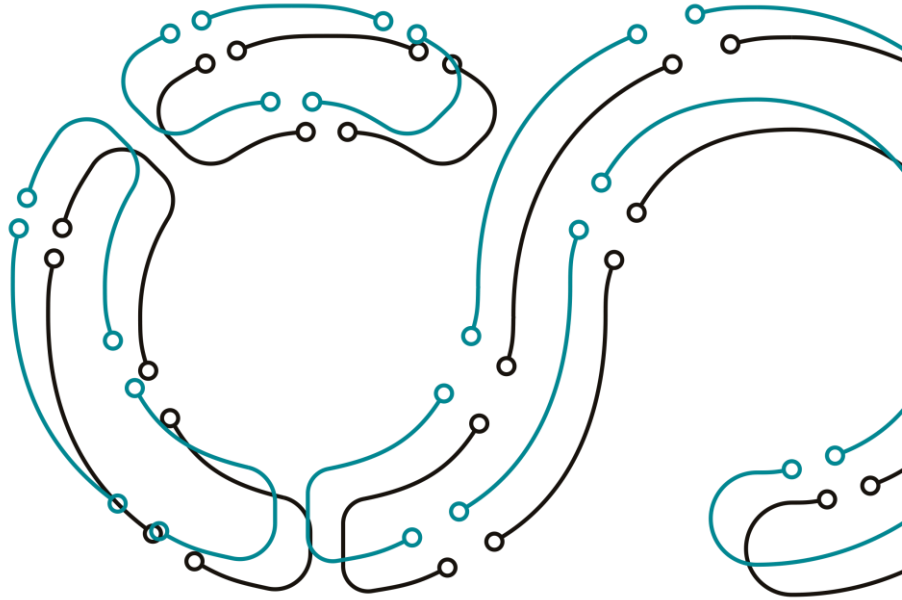
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CORAL-COllaborative Research Application Layer for FAIR data

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Italian Institute of Technology in a nutshell

ISTITUTO ITALIANO DI TECNOLOGIA

IIT's Strategic Plan places significant emphasis on the **exploitation of AI for Science and Technology**

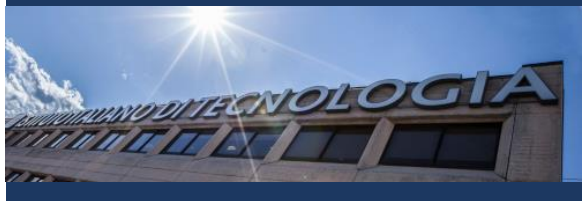
IIT conducts **scientific research** and develops **cutting-edge technologies** in 4 Research Domains:
Computational Sciences, **Technologies for Life Sciences, Nanomaterials** and **Robotics**.



> To pivot, IIT will invest in changing its culture to ensure that data is AI-ready. It is not enough to store raw data. Rather, in line with the FAIR guidelines, data must be Findable, Accessible, Interoperable, and Reusable.

IIT Strategic Plan 2024-2029: https://www.iit.it/documents/20123/8310093/2024-2029_Strategic_Plan.pdf

