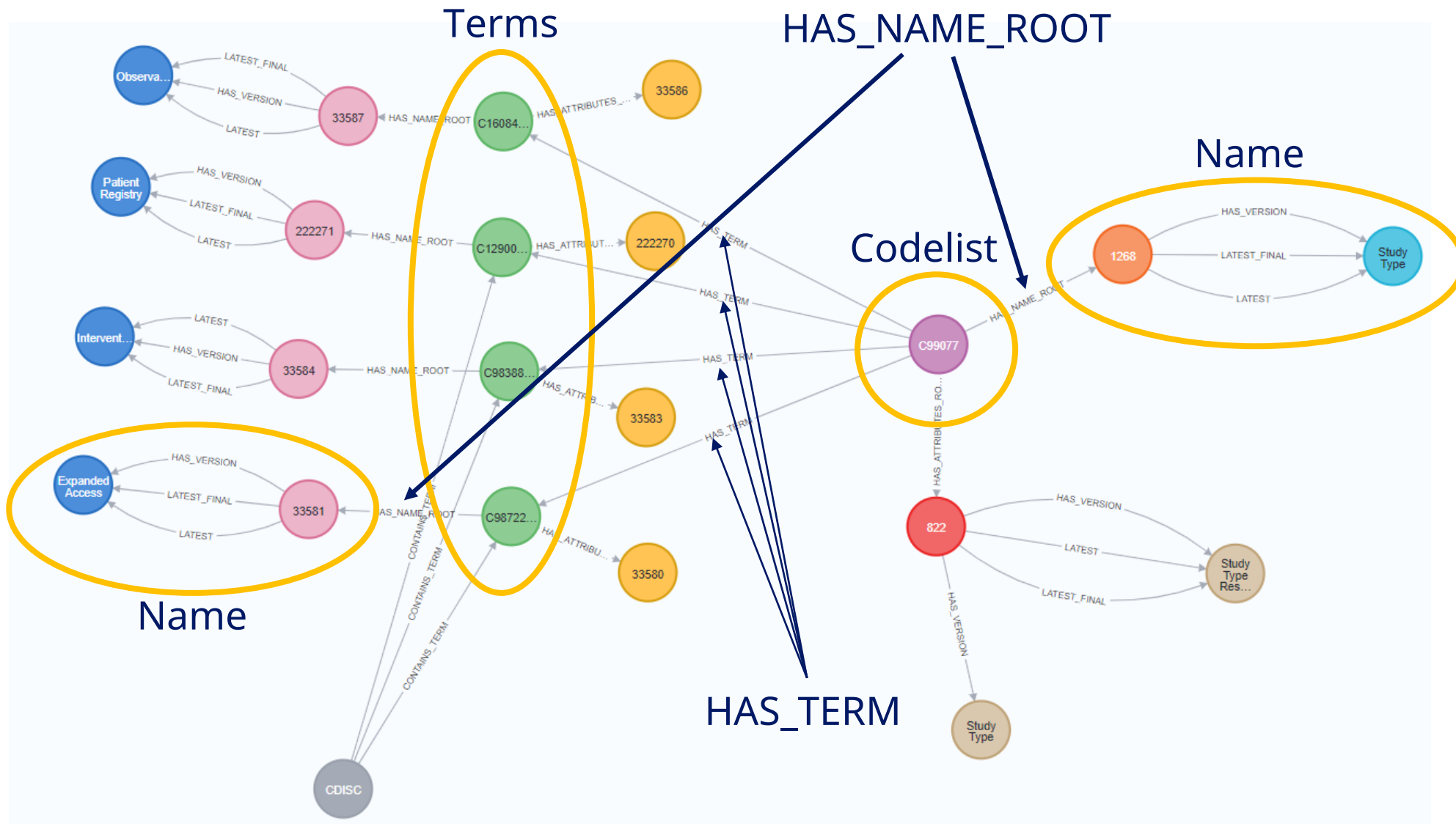
- Which side? Left or right

C25229, C25228

Code lists

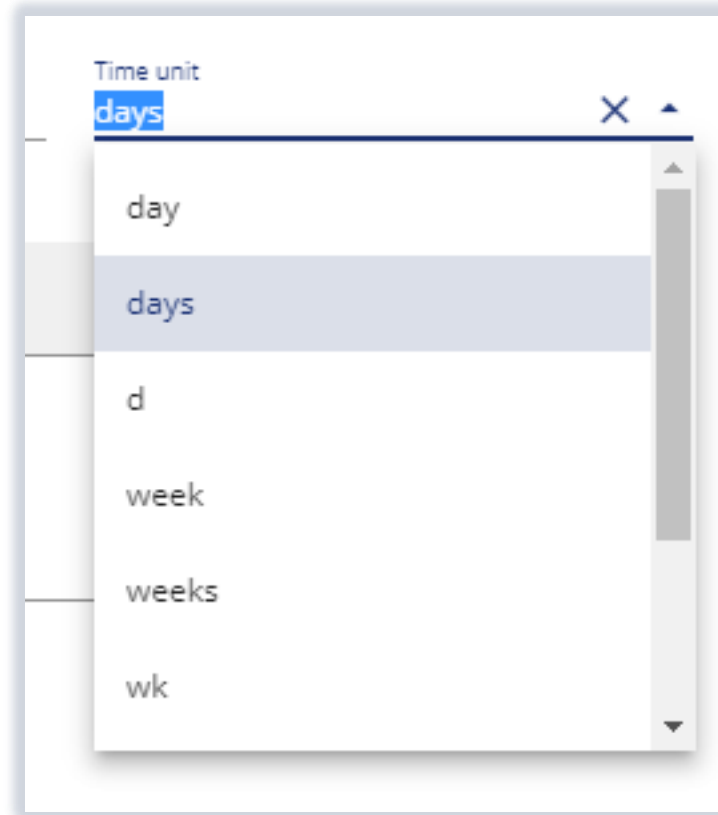
- A codelist is a collection of standard terms
 - Unit: mmHg, kg, ...
 - Position: Sitting, Standing, ...
 - Laterality: Left, Right, ...
 - Visit Type: Screening, Baseline, Treatment,
 - Type of Treatment: Investigational Product, Placebo,
 - Study Arm Type: Investigational Arm, Comparator Arm, Placebo Arm
 - Route of Administration: Inhalation, Intramuscular, Oral,

