







Ontology and Semantic Modelling Documentation and ETL Software **3M**

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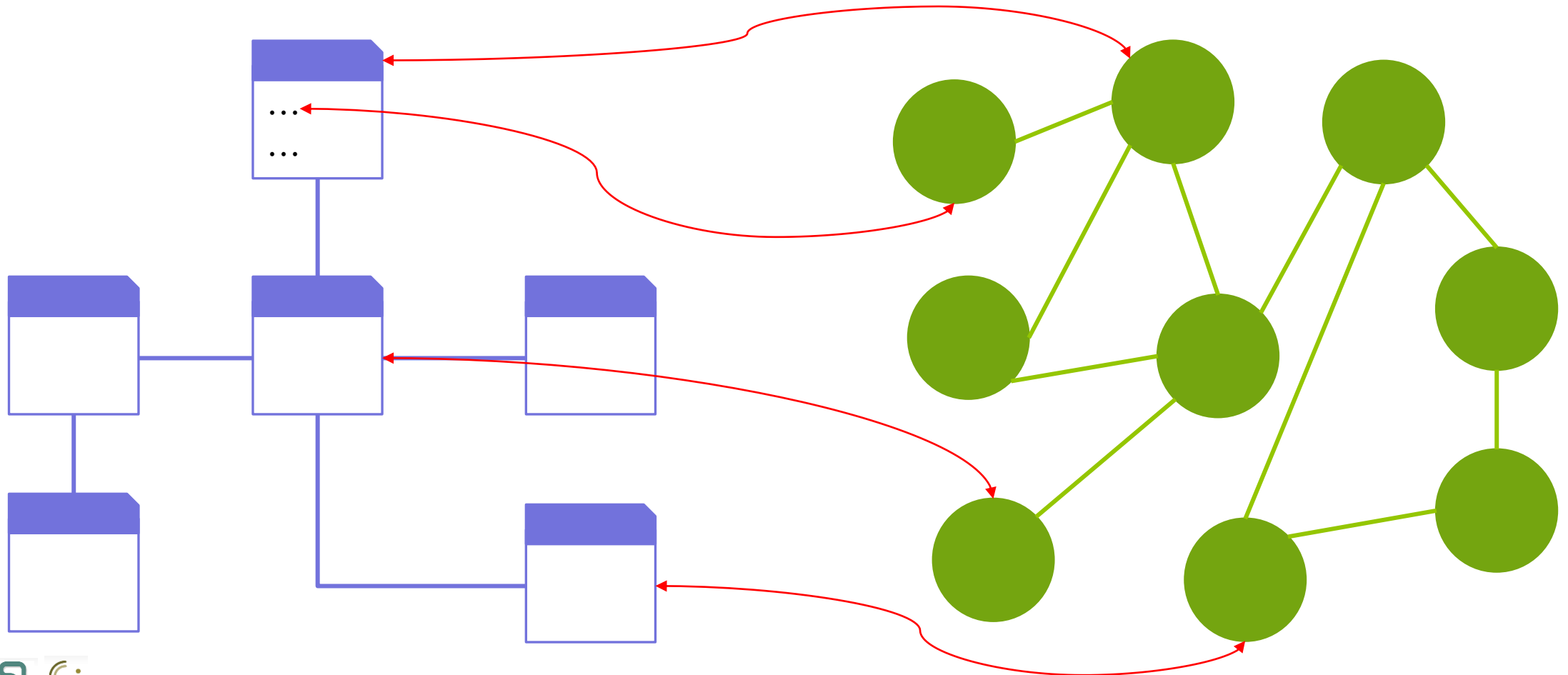
Outline

	Background	2'
	3M	7'
	Latest advancements	4'
	Access 3M	1'
	Future Steps	1'
	Demo	



