

THE POWER OF HPC FOR BETTER LIFE

Bulgarian contribution to the EOSC (NI4OS-Europe, EGI-ACE and Skills4EOSC)

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EuroCC Conference:
HPC for the benefit of researchers and society,
Sofia, 21-22 November 2022



- ❑ Име: **Национални инициативи за отворена наука в Европа**
- ❑ Акроним: **NI4OS-Europe** (произнася се “НИФОС”)
- ❑ Конкурс: INFRAEOSC-05 (b) *Координация на национални инициативи, свързани с EOSC в цяла Европа и подкрепа за потенциални доставчици на услуги към EOSC – научни и иновационни дейности*
 - ❑ Финансирани са 4 регионални проекта: EOSC-Pillar, EOSC-Synergy, EOSC-Nordic, NI4OS-Europe
- ❑ 22 партньорски организации + 2 организации като „third party“ от общо 15 държави
- ❑ Регионален контекст: 16 години успешно сътрудничество в широк регион
 - ❑ Страни-членки на ЕС: България, Гърция, Кипър, Румъния, Хърватия, Словения, Унгария
 - ❑ Западните Балкани
 - ❑ Източното Средиземноморие
 - ❑ Южен Кавказ





Подкрепа за
развитието и
включването на
националните облачни
инициативи за
отворена наука (OSC) в
15 страни-членки и
свързани страни към
цялостната схема на
управление на EOSC

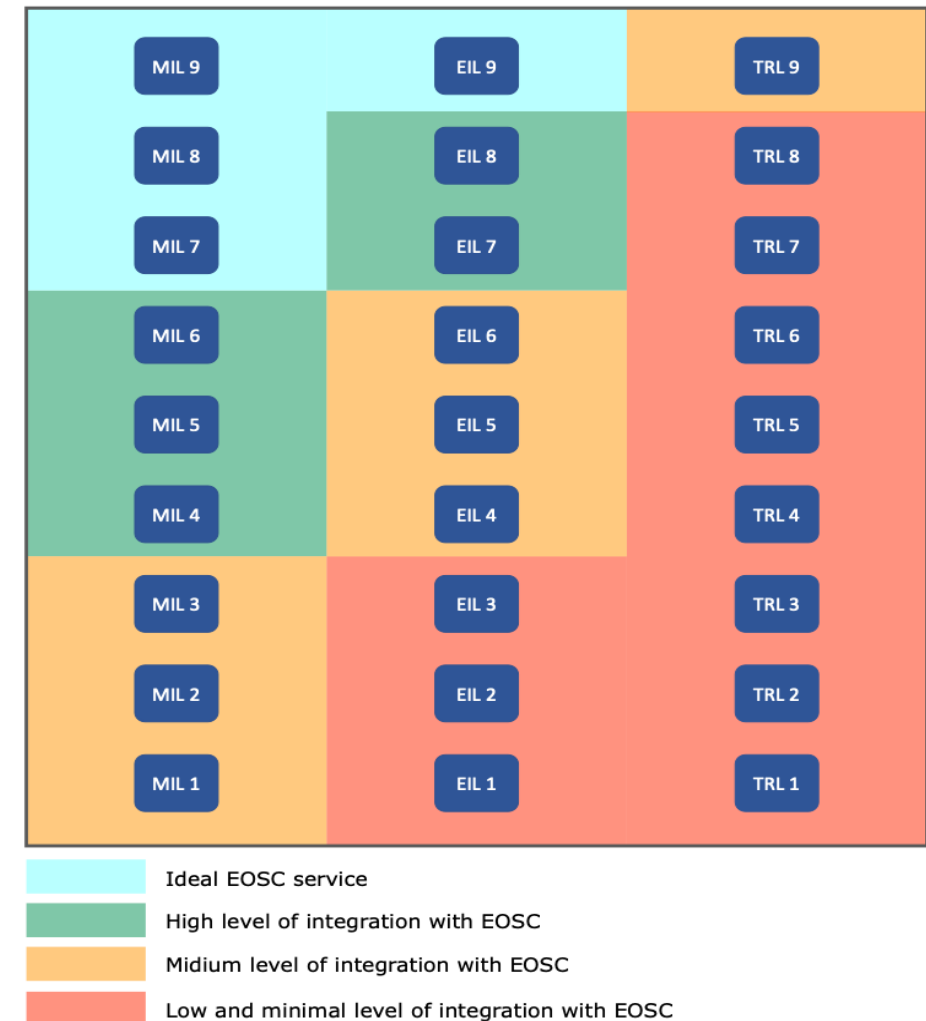


Разпространение на
принципите на EOSC и
FAIR в общността и
обучението ѝ

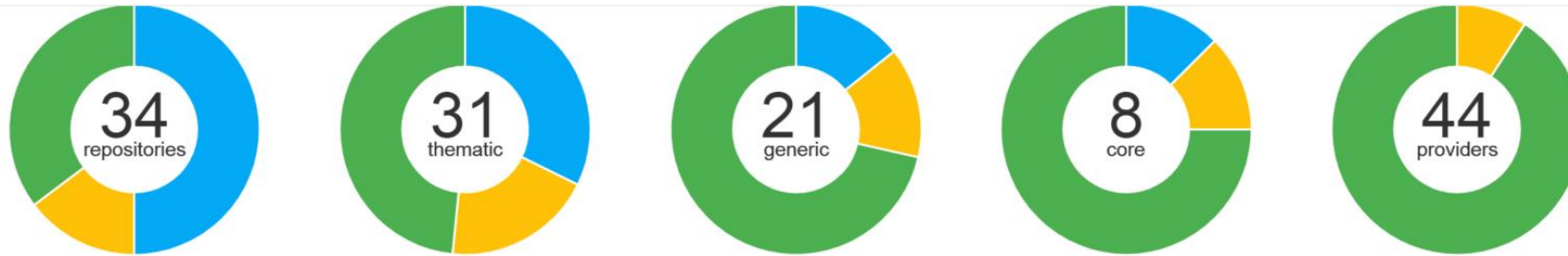


Осигуряване на
техническа поддръжка
и подкрепа за
създаване на политики
за приобщаване на
съществуващи и
бъдещи доставчици на
услуги към EOSC