14
Centres
12 in Italy
2 US outstations
50.000 m^2 of labs



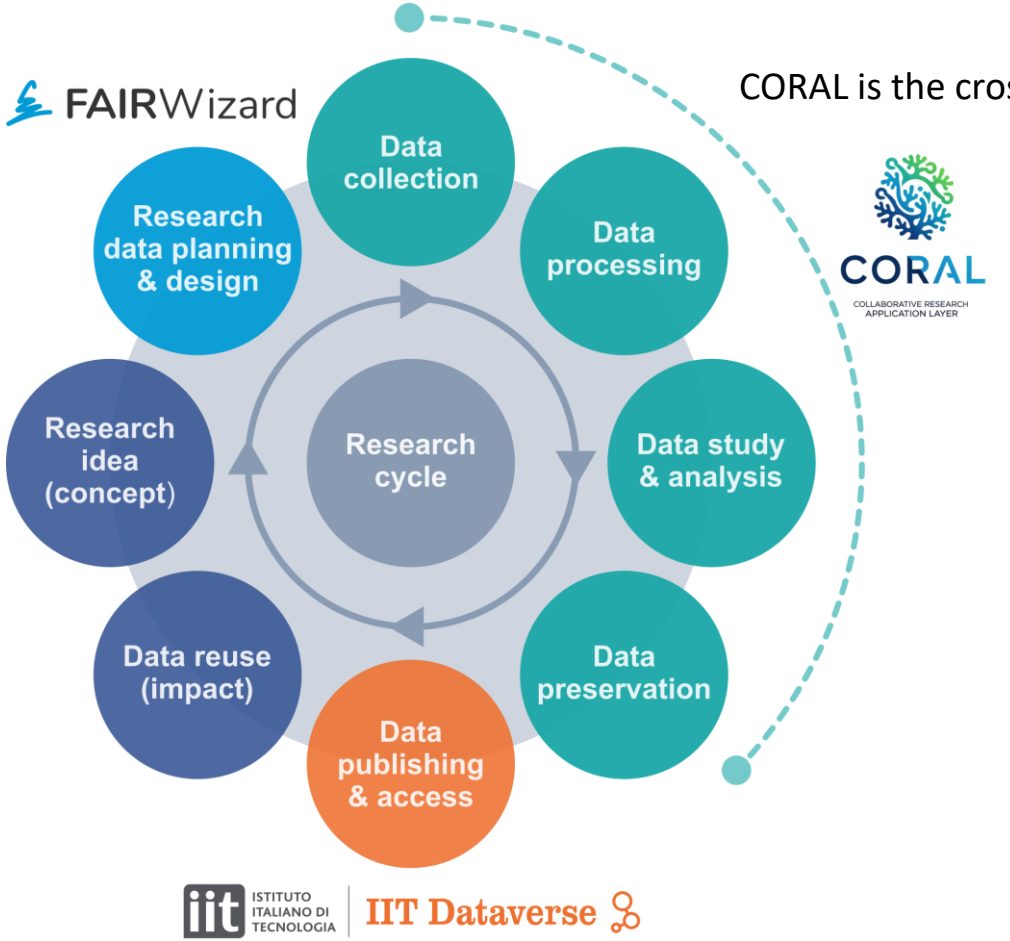
1922
Staff
62 countries of origin
37 years average age
45% women
80% scientific staff



Data as of December 2025

User-centered services for RDM

Achieving secure Research Data Management with CORAL



CORAL is the cross-domain institutional platform under development at IIT to enable:

Secure storage
Ensuring data is protected from loss and unauthorized access.

Collection organization
Structuring data into logical collections for easy management.

Documentation
Adding structured metadata to enhance data understanding and usability.

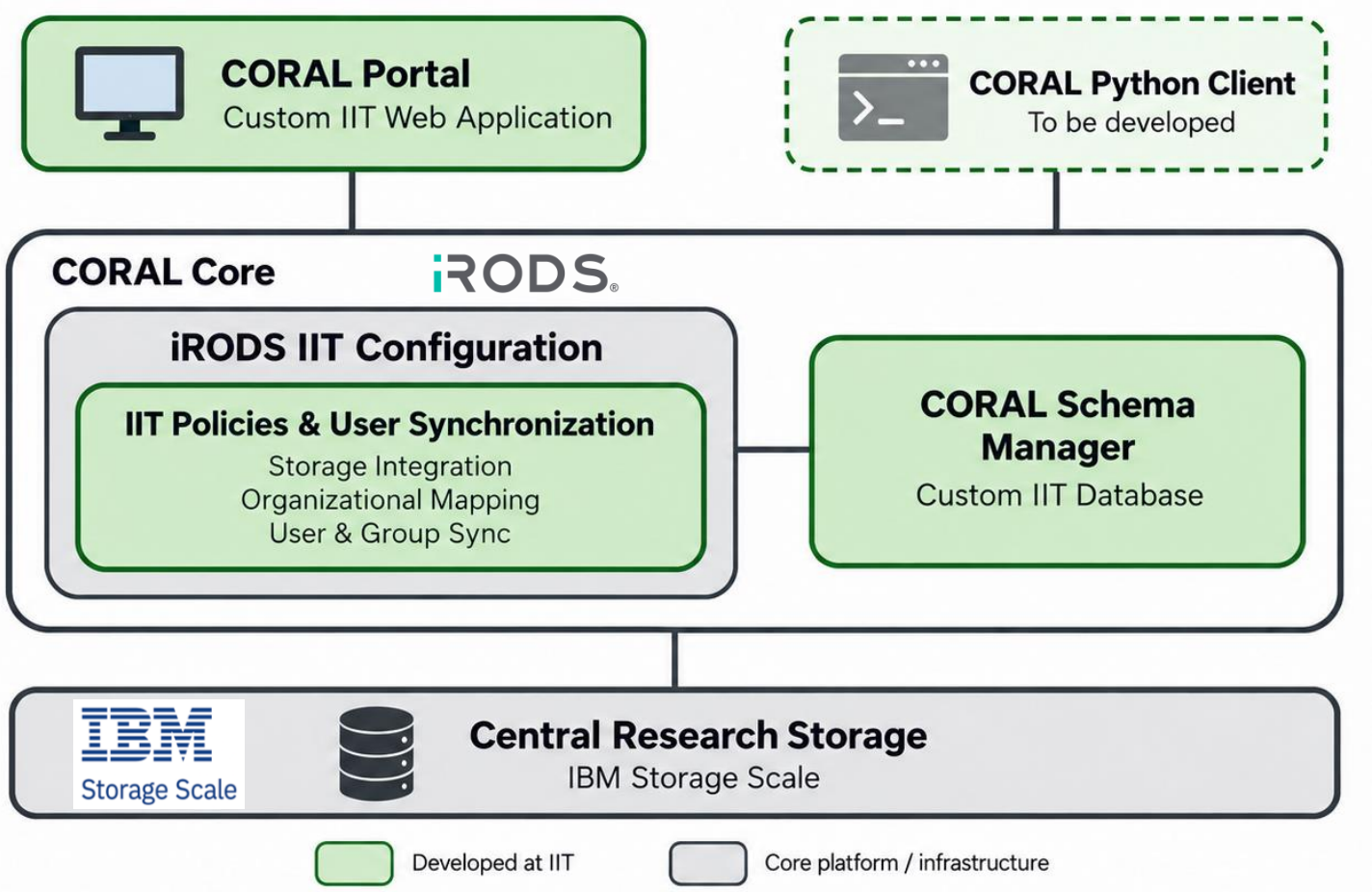
Discovery
Enabling researchers to find relevant data efficiently.

Controlled access & collaboration
Managing permissions to enable controlled sharing and collaboration.

Adapted from an image made by Napkin

CORAL platform's architecture

CORAL is based on iRODS and enables the configuration of structured metadata schemas



CORAL Portal (web application, in-house development), enabling easy graphical user interaction with the platform
+
Python client for easy programmatic access, use, and task automation (e.g., data and metadata ingestion)

iRODS (open source data management system) using custom IIT configuration and policies for storage integration, and users & groups sync
+
Metadata schema DB manager (in-house development), storing custom structured metadata schemas

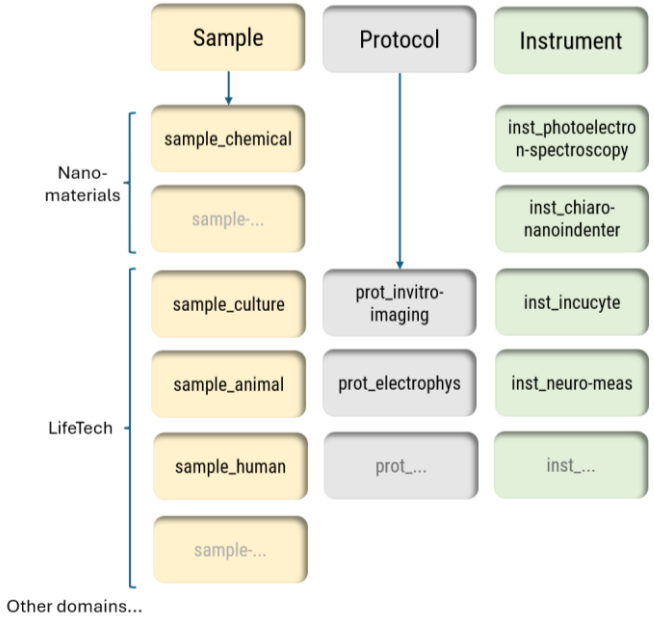
On-prem distributed storage system (IBM Storage Scale, petabyte capacity)

The importance of metadata for interoperability

Creating and maintaining user-centered designed metadata schemas

Every **research data steward** knows that defining and adding metadata is **the most difficult and unattended part of RDM**.
But metadata are a **key element to enable the FAIR principles** and must be collected from the very beginning of the research data lifecycle.

1. Modular design: composing metadata records from reusable metadata schemas



2. Metadata schema **harmonisation**: aligning standards, researchers' requirements, and technological constraints

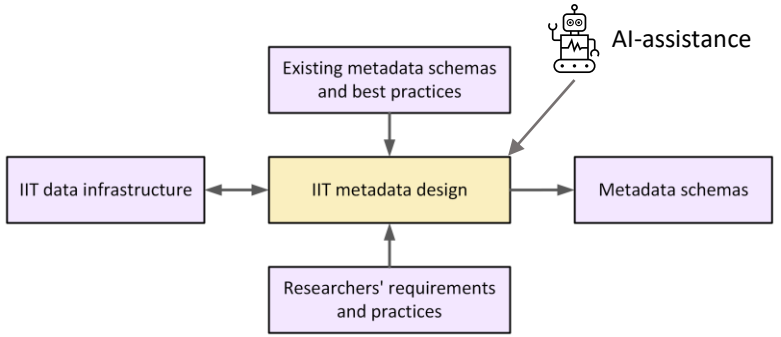
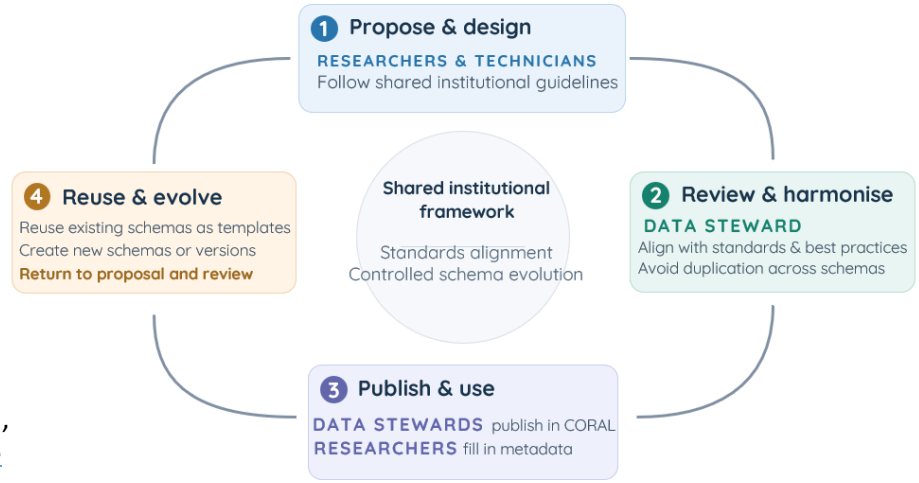


Figure adapted from Bunakov, V., Matthews, B.,, Jejkal, T., Aversa, R., Cozzini, S. (2018). D11.14 - Final metadata standard for nanoscience data, NFFA-Europe project website.

3. Collaborative governance: continuous cycle of metadata schema design, review, use, and evolution



Adapted from an image made by Copilot

Data stewardship (also AI-assisted) is central.

How does this work contribute to EOSC?

Supporting the journey to FAIR-by-design data

Tools

CORAL is still under development, but we plan to release the code as **open-source** within 2027, to foster collaboration and re-use (also within the **iRODS Consortium**)

Data Stewardship Methods

We would like to share our experience with **communities** and **institutions**, to contribute to building data stewardship knowledge and best practices

FAIR data

We believe our institute's data infrastructures help scientists produce **FAIR data** that will contribute to the **Internet of FAIR data and services**

Q&A

Any further questions? Write to rdm@iit.it