Background - Schema mappings

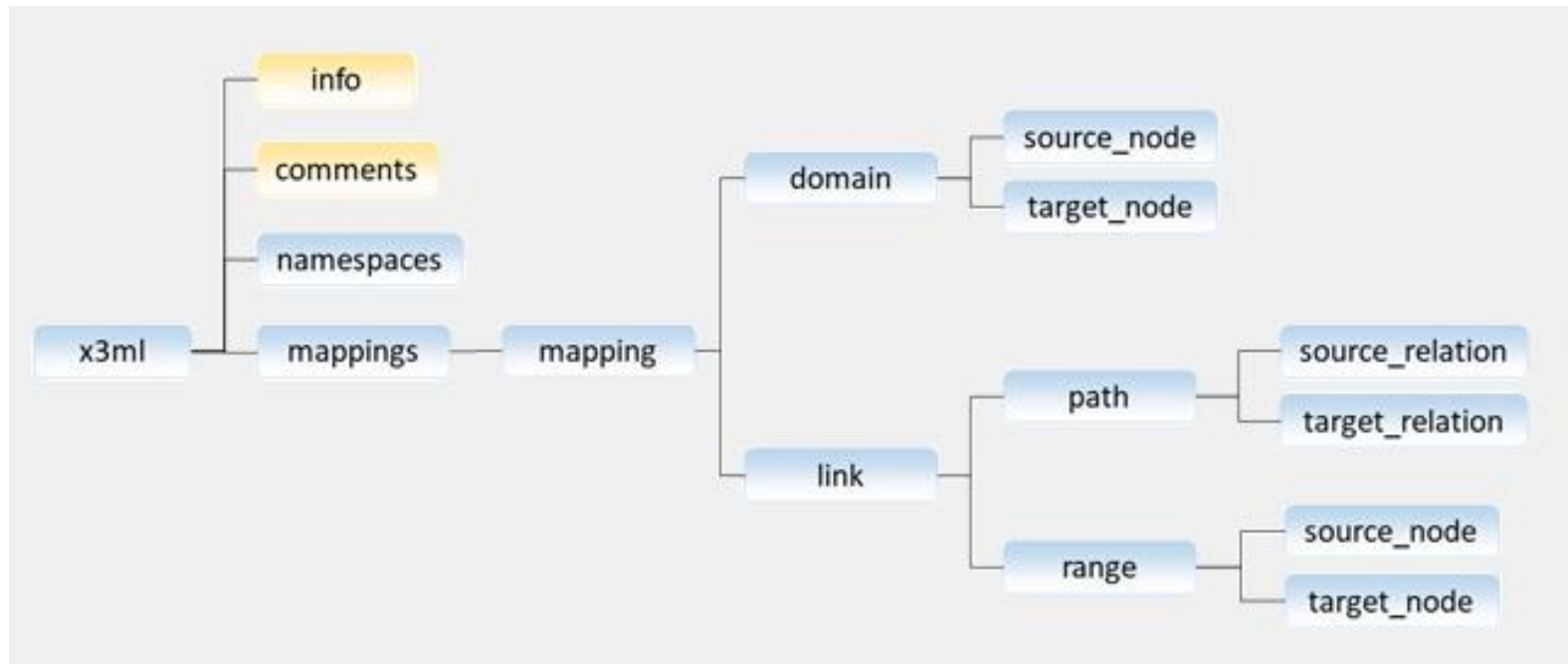
- The rules or specifications that define the relationships between different schemas or data models
 - How elements, attributes, and structures of different schemata are connected



Background - X3ML

□ X3ML Mapping Definition Language

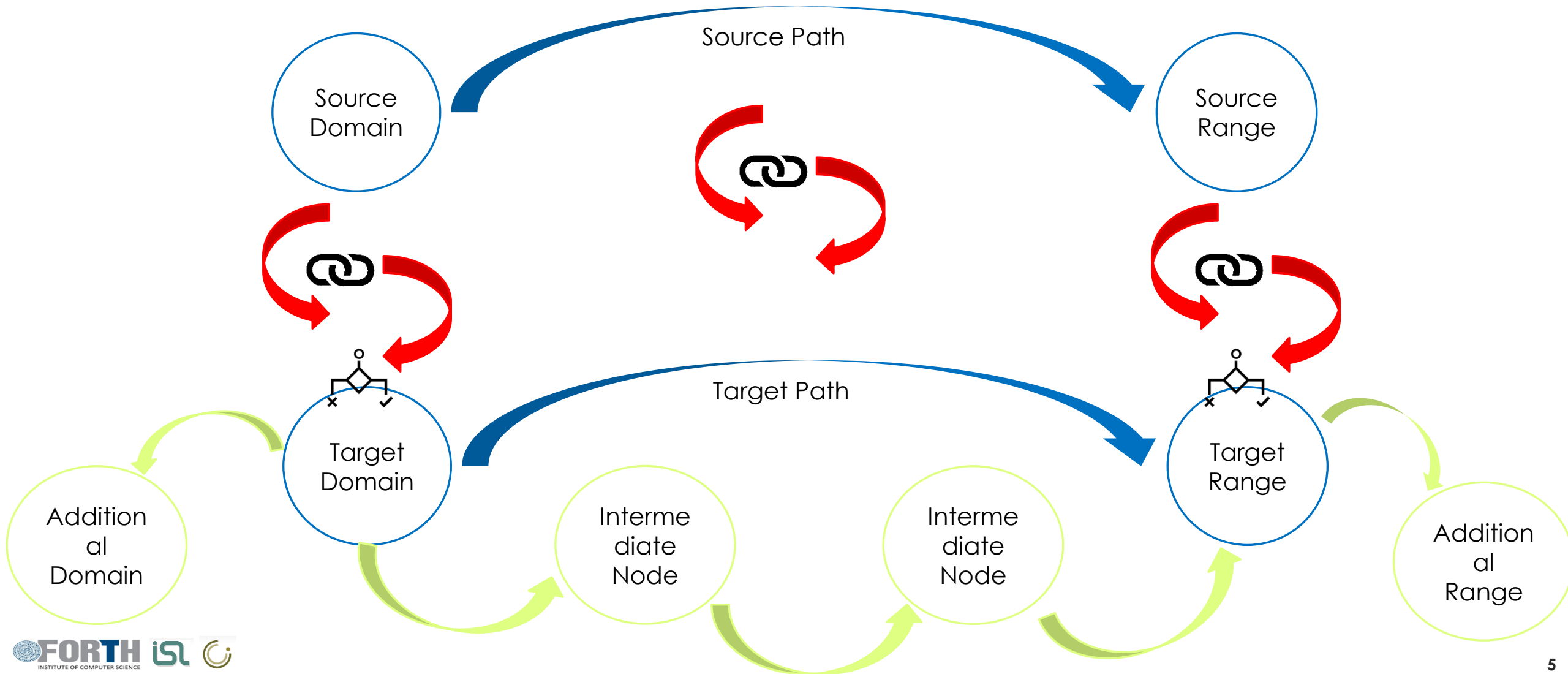
- Describe schema mappings in a declarative manner
- Focused on collaborative creation and exchange of mappings
- Decoupled from URI and values generation
- XML serialization for efficient storage and exchange



