

SLICES-RI

Metadata Registry System/Data Management Infrastructure

SLICES-RI summer school 2026

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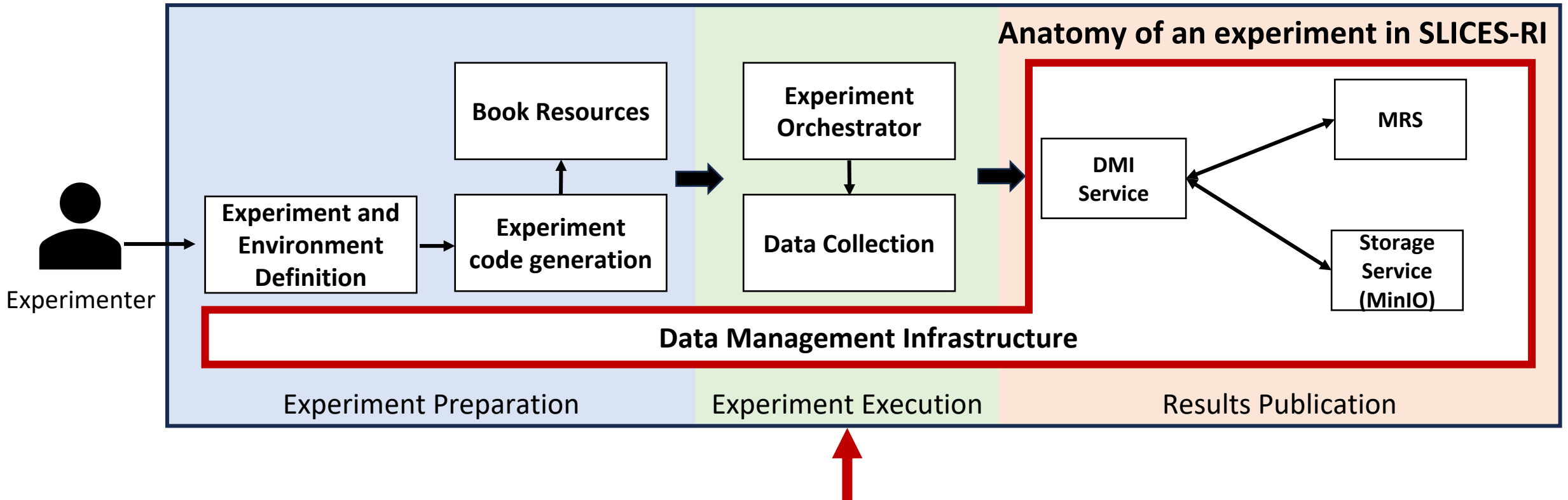
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Outline

- **Overview of SLICES-RI MRS/DMI**
 - Metadata Models
 - Metadata Registry System
 - Data Management Infrastructure

Data Management Infrastructure (DMI)



Metadata Models

Digital object = file + metadata + persistent identification

- **Metadata is a key enabler of open science**, facilitating the **repeatability, reproducibility and replication** of experiments
- It is necessary to **adhere the FAIR open science principles (Findability, Accessibility, Interoperability, Reusability)**, to facilitate human-/machine-readability and machine-actionability, and ensure compliance with legal and ethical regulations.
- **Metadata models must be open, flexible and expandable** to accommodate for the evolving needs of an RI in the digital sciences
- SLICES-RI implements a **Flexible Hierarchical Metadata Model**



Level 1: Domain-agnostic (Core Info, Discovery for any object)

- Includes: **Primary** (e.g., *persistent identification*), **Management** (e.g., version, metadata profile), **Access** (access type, access mode), **Links**, **User Info**, **Rights** (e.g., licence)