- ❑ NI4OS-Europe използва следната категоризация на услугите:
 - ❑ Technology Readiness Levels (TRL)
 - ❑ EOSC Integration Levels (EIL)
 - ❑ Management Integration Levels (MIL)
- ❑ Тези три категоризации се използват за оценка на готовността за включване в EOSC на всички услуги, които предлагаме.
- ❑ Процес на присъединяване (On-boarding) – 5 основни стъпки.
- ❑ Представителство (ИИКТ) в EOSC-A Task Force: „Technical Interoperability of Data and Services“.



□ <https://catalogue.ni4os.eu/>



Recently on-boarded resources







REPOSITORY	ON-BOARDED	THEMATIC	ON-BOARDED	THEMATIC	ON-BOARDED	THEMATIC	ON-BOARDED	THEMATIC	ON-BOARDED	GENERIC	ON-BOARDED
											
VideoLectures.Net		CHERE		Clowder4DCH		Live Access Server		RS2C - Remote Sensing Scene Classification		ASNET-AM Cloud	
exchange ideas & share knowledge		One stop shop for digitizing cultural heritage		A flexible and extensible online content management system for Digital Cultural Heritage		Flexible access and visualization of geo-referenced scientific data.		Easy to use system for remote sensing scene classification		Cloud based on Openstack deployed at the Institute for Informatics and Automation Problems of NAS RA, Yerevan, Armenia	
VideoLectures.NET is an award-winning free and open access educational video lectures repository. The lectures are given by distinguished scholars and scientists at the most important and prominent events like conferences, summer schools, workshops and science promotional events from many fields of Science. The portal is aimed at promoting ...		CHERE Tools stands for Cultural Heritage Repository Tools and represents a set of web based tools aimed at people working in cultural heritage preservation and digitization, but is not limited to those uses as individual services can be used in a variety of ways. The service currently provides following functions: Structure from Motion ...		Clowder4DCH, a highly extensible active curation-based research data management platform. It contains three major extension points: preprocessing, processing and previewing. When new data is added to the system, preprocessing is off-loaded to extraction services for extracting appr...		The LAS enables the data provider to unify access to multiple types of data in a single interface, create thematic data servers from distributed data sources, and offer derived products on the fly. In the initial window screen, the user can select a new dataset using the "Data Set" button on the t...		RS2C is a RESTful web service and web application for remote sensing scene classification based on convolutional neural networks. Currently, ResNet-50 pre-trained on ImageNet and fine-tuned on MLRSNet is used for classification. The web service is implemented in Python using TensorFlo...		ASNET-Cloud provides Infrastructure as a Service services (IaaS) to academia and stakeholders based on OpenStack middleware. The users launch virtual machines (1-64 CPU cores) via dashboard distributed in the following three zones (596 CPU cor...	
more		more		more		more		more		more	
GENERIC	ON-BOARDED	GENERIC	ON-BOARDED	GENERIC	ON-BOARDED	GENERIC	ON-BOARDED	GENERIC	ON-BOARDED	CORE	ON-BOARDED

Bulgarian services visible in NI4OS-Europe catalogue

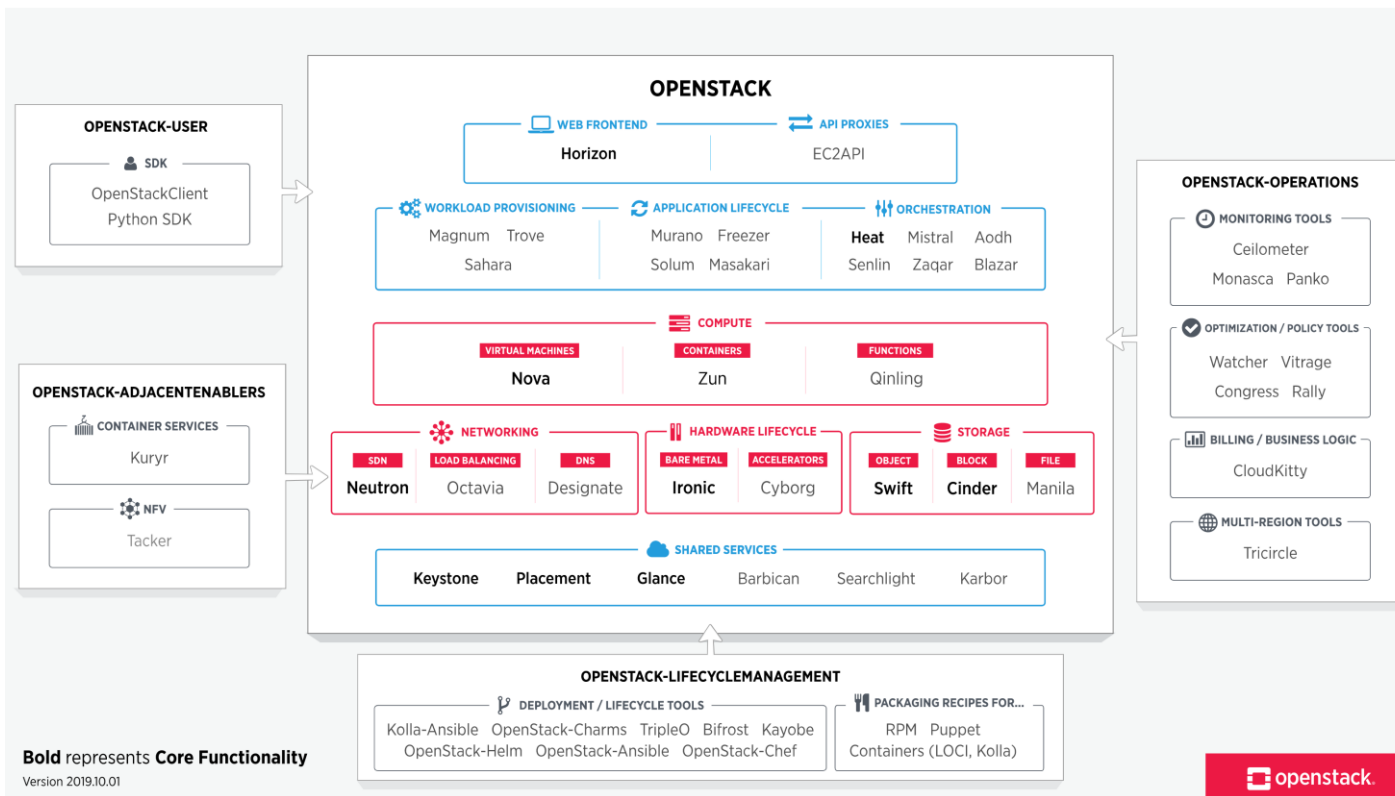
Institute of Information and Communication Technologies, Bulgarian Academy of Sciences