<https://github.com/isl/x3ml/blob/master/docs/x3ml-language.md>

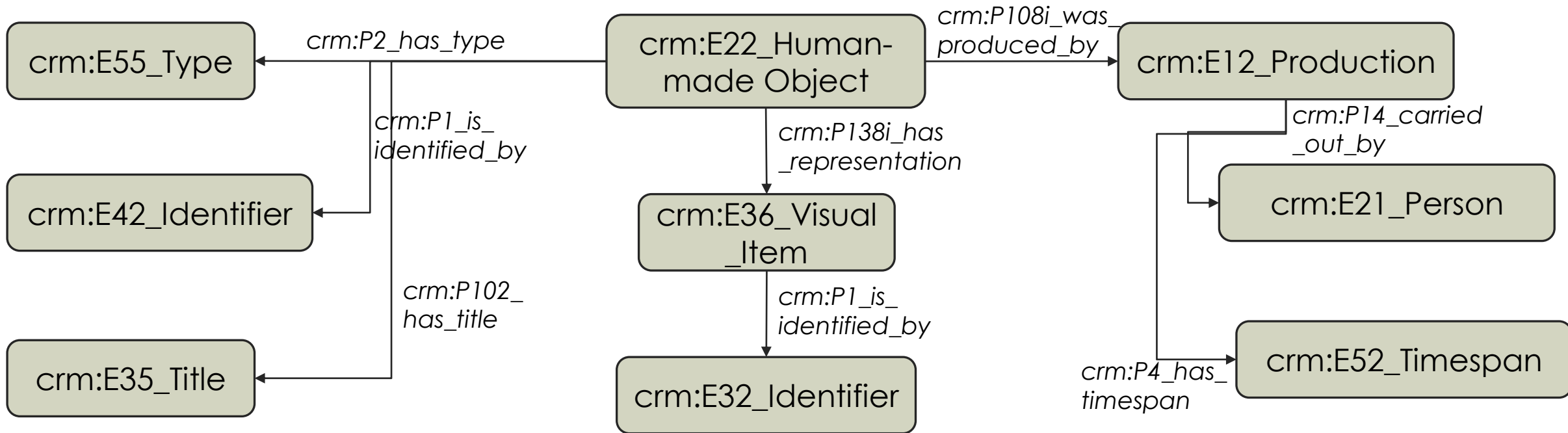
Background - X3ML

□ Structure of mapping



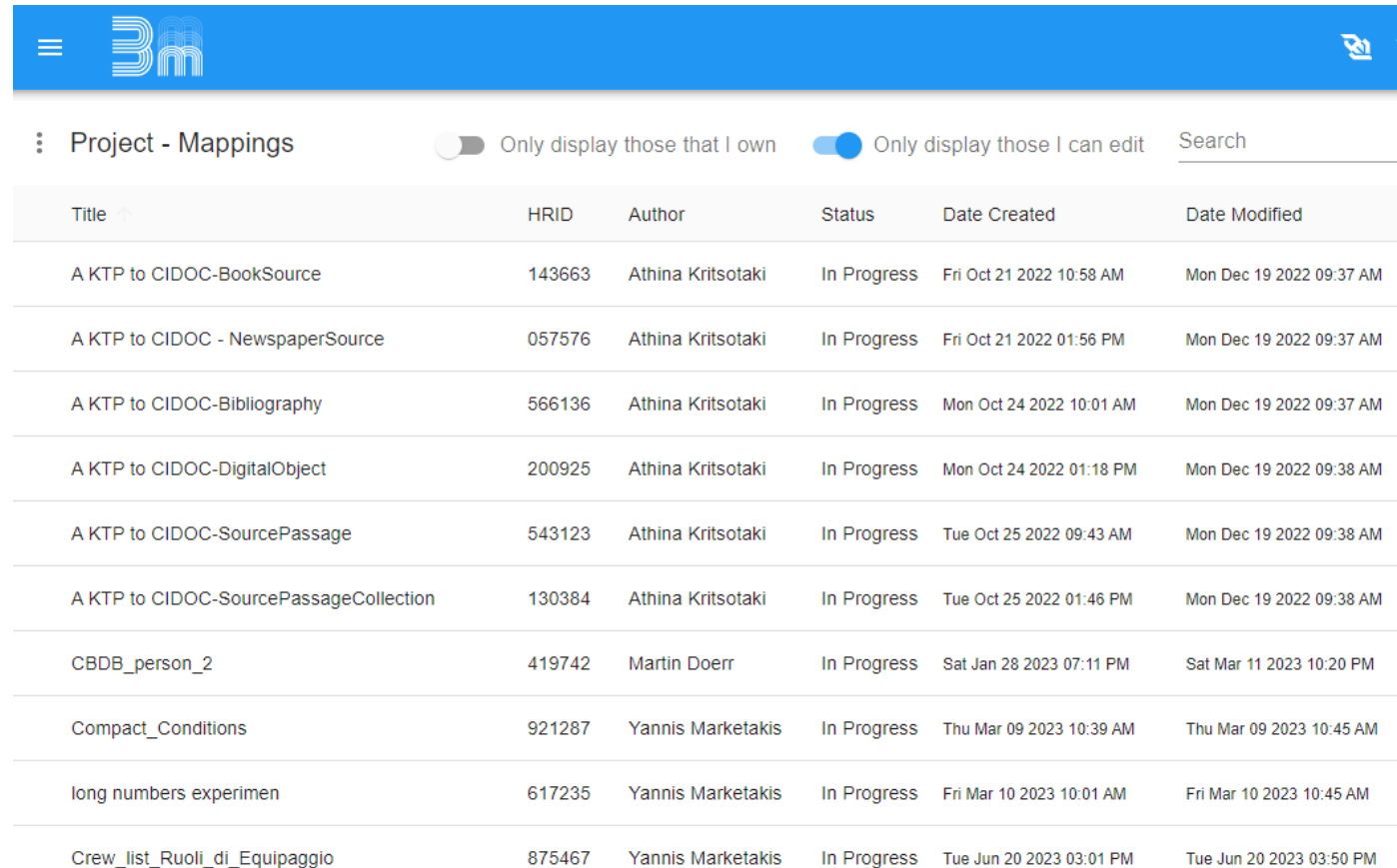
Background - example

id	Painting title	painter	Creation date	Filename
p-1	Self-Portrait as a Painter	Vincent van Gogh	1889	p1.jpg
p-2	The Starry Night	Vincent van Gogh	1889	p2.jpg
p-3	The Ballet Class	Edgar Degas	1874	p3.jpg



3M

- ❑ Supports the collaborative creation and exchange of (X3ML) mapping definitions
 - Mappings definition
 - Mappings storage
 - Organized in projects
 - Collaborative (many users working on the same project)
 - Supports concurrent schema editing (à la google docs)



The screenshot shows the 3M web interface. At the top, there is a blue header with the 3M logo and a search icon. Below the header, there is a navigation bar with a hamburger menu, the text "Project - Mappings", and two toggle switches: "Only display those that I own" (disabled) and "Only display those I can edit" (enabled). A search bar is also present. The main content is a table with the following columns: Title, HRID, Author, Status, Date Created, and Date Modified. The table lists several mapping projects, including "A KTP to CIDOC-BookSource", "A KTP to CIDOC - NewspaperSource", "A KTP to CIDOC-Bibliography", "A KTP to CIDOC-DigitalObject", "A KTP to CIDOC-SourcePassage", "A KTP to CIDOC-SourcePassageCollection", "CBDB_person_2", "Compact_Conditions", "long numbers experimen", and "Crew_list_Ruoli_di_Equipaggio".

Title	HRID	Author	Status	Date Created	Date Modified
A KTP to CIDOC-BookSource	143663	Athina Kritsotaki	In Progress	Fri Oct 21 2022 10:58 AM	Mon Dec 19 2022 09:37 AM
