Contributions to the EOSC MVE beyond EOSC Future and the INFRAEOSC07 Agenda

9:00  Introduction, Per Oster (CSC)
09:05  Talk #1: A membership and inventory app for the food metrology research infrastructure METROFOOD-RI, Karl Presser, Premotec GmbH
09:15  Talk #2: OpenWebSearch.EU: Towards an open Web Search Infrastructure, Michael Granitzer, University of Passau
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Karl Presser, Claudia Zoani, METROFOOD consortium
EOSC Symposium 2022
14-17 November 2022, Prague, Czech Republic
What is METROFOOD-RI?

- Research Infrastructure promoting metrology (science of measurements) in food and nutrition
- Network of food labs and growing and farming facilities
- **METROFOOD-RI** is a distributed research infrastructure
- Entered **ESFRI roadmap** in 2016 as “Emerging” and then in 2018 as “Project”
- Finished its **preparatory phase**, METROFOOD-PP (GA871083)
- Covers agrifood systems focusing on food safety, food quality, traceability, authenticity, circular bioeconomy, sustainability and human health
METROFOOD-PP has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871083.
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- The app lists all national nodes and partner institutions
- A national node contains the list of country institutions
• For each partner, the app has information about
  – Contact person
  – Address
  – Physical and electronic resources
  – Physical and electronic resource managers
  – Finances
  – Future plans
  – Involved departments and divisions

METROFOOD-PP has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 871083.
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Physical Resources

- For each partner institute, the app lists the physical facilities
- Multiple facilities can be stored
- 4 types of facilities: Reference Material (RM) facilities, analytical labs, primary production, processing and kitchen lab
METROFOOD-PP has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 871083.

Physical Resources

- For each physical resource, the app provides info about:
  - People
  - Sector
  - Finances
  - HR
  - Equipment
  - Plans for upgrade
  - % to RI
  - Quality
METROFOOD-PP has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 871083.
• METROFOOD-RI services were defined
• Each facility has information to what services they can contribute
• In future: Service provision infrastructure will use this information
Roles and Rights

METROFOOD-PP has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 871083.
Thank you for your attention

www.metrofood.eu


Karl Presser
Premotec GmbH
karl.presser@premotec.ch

METROFOOD-PP has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 871083.
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Towards an Open Web Search Infrastructure

https://openwebsearch.eu/

Prof. Dr. Michael Granitzer
Partners: 12+2, 8.5 MEur Funding

Research

NGOs

Businesses
Two properties of Web Search that don’t add up

• A critical infrastructure for society, like satellite navigation

• A market oligopoly: i.e. “… market … dominated by a small number of large sellers or producers.”

Effects

• Reduced User Choice

• User locked-in despite of ”open” technologies

• Rich-gets-richer effects through exclusive data

• Concerning market behaviour (e.g. Jedi Blue)

• SEO optimized ranking = best information delivery?

• Limited business models

Tapping the Web as resources

• Web data as crucial innovation source

• Tapping the resource is challenging, especially for small innovators

Effects

• Huge upfront costs and high risks for innovator to use web data

• High demand on technical and technological skills (Big Data, AI etc.)

• High demand on hardware resources

• Legal and ethical uncertainties

• Web as competitive, partially adversarial environment
Goals & Objectives

Goals
• Build an Open Web Index including the corresponding pipelines and infrastructure
• Empower users, researchers & innovators to build on top of the Index
• **FAIR Web-Data**: An Open Index should be Open Data with a transparent & legal compliant creation process and fair-use access.

Key Innovations
• Open Management of Website Data
• Automatic Ethics and Information Quality Enrichment of pages
• Open Science Search and new search paradigms as POC
• Open Search Engine Hubs
• Ethical, legal and social concerns
Sketch for Creating and Distributing an Open Web Index

Different Stakeholders along the creation chain
Open Science Search

• Planned Vertical Search Use Case as Proof of Concept
• Integration of potential resources available in the EOSC

Web-Data for Research

• Web-data as research resource
• Access to pre-processed, (hopefully) legally compliant Web-data

Web-Search as EOSC Service

• Curate specialised indices / search engines (e.g. Particle Physics, Computer Science, Datasets ....)
• Enrich your own specialised search engines
• Source for Altmetrics & Co.