Study type code list

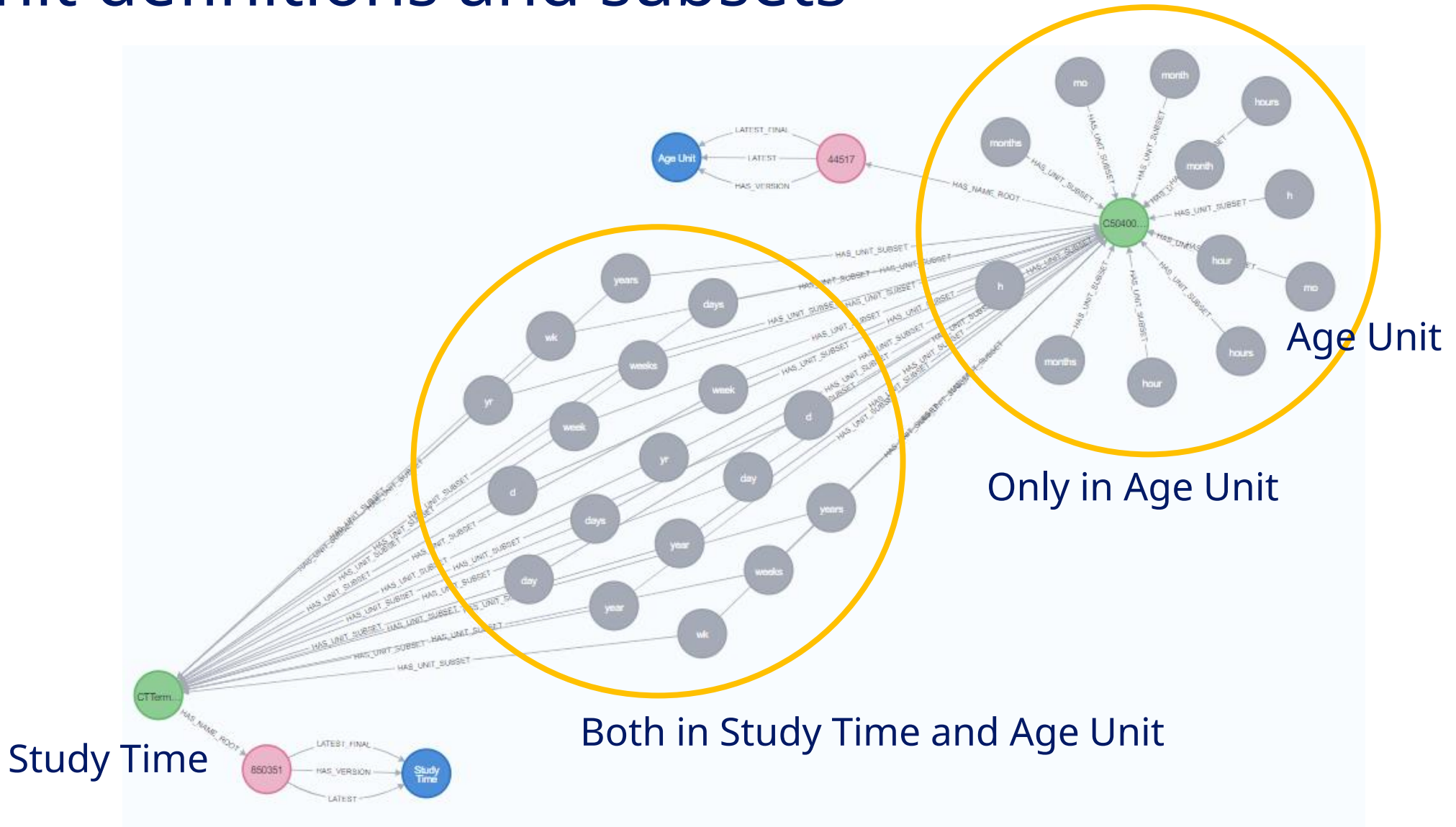


Unit definitions

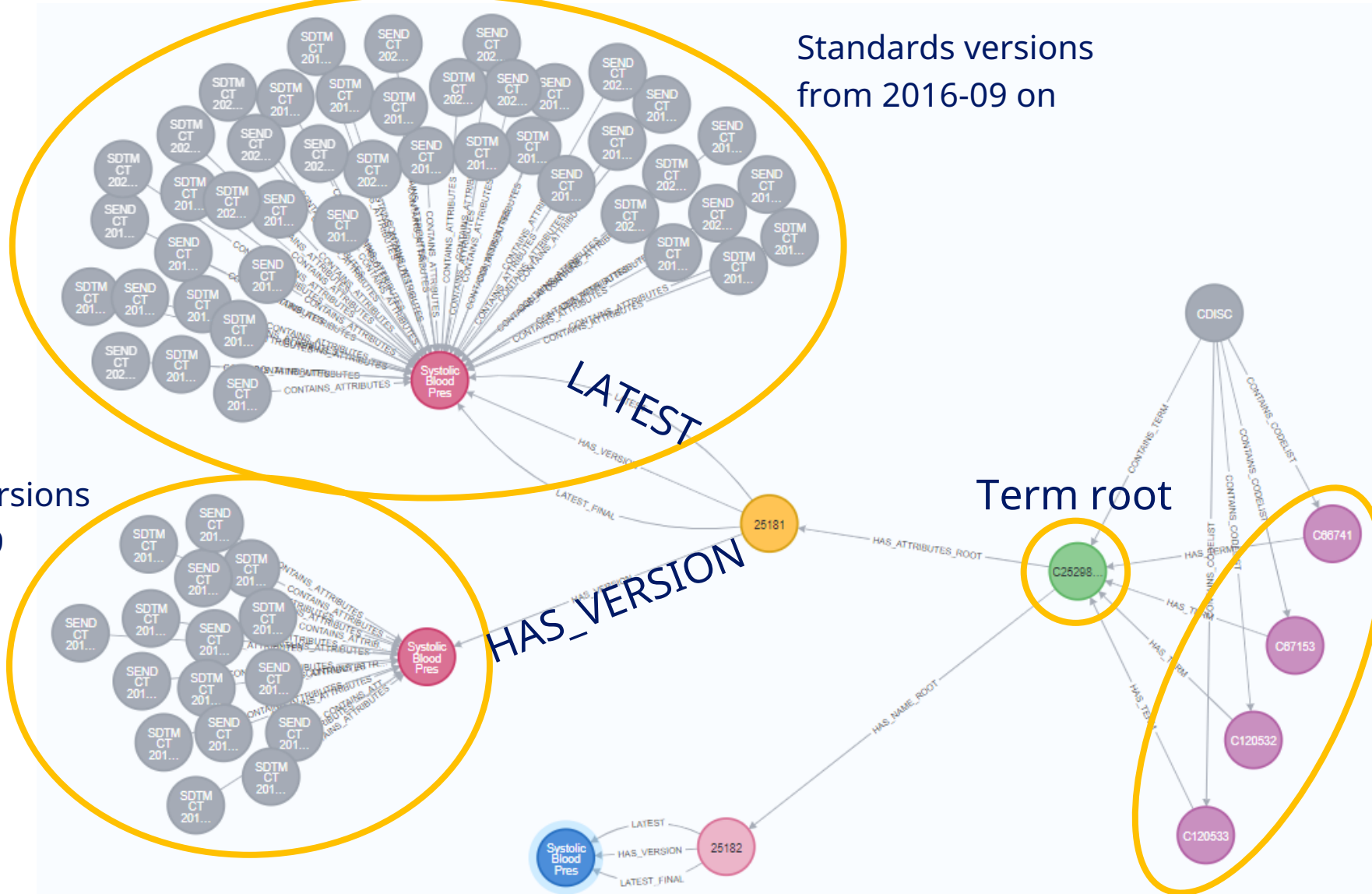
- Full list – long!
- Group by Unit dimension
 - Time
 - Pressure
 - Weight
 - ...
- Further grouping by subsets:
 - Age units
 - Study Time
 - ...