A KTP to CIDOC - NewspaperSource	057576	Athina Kritsotaki	In Progress	Fri Oct 21 2022 01:56 PM	Mon Dec 19 2022 09:37 AM
A KTP to CIDOC-Bibliography	566136	Athina Kritsotaki	In Progress	Mon Oct 24 2022 10:01 AM	Mon Dec 19 2022 09:37 AM
A KTP to CIDOC-DigitalObject	200925	Athina Kritsotaki	In Progress	Mon Oct 24 2022 01:18 PM	Mon Dec 19 2022 09:38 AM
A KTP to CIDOC-SourcePassage	543123	Athina Kritsotaki	In Progress	Tue Oct 25 2022 09:43 AM	Mon Dec 19 2022 09:38 AM
A KTP to CIDOC-SourcePassageCollection	130384	Athina Kritsotaki	In Progress	Tue Oct 25 2022 01:46 PM	Mon Dec 19 2022 09:38 AM
CBDB_person_2	419742	Martin Doerr	In Progress	Sat Jan 28 2023 07:11 PM	Sat Mar 11 2023 10:20 PM
Compact_Conditions	921287	Yannis Marketakis	In Progress	Thu Mar 09 2023 10:39 AM	Thu Mar 09 2023 10:45 AM
long numbers experimen	617235	Yannis Marketakis	In Progress	Fri Mar 10 2023 10:01 AM	Fri Mar 10 2023 10:45 AM
Crew_list_Ruoli_di_Equipaggio	875467	Yannis Marketakis	In Progress	Tue Jun 20 2023 03:01 PM	Tue Jun 20 2023 03:50 PM



A new project is created in the form of a workflow (**5 + 1 steps**)

3M

- Step 1: Define a title and a short description for the project

×

1 Mapping Information — 2 Source Input — 3 Target Schema — 4 URI Generator Policy — 5 Confirmation

Please fill in the following form to create a new "Mapping Project".

Title *

Demo schema mappings

Description

A project with schema mappings created for demonstration purposes

BACK

NEXT

□ Step 2: Upload (a sample) of the data in their original format

×

✓ Mapping Information — 2 Source Input — 3 Target Schema — 4 URI Generator Policy — 5 Confirmation

Please add your own file(s) bellow.

You can add your own "Source Input" files from here, by clicking on the "plus" blue button and then filling in the respective fields.