Empower users, researchers and innovators at scale
Conclusion

• No substitution of major players:
  (i) we can’t
  (ii) we do it differently

• Opening up the search market and tapping the web as resource

• Three Pillars: Tech, Network, Ecosystem

• Caveat: OpenWebSearch.EU can only bootstrap the approach. More efforts needed to go beyond

• EOSC: potential for interesting services
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Metrology for Integrated marine maNagement and Knowledge-transfer nEtwork

INFRAIA-02-2020: Integrating Activities for Starting Communities

Markus Konkol
MINKE

PARTNERS

# 10 countries
# 22 organisations
The project

**PROGRAMME:** H2020-EU.1.4.1.2. - Integrating and opening existing national and regional research infrastructures of European interest

**CALL:** INFRAIA-02-2020-1. **Topic:** Integrating Activities for Starting Communities

*Integrating Activities* shall combine, in a closely co-ordinated manner 3 types of activities:

• **Networking Activities (NA),** to foster a culture of co-operation between research infrastructures, scientific communities, industries and other stakeholders as appropriate, and to help develop a more efficient and attractive European Research Area;

• **Trans-national Access (TNA) or Virtual Access (VA) Activities,** to support scientific communities in their access to the identified key research infrastructures;

• **Joint Research Activities (JRA),** to improve, in quality and/or quantity, the integrated services provided at European level by the infrastructures.
The main goals

MINKE will integrate key European Marine Metrology Research Infrastructures, to coordinate their use and development and propose an innovative framework of quality of oceanographic data

What to measure?

Identifying the Essential Ocean Variables (EOVs) as the key parameters to monitor

How to measure them?

Adopting a multidimensional framework of data quality:

- **Accuracy**: Minimising the measurement errors
- **Completeness**: Minimising the interpolation errors
- **Timeliness**: Providing the observations as fast as required

**Purpose**: To retrieve (at least) the large scale features, both temporal and spatial, of the EOVs
Data quality approach

IDEAL CASE

REAL OPTIONS

ASSOCIATED ERRORS

OPTIMAL PRODUCT

Accuracy-based approach

Completeness-based approach

Interpolation error

Bias

Fusion data solution

Accurate measurements in (few) selected stations

Measurements in all stations with low cost systems

stations

stations
Vision

Accuracy

Accuracy + Completeness

- Primary reference nodes
- Secondary reference nodes
- Scientific users Operators
- Participatory nodes
# Test Report

Temperature & Conductivity

## SBE 37 SMP MicroCAT

Serial Number: 3287

<table>
<thead>
<tr>
<th>Table. Results of the “as-received” test for temperature and conductivity following the cleaning operation described on page 2 of this report.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T Ref. (°C)</td>
</tr>
<tr>
<td>25.0466</td>
</tr>
<tr>
<td>20.1492</td>
</tr>
</tbody>
</table>

**Old temperature** calibration coefficients:

- \( a_0 = -4.078553 \times 10^{-5} \)
- \( a_1 = 2.878170 \times 10^{-4} \)
- \( a_2 = -3.197355 \times 10^{-6} \)
- \( a_3 = 1.795368 \times 10^{-7} \)

\[
\text{ITS-90 Temperature} = \frac{1}{a_0 + a_1 \ln(n) + a_2 \ln^2(n) + a_3 \ln^3(n)} - 273.15 \, ^\circ C
\]

<table>
<thead>
<tr>
<th>T Ref. (°C)</th>
<th>T Inst. (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0351</td>
<td>2.0352</td>
</tr>
<tr>
<td>5.2141</td>
<td>5.2140</td>
</tr>
</tbody>
</table>

**New temperature** calibration coefficients:

- \( a_0 = 7.2754375 \times 10^{-6} \)
- \( a_1 = 2.783671 \times 10^{-4} \)
- \( a_2 = -2.2808406 \times 10^{-6} \)
- \( a_3 = 1.5520126 \times 10^{-7} \)

\[
\text{ITS-90 Temperature} = \frac{1}{(a_0 + a_1 \ln(n) + a_2 (\ln^2(n)) + a_3 (\ln^3(n))} - 273.15 \, ^\circ C
\]

<table>
<thead>
<tr>
<th>T Ref. (°C)</th>
<th>Inst Output (n)</th>
<th>T Inst. (°C)</th>
<th>T Inst. - T Ref.* (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0351</td>
<td>577392.7</td>
<td>2.0352</td>
<td>0.0001</td>
</tr>
<tr>
<td>5.2141</td>
<td>502147.0</td>
<td>5.2140</td>
<td>0.0004</td>
</tr>
</tbody>
</table>
## Quality Flags

<table>
<thead>
<tr>
<th>Flag</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass=1</td>
<td>Data have passed critical real-time quality control tests and are deemed adequate for use as preliminary data.</td>
</tr>
<tr>
<td>Not evaluated=2</td>
<td>Data have not been QC-tested, or the information on quality is not available.</td>
</tr>
<tr>
<td>Suspect or Of High Interest=3</td>
<td>Data are considered to be either suspect or of high interest to data providers and users. They are flagged suspect to draw further attention to them by operators.</td>
</tr>
<tr>
<td>Fail=4</td>
<td>Data are considered to have failed one or more critical real-time QC checks. If they are disseminated at all, it should be readily apparent that they are not of acceptable quality.</td>
</tr>
<tr>
<td>Missing data=9</td>
<td>Data are missing; used as a placeholder.</td>
</tr>
</tbody>
</table>