Unit definitions and subsets



A term, systolic blood pressure, C25298



Standards versions from 2016-09 on

Standards versions from 2014-09 to 2016-09

Term root

Included in 4 codelists

Objective templates

- Template:
To compare the effect of [Compound] relative to [Comparator] on [ActivityInstance]
- Standardize how the text is written in the protocol.
- Don't edit, instead create new versions.

Objective Templates ?

Sponsor Standards

User Defined Templates

Select rows

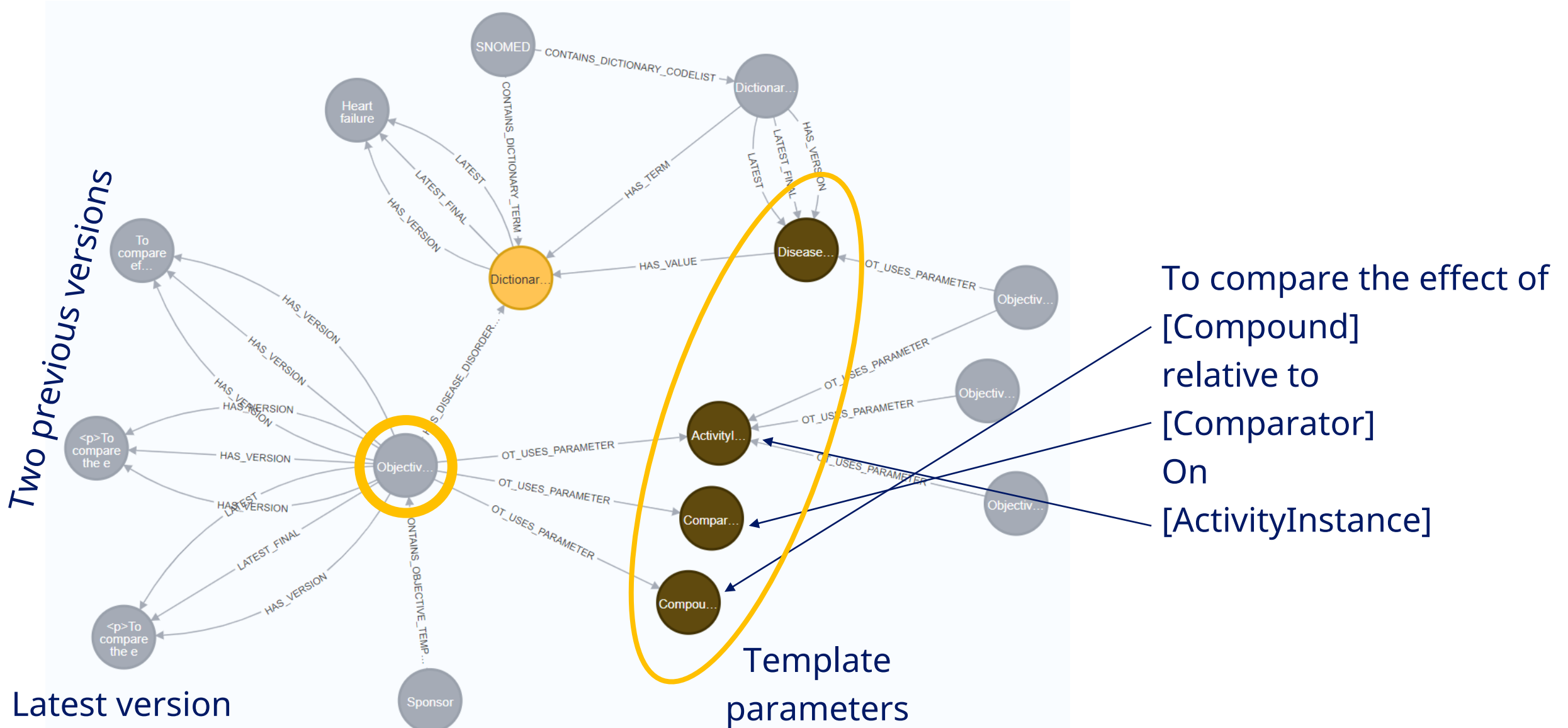


Search

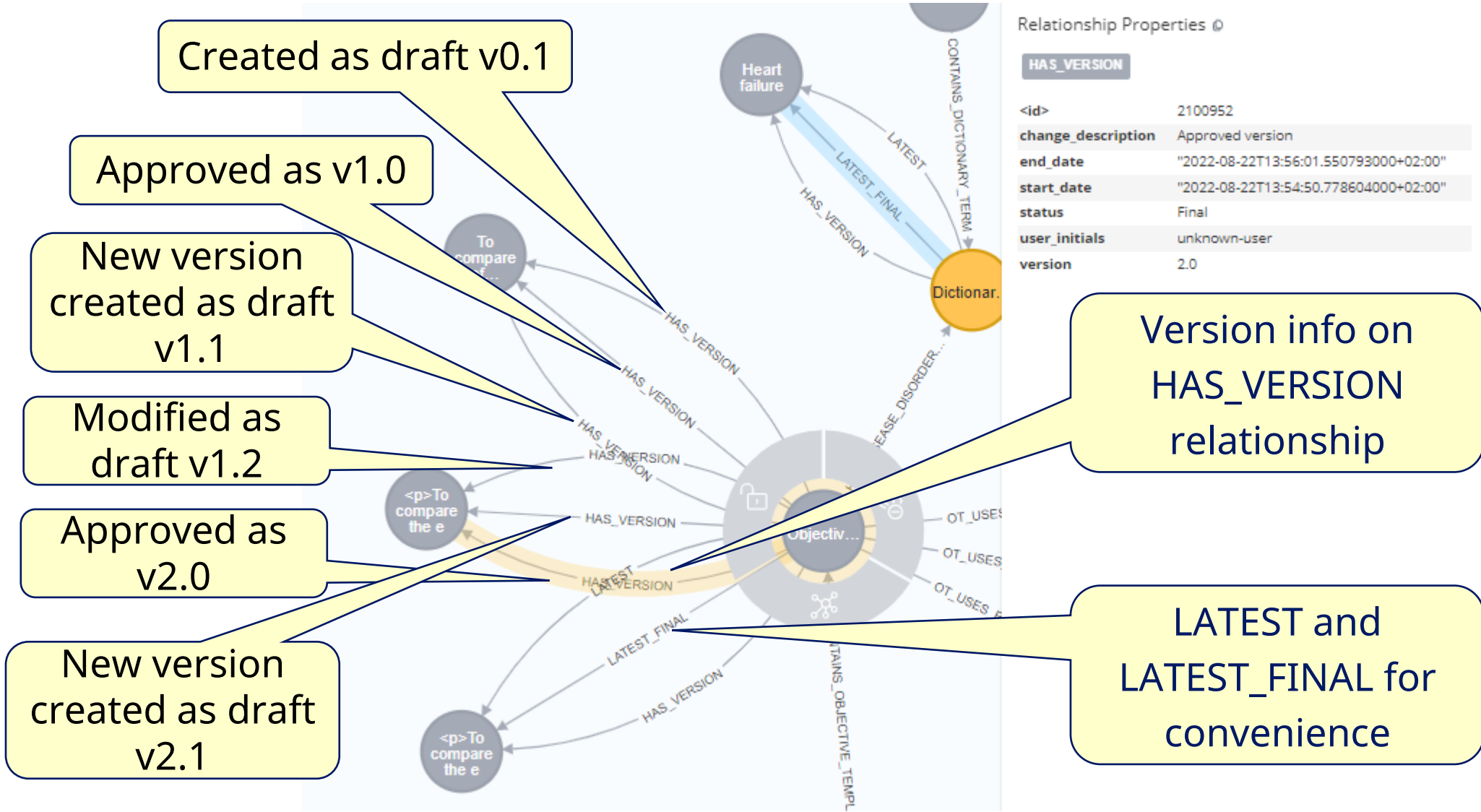


	Indication or disorder	Objective category	Confirmatory testing	Template	Modified	Status	Version
⋮	Heart failure	Not Applicable	No	To compare the effects of [Compound] relative to [Comparator] for [ActivityInstance]	Aug 22, 2022, 1:56 PM	Final	3.0