File #1 ×

Title *
sample file

Description
some sample data

Version
1.0

raw_data.xml
21 KB DOWNLOAD

BACK

NEXT

Step 3: Select or upload the target schema/ontology

Mapping Information — Source Input — **3 Target Schema** — 4 URI Generator Policy — 5 Confirmation

Please select one or more Target Schema file(s) from the available list. Additionally, you can further add your own file(s) below.

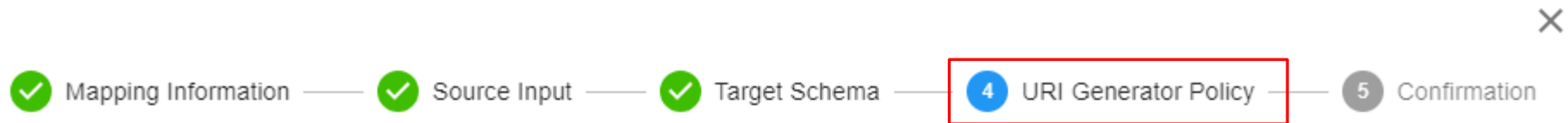
Select one or more predefined "Target Schema" files from the following list.

- CRMsci (1.2.2)**
The Scientific Observation Model(CRMsci) is a formal ontology intended to be used as a global schema for integrating metadata about scientific observation, measurements and processed data in descriptive and empirical sciences such as biodiversity, geology, geography, archaeology, cultural heritage conservation and others in research IT environments and research data libraries.
- FRBR (2.4)**
The FRBRoo is a formal ontology intended to capture and represent the underlying semantics of bibliographic information and to facilitate the integration, mediation, and interchange of bibliographic and museum information.
- CIDOC CRM (6.2.1)**
The CIDOC Conceptual Reference Model (CRM) is a theoretical and practical tool for information integration in the field of cultural heritage
- CIDOC CRM (7.1.1)**
The CIDOC Conceptual Reference Model (CRM) is a theoretical and practical tool for information integration in the field of cultural heritage

You can add your own "Target Schema" files from here.

[BACK](#)[NEXT](#)

□ Step 4: Select or upload the URI and values generation policy



Please select one or more Generator Policy file(s) from the available list. Additionally, you can further add your own file(s) below.

Select one or more predefined "Generator Policy" files from the following list.

- Basic Generator Policy Resources (1.0)
Some basic generator policy definitions

You can add your own "Generator Policy" files from here.

BACK

NEXT

□ Step 5: Inspect the project configuration and create the project

Progress bar: ✓ Mapping Information — ✓ Source Input — ✓ Target Schema — ✓ URI Generator Policy — **5 Confirmation** ✕

- 📄 Title
Demo schema mappings
- 📄 Description
A project with schema mappings created for demonstration purposes
- 📄 Source Input
sample file v1.0 (raw_data.xml)
- 🎯 Target Schema
CIDOC CRM v7.1.1 (CIDOC_CRM_v7.1.1.rdfs)
- 📄 Generator Policy
Basic Generator Policy Resources v1.0 (generator-policy.xml)

BACK

FINISH








□ Extra steps

Invite Collaborators

Participating to this project users □ ×

Select any user to allow editing this Mapping Project

Search by name ×

-  Nurdan Atalan Çayırmez
Natalan
-  Achille Felicetti
akillus
-  Kai Salas Rossenbach
kaisalasrossenbach
-  David Novák
novak
-  Michael English
DEA_livearchive
-  Pavlos Fafalios
fafalios
-  Marie LAGASSE
Marie


< 1 2 3 4 5 6 7 >

Start your mappings project



3M

- Guided mappings by analyzing source resources and target schemata

<> Domain - Named Graph: *(Optionally add one)* 

Source Node

/root/painting

/root

/root/painting

/root/painting/creator

/root/painting/title

/root/painting/creation_date

/root/painting/filename

Target Entity

E2

CIDOC_CRM_v7.1.1

E20_Biological_Object

E21_Person

E22_Human-Made_Object

E24_Physical_Human-Made_Thing

E25_Human-Made_Feature

E26_Physical_Feature

E27_Site

3M

□ Guided mappings by analyzing source resources and target schemata

```
<painting>  
  <id>p-1</id>  
  <painter>Van Gogh</painter>  
  <title>Self-Portrait as a Painter</title>  
  <creation_date>1889</creation_date>  
  <filename>file_p-1.jpg</filename>  
</painting>
```

```
<painting>  
  <id>p-3</id>  
  <painter>Degas</painter>  
  <title>The Ballet Class</title>  
  <creation_date>1874</creation_date>  
  <filename>file_p-3.jpg</filename>  
</painting>
```

Domain

Source Node: /root/painting

Target Entity: E22_Human-Made_Object

= Link #1 (of mapping #1)

↓ Source Relation: title

Source Node: title

↓ Target Relation: P102_has_title

Target Entity: E35_Title

= Link #2 (of mapping #1)

