



# Interoperability frameworks for data sharing across domains and reuse of domain solutions





## General factors that support interoperability

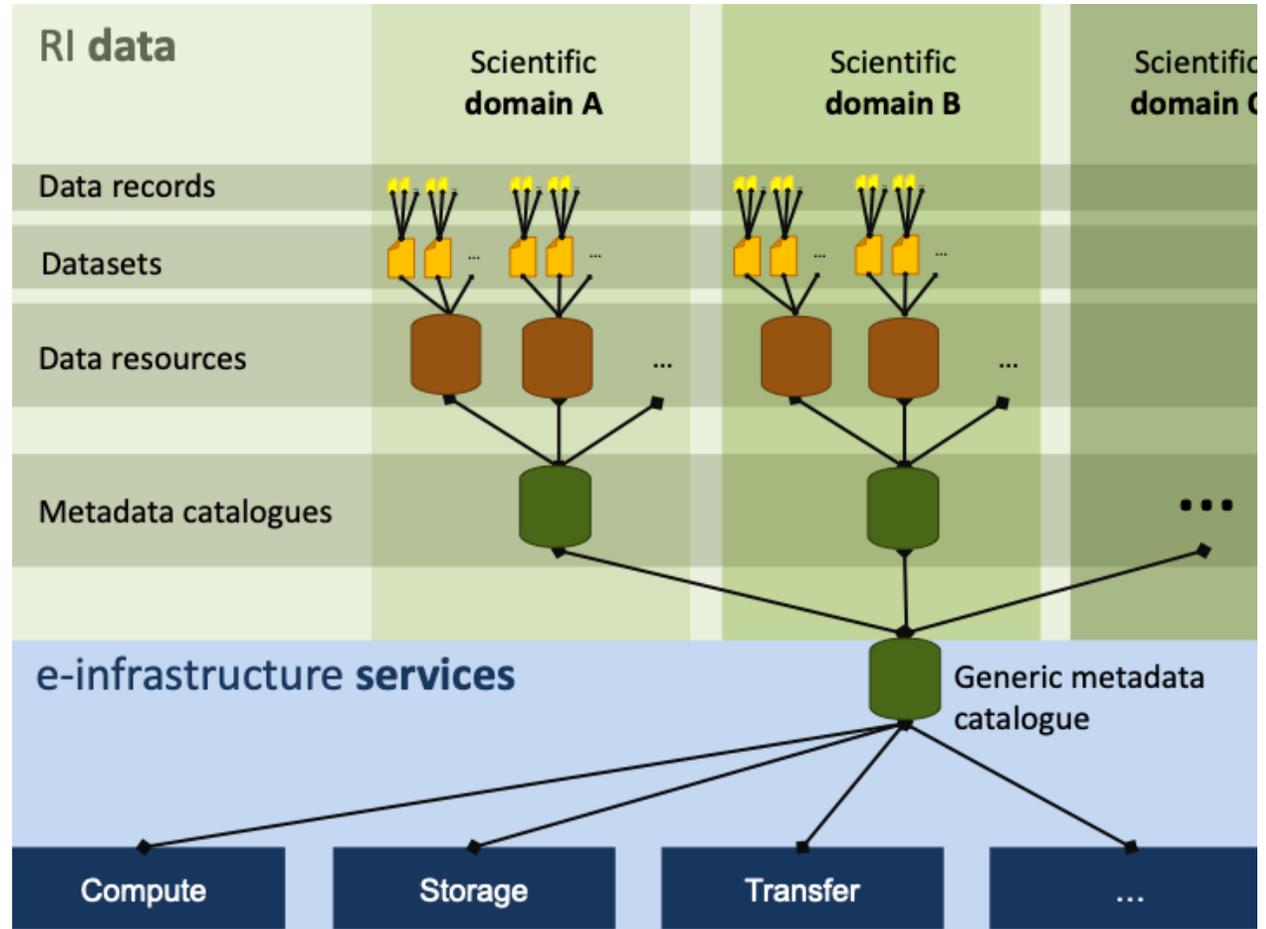
- Low barriers to entry for service providers and users
- Incentives for sustainability: open standards
- Shared services and infrastructure whenever possible – AAI, commercial procurement
- Caveat! Ensuring interoperability between disciplines remains challenge that is not solved



# An architecture to support interdisciplinarity



**EOSC** pilot  
The European Open Science  
Cloud for Research Pilot Project





# Bioschemas

*"schema.org markup for life sciences – minimum properties needed for finding data"*

<http://bioschemas.org>

The screenshot shows a Google search for "Apple pie". The search results include several recipe cards from Pillsbury.com, BBC Good Food, and SimplyRecipes.com. The top result is a "Perfect Apple Pie recipe from Pillsbury.com" with a rating of 4.5 stars and 123 votes. Below the search results is a "Nutrition Facts" table for an apple pie.