*	Not Applicable	Not Applicable	Not Applicable	To compare the effects of [Compound] relative to [Comparator] for [ActivityInstance]	Aug 18, 2022	Final	1.0

Objective templates

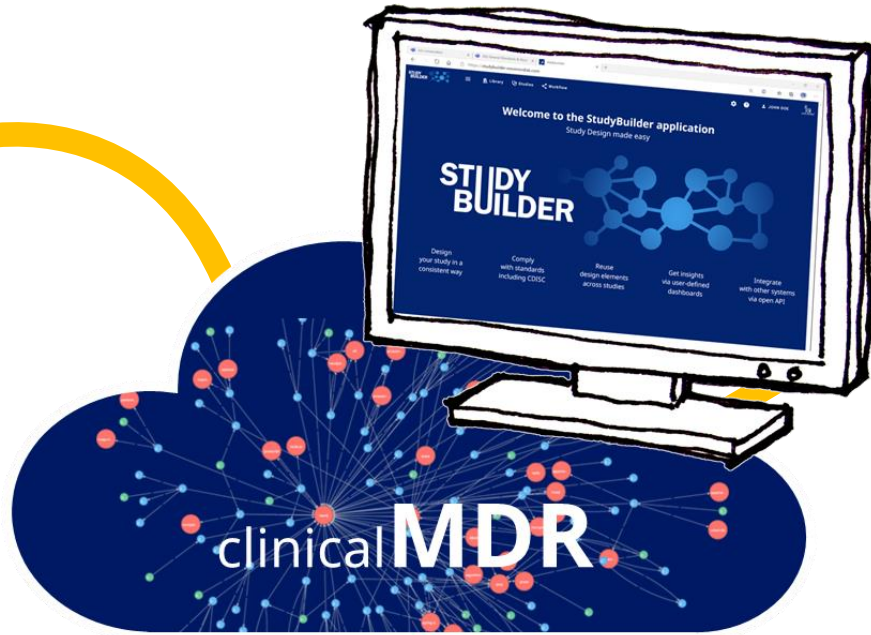


Objective templates, versioning



Why graphs?

- Graphs are good for handling relationships between tables
- Existing solution has >300 tables
 - Difficult to get overview
 - Hard to maintain
 - Versioning is challenging
 - Keeps growing..



Thank you!

HNEU@novonordisk.com