



# EOSC-Life: Building a digital space for the life sciences

## D11.2 – Life Science in EOSC: Summary of EOSC-Life impact and key results

WP11 – Project Management  
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## Executive Summary

"EOSC-Life is building a digital space for the life sciences" with the following project goals:

1. Establish EOSC-Life by publishing FAIR life science data resources for cloud use
2. Create an ecosystem of innovative life-science tools in EOSC
3. Enable ground-breaking data driven research in Europe by connecting life scientists to EOSC

This deliverable summarises the results across all work packages in EOSC-Life achieved in the first two years. The three goals have been addressed by activities across all work packages in the first half of the project:

- Populating the EOSC with data
  - EOSC-Life is supporting in total 16 projects (8 pre-selected and 8 granted following an Open Call for proposals) to deploy their datasets in the cloud implementing FAIR metrics.
  - A call across Life Science Research Infrastructure (LS RI) facilities selected 8 major data resources for "cloudification" and incorporation into EOSC.
  - In answer to the COVID-19 crises two newly added work packages in EOSC-Life are extending the COVID-19 Data Portal<sup>1</sup> and are developing a COVID-19 Clinical Trial Data Repository.
  - The project is developing supporting tools to ensure that data publication meets ethical and legal requirements. Existing solutions and requirements have been documented and form the basis of the continually developed "Sensitive data toolkit" for the LS RI and their users.
  - Access to data and cloud services will be underpinned by a shared federated authentication and authorisation infrastructure (Life Science AAI) including step-up security for controlled data access.
- Packaging tools and workflows for use in the cloud
  - The WorkflowHub<sup>2</sup> has been developed, which is a registry of scientific workflows to make them more findable. In response to the pandemic the focus has been shifted to COVID-19 workflows.
- Cloud deployment and cloud resources
  - A helpdesk system for cloud deployment and cloud resources has been set up, following a support procedure<sup>3</sup> to offer consistent answers to all users.
- Providing access
  - The Life Science Login (LS AAI) has been initiated, giving access and access management rights built on existing identities.
- Connecting users
  - 2 Open Calls for user projects have been published, offering support for researchers to deploy their data, tools and workflows in the cloud.
- Informing & training users

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<sup>1</sup> <https://www.covid19dataportal.org/>

<sup>2</sup> <https://workflowhub.eu/>

<sup>3</sup> [https://docs.google.com/document/d/1gqp4LR\\_Zf9mNsMUT\\_QeyA7z2tQUToGfOLONksD\\_Yx8/edit?usp=sharing](https://docs.google.com/document/d/1gqp4LR_Zf9mNsMUT_QeyA7z2tQUToGfOLONksD_Yx8/edit?usp=sharing)



- Guidelines and tools have been developed to support researchers and RI staff to go FAIR.<sup>4</sup>
- Open Calls have been organised to fill gaps in existing training courses by offering support for the creation of training material and the development and implementation of training activities<sup>5</sup>.
- Training events and a remote learning series have been organised supporting RIs in transferring their face-to-face training to a remote setting<sup>6</sup>.

The legacies of EOSC-Life—parts of the future EOSC—include skills, new capabilities and networks of experts as well as the experience and processes for consolidated RI service delivery.

## Project Objectives

This deliverable has contributed to the following project objectives:

1. Establish EOSC-Life by publishing FAIR life science data resources for cloud use
2. Create an ecosystem of innovative life-science tools in EOSC
3. Enable ground-breaking data driven research in Europe by connecting life scientists to EOSC

## Detailed Report on the Deliverable

### Description of Work

The EOSC-Life project<sup>7</sup> brings together the 13 Life Science Research Infrastructures (LS RIs) within ESFRI to **create EOSC for the life sciences**, an *open collaborative space for digital life science*. The project co-creates and integrates the EOSC federated core, while simultaneously creating, adapting and adopting the services and policies for Open Science that help researchers in the life sciences to manage, publish, analyse and reuse data.

The LS RIs provide access to advanced instruments, research facilities and services – helping researchers to describe biology from single molecules to ecosystems and long-term population cohorts. The LS RIs are all distributed organisations, each bringing together national facilities and centres into a connected European entity with harmonised access procedures, aligned quality assurance, and joint FAIR data management.

The EOSC-Life project builds on the outcomes from previous cluster projects: in CORBEL the LS RIs established a foundation of collaborative scientific services that support users throughout the execution of a scientific project, from planning and grant applications through to the long-term sustainable management and exploitation of research data. EOSC-Life takes the next step:

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<sup>4</sup> FAIRassist: <https://fairassist.org/>, Terms4FAIRskills: <https://terms4fairskills.github.io/>, Toolbox for sharing sensitive data: <https://doi.org/10.5281/zenodo.4483694>

<sup>5</sup> <https://www.eosc-life.eu/news/4-projects-awarded-funding-within-first-training-open-call/>

<sup>6</sup> <https://www.eosc-life.eu/services/training/>

<sup>7</sup> <https://www.eosc-life.eu/>



building on the EOSC foundation, the project is embedding the combined infrastructure capabilities into the scientific workflow of advanced users across the European research area.

The EOSC-Life vision of an *open collaborative space for digital life science* is central to the user support: scientists in advanced research projects need to access and integrate an unprecedented richness of data resources. The use of common metadata specifications, cataloguing and indexing in data catalogues will make (LS RI) datasets widely accessible across disciplines. The project has established mechanisms to continually align our strategy with those of other entities in the EOSC, other cluster projects, and the wider life science community while actively engaging to shape EOSC as a pan-European, interdisciplinary ecosystem.

People – users, research infrastructure operators and key stakeholders – are critical to the success of EOSC-Life. The collaborative platform and our inclusive community and capacity building will help to foster data science skills in life-science research, within and beyond the research infrastructures. A dedicated “EOSC Stakeholder Interaction Group” (ESIG) discusses EOSC Governance-related topics with representatives from all Life Science Research Infrastructures participating in EOSC-Life and provides coordinated strategic input, such as to the Consultation on the Strategic Research Agenda of the *EOSC Association*.

Service development in EOSC-Life is user-driven. In a first phase, eight pre-selected user demonstrators provided the focal point for service development followed by projects selected through an open call for user research. This allows the wider life science community to engage within EOSC to make data FAIR, share it in the cloud and to support the implementation of large-scale data analysis workflows in the cloud. The legacies of EOSC-Life—parts of the future EOSC—include skills, new capabilities and networks of experts as well as the experience and processes for consolidated RI service delivery.

### ***Building on established LS RI collaboration mechanisms***

The Life Science RIs are the foundation for sustainability of EOSC-Life services; the life science infrastructures on the ESFRI roadmap are established entities and form the long-term actors in the life science ecosystem with strong anchoring in the user communities and national facilities.

In 2015 the LS RIs established the LS RI Strategy Board, governed by an MoU between the individual infrastructures, as a framework for long-term strategic collaboration and joint work to “serve excellent science in Europe by providing access to world-class facilities, samples, instruments, services and data”. Through the LS RI Strategy Board the infrastructure directors meet at least four times per year and have regular “retreats” aligned with the EOSC-Life project and its work-package leaders.

In addition, the joint services provision between the LS RIs is supported by pairwise MoUs that build on the outcomes from the CORBEL project (2015-2020). The purpose of these MoUs are to sustain and improve the procedures for facilities access established in CORBEL and serve as a basis for joint access projects aligned with Horizon Europe priorities and missions.

### ***Creating tools and workflows for life science data***

Furthermore, several initiatives for analysing life science data using tools and workflows have been (co-)developed within EOSC-Life and are already being used in the life science community. For example, the WorkflowHub<sup>8</sup>, a registry of scientific workflows to make them more findable,

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<sup>8</sup> <https://workflowhub.eu/>



has already been mentioned in a *Nature Methods*<sup>9</sup> article. It was released early in order to provide a registry for COVID-19 workflows. In collaboration with the global Galaxy community, workflows have been made available on public Galaxy instances worldwide.

EOSC-Life has been instrumental in developing the RO-Crate community and specifications. RO-Crate<sup>10</sup> is a community effort to formalise packaging of research data with structured metadata, based on Schema.org, and has already been adopted across EOSC initiatives.

In addition, EOSC-Life has developed and harmonised metadata specifications for computational tools and workflows, and presented them via Schema.org and Bioschemas.

The Tools Collaboratory Roadmap<sup>11</sup> promotes interoperability across LS RIs and domains and is being used by less mature infrastructures to shape their own computational infrastructures in a more coherent manner. Euro-BioImaging is for example working with the roadmap to make image data and image analysis tools available in cloud environments.

### ***An open collaborative digital space for responding to the COVID-19 pandemic***

The COVID-19 pandemic refocused EOSC-Life: the project has been a core part of the European response and the *ERAvsCORONA Action Plan*. The LS RIs were able to leverage the solutions established in the early phases of the EOSC-Life project to accelerate COVID-19 research efforts. For example, *The International COVID-19 Biohackathon* (April 2020) brought together computational biologists around the globe to tailor open analysis tools and workflows to COVID-19 research. The hackathon was supported by EOSC-Life cloud resources and contributed to the community engagement, adoption and accelerated delivery of an open access workflow registry (workflowhub.eu), which together with usegalaxy.eu was used to drive early access to open, reproducible pipelines.

EOSC-Life has also established two new work packages (WP13 and WP14) with additional resources as a consequence of the EC rapid response package to the COVID-19 pandemic:

In WP13 EOSC-Life supports the development of the core functionality of the COVID-19 Data Portal, which delivers essential open data infrastructure to support urgent scientific research in the face of the COVID-19 pandemic. WP13 includes both the extension of existing infrastructure through software development and the operationalisation of this extended infrastructure through deep support services; our work is enabling and linking data from the substantial research effort across European and global research communities.

In WP14 work is done to define the specifications for and to develop, implement and routinely operate a repository for individual participant data (IPD) from COVID-19 trials, compliant with European regulations and in particular with GDPR, allowing clinical trial data sharing after completion of the trial. Due to the COVID-19 crisis there is an urgent need for this individual patient-level clinical trial data repository allowing data sharing and optimal use of clinical trial data (for re-analyses, for secondary analyses, for patient-level data meta-analyses). Such repository will be part of the COVID-19 data hub, with a portal operated by ECRIN acting as the interface with the clinical research community, and with technical partners providing a secure environment and data sharing services.

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<sup>9</sup> <https://doi.org/10.1038/s41592-020-0886-9>

<sup>10</sup> <https://www.researchobject.org/ro-crate/>

<sup>11</sup> [https://www.eosc-life.eu/wp-content/uploads/2021/03/WP2\\_Roadmap\\_figure.pptx.png](https://www.eosc-life.eu/wp-content/uploads/2021/03/WP2_Roadmap_figure.pptx.png)



**In Summary**, the experience from the rapid response to support COVID research and manage cross-disciplinary data flows during the pandemic shows the long-term value of maintaining close collaborations and active interfaces between the LS RIs. Societal challenges such as pandemics, climate change and food security link human biology to developments in environments, ecosystems and agriculture. In addition, life sciences are rapidly developing – every year sees the invention of new technologies, instruments, and models – responding to the changing user needs. This requires ongoing investment to secure support to advanced European projects. Training programmes, workshops and hackathons help to prepare our users for a new way of working. Open calls and demonstrator projects guide our developments and create examples for other projects and illustrate the capabilities of EOSC-Life. By populating EOSC-Life, we are not merely fulfilling a project’s goals – we are building tools and training people to make EOSC the new normal for life science data. Through EOSC-Life we lay a foundation so that European scientists can collaborate and reuse data regardless of where they are based – harnessing the collective capacity of Europe's research ecosystem.

## Recent publications and outcomes

### EOSC-Life Achievements Brochure

On the occasion of the 2nd Annual General Meeting from 25-26 March 2021, EOSC-Life published “Populating EOSC-Life: Achievements of the project thus far”.

The 12-page brochure features an updated design and offers a brief overview of the project, followed by achievements in the following areas:

- Populating the EOSC with data
- Packaging tools and workflows for use in the cloud
- Cloud deployment and cloud resources
- Providing access
- Connecting users
- Informing & training users

The goal of this brochure is to inform our community about ways in which they can benefit from ongoing work within the project (see Appendix 1).

### Position statement on open science with ESFRI Science Clusters

EOSC-Life joins PaNOSC, ESCAPE, SSHOC and ENVRI-FAIR to detail commitments to open science:

This position paper contributes formally to explain the urgent need of the EC to support a longer-term role of the five Science Clusters to provide content to the EOSC, to enhance researchers’ involvement in Open Science and to suggest potential cooperative pathways in the Horizon Europe framework and along with the EOSC Association roadmap.

This paper highlights:



This project has received funding from the *European Union’s Horizon 2020 research and innovation programme* under grant agreement No 824087.

- Expectations of the clusters and the concerned research communities, pointing out a common structured vision and a series of suggestions for the future.
- A more detailed analysis from each cluster, which is provided for completeness.

EOSC-Life has its own section detailing initiatives within the project, collaborative mechanisms and aspects of collaborative actions.

This statement was published on Zenodo<sup>12</sup> on the 1<sup>st</sup> of June 2021.

### Further reading

A full list of outcomes can be found on the EOSC-Life webpage under “Resources/project deliverables & publications<sup>13</sup>” and “Achievements<sup>14</sup>”.

## Delivery and Schedule

The delivery is delayed:

Yes

The delivery was delayed from March 2021 due to urgent COVID-19 related work.

## Adjustments

Adjustments made:

None

## Appendices

Appendix A. Populating EOSC-Life: Achievements of the project thus far

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<sup>12</sup> <https://doi.org/10.5281/zenodo.4892245>

<sup>13</sup> <https://www.eosc-life.eu/resources/project-deliverables/>

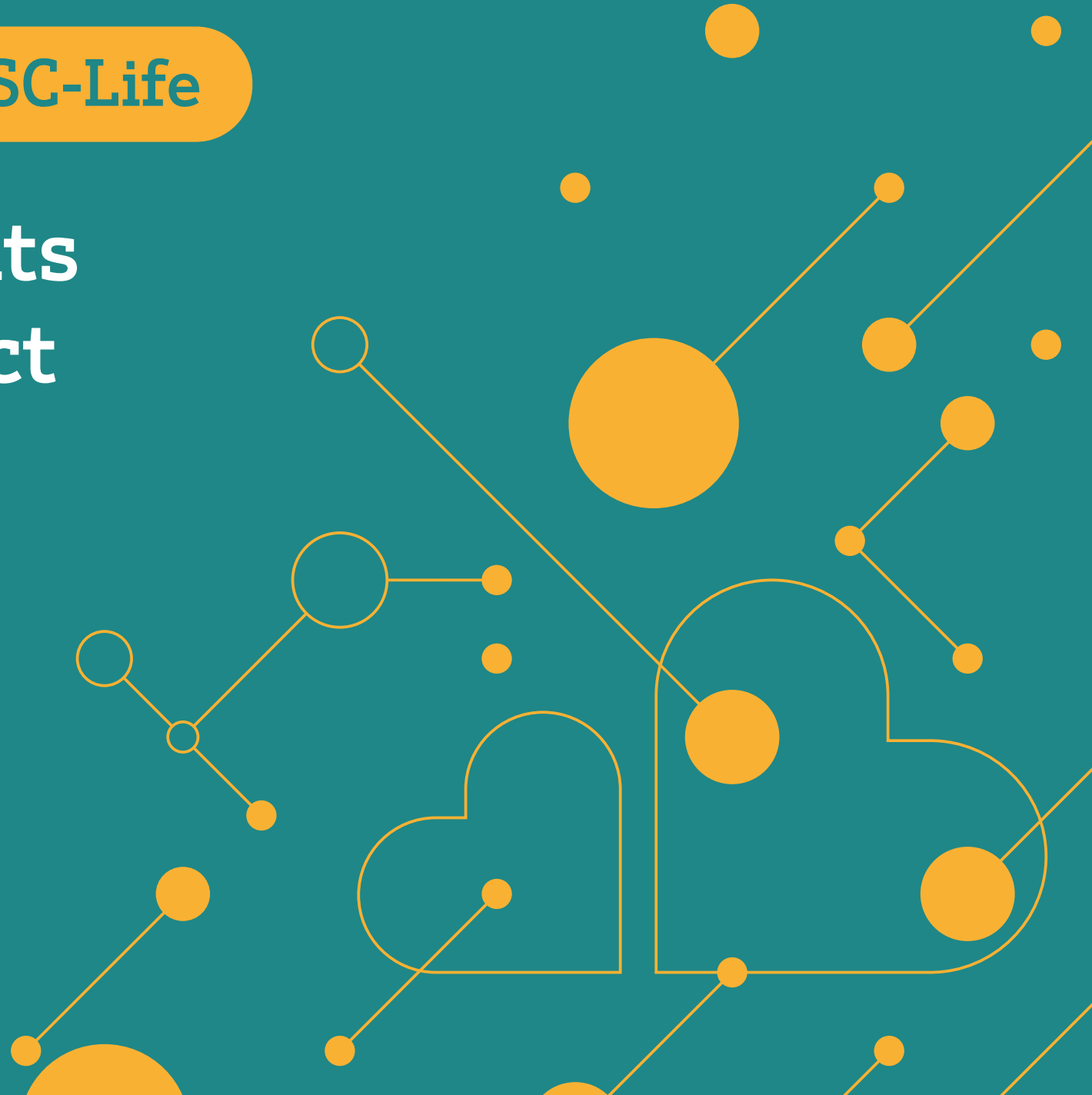
<sup>14</sup> <https://www.eosc-life.eu/achievements/>





## Populating EOSC-Life

**Achievements  
of the project  
thus far**

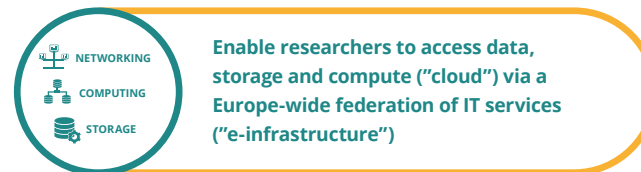


## EOSC-Life is creating an open, collaborative space for digital life science

EOSC-Life is a Horizon 2020-funded bringing together the 13 'ESFRI' Life Science Research Infrastructures (LS RIs) to create an open, digital and collaborative space for life science research.

The project co-creates and integrates the EOSC federated core, while simultaneously creating, adapting and adopting policies for Open Science.

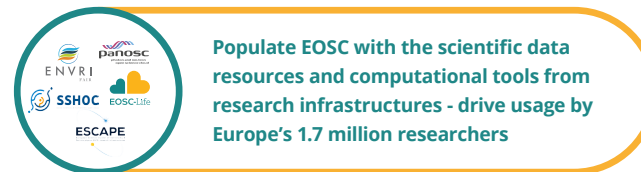
## European Open Science Cloud



**E-Infrastructure consolidation**



**Open Science**



**Scientific Communities' content and users**

## All activities aim to fulfil our 4 project goals:

- **Establish** EOSC-Life by publishing FAIR life science data resources in EOSC
- **Provide** the policies, guidelines and processes for secure and ethical data reuse
- **Populate** an ecosystem of innovative life science tools in EOSC
- **Enable** data-driven research in Europe by connecting life scientists to EOSC via open calls for participation

## Life science data is rich and diverse

The Life Science Research Infrastructures provide access to advanced instruments and research facilities that describe biology from single molecules to ecosystems and long-term population cohorts.

## Connecting digital life science data will allow us to address major challenges facing humanity

These include the 5 EU missions in Horizon Europe:

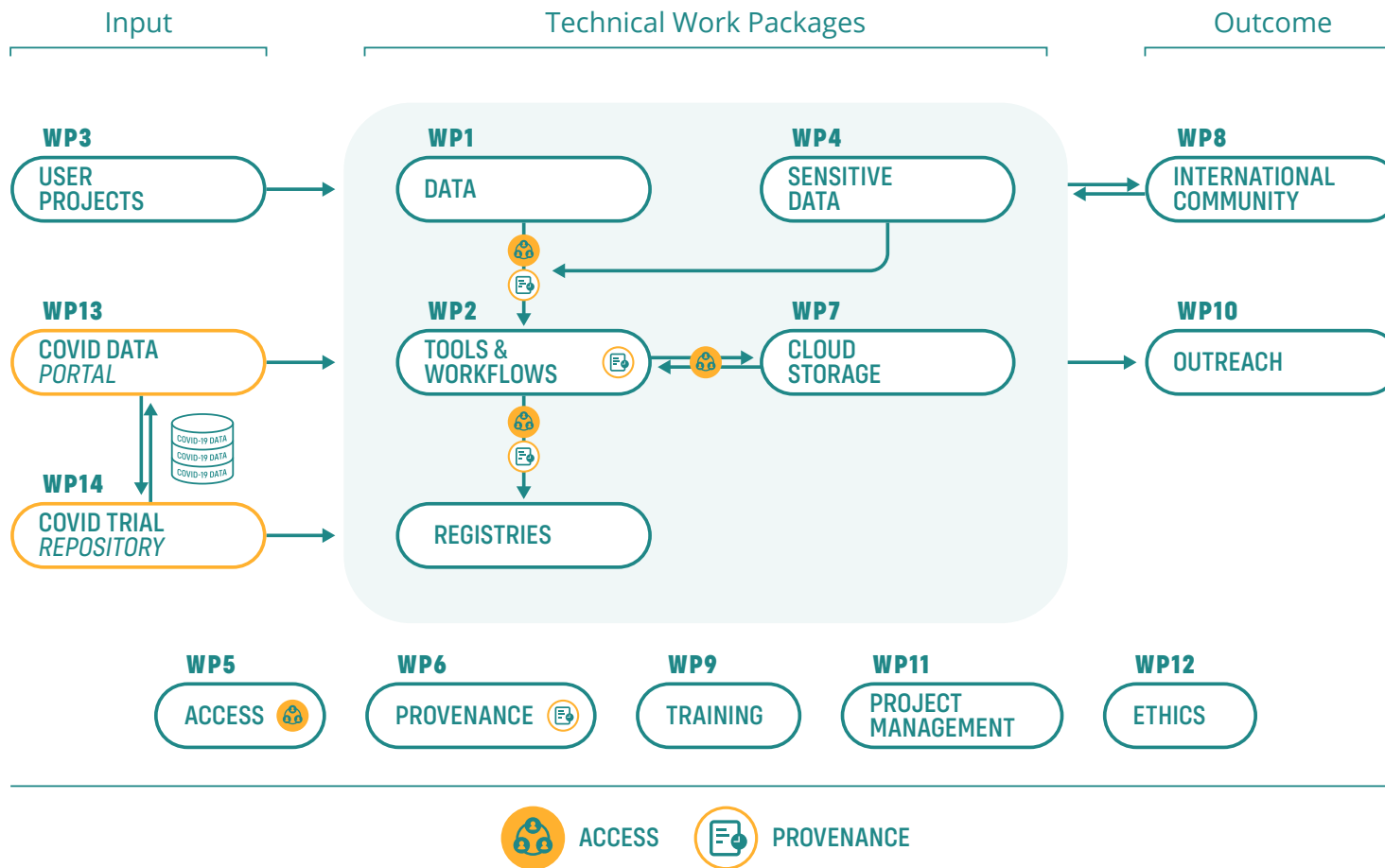
- *Cancer*
- *Adaptation to climate change including societal transformation*
- *Healthy oceans, seas, coastal and inland waters*
- *Climate-neutral and smart cities*
- *Soil health and food*

## EOSC-Life provides solutions so that life scientists can make use of data, tools and workflows in the cloud

Vast amounts of data are processed and analysed daily in the life sciences. EOSC-Life aims to make data, tools and analysis workflows more findable, accessible, interoperable and reusable (FAIR) through cloud deployment of these resources.



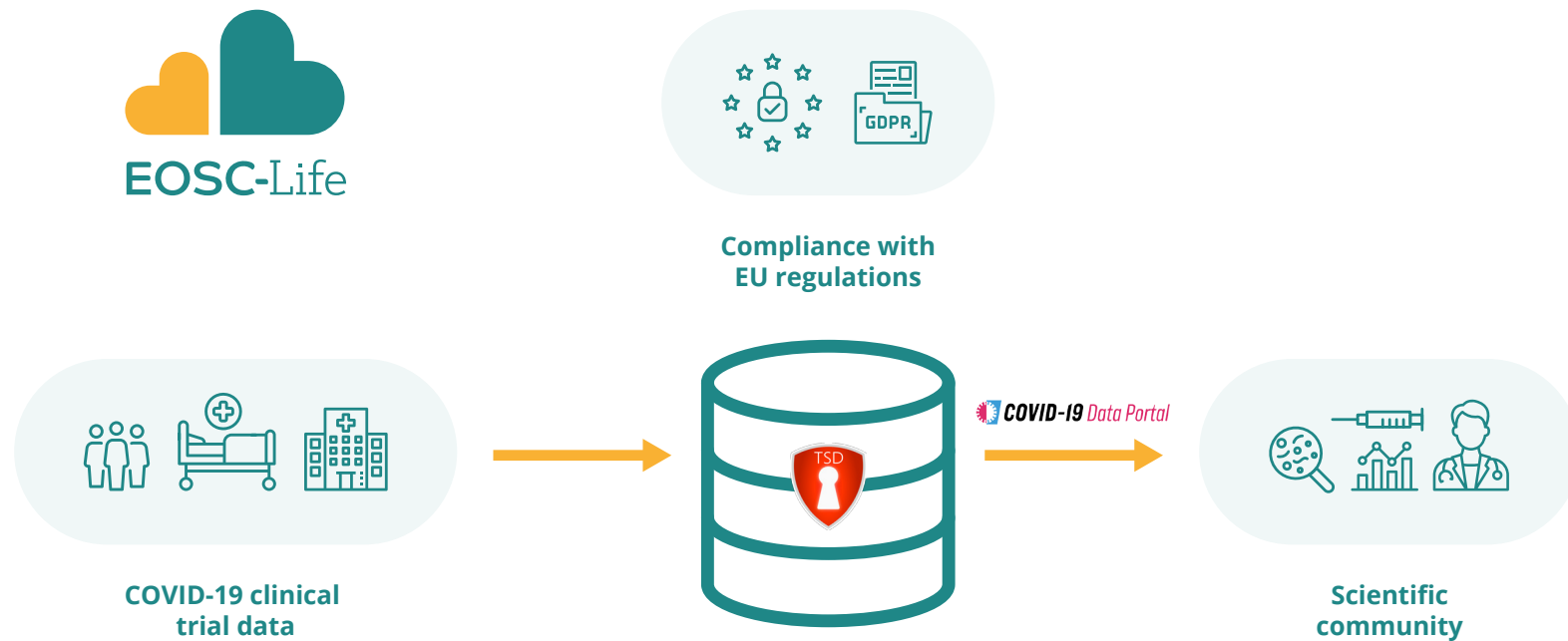
Structured into 14 work packages—including 2 new work packages in response to COVID-19—EOSC-Life will provide a unique opportunity for scientists to access and integrate an unprecedented richness of data resources. The use of common metadata specifications, cataloguing and indexing in data catalogues will make (LS RI) datasets widely accessible across disciplines.



## EOSC-Life's response to the COVID-19 pandemic

Data sharing and digital tools are critical for the response to the pandemic. EOSC-Life partners and solutions were well positioned to respond quickly to the needs of our community with efforts such as:

- *International COVID-19 biohackathon and cloud resources*
- *Frontloading of open tools and workflows ([WorkflowHub](#), etc.)*
- *Building a repository to host COVID-19 clinical trial data*
- *Extension of the [COVID-19 Data Portal](#)*



## EOSC-Life prepares European life science for a new way of working

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By populating EOSC-Life, we are not merely fulfilling a project's goals—we are building tools and training people to make this the new normal for life science data. European scientists should be able to collaborate and reuse data regardless of where they are based. Training programmes, workshops and hackathons help to prepare our users for a new way of working. Open calls and demonstrator projects guide our developments and create examples for other projects—illustrating the capabilities of EOSC-Life.

The legacies of EOSC-Life—parts of the future EOSC—include:

- People: skills, new capabilities and networks
- Experience and processes for consolidated RI service delivery
- Life science data resources, workflows, registries and other services
- Training materials, policies, guidelines (FAIR, Sensitive data)

In the following pages we introduce some of our achievements thus far, and how potential users can take advantage of these to enrich their life science research.

# How to benefit from EOSC-Life

## Populating the EOSC with data

EOSC-Life helps research infrastructures evolve the repository infrastructure; for example a particular dataset is being deployed into the cloud and connected to workflows, enhancing the accessibility of mouse model data for researching biology and understanding diseases. EOSC-Life is developing data expertise within the Life Science Research Infrastructures, helping to build a community of experts across the European research infrastructures.

### Science Demonstrators

EOSC-Life has funded 8 “Demonstrator” projects, scientific and technical pilot projects that provide concrete scientific use-cases and guide and structure the work done in EOSC-Life. They provide concrete examples of how to build an open digital and collaborative space for biological and medical research. The demonstrator projects represent a broad scope of life science domains and aim to make data, tools and workflows available in the cloud for re-use by the scientific community. The year-long projects have completed and publications and resources are becoming available, including training material and documentation to facilitate uptake in the community.

### Clinical Research Metadata Repository

EOSC-Life partners have been working on the development of the Clinical Research Metadata Repository (MDR), including COVID-19 data, allowing researchers to access clinical studies and related data objects. These include, for example, protocols, information sheets and consent forms, data management plans, statistical analysis plans, case report forms, results, publications, descriptive metadata, etc. MDR contributes to making clinical research data from all disease areas FAIR by increasing data Findability. Browse and search metadata on clinical trials—as well as all related documents.

### Cloud Data Deployment Call

Launched in January 2021, 8 funded projects will make their dataset / service / data resource newly available in a cloud instance, implementing FAIR metrics.

### COVID-19 Clinical Trial Data Repository

During a pandemic there is a need for timely and accurate collection, reporting and sharing of Individual Participant Data (IPD) from clinical trials. IPD should be stored in trustworthy data repositories that have been certified, are subject to rigorous governance, committed to longer-term preservation of their data and compliant with the relevant regulations (e.g. GDPR). This will facilitate re-analyses, secondary analyses and patient-level data meta-analyses. With the help of EOSC-Life, our partners are currently developing such a repository using the TSD platform for sensitive data. The repository will be part of the European *COVID-19 Data Portal*.

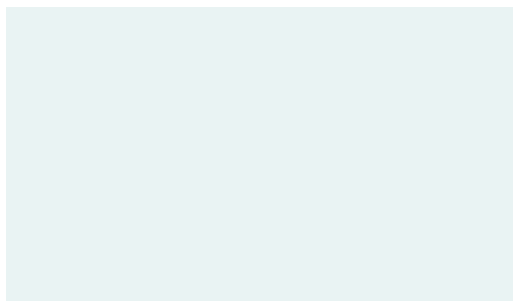
### Extension of the COVID-19 Data Portal

The COVID-19 Data Portal brings together relevant datasets submitted to major centres for biomedical data, with the aim to facilitate data sharing and analysis, and to accelerate coronavirus research. Within EOSC-Life the COVID-19 Data Portal is extended to mobilise open biomolecular data (500,000 records from the biomolecular and literature domains are available openly to users), to mobilise new SARS-CoV-2 data (currently >160,000 viral isolates with raw sequence data; 75% of the world's data flows through the Data Hubs) and to connect to clinical and epidemiological data.

### FAIRsharing.org (standards, databases, policies)

FAIRsharing is a place to discover standards, repositories and data policies and how they interlink. It also features a prototype educational page on standards. The resource serves all disciplines and has been *adopted* by funders, publishers, RDA and other organisations.





#### [FAIRsharing EOSC-Life Collection](#)

A collection of 100 diverse data resources (each containing thousands of datasets) following FAIR principles, produced by EOSC-Life partners.

#### [Provenance standard for life science data](#)

A provenance model is being developed and its instance is being standardised under ISO 23494 to describe the history of data in life sciences in distributed environments, in order to assess reusability

of data for further research and to improve reproducibility of research results. The model aims at documenting the full chain of history of data all the way to its source (biological entity), supporting documenting history of sensitive data (such as genetic or clinical data) and is designed to implement interlinking across institutional boundaries. The standard also supports compliance with the *Nagoya Protocol*.

### **Packaging tools and workflows for use in the cloud**

EOSC-Life is developing expertise in the cloud deployment of software and workflows across all domains of the life sciences. This will help Life Science Research Infrastructures to develop their computational infrastructure and make it FAIR.

#### [WorkflowHub](#)

A registry of scientific workflows to make them more findable, mostly from EOSC-Life partners, many from COVID-related initiatives. The federated registry would support a common API to simplify access for tool developers. An open community of developers and users has been formed and is growing, as the *WorkflowHub Club*. WorkflowHub has already been mentioned in a *Nature Methods* article. Visit WorkflowHub to find and retrieve scientific workflows, or to register your own workflow.

#### [COVID workflows in the WorkflowHub](#)

Due to the COVID-19 pandemic, the focus shifted towards providing tools and workflows to tackle analyses of COVID-related data in an open and reproducible way. The WorkflowHub was accelerated by 6 months and released early to provide a registry for COVID-19 workflows. In collaboration with the global Galaxy community, workflows have been made available on *public Galaxy instances* worldwide.

#### [Tools Collaboratory Roadmap](#)

Our roadmap promotes interoperability across LS RIs and domains and can be used by less mature infrastructures to shape their own computational infrastructures in a more coherent manner.

#### [Metadata specifications for tools and workflows](#)

Community definitions of the metadata required for describing, documenting and registering a Computational Workflow and a Computational Tool were developed and harmonised. The schema has been presented using Schema.org, a web metadata markup standard, as part of the Bioschemas community, which produces subsets of *Schema.org* suitable for the biosciences resources. *Bioschemas* markup enables discovery by search engines and other aggregators such as Google and OpenAIRE.

#### [RO-Crate](#)

RO-Crate is a community effort to formalise packaging of research data with structured metadata, based on *Schema.org*. EOSC-Life has been instrumental in developing the RO-Crate community and specifications, in particular with its specialisation Workflow RO-Crate used by *WorkflowHub* for integrating with workflow systems such as *Galaxy* and continual workflow monitoring with the Workflow Execution service WfExS. RO-Crate is seeing wider interest and adoption across EOSC initiatives, and we are also aligning RO-Crate with FAIR Digital Objects through Research Data Alliance and the DISSSCo SYNTHESYS+ project.

### Cloud deployment and cloud resources

EOSC-Life provides access and support to cloud resources for the life science community and offers deployable platforms for workflows. In addition, we establish capabilities and identify suitable cloud providers for secure hosting of sensitive data.

#### Helpdesk system for cloud deployment and cloud resources

EOSC-Life's cloud deployment and cloud resources work package has set up a helpdesk system that can be contacted by sending an email to [eosc-life-helpdesk@elixir-europe.org](mailto:eosc-life-helpdesk@elixir-europe.org)—currently limited to project participants—to provide support for technologies within the project (e.g. *Galaxy*). The helpdesk system follows a *support procedure* to offer consistent answers to all users.

### Providing access

We are creating an access and user management system to enable multi-RI applications and workflows that build on existing approaches and support access to sensitive data with their specific requirements.

#### LS AAI

The Life Science Login enables researchers to use their home organisation credentials or community or commercial identities (e.g. ORCID, LinkedIn) to sign in and access data and services they need across multiple platforms. It also allows service providers (both in academia and industry) to control and manage access rights of their users and create different access levels for research groups or international projects. Piloting has begun.

### Connecting users

EOSC-Life is a user-focussed project in which open calls for user research allow the wider life science community to receive support to make data FAIR, share it in the cloud and to support the implementation of large-scale data analysis workflows in the cloud. We are continually aligning our strategy with those of other entities in the EOSC, other cluster projects, and the wider life science community. The collaborative platform and our inclusive community and capacity building will help to foster data science skills in life-science research, within and beyond the research infrastructures.

#### Digital Life Sciences Open Calls

The 1st EOSC-Life Open Call for projects sharing data, tools and workflows in the cloud generated a huge amount of interest across the scientific community. Project proposals from the first Open Call are currently under review with an expected funding rate of about 10%.

Reach out to our experts during the mandatory maturation phase (deadline 26 May 2021) and apply by 30 June 2021 for the 2nd Open Call's sensitive data track or industry track.

#### International Collaborations

EOSC-Life is collaborating with the other EOSC Science Cluster projects to contribute to common activities and position papers. We also align with EOSC Governance activities and provide strategic input, such as to the Consultation on the Strategic Research Agenda of the *EOSC Association*. A dedicated "EOSC Stakeholder Interaction Group" (ESIG) discusses EOSC Governance-related topics with representatives from all Life Science Research Infrastructures participating in EOSC-Life.

## Informing & Training Users

Training the EOSC-Life community—from staff to end users—on FAIR principles, using sensitive data in research, and the use of our data resources, tools and workflows, is an integral part of our mission

### FAIRassist

The FAIRassist tool, part of the FAIRsharing resource, is under development to offer personalised guidance to discover resources, such as data and metadata standards and databases, which should be used to make data FAIR.

### Terms4FAIRskills

Terms4FAIRskills is a terminology for the skills, competencies and knowledge necessary to make data FAIR and to keep it FAIR. The terminology can be used to assist with the creation and assessment of stewardship curricula; to facilitate the annotation, discovery and evaluation of FAIR-enabling materials (e.g. training) and resources; and to enable the formalisation of job descriptions and CVs with recognised, structured competencies.

### Toolbox for sharing of sensitive data

Sharing sensitive data is a specific challenge within EOSC-Life. For that reason, a toolbox is currently under development, providing pooled information on recommendations, best practices, software tools etc. to researchers who wish to share and/or use sensitive data in a cloud environment in general, and the European Open Science Cloud in particular. The sensitivity of the data may arise from its personal nature but can also be related to intellectual property considerations, biohazard concerns, or the Nagoya Protocol.

### Landscape mapping on sharing and re-use of health data

EOSC-Life is currently mapping the national landscapes on sharing and re-using health data to understand the implications for Life Science RIs and their services, especially with regards to data protection, appropriate safeguards (e.g. de-identification techniques), risk-based approaches, data ownership, and conditions for sharing and re-use of health data. The results will allow us to assess EU countries' preparedness for EOSC.

### Training Open Calls

Our Training Open Calls offer funding to support training activities and provides expertise and guidance to help awardees organise successful and impactful training. Examples of funded projects are training and mentoring for *Open Life Science* Ambassadors, COVID-19 modelling, and cross-cluster training on modelling workflows with FATES for improving climate models.

### Training resources

EOSC-Life has organised several training events for the EOSC-Life community to prepare European life science for a new way of working, and is supporting RIs in transferring their face-to-face training to a remote setting by organising a remote learning series. View upcoming training and past training materials and recordings, such as the online tutorial on *ResOps, cloud native tools and technology for researchers*.

For more information about the project and to stay updated on future achievements, visit [www.eosc-life.eu](http://www.eosc-life.eu) and sign up for our bi-monthly [newsletter](#).

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