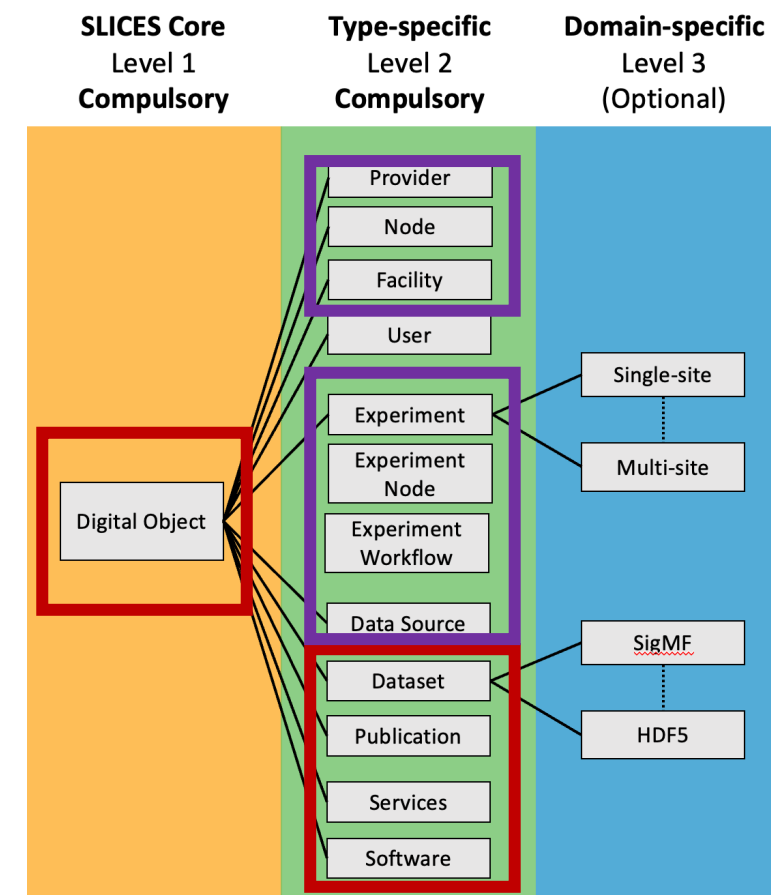
Level 2: Type-specific (Additional Info, improved machine-actionability)

- Extends basic metadata with type specific metadata (shape, statistics for datasets)



Level 3: Domain-specific (Specialized Info, improved machine-actionability)