Nutrition Facts	
Amount Per 100 grams	
Calories 237	
	<b>% Daily Value*</b>
<b>Total Fat</b> 11 g	16%
Saturated fat 3.8 g	19%
Polyunsaturated fat 2.2 g	
Monounsaturated fat 4.4 g	
<b>Cholesterol</b> 0 mg	0%
<b>Sodium</b> 266 mg	11%
<b>Potassium</b> 65 mg	1%
<b>Total Carbohydrate</b> 34 g	11%
Dietary fiber 1.8 g	6%
<b>Protein</b> 1.9 g	3%
Vitamin A	2%
Vitamin C	5%
Calcium	1%
Iron	6%
Vitamin B-6	0%
Vitamin B-12	0%
Magnesium	1%

\*Percent Daily Values are based on a diet of other people's secrets.



# Interoperability in practice



Events Materials Workflows Providers About

## Welcome to TeSS: ELIXIR's Training Portal

Browsing, discovering and organising life sciences training resources, aggregated from ELIXIR nodes and 3<sup>rd</sup>-party providers.

### Events



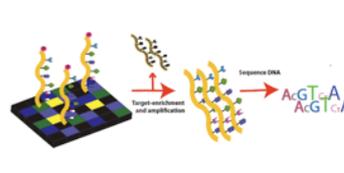
Discover the latest training events and news from ELIXIR nodes and 3<sup>rd</sup>-party providers.

### Materials



Browse the catalogue of training materials offered by ELIXIR nodes and 3<sup>rd</sup>-party providers.

### Workflows



Create training workflows to visualise learning steps and link to resources specific to your training needs.

### Providers



Browse training providers to discover training resources they offer and follow links to their materials and courses.



### ABACBS

The Australian Bioinformatics and Computational Biology Society Inc or ABACBS (pronounced abacus)...

**0 upcoming events** (9 past events)



### BioExcel

BioExcel is a Centre of Excellence for Computational Biomolecular Research set up to support...

**0 upcoming events** (10 past events)



### Thermo Fisher Scientific

Thermo Fisher Scientific is the world leader in serving science, a company with approximately...

**1 upcoming event** (5 past events)



### Software Carpentry

The Software Carpentry Foundation is a non-profit organization whose members teach researchers...

**70 training materials**  
**24 upcoming events** (1912 past events)



### PRACE

Partnership for Advanced Computing in Europe

**46 upcoming events** (533 past events)



### Galaxy Project

There are many approaches to learning how to use Galaxy. The most popular is probably to just...

**8 upcoming events** (173 past events)



# Recommended Interoperability Resources

Resource	Description
<a href="#">FAIRsharing</a>	A FAIR-supporting resource including a registry on data standards, repositories and policy, alongside informative and educational tools and services.
<a href="#">g:Profiler</a>	A gene-centric data integrator with web UI and API services.
<a href="#">Identifiers.org</a>	Provider of persistent and compact identifiers for data objects in life sciences through a curated registry and associated resolver.
<a href="#">InterMine</a>	Framework to integrate life sciences data based on an extensible data model, providing web interface and RESTful web services.
<a href="#">ISA Framework</a>	The ISA (Investigation > Study > Assay) provides formats and tools to manage the experimental descriptions throughout the research life cycle, from collection, curation and deposition in public repositories, to analysis with existing tools and publication in data journals.
<a href="#">Ontology Lookup Service</a>	Repository for biomedical ontologies that aims to provide a single point of access to the latest ontology versions through web UI or RESTFUL API
<a href="#">3DBIONOTES API</a>	A reusable platform-independent API call component for protein and gene metadata alignment, annotation, and integration across major bioinformatic data resources.
<a href="#">BridgeDb</a>	A combination of a software framework and an API for mapping identifiers for related objects in life sciences.
<a href="#">DisGeNET RDF API</a>	An RDF SPARQL Endpoint for DisGeNET, a knowledge platform on human disease genes and variants
<a href="#">MOLGENIS</a>	A software package to help researchers set up an online database application that supports data queries and allows data sharing.

Full details

<https://www.eelixir-europe.org/platforms/interoperability/rirs>