↓ Source Relation: painter_id

Source Node: painter_id

↓ Target Relation: P108i_was_produced_by

Target Entity: E12_Production

production_event

↓ Target Relation: P14_carried_out_by

Target Entity: E21_Person

Guided mappings by analyzing source resources and target schemata

```
<painting>
  <id>p-1</id>
  <painter>Van Gogh</painter>
  <title>Self-Portrait as a Painter</title>
  <creation_date>1889</creation_date>
  <filename>file_p-1.jpg</filename>
</painting>
```

```
<painting>
  <id>p-3</id>
  <painter>Degas</painter>
  <title>The Ballet Class</title>
  <creation_date>1874</creation_date>
  <filename>file_p-3.jpg</filename>
</painting>
```

Target Entity: E22_Human-Made_Object



LocalTermURI
{painting}/{id/text()}

http://.../painting/p-1



CompositeLabel
{Painting with title:} {title/text()}

Painting with the title: Self-Portrait as a Painter

Target Entity: E12_Production



production_event

urn:uuid:5178d556-d670-4bf8-b7dc-48e78433edd3



UUID

Creation of the painting with the title: Self-Portrait as a Painter



CompositeLabel
{Creation of painting with title:} {../title/text()}

↓ **Target Relation:** P14_carried_out_by

Target Entity: E21_Person



LocalTermURI
{painter}/{text()}

http://.../painter/VanGogh

3M – comparison with old 3M

The screenshot shows the old 3M interface. On the left is a sidebar menu with sections: Main Menu, Mappings (with a sub-item 'Sample Mappings'), and Help (with sub-items 'Quick Start Guide', 'Manual', and 'X3ML Generators Manual'). The main content area has a search bar and a 'More' dropdown. Below is a 'Mappings' section with 'Showing: All' and a 'Filter Table' input. A table displays 10 entries with columns: Title, General Description, Creator, Card Status, Last Modified, Id, and a lock icon.

Title	General Description	Creator	Card Status	Last Modified	Id	
LIDO to CIDOC (version 2.0)	The mapping was implemented within the ATHENA project (www.athenaeurope.org). The ATHENA project is bringing together re...	admin	Unpublished	2023-03-16	Mapping/1	🔒
OXLOD-Bodleian-Chinese-Catalogues		avelios	Unpublished	2023-03-10	Mapping/1004	🔒
BM Record Production Data		math	Unpublished	2023-03-17	Mapping/1006	🔒 📄
BM Record Association Types		math	Unpublished	2021-04-22	Mapping/1007	🔒
An example of nested relationships based on the Plateabase data of BM		math	Unpublished	2023-03-17	Mapping/1010	🔒 📄
OXLOD-bodleian-chinese-author-authority		avelios	Unpublished	2019-10-17	Mapping/1011	🔒
OXLOD-bodleian-chinese-classification-authority		avelios	Unpublished	2019-06-27	Mapping/1012	🔒

- Old and outdated technology
- Slow and laggy
- Consists of multiple components
- Difficult to scale
- Complicated installation

The screenshot shows the new 3M interface. It features a blue header with the 3M logo and a search bar. Below the header is a 'Project - Mappings' section with two toggle switches: 'Only display those that I own' (disabled) and 'Only display those I can edit' (enabled). A search bar is also present. The main content is a table with columns: Title, HRID, Author, Status, Date Created, and Date Modified.

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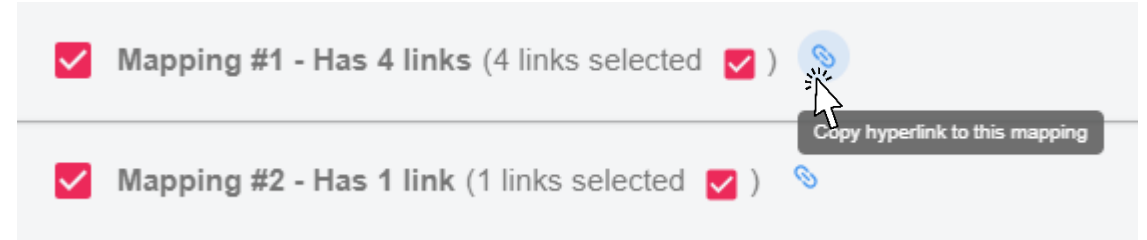
- Modern and state-of-the-art technologies
- Fast and responsive
- Simple MVC design and implementation
- Robust and scalable
- One-command installation

3M – Latest advancements

□ Link to share mapping projects

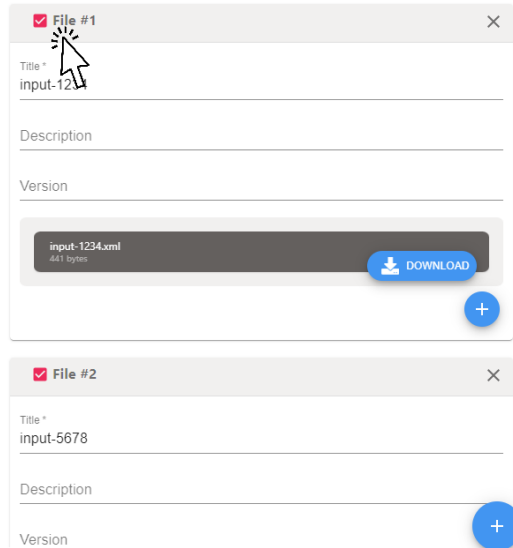
Title	HRID
FIRMS Stock Mappings	278840
RTI-NEH	756044