*Figure 6 - QARTOD / UNESCO IOC 54:V3 flagging scheme (source: U.S. Integrated Ocean Observing System, 2020a)*
Metadata on quality

Sensor
- Accuracy: +/- 0.002 °C
- Precision: +/- 0.002 °C
- Detection Limit: -5 to 45°C
- Battery Charge: 30%
- Measurement Rate: 1/s
- Coordinates: 52.1234, 7.456
- Placement: <text>
- Quality Level: checked
- Test Reports: [TestReport]
- Sensor Uncertainty: QualityFlag(?)

Test report
- As Received: <text>
- Condition: damaged
- Photographs: [Photos]
- Activities: repaired
- Workflow: <text>
- Test Type: New Calibration
- Procedure: <text>
- Date: Date
- Ambient Conditions: °C, %, etc.
- Measured Values: [values]
- Reference Values: [values]
- Deviations: Measured – Reference
- Mean Deviation: 0.0002
- Satisfactory: pass

Observation
- Time Stamp: Date
- Measurement: 20°
- Validity: inconsistent
- Data Processing: Adjusted
- Provenance: Code
- Observation Uncertainty: Sensor Uncertainty + Validity + Processing = QualityFlag(?)
Metrology for Integrated marine maNagement and Knowledge-transfer nEtwork

INFRAIA-02-2020: Integrating Activities for Starting Communities

Markus Konkol
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Artificial Intelligence for the #EOSC
AI4EOSC

Artificial Intelligence for the #EOSC

- Evolution of the DEEP Hybrid DataCloud platform
- HORIZON-INFRA-2021-EOSC-01-04 call
- Runs September 1st 2022 – August 2025 (36 months)
- 7 academic partners
  + 2 SME
  + 1 non-profit organization

Advanced features for distributed, federated, composite learning, metadata provenance, MLOps, event-driven data processing, and provision of AI/ML/DL services
Objectives

**Objective 1**
Provide feature rich services and platform to build and deploy custom AI applications in the EOSC

**Objective 2**
Enhance existing cloud services to support AI on distributed datasets, with a particular focus on federated learning

**Objective 3**
Deliver methods to compose AI tools, enabling the development of complex data-driven composite applications

**Objective 4**
Deliver an AI exchange in the context of the EOSC, enhancing and increasing the application offer currently available

**Objective 5**
Extend the service offer and the capabilities being offered through the EOSC portal, with focus on AI

**Goal**
Foster an AI exchange in the EOSC context, with added value, innovative and easily customizable services
Background and ecosystem

INDIGO-DataCloud
PaaS-based cloud solution for e-Science

EOSC-Hub
Industry and innovate SME support

DEEP-Hybrid-DataCloud
AI/ML/DL PaaS and services, with transparent access to GPUs

iMagine
AI-based imaging applications for aquatic sciences

uDocker
PaaS Orchestrator
Infrastructure Manager
Identity and Access Manager

AI4EOSC
Enhanced AI Platform for the EOSC

DEEP
AI services for the EOSC Compute platform exploited by additional use cases

Support to SME support in EOSC DIH

DEEP Platform and services

DEEP 3 will become AI4EOSC 3 platform release

2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 ...
## DEEP evolves in...

<table>
<thead>
<tr>
<th>Training on single site, centralized dataset expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single AI application, self deployed or on serverless computing</td>
</tr>
<tr>
<td>Central management of onboarded sites, complex on-premises deployment</td>
</tr>
</tbody>
</table>

## AI4EOSC

<table>
<thead>
<tr>
<th>Federated learning, split learning, gossip learning, making possible training on decentralized datasets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite AI for complex AI tools and applications through function composition and serverless computing</td>
</tr>
<tr>
<td>Enhanced onboarding of resources, easier deployment on-premises</td>
</tr>
</tbody>
</table>
## (some) New features

<table>
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<th>Description</th>
</tr>
</thead>
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<tr>
<td>Integration with privacy tools (differential privacy, anonymity checks)</td>
<td>Community standards for models API (Kserve) following OpenAPI specifications</td>
</tr>
<tr>
<td>ML pipeline composition and workflows</td>
<td>Enhanced web user interface for applications</td>
</tr>
<tr>
<td>MLOps tools to monitor deployed models (drift detection, concept drift, accuracy and performance)</td>
<td>Improved development environment (VS Code, JupyterLab)</td>
</tr>
</tbody>
</table>
AI4EOSC conceptual diagram
AI4EOSC challenges