- Serves the needs of a specific community

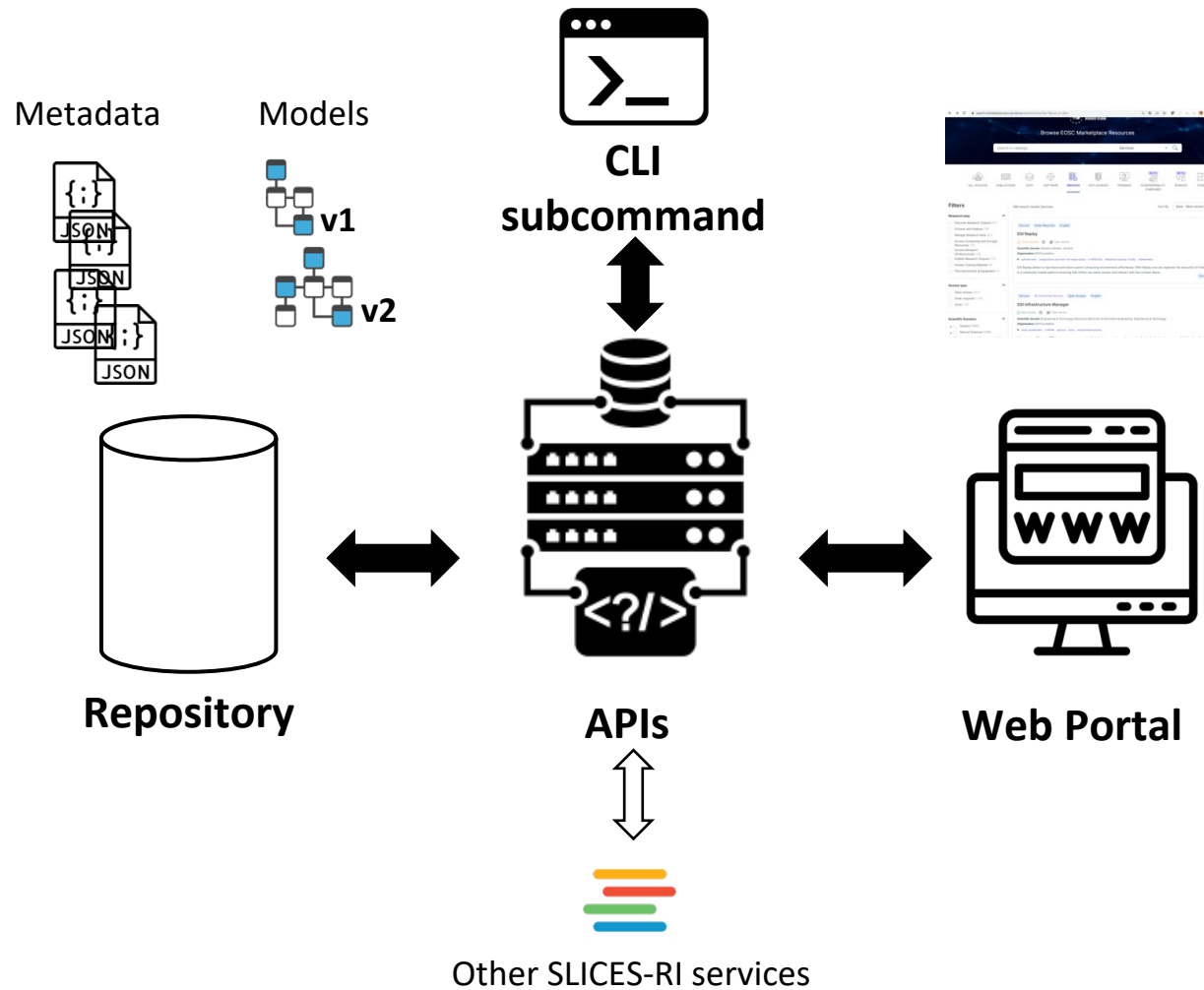


Implemented and Tested



Beta (May-25)

Metadata Registry System (MRS) Architecture



MRS

- Composed of 4 sub-systems
 - **Repository**
 - Metadata (datasets, services, experiments, etc.)
 - Metadata models used for versioning
 - **APIs**
 - Discovery: simple and advanced search (e.g., CreatedAt >= 2026-06-10 && (Keywords ^\$ "POS" && Keywords ^\$ "summer school")
 - Management
 - ...
 - **Web portal**
 - Access to the services
 - Dashboards
 - **CLI subcommand**
 - Metadata publication

Slices dm publish subcommand

- Dynamically follows the MRS APIs model specifications:
 - Get the digital object's properties and:
 - prompt the user to fill all of them **interactively**
 - or use a JSON provided by the user with all fields filled (non interactive mode)

```
Usage: slices dm publish [OPTIONS] DIGITAL_OBJECT

Publish a digital object to the MRS.

Arguments
*  digital_object  TEXT  Digital object type to publish [required]

Options
--data-location -d  TEXT  Path to data file or directory to upload as
                           artifact
--json-file      -j  TEXT  Path to JSON file containing metadata
--verbose        -v                Run in verbose mode (detailed description of
                                   digital object's properties if available)
--help          -h                Show this message and exit.
```

```
[(.venv) zimabrou@MAC-04021493 ~ % slices dm publish dataset
Loading Swagger specification ...

=====
Publishing Digital Object: Dataset
MRS URL: https://mini-dmi.slices-staging.slices-be.eu/datasets
Mode: Interactive
=====

Enter the values to publish the Digital Object of type Dataset.
Enter identifier:
Skipped...
Enter alternateIdentifier:
Skipped...
Enter creators: (List of items of type Person)
Enter number of items to provide:
>>> Enter values for Person #1:
    Enter firstName: [default: ZIYAD]
    Skipped...
    Enter lastName: [default: MABROUK]
    Skipped...
    Enter email: [default: ziyad.mabrouk@inria.fr]
    Skipped...
```