<https://demos.isl.ics.forth.gr/3m/MappingTableView/278840>



<https://demos.isl.ics.forth.gr/3m/MappingTableView/753281/1xcfx2h6>

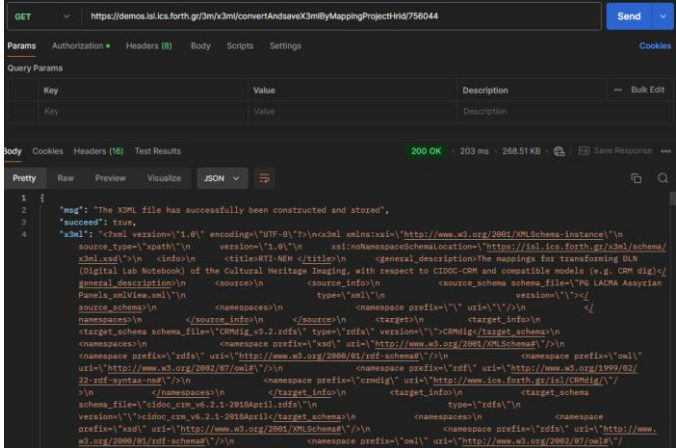
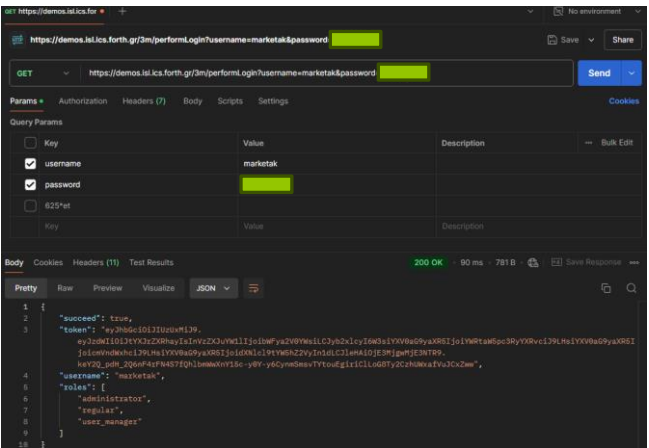
□ Select input files to transform



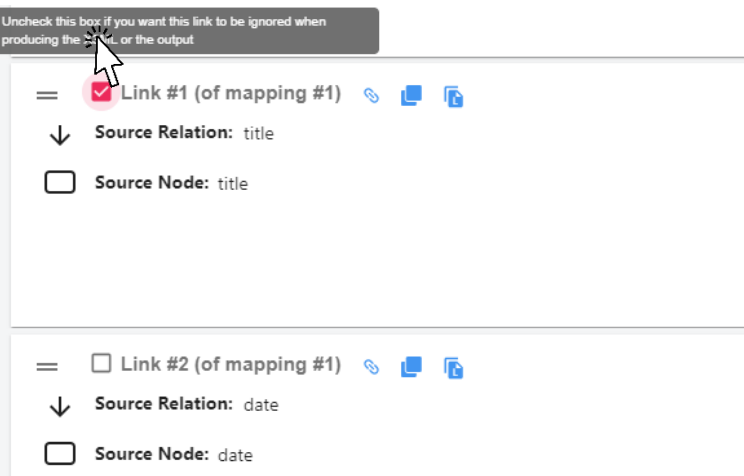
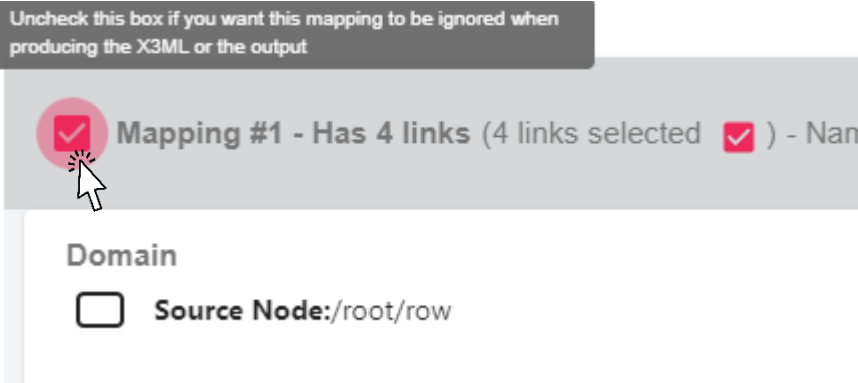
Select which files will be used for the transformation

3M – Latest advancements

REST Service to expose the raw data of X3ML mappings



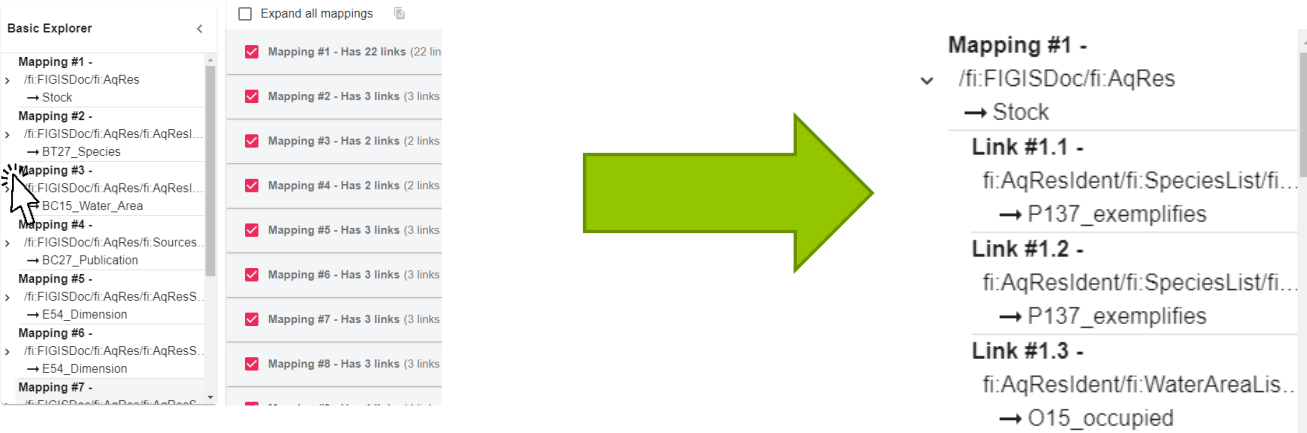
Enable/Disable mappings and links



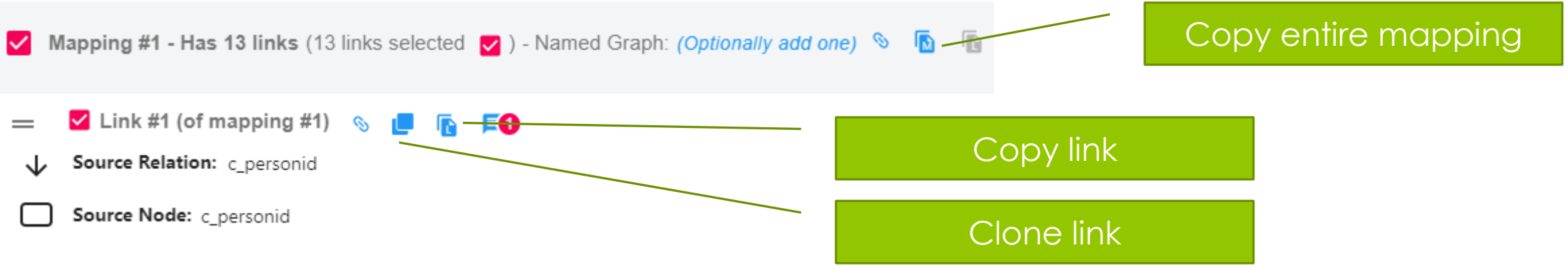
3M – Latest advancements

□ Explorer View

➤ Provides a dense overview of a mapping project



□ Copy/Clone entire mappings/links



3M – Latest advancements

❑ XPATH suggestions in generator policy declarations

INSTANCE LABEL

Please select some definition and then fill in the respective form. Don't forget to save before closing this dialog.

Definitions

- UUID
- Literal
- URIorUUID
- LocalTermUri-Hashed
Prefix: grsf
Pattern: {hierarchy}/{term}
Shorten, UUID
- LocalTermUri
Prefix: grsf
Pattern: {hierarchy}/{term}

FISHBASE_ID/text()
TSN_ID/text()
APHIA_ID/text()
GBIF_ID/text()
TAXONOMIC_CODE/text()
ALPHA_3_CODE/text()
IUCN_CODE/text()
scientific_name/text()
isscaap_group/text()
cpc_group/text()
cpc_class/text()

INSTANCE LABEL

Please select some definition and then fill in the respective form. Don't forget to save before closing this dialog.

Definitions

- Literal
- prefLabel
- URIorUUID
- LocalTermUri-Hashed
Prefix: grsf
Pattern: {hierarchy}/{term}
Shorten, UUID
- LocalTermUri
Prefix: grsf
Pattern: {hierarchy}/{term}
Shorten, UUID
- CompositeLabel
Pattern: {term1} {term2}

Label Declaration

Literal

Argument #1: text
Select Type

Xpath

Select or add your own XPath *

- phylum/text()
- class/text()
- order/text()
- family/text()
- genus/text()
- water_types/text()
- water_types/water_type/text()
- iucn_red_list_code/text()
- iucn_red_list_category/text()
- common_names_eng/text()
- common_names_eng/common_name_eng/text()

Access 3M

❑ Online version

- Just register and use it
- Available at <https://demos.isl.ics.forth.gr/3m>

❑ Build your own deployment

- Based on docker
 - Download from <https://gitlab.isl.ics.forth.gr/cci/3m-docker>
 - Update .env accordingly (i.e. mail settings)
 - Execute `docker-compose up`
 - 😊



3M – Future Steps

- ❑ 3M is under continuous development
- ❑ Short term
 - Improvement of error logging and information messages
 - New ontology reasoner
 - Documentation and user manuals
 - Various fixes and bugs
 - ❖ We will open a ticketing mechanism
- ❑ Long term
 - Better integration with other components (e.g. AQuB)

3M Demo

About 3M



3M is a web tool that facilitates the schema mapping definition process by providing an environment that offers rich and complex functionality hidden under a friendly user interface.

[Download & Installation instructions](#), [Download User Manual](#)

Version 0.3.992 Copyright 2019

[Change Log](#)



□ Currently (September 2024)

- Latest release (September 9, 2024)
 - ❖ Overall 6 releases in 2024
- Contains
 - ❖ 120 users
 - ❖ 454 mapping projects