Integration of disparate resources from different providers across EU e-Infras

Data access and privacy-preserving model training on sensitive data

Correct handling of metadata and quality aspects of AI/ML/DL assets

Community adoption of best practices for AI code development and sharing

Related task forces: FAIR metrics and data quality, semantic interoperability, Infrastructures for quality research software, Technical interoperability of data and services
AI4EOSC Expected results

Cloud based AI platform, integrated into the EOSC, with distributed training capabilities

Reusable AI/ML applications offered through AI4EOSC exchange, with easy deployment paths

Best practices and recommendations for AI practitioners and data scientists

MLOps technological framework providing drift detection capabilities

Model provenance metadata framework, covering the whole AI/M
AI4EOSC: use cases

- Agrometeorology
- Integrated plant protection
- Automated thermography
Agrometeorology

**Aim:** Usage of satellite imagery, in-site measurements, and weather forecasts to generate added-value products for improving farmers activity: e.g. prediction of phenological or pest development stages.

**Currently:** Measurement system - TRL9, prediction system - TRL3

**Within AI4EOSC:** Enhancement of the prediction subsystem following a Composite AI approach to combine the different machine learning models used for the different data sources

**Partners:** Microstep, IISAS, Predictia
Aim: To determine the risk of disease and pests in agricultural crops and determine the phases of plant growth and the condition of crops. The developed AI models are going to be integrated into existing national advisory platforms, operated by WODR and PSNC.

Currently: WODR and PSNC operate a national advisory platform for farmers (eDWIN), which includes a network of meteorological ground stations, the Farm Management System, and ground observations of the occurrence of diseases and pests. The current solutions are based on predictive mathematical models.

Within AI4EOSC: The plan is to add to the current mathematical prediction models the ML/DL-based models used for recognition of the plant diseases and add new sources of the data. Initial focus on wheat and sugar beats and detection of the fungal diseases.

Partners: WODR, PSNC
Automated Thermography

**Aim:** To identify heat losses and thermal bridges in buildings and infrastructures using drone-based images and ML/DL approach in order to provide a corresponding automated AI-based service.

**Currently:** The group owns a dataset of drone-based images on urban districts and drone-based thermal images on a campus district (ca. 0.8TB). The identification of thermal bridges on roofs is already possible using DL (TRL 4). The identification of leakages in district heating networks is possible too (TRL 5/6).

**Within AI4EOSC:** Targets enlargement of the training dataset, AI model improvement, optimisation of the workflows, and creation of a cloud-based automated service

**Partners:** KIT (IIP, SCC)
Thank you for your attention

Project Coordinator: Álvaro López García
aloga@ifca.unican.es
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AI driven policy making using open scientific data

Androniki Pavlidou (Athena Research and Innovation Center)

17th November 2022

EOSC Symposium 2022
Policy making

Evolution and process
Policy making evolution

Human factors

Science, Technology and Innovation (STI) policymakers need to design and implement a new generation of STI policies that contributes to sustainability transitions

A human in the loop is crucial

Science, Technologies, Data factors

The evolving context in STI policies is calling for:

• New data sources (heterogenous, unstructured, structured), with scientific validity
• New tools to collect, analyze and visualize the big data
• Automated & timely processes of heterogeneous data
• Comprehensive & granular – 360o view across multiple facets of R&I activities
• Transparent, replicable and trustworthy outcomes
• Sustainable solutions
The European R&I

R&I activities

- **310 Billion EUR**: EU expenditure in R&D in 2020 (EC)
- Is a **priority** across different players
- Drives large share of Europe’s economic **growth**
- Creates new jobs
- Is key in addressing **societal** challenges

R&I policy making

- **Align** with priorities
- **Sustainable Development Goals** (SDGs)
- **Open** and **inclusive**
- **Transparent**, evidence-driven, **accessible** and **responsive** to as wide a range of citizens as possible (OECD)
- Up-to-date
The policy cycle process

Policies build up on past knowledge and experiences and as long as you exploit past evidence your policy gets better (policy is not formulated in a vacuum).

- **Agenda setting**: Definition of the problem(s) to address
- **Policy formulation**: Explore different courses of action
- **Policy adoption**: Make a choice
- **Policy Implementation**
- **Monitoring and Evaluation**
IntelComp

An Open Science driven solution
Introducing IntelComp


**Website:** [https://intelcomp.eu/](https://intelcomp.eu/)
The objectives of IntelComp

1. Understand the challenges of STI policy making via the development of a co-designed framework with policy makers, funders, analysts, public administrators, citizens

2. Create a Data Space of STI related data sources

3. Develop a suite of analytical tools for STI analysis
   a. NLP and Machine Translation
   b. Subcorpus selection tools using relevance feedback
   c. Topic Modeling

4. Analyse and Validate STI Policy models

5. Deploy in HPC/HTC environment ensuring connection with EOSC standards

6. Co-develop policies via domain specific Living Labs - AI (Spain), Health (France), Climate change (Greece)
The STI policy making challenges

- Examination of research and innovation factors
- Formation of STI policy questions
- Mapping of R&I factors with questions
- Definition of R&I indicators with the questions

For **agenda setting** these indicators provide granular information about scientific and technological trends, and social needs (STI for health, environment, etc.)

- Where should I invest in next?
- Research topic, organization, country, etc
- Opportunities
- Alignment with societal goals

For **impact evaluation**, these indicators provide granular information for already identified outputs and outcomes

- What is the impact of R&I activities on the society different sectors/areas timing (short, medium, long-term)?
- How did (my) funding/policy/approach contribute?
From information needs to concrete policy questions

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<tbody>
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<td><strong>Function 1.</strong> Entrepreneurial activity</td>
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<td><strong>Function 2.</strong> Knowledge creation</td>
<td></td>
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<td><strong>Function 3.</strong> Knowledge diffusion through networks</td>
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<tr>
<td><strong>Function 4.</strong> Guidance (creating legitimacy for stakeholders, visibility and clarity)</td>
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<tr>
<td><strong>Function 5.</strong> Market formation (create markets through regulation of incentives)</td>
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<td><strong>Function 6.</strong> Human and financial Resources mobilisation</td>
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<tr>
<td><strong>Function 7.</strong> Creation of legitimacy for society/counteract resistance to change</td>
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</tbody>
</table>

160 domain agnostic questions
EOSC MVE and INFRAEOSC-07

How Open Science empowers policy making
EOSC MVE Utilization

EOSC

- IntelComp is by design compatible with the EOSC Core provider: OpenAIRE Graph (OpenAIRE)
- Will follow the EOSC Interoperability Guidelines
- Runs on High Performance Computing environment provided by an EOSC Provider EuroHPC member (BSC)
- Will use AAI service, offered by an EOSC provider
EOSC CORE at IntelComp - The OpenAIRE Graph

- Is the major **Open Science data source collection** for agenda setting (what’s going on in science?), on IntelComp **STI Data Lake**
- Provides information critical to **impact** assessment (what did this project directly create?)
- It provides a broad **Coverage, Readiness, Timeliness**
- It offers access to scientific research **outputs + links** to each other and projects
- It includes **rich metadata** (organizations, data sources, citations, APCs, etc.)
- It is a fully operational Open Science infrastructure, fully embedded in **EOSC infrastructure**
- Is **inclusive, transparent, replicable, open**
IntelComp Tools

Data Catalogue-STI Viewer
## THE INTELCOMP CONTEXT – END USER TOOLS

<table>
<thead>
<tr>
<th>Targeted Organization</th>
<th>STI Viewer</th>
<th>STI Policy Participation Portal</th>
<th>Evaluation Workbench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public administration (Ministry), funding agency</td>
<td>Ministry, funding agency, academic, business and citizen organizations</td>
<td>Funding Agency</td>
<td></td>
</tr>
</tbody>
</table>

| Targeted user | Policy & STI analyst | Policy officer, STI managers/agents for organizations, citizens | Call Manager |

| Main functionality | Analyze, compare and visualize a comprehensive set of STI related KPIs | To provide a synthetic list of measurements for participatory STI policy making | To assist in the ex-ante evaluation of STI proposals for funding |

| Stage of the policy-making cycle | Agenda setting, Evaluation | Agenda setting, Evaluation | Implementation |

| Previous Tool | Data4Impact | (simplified) STI Viewer | Corpus Viewer |
IntelComp Data Catalogue

IntelComp Tools
IntelComp STI Data Catalogue

Website: http://catalogue.intelcomp.bsc.es/search
IntelComp tools - STI Viewer
International collaborations by topic

- Cogeneration of Heat/Cool and Power from Bioenergy (Biomass...)
- Cogeneration of Heat/Cool and Power from Hydropower
- Storage of Hydrogen
- Production of Electricity
- Production of Heat/Cool from Solar PV
- Production of Heat/Cool from Hydropower
- Production of Electricity from Solar PV
- Storage of Electricity
- Storage of Thermal Energy
- Production of Electricity from Wind
- Manufacture of Biogas
- Transmission and Distribution
- Cogeneration of Heat and Power from Biomass
- Production of Electricity from Biomass
- Installation and Operation of Electric Heat Pumps
- District Heating and Cooling Distribution
- Production of Heat/Cool from Concentrated Solar Power
- Cogeneration of Heat/Cool and Power from Concentrated Solar Power
- Production of Heat/Cool using Waste Heat
- Cogeneration of Heat/Cool and Power from Waste Heat
IntelComp workshops

• Domain specific living labs workshops
• Information: https://intelcomp.eu/events

• National events (Spain, Greece, France) focusing on AI, Climate Change, Health respectively

• Dissemination events, Register!
Sustainability

In practise
Overview

Tools & Projects
IntelComp re-uses two existing platforms for STI policy:
- A national (Spain) Corpus Viewer tool
- Data4Impact (H2020 Funded project)

Utilizes OpenAIRE-Nexus (H2020 Funded project) services
- OpenAIRE Graph
- ARGOS
- Zenodo

Indirectly through the OpenAIRE Graph
- OpenAPC
- Episciences
- OpenCitations
- MONITOR

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10:25  Conclusion and wrap-up, Per Oster (CSC)
Involving researchers in Open Science
SoVisu an innovative solution

D. Reymond, MCF-HDR - Library and Information Science - david.reymond@univ-tln.fr
IMSIC (Institut Méditerranéen des Sciences de l’Information et de la Communication)
EA 7492, Université de Toulon, Aix Marseille Univ, Toulon, France
The researchers points of views

➢ Ok, it’s already done in several disciplines: maths, physics, medicine... But is it well done in a LIS point of view: metadata are often missing (left side of graphic: no title, abstract, kwds).

➢ But, most are also afraid of the huge work do, or legacy rights [...] 

➢ The several harvesting processes are not known (many publications are already present in HAL)

➢ metadata of many publications are missing

→ no keywords, abstracts, title, and furthermore the full text,

→ many errors in database persist (names, institutions)

→ the need for a dispositive to help researchers to check their visibility and ensure the quality of their data to open up their readability, comes as must be.
SoVisu : self-archiving, self-diffusion & trust

- Integrated system in UTLN ‘s IS
- Documentation and policy markers, steering

Objectives :
- Incitation to self archive in HAL (visibility)
- Facilitate the quality management (readability)
- Participate in a collaborative building process of expert index
  - Synthetic cartographies
  - Data checked by experts
  - Aggregations and indexations
Statements

The best way to enter open science is:

1. get a researcher Id (Orcid) : international identification

2. get an archive Id (halid) : to claim several forms (misspell or not) of the author's name and attached publications

That’s where comes SoVisu.

Once done, one get access to all publications, and can check consistency, check quality of description and repair, clean and fashion own informational expert profile
Results

➢ Release prototype in nov 2021 ➔ one mail information to the whole community
   ➢ 30% of them did connect and custom their profile in one week,
   ➢ 50% did connect (curiosity)

➢ Second mail in january with one main function (and less bugs) : automatic data export for HCERES (evaluation of research) ➔ nearly 80% of the community

➔ It works:
   ➔ because researcher’s ego is directly affected and most want to fashion their profile
   ➔ It is useful for the whole community locally (researchers, policy makers, etc.)
   ➔ This can be a fine-tuned direct window from EOSC ecosystem services and backloop (cleaned data)
Open source, flexible, robust, scalable

- Cloud friendly (<epsilon), online documentation (FR)
  docker, elasticsearch, kibana → distributed Full REST API, nginx (proxy, security), Python, django (Front)
- quite easy to install, to configure in short term process
- The community accepts easily the help provided
- We plan to improve several features:
  - Granularity (thesis, patents, data),
  - Recommender system,
  - Lexical completion suggestion

Collaborate we us for EOSC integration (interoperability and services) ?
Anyone in? mailto:david.reymond@univ-tln.fr

➢ First steps are quite easy: **interface translation** and connection **to specific archive and IS**

➢ The ANR participates in the **Call Open & Re-usable Research Data & Software (ORD)** of the CHIST-ERA ERA-NET consortium bringing together 11 countries,

➢ Can be found under Call ORD on the official CHIST-ERA website: [https://www.chistera.eu](https://www.chistera.eu)
Thanks to Alaric Tabaries who provided the distribution of QD indicator on HAL


References


Vancauwenbergh, Sadia. 2021. « Research information systems as leverage for open science ». In . euroCRIS. http://hdl.handle.net/11366/1746.
But this is not all

➢ The state-of-the-art technology besides SOVisu allows:
  ➢ Aggregations by laboratories
  ➢ Indexations and an exploration motor
  ➢ Interconnexions and API support (reversing qualified data to the OS ecosystem)

➢ The connection to the information system of university allows automatic information completion, **could be the missing (users) part** of a *Current Research Information System (CRIS)*,

➢ allowing to capitalize, trace and dynamically index the knowledge of experts with the *singularity of inviting the expertise actors* of the ecosystem to check the quality of their own data and to **participate** to this indexation (crowd qualifying system?).

➢ if used as an evaluation system, researchers takes part in their evaluation

➢ if installed across the European academic sphere it will be able to stimulate collaborations, cross complete lexical expertise of profiles, and feed up valuable information in IR systems: a breakthrough in automatic corpora constitution (cross disciplinary and linguistic)
Extensions?

➢ Not just a locale french initiative, a direct open door to researchers

➢ Use the rich european ecosystem and tackle interoperability, service integration

➢ Start building **together** a collaborative integration to EuroCRIS and involve researchers?

➢ Interconnect most EOSC services up to researchers and get valuable feedback
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An interdisciplinary Digital Twin Engine for science

Xavier Salazar, interTwin Innovation Manager

17th November 2022
Why interTwin
Co-design and implement the prototype of an interdisciplinary Digital Twin Engine - an open source platform based on open standards that offers the capability to integrate with application-specific Digital Twins. Its functional specifications and implementation are based on a co-designed interoperability framework and conceptual model of a DT for research - the DTE blueprint architecture.

HORIZON-INFRA-2021-TECH-01-01: Interdisciplinary digital twins - Expected outcomes

- prototype of an interdisciplinary Digital Twin, using a combination of the latest digital technologies, to address complex challenges;
- support interoperability of data and software, integration and collaboration across different scientific domains;
- A framework enabling Researchers to ensure the quality, reliability, verifiability of the data available through the Common European Data Spaces and the European Open Science Cloud
General Information

- EGI Foundation as coordinator and 30 partners
- Consortium at a glance

- 10 partners to deliver cloud, HTC, HPC resources and access to Quantum systems
- 11 open source technology providers delivering the DTE infrastructure and horizontal capabilities
- 14 partners representing research communities from 5 scientific areas bringing requirements and developing DT applications and thematic modules.

<table>
<thead>
<tr>
<th>Duration</th>
<th>36 months</th>
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<tbody>
<tr>
<td>Start date</td>
<td>1 September 2022</td>
</tr>
<tr>
<td>End date</td>
<td>31 August 2025</td>
</tr>
<tr>
<td>Budget</td>
<td>11,731,665 EUR</td>
</tr>
<tr>
<td>PMs</td>
<td>1481.5</td>
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</table>
Co-design, develop and provide a Digital Twin Engine that simplifies & accelerates the development of complex application-specific DTs that benefits researchers, business and civil society

Co-design a Digital Twin Engine blueprint architecture that provides a conceptual framework for the development of DTs supporting interoperability, performance, portability & accuracy.

Extend the technical capabilities of the European Open Science Cloud with modelling & simulation tools integrated with its compute platform

Ensure trust and reproducibility in science through quality, reliability and verifiability of the outputs of Digital Twins

Demonstrate data fusion with complex modelling & prediction technologies

Simplify DT application development with tools to manage AI workflows and the model lifecycle while reinforcing open science practices
Digital Twin Engine - Strawman Concept

- **Thematic Modules**
  - (Environmental Sciences)
  - (Physics Sciences)
  - (Other Sciences)

- **DTE Infrastructure**
  - Cloud infrastructures
  - Data sources & infrastructures
  - High Performance Computing

- **Advanced Workflow Composition** (including all the above capabilities)

- **Quality & Uncertainty tracing**: Capabilities supporting verification, validation, predictivity, traceability, ...

- **Orchestration of all the above capabilities across hybrid infrastructures (Platform level)**
**Aim:**
Pre-operational software of a DTE at TRL 6 or 7 depending on the components

**Objective:** To get results onboarded and available via EOSC marketplace:
- DTE components reaching higher TRL > 7 onboarded as EOSC resources
- DT applications as Software Research Product
### Design and specifications
- **Project Year 1**
  - **04.2023**
    - Design and specifications
      - Deliverables: Report on requirements for all use cases
  - **05.2023**
    - DTE blueprint architecture
      - Deliverable: DTE blueprint architecture, functional specifications and requirements analysis v1
  - **09.2024**
    - Design and specifications
      - Deliverables: Updated report on requirements for all use cases

### Software Releases
- **Project Year 2**
  - **10-12.2023**
    - Software Releases
      - Deliverables: Software releases for all use cases and modules
  - **01.2024**
    - DTE blueprint architecture
      - Deliverable: DTE blueprint architecture, functional specifications and requirements analysis v2
  - **04.2024**
    - Validation
      - Deliverables: First version of the thematic module
  - **10.2024**
    - DTE blueprint architecture
      - Deliverable: DTE blueprint architecture, functional specifications and requirements analysis v3

### Validation
- **Project Year 3**
  - **07-08.2025**
    - Validation
      - Deliverables: DT application development and integration report