ICT-BAS conducts basic and applied research in the field of computer science, information and communication technologies (ICT) and develops innovative interdisciplinary applications of these technologies.

Provided resources

GENERIC	ON-BOARDED		AVITOHOL cloud Openstack Cloud, Institute of Information and Communication Technologies, Bulgarian Academy of Sciences more
GENERIC	ON-BOARDED		Avitohol Avitohol supercomputer more
GENERIC	ON-BOARDED		Data discovery service Data discovery service more
CORE	ON-BOARDED		Accounting system accounting service usage more
THEMATIC	CANDIDATE		ClimCost Providing comprehensive and reliable computer simulations of climate changes in regional/local scales and evaluation of their impacts on ecosystems and quality of life. more
THEMATIC	CANDIDATE		ClinHealth ClinHealth produces comprehensive data about indexes and metrics that quantify the impact of atmosphere parameters and characteristics on the quality of life and health risks for the population. more

- Two types of services using Avitohol
 - Direct HPC access, using all the supercomputing features
 - Cloud-based access



АВИТОХОЛ

Високопроизводителна изчислителна сиситема – [Авитохол](#) в списъка ТОП500 (388-мо място, ноември 2015).



Общ преглед на системата

АВИТОХОЛ се състои от 150 сървъра от платформата HP Cluster SL250S GEN8, всеки с по 2 Intel Xeon E2650v2 процесора и 2 копроцесора Intel Xeon Phi 7120P.

Местоположение: ИИКТ-БАН/Авитохол

Производител: Hewlett-Packard

Брой ядра: 20700

Свързаност: FDR InfiniBand

Navigate to Project > Compute > Images

- Create New Image

- Browse filesystem image (ISO, QCOW2, etc.)

openstack. demo admin

Project / Compute / Images

Images

Click here for filters.

+ Create Image Delete Images

Displaying 1 item

Owner	Name ^	Type	Status	Visibility	Protected	Disk Format	Size
admin	cirros-0.3.2-1386-disk	Image	Active	Public	No	VMDK	16.31 MB

Launch

Create Image

Image Details *

Metadata

Image Details

Specify an image to upload to the Image Service.

Image Name *

Image Description

Image Source

Source Type

File

File *

Browse...

CentOS-8.3.2011-x86_64-minimal.iso

Format *

ISO - Optical Disk Image

Image Requirements

Kernel

Choose an image

Ramdisk

Choose an image

Architecture

Minimum Disk (GB)

Minimum RAM (MB)

Image Sharing

Visibility

Public Private

Protected

Yes No

- ❑ The accounting service collects information about the usage of the services in the infrastructure

NI4OS Accounting Data

Compute Data

Cloud Data

Storage Data

Repository Data

WebScience

Data type

Number of jobs

▼

Period

from

06-2022

to

09-2022

Table

rows

Country

▼

columns

Date

▼

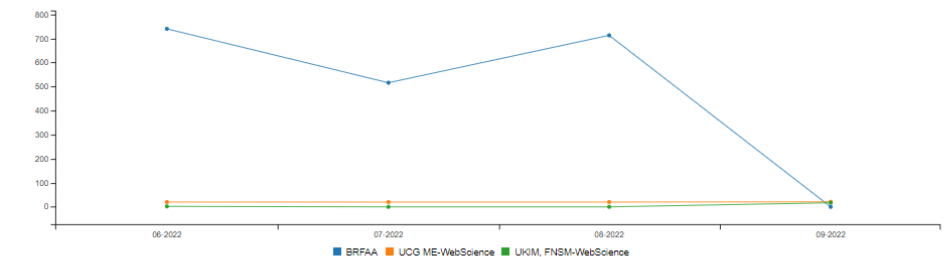
show

resource	06-2022	07-2022	08-2022	09-2022
BRFAA	740	516	713	0
UCG ME-WebScience	20	20	20	21
UKIM, FNSM-WebScience	2	0	0	17

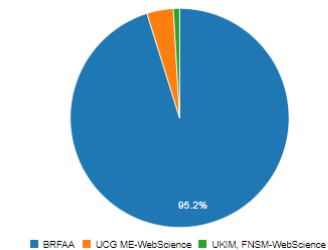
Showing 1 to 3 of 3 entries

CSV Excel

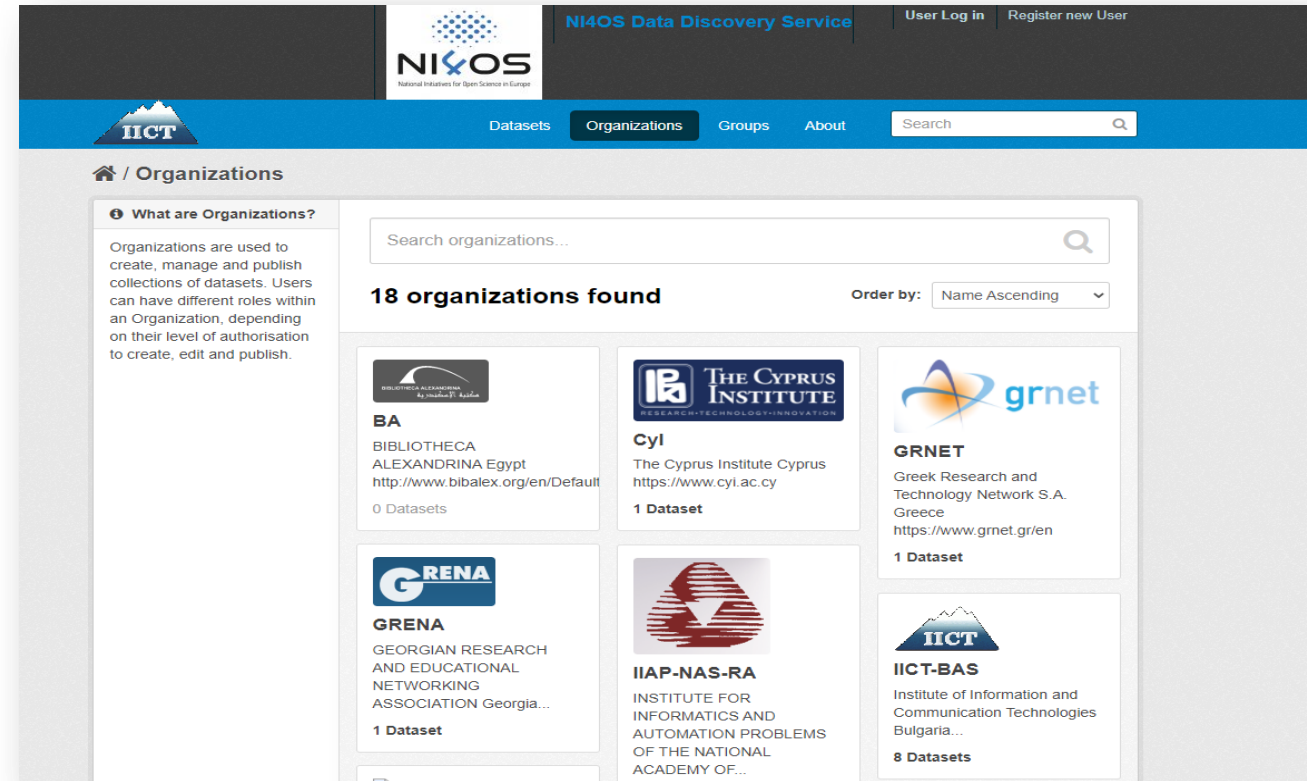
webscience usage by Resource name and Date



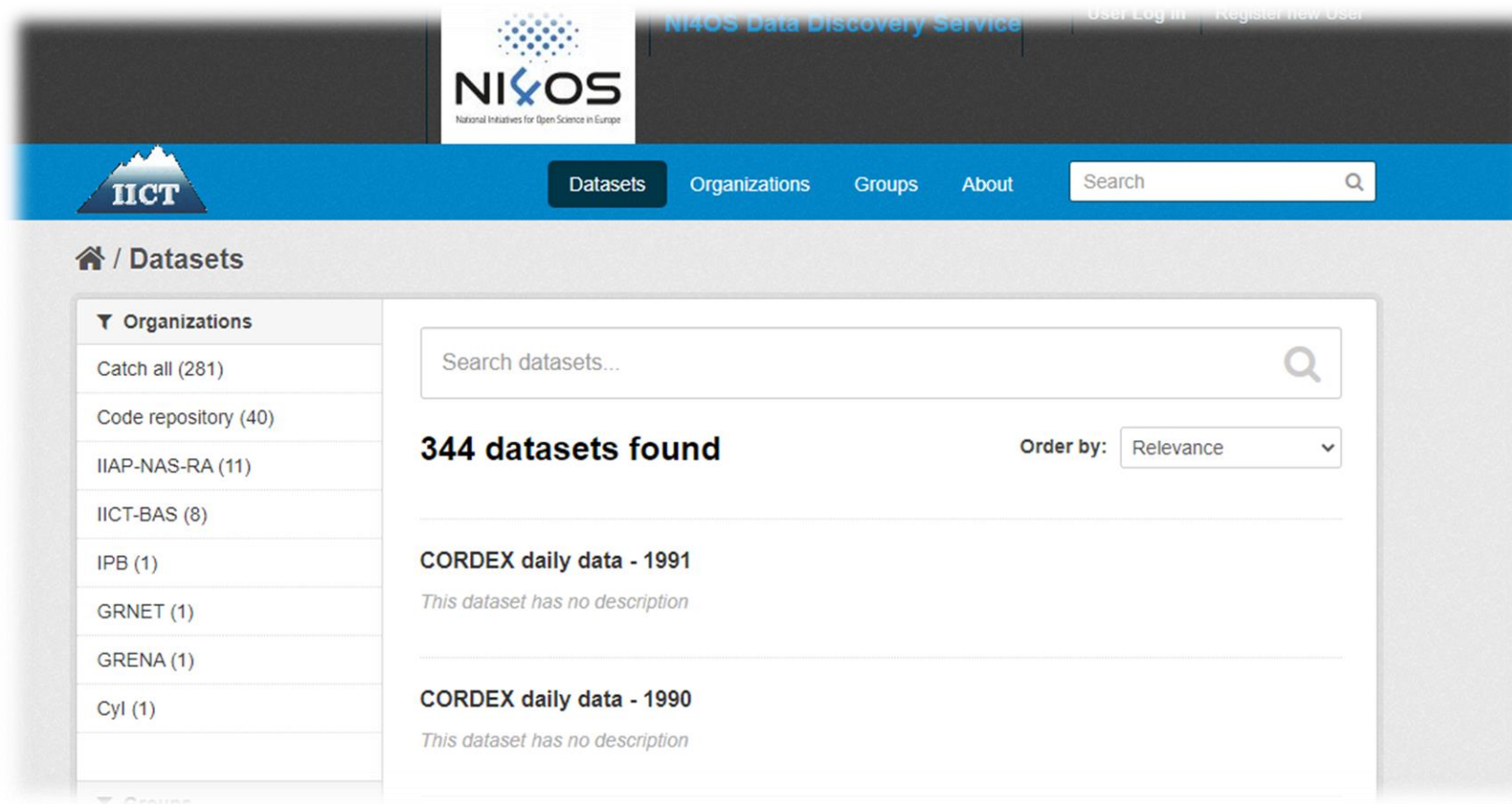
webscience usage by Resource name



- ❑ <https://search.vi-seem.eu/>
- ❑ Developed by IICT-BAS.
Ensures powerful metadata search within datasets.
- ❑ Can be used to share and search for datasets of different types, using metadata



NI4OS Data Discovery Service



The screenshot shows the NI4OS Data Discovery Service interface. At the top, there is a dark blue header with the NI4OS logo and the text "NI4OS Data Discovery Service". Below this is a blue navigation bar with the IICT logo and links for "Datasets", "Organizations", "Groups", and "About". A search bar is also present in the navigation bar. The main content area is titled "Datasets" and features a sidebar on the left with a list of organizations and their dataset counts: "Catch all (281)", "Code repository (40)", "IIAP-NAS-RA (11)", "IICT-BAS (8)", "IPB (1)", "GRNET (1)", "GRENA (1)", and "Cyl (1)". The main content area has a search bar labeled "Search datasets..." and a dropdown menu for "Order by: Relevance". Below the search bar, two dataset entries are displayed: "CORDEX daily data - 1991" and "CORDEX daily data - 1990", both with the note "This dataset has no description".

- ClinHealth предоставя изчерпателни данни за индекси и метрики, които определят количествено въздействието на атмосферни параметрите и характеристиките върху качеството на живот и здравните рискове за населението.
- Услугата генерира надеждни, изчерпателни и детайлни изследвания за влиянието на параметрите и характеристиките на ниските атмосферни условия върху качеството на живот и рисковете за здравето на населението у нас.
- Разработена от НИГГГ-БАН

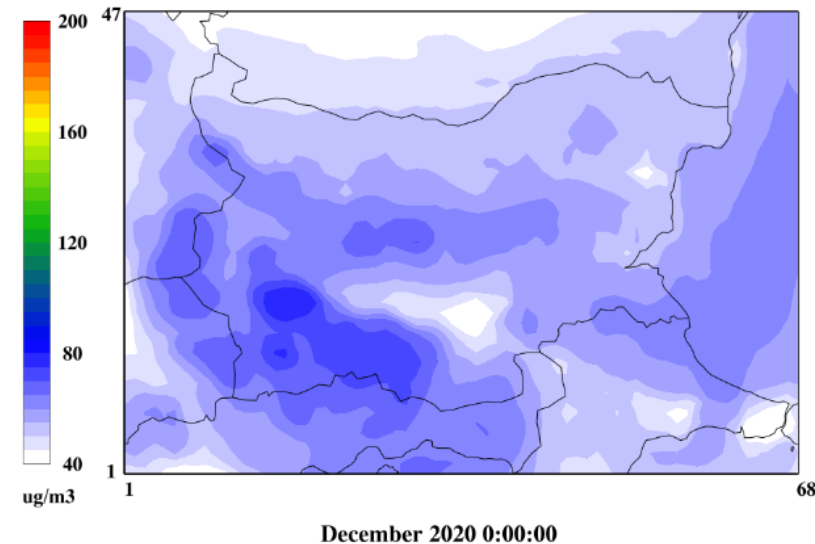
Bulgaria average data

[Sofia](#) [Surface CO](#) [Surface NO2](#) [Surface O3](#) [Surface PM10](#) [Surface SO2](#) [Show Hourly Data](#)

Choose start date: 12/01/2020

Surface O3

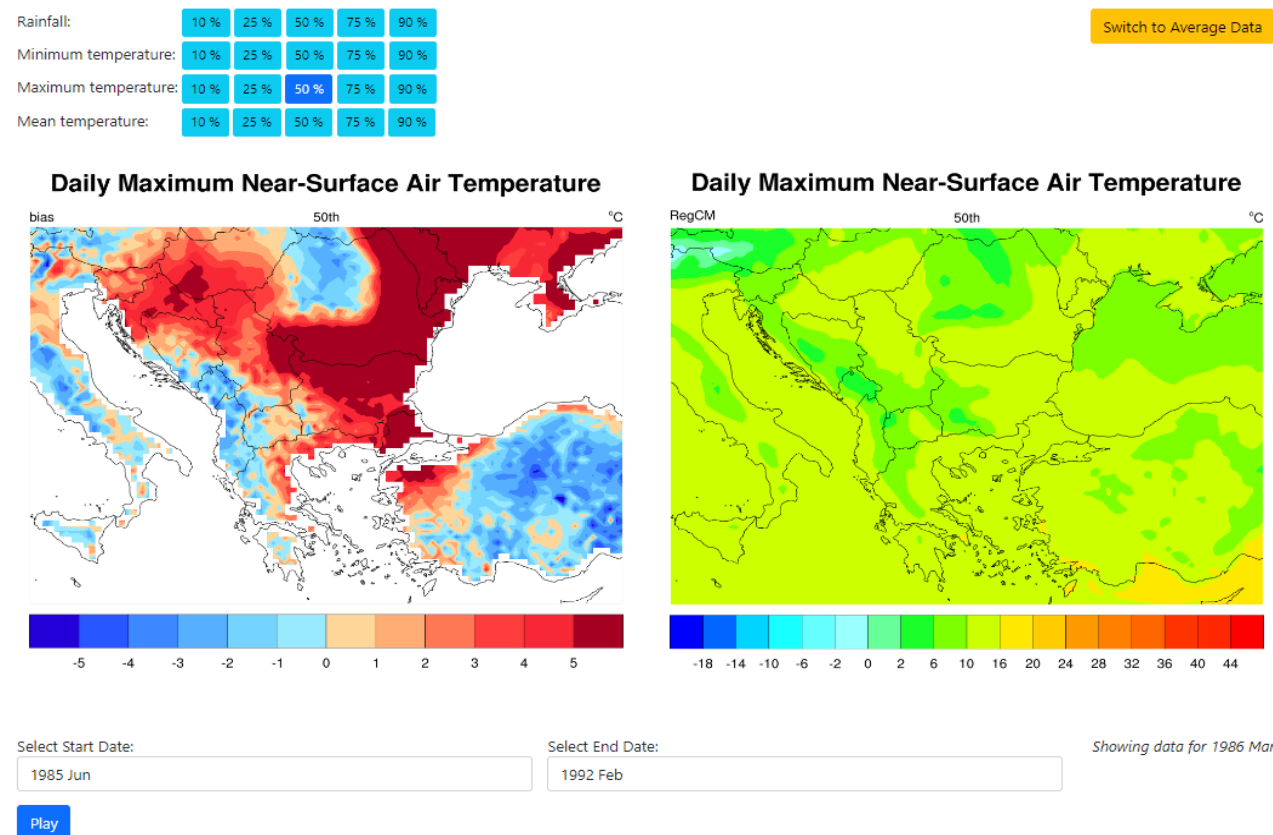
dx = dy = 9 km.



[About ClinHealth Service](#)

[Back](#) [Play](#) [Next](#)

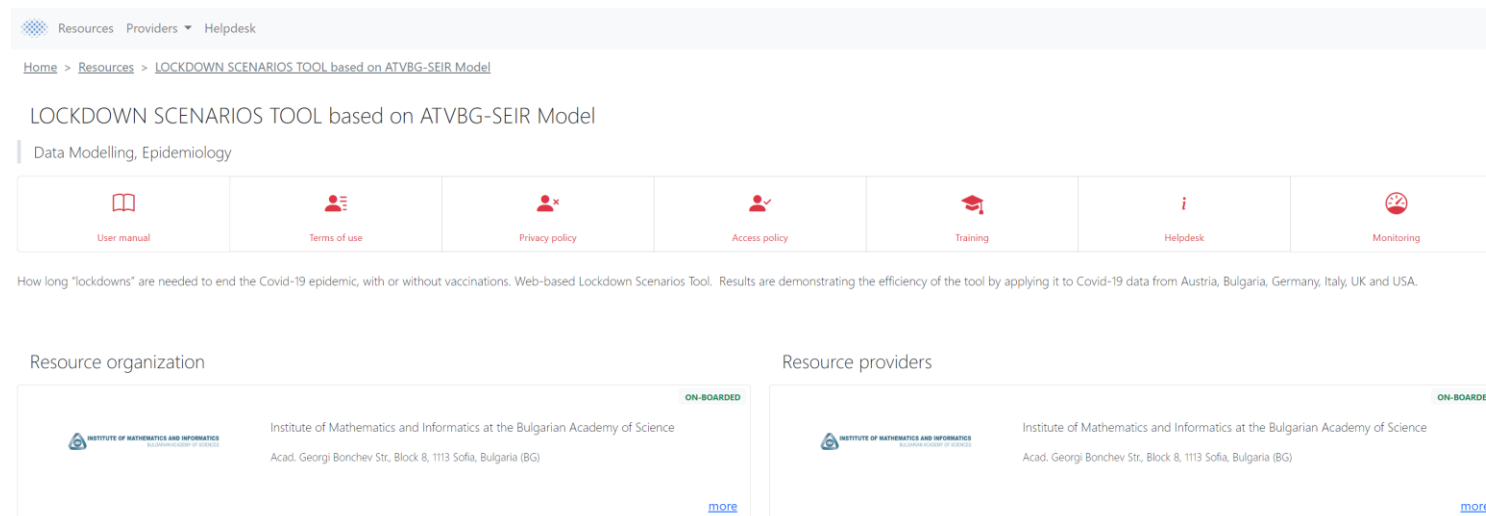
- ❑ ClimCoSt предоставя изчерпателни и надеждни компютърни симулации на промените в климата в регионален/местен мащаб и оценка на тяхното въздействие върху екосистемите и качеството на живот.
- ❑ Услугата произвежда надеждни, изчерпателни и подробни оценки на възможни регионални/местни промени в климата и техните последици за различни сценарии на глобална промяна.
- ❑ Разработена от НИГГГ-БАН