MRS Portal

<https://mrs-portal.slices-staging.slices-be.eu/app/home>

- Allows researchers to access and manage their metadata





Digital object details

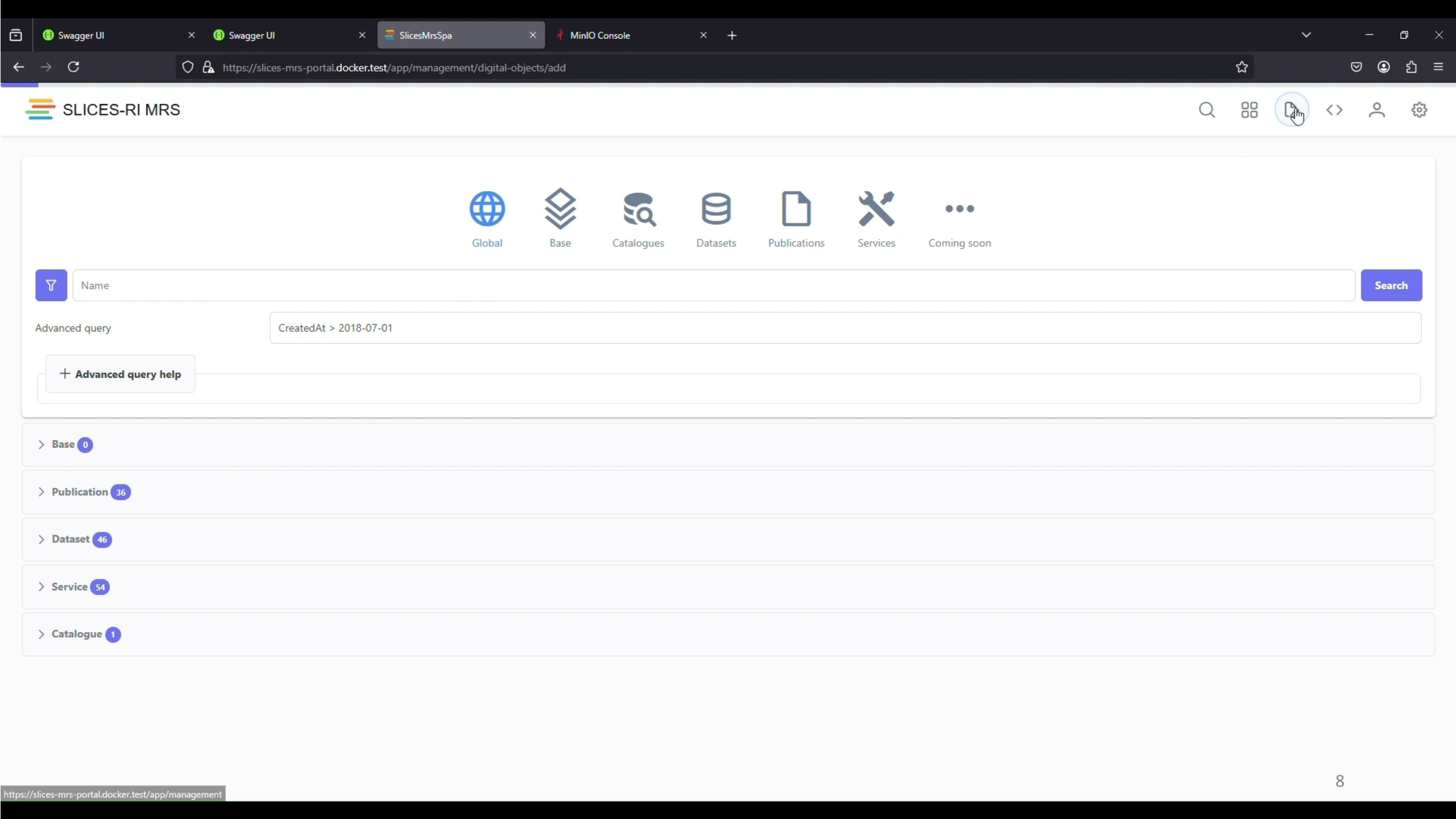
Core

Identifier	pos-network-latency																
System creation date	12:02:11 09/06/2026																
Internal identifier	872																
Alternate identifier	N/A																
Download Url	https://s3.slices-be.eu/riabt.imec.be-project-uclan-cy-playground-1/artifacts/872/object?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=Gnc8Ji3vKLIkJR9OqMCP%2F20260609%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20260609T100211Z&X-Amz-Expires=604800&X-Amz-SignedHeaders=host&X-Amz-Signature=593de840d5259c93ec6862f4dbd62c4b0a64f82eef3a288ba71e36573691953																
Creators	<table><tr><td>First name</td><td>ZIYAD</td></tr><tr><td>Last name</td><td>MABROUK</td></tr><tr><td>Email</td><td>ziyad.mabrouk@inria.fr</td></tr><tr><td>Phone</td><td>N/A</td></tr><tr><td>Position</td><td>N/A</td></tr><tr><td>Organization</td><td>Universite Cote D'Azur</td></tr><tr><td>ORCID</td><td>N/A</td></tr><tr><td>Website</td><td>N/A</td></tr></table>	First name	ZIYAD	Last name	MABROUK	Email	ziyad.mabrouk@inria.fr	Phone	N/A	Position	N/A	Organization	Universite Cote D'Azur	ORCID	N/A	Website	N/A
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ORCID	N/A																
Website	N/A																
Name	pos-network-latency																
Description	This dataset contains the results of a POS experiment measuring network latency (RTT) in both directions between two nodes. The measurements were taken using ping with varying packet sizes, and the dataset includes average RTT values for each packet size. The experiment was conducted as part of the Slices Summer School 2026.																

Resource typeDataset

Dataset

Payment model	N/A
Pricing	N/A
Scientific domains	networks
Scientific subdomains	network protocols
Address	N/A
Date time start	10:02:10 09/06/2026
Date time end	10:02:10 09/06/2026
Locations	Empty
Byte size	153,120
Duration	N/A
Format	application/x-tar
Medium	
Compression format	application/gzip
File metadata	Empty
Data standard	N/A
Encoding format	N/A



Discovery

Available properties

- Identifier
- SystemCreationDate (datetime+tz)
- InternalIdentifier
- AlternateIdentifier
- Creators [Person]
- Name
- Description
- Subjects.Value
- Keywords.Value
- CreatedAt
- Version
- MetadataProfile
- Contributors [Person]
- RequiredObjects [Link]
- RelatedObjects [Link]

• Discovery

• Search Methods

- Simple search: e.g., match, multi-match, pattern match
- Advanced search: multiple-conditions, multiple filters, fuzzy search, synonyms, other
- Metadata Search, e.g., satisfy type,

• Search options

- Sort, advanced sort
- Paging, Limit results

The screenshot shows the SLICES-RI Discovery interface. At the top, there are icons for Global, Datasets, Publications, Services, and Coming soon. Below these is a search bar with a 'Name' label and a 'Search' button. An 'Advanced query' section contains a text input with the query: `Identifier _= "https://doi.org" && CreatedAt > 2022-07-01`. Below the query input is an 'Advanced query help' button. The main content area is divided into three columns: 'Available properties', 'Comparison operators', and 'Complex objects'. The 'Available properties' column lists various properties like Identifier, SystemCreationDate, InternalIdentifier, etc. The 'Comparison operators' column contains a table with operators like Equals, Not Equals, Greater Than, etc. The 'Complex objects' column lists object types like Person, Link, Location, and Formats, each with its own set of properties.

Name	Operator	Case Insensitive Operator
Equals	==	==*
Not Equals	!=	!=*
Greater Than	>	N/A
Less Than	<	N/A
Greater Than Or Equal	>=	N/A
Less Than Or Equal	<=	N/A
Starts With	_=	_=*
Does Not Start With	!_ =	!_ =*
Ends With	_-=	_-=*
Does Not End With	!_-=	!_-=*
Contains	@=	@=*
Does Not Contain	!@=	!@=*
Example 1 like	~	N/A

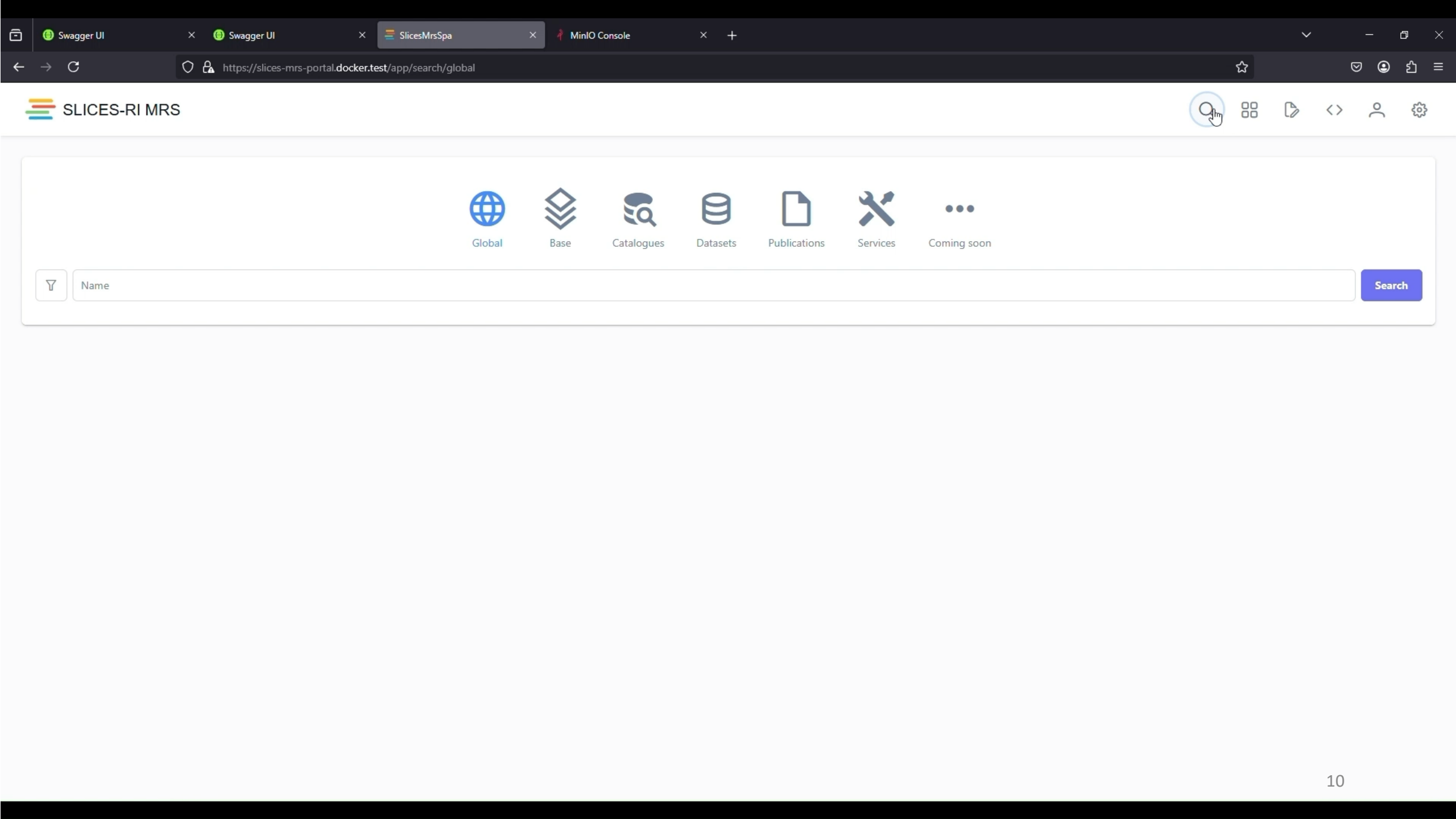
Examples

- Identifier _= "https://doi.org" && CreatedAt > 2022-07-01
- Creators.FirstName @=* "John" || (License @=* "MIT" && Keywords.Value == "5G")
- ByteSize > 1000

Comparison operators

Name	Operator	Case Insensitive Operator
Equals	==	==*
Not Equals	!=	!=*
Greater Than	>	N/A





MRS/DMI Summary: FAIR

- **Findability** of all digital objects by systems and users
 - Implements **SLICES Fair Digital Object (SFDO)**
 - Includes **Type-specific** Digital Objects: **Common** (Datasets, Publications, Software, Tools), **Internal**: (Nodes, Sites, Provider, Monitoring), **Meta** (Metadata models, versioning), etc.
 - Implements and exposes a **query engine** for discovery
- **Access and Management** of all digital objects
 - Provides API for CRUD and more complex operations
 - Authentication and authorization provided by SLICES-RI
- **Interoperability** of Digital Objects
 - **Exports/Registers** on-demand or automatically **to external platforms/systems**
- **Reusability** of Digital Objects
 - **Standardized APIs, Standardized Formats, Comprehensive Documentation, Versioning**

Thank you for your attention!

Full documentation: <https://doc.slices-ri.eu/BasicServices/MRS/MRS.html>



Questions?

For more detailed information, please contact:

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