### DTE blueprint architecture
- **Project Year 3**
  - **01-04.2025**
    - Software Releases
      - Deliverables: Final Software releases for all use cases and modules
  - **01-04.2025**
    - DTE blueprint architecture
      - Deliverable: Final Architecture design of the DTs capabilities
Cooperation with other external initiatives

Projects in HORIZON-INFRA-TECH-01

- **https://www.ai4europe.eu/**
- **https://gaia-x.eu/**
- **https://www.plattform-i40.de/**
- **https://biodt.eu/**
- **https://dtgeo.eu/**
- **https://www.ebrain-health.eu/**

External Expert Advisory Board (EEAB)

- **https://eosc.eu/**
KERs and Expected Pathway to Impact

**Results (KERs)**

- **KER1**: Interdisciplinary Digital Twin Engine
- **KER2**: Interoperability Framework
- **KER3**: Toolkit for AI workflow and method lifecycle management
- **KER4**: Quality Framework
- **KER5**: DTE federated infrast. integrated with EOSC and EU Data Spaces
- **KER6**: interTwin Open Source Community

**Outcomes**

- A pre-operational prototype of an interdisciplinary Digital Twin,
- Latest modelling and prediction technologies in a number of different areas
- Facilitated Open Science practices with connected, shared and re-use of research outputs

**Impact**

- Enhanced global competitiveness technological excellence and wider use of AI in research and enhanced data-based research
- Opening up of new areas of R&D of new industrial applications/products.
- Transdisciplinarity, cross-fertilisation and a wider tech. transfer between academia and industry.
Main contributions for EOSC

- One of our main channels for community & ecosystem development
- Main computing providers partners are also EOSC providers
- An important exploitation path to become part of EOSC marketplace / portfolio of available technologies and services
- Committed to support Interoperability guidelines for access and orchestration
- DTE make use of the EOSC computing platform
- Extension to EOSC accounting to support HPC resources
We would like to hear feedback from you:

- We expect to engage with more communities having similar approaches / wanting to use or implement digital twins (early adopters)
- We aim to engage with external communities to discuss about the Blueprint Architecture (internal co-design within the project, to be extended during the project)
- We aim to engage experts in Digital Twins to join the External Expert Advisory Board - want to contribute & join
Thank you!

https://www.intertwin.eu
info@intertwin.eu
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Connectome – Project
EOSC Symposium 2022
Crosswalks implemented:
→ BCUL Patrinum MARCXML -> RiC-O
→ RiC-O (Archives) -> RESCS
→ Patrinum MARCXML -> RESCS
→ SLSP MARCXML -> RESCS
→ CORDIS XML -> RESCS
→ OpenAlex JSON -> RESCS
→ SNSF CSV -> RESCS
→ Opendata.swiss JSON -> RESCS

Technology
→ RDF – Mapping: Non-RDF to RDF.
→ preprocessing & specific mapping needed

EOSC TF Semantic Interoperability
→ Scope Landscape Overview

Objective
→ Exchangeable crosswalks (target) to achieve DevOps flexibility
Data Enrichment Use-Cases

- Linked Archival & Bibliographic Metadata with BCUL and FHGR.
- Named Entity Recognition and Disambiguation with Memobase and DaSCH.
- Development of various crosswalks for data aggregation purposes.
→ AI research projects, people, organizations for exploration purposes.

→ Swiss (SNF, ARAMIS), and European (CORDIS, in dev) project data.

→ API allows integration of metadata (using their data structure).
Openness Score

Swissuniversities funded project with University of Applied Sciences Graubünden & Université de Fribourg
Discovery & Insights Platform

→ For students & scholars to discover and use open data from different disciplines.

→ Data Insights
  → Visualisations
  → Recommendations
  → automated summaries
  → simplifications of abstracts
Want to collaborate?

We are looking for joint projects in...

→ Metadata & crosswalks registries (FAIRCORE4EOSC / EOSC-A TF-SI).
→ Data Enrichments.
→ EOSC Research Discovery Graphs & Platforms.
→ Infrastructure Federations.
→ CH-Node for exchanging metadata to EOSC.

Participation in Horizon Europe Projects
→ Switzerland is currently a non-associated third-country.
→ Participation via EU partners still possible.
→ Funding from Swiss Secretariat for Education, Research and Innovation (SERI).

Partners for CHIST-ERA
→ Joint project for Open Research Data call.
Contact us

Dr Sebastian Sigloch
Head of Data & Insights
sebastian.sigloch@switch.ch

Dr Andrea Bertino
Senior Project Manager Open Science / Connectome Project
andrea.bertino@switch.ch

EOSC Task-Forces, we’re participating in:
→ Semantic Interoperability (Kurt Baumann)
→ FAIR metrics and Data Quality (Andrea Bertino)
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