□ Lockdown Scenarios tool based on ATVBG-SEIR Model

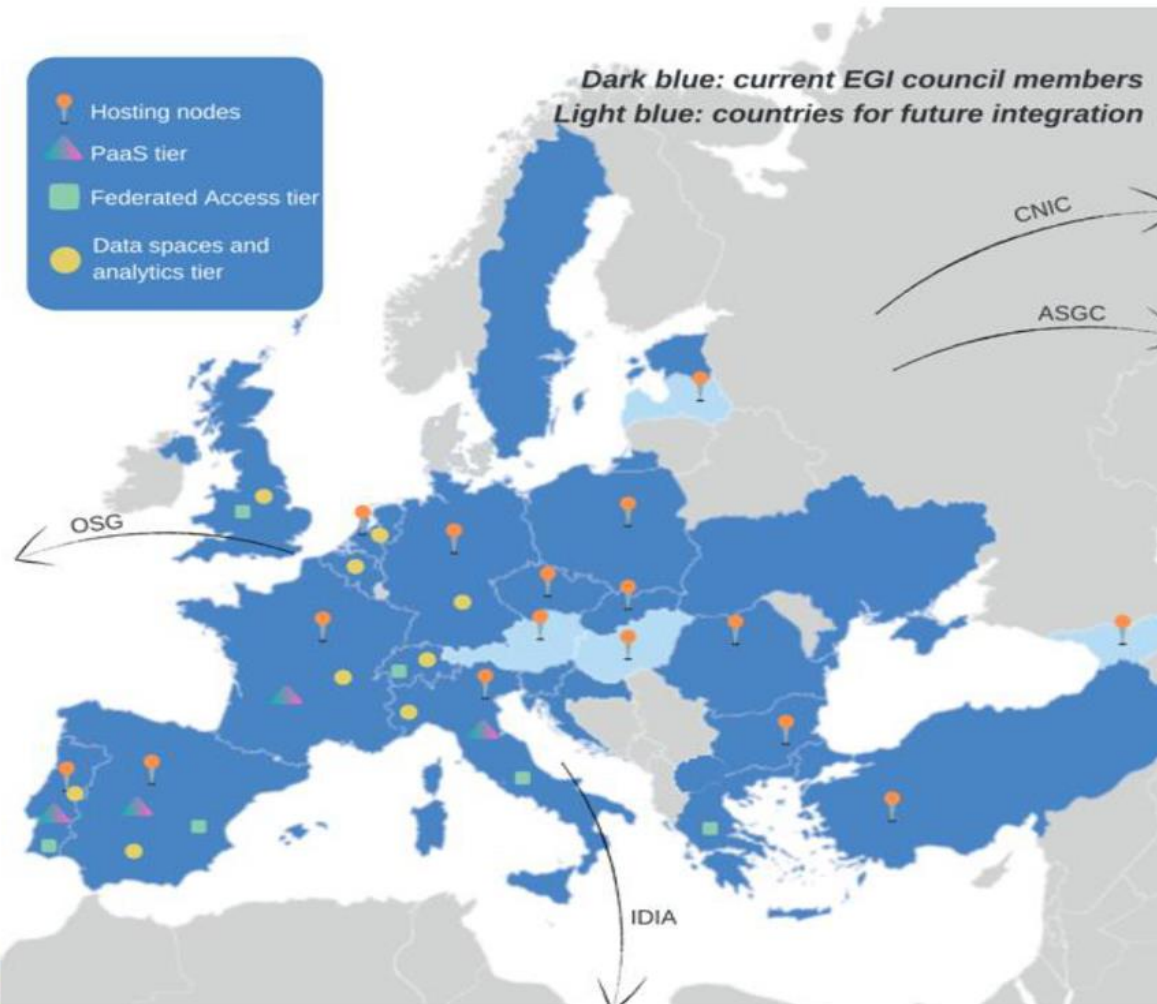
- How long “lockdowns” are needed to end the Covid-19 epidemic, with or without vaccinations. Results are demonstrating the efficiency of the tool by applying it to Covid-19 data from Austria, Bulgaria, Germany, Italy, UK and USA.
- Repository - Bulgarian Digital Mathematics Library (BuIDML) at IMI-BAS

<http://sci-gems.math.bas.bg/>



The screenshot displays the web interface of the Lockdown Scenarios Tool. At the top, there is a navigation bar with links for 'Resources', 'Providers', and 'Helpdesk'. Below this, a breadcrumb trail shows 'Home > Resources > LOCKDOWN SCENARIOS TOOL based on ATVBG-SEIR Model'. The main heading is 'LOCKDOWN SCENARIOS TOOL based on ATVBG-SEIR Model', followed by the category 'Data Modelling, Epidemiology'. A horizontal menu contains seven items: 'User manual', 'Terms of use', 'Privacy policy', 'Access policy', 'Training', 'Helpdesk', and 'Monitoring', each with a corresponding icon. A descriptive paragraph states: 'How long "lockdowns" are needed to end the Covid-19 epidemic, with or without vaccinations. Web-based Lockdown Scenarios Tool. Results are demonstrating the efficiency of the tool by applying it to Covid-19 data from Austria, Bulgaria, Germany, Italy, UK and USA.' Below this, there are two sections: 'Resource organization' and 'Resource providers'. Both sections feature the logo of the Institute of Mathematics and Informatics at the Bulgarian Academy of Science, its name, and its address: 'Acad. Georgi Bonchev Str, Block 8, 1113 Sofia, Bulgaria (BG)'. Each section also includes an 'ON-BOARDED' status indicator and a 'more' link.

Project Overview



EGI Advanced Computing for EOSC Grant agreement ID: 101017567

Budget

- Total budget: € 12,009,988
- EC budget: € 8,000,000

Consortium

- Coordinator - Stichting EGI
- 33 Partners, 23 third parties

Effort

- 1472 PMs, 48 FTEs
- **49% Virtual Access** (35 services, 38 providers)

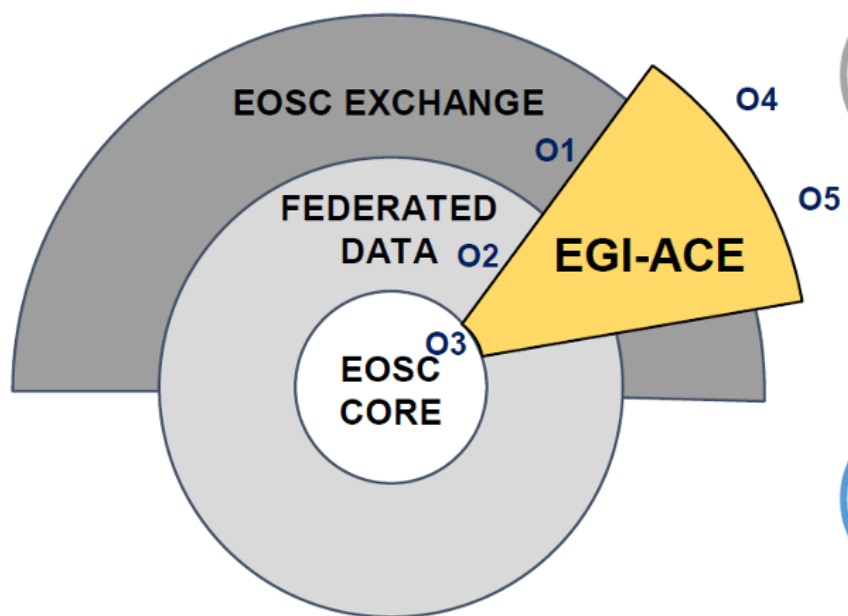
Duration

- Jan 2021 - June 2023 (30 months)

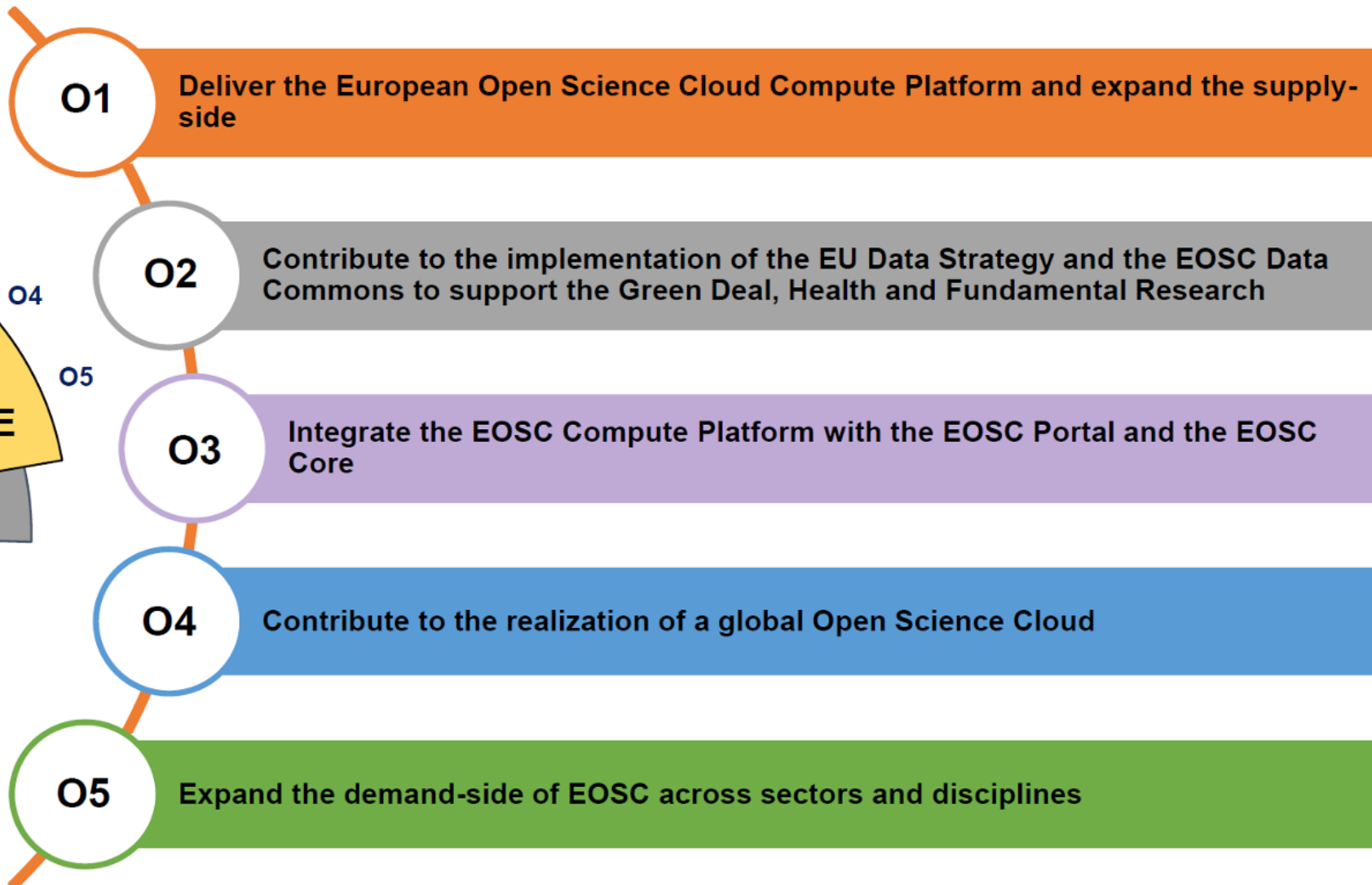
Implement the **Compute Platform of the EOSC** and contribute to the **EOSC Data Commons** by delivering integrated computing, platforms, data spaces and tools as an integrated solution that is **aligned with** major European cloud federation projects and HPC initiatives.

Внедряване на компютърната платформа за EOSC и допринасяне за общите (FAIR) данни на EOSC, като предоставя интегрирани изчисления, платформи, услуги за данни и инструменти като интегрирано решение, което е в съответствие с европейските проекти за облачна федерация и HPC инициативи.

Project Objectives



EOSC Architecture:
[Solutions for a sustainable EOSC](#)
 (report from the EOSC Sustainability WG)



Federated Infrastructure Services

Distributed compute and storage facilities deliver CPU, GPU and Storage

- 27 Cloud providers: **15** funded with Virtual Access, 23 support EGI-ACE use cases
- 200+ HTC providers: **1** funded with Virtual Access, 58 support EGI-ACE use cases
- 4 pilot level HPC centres (BG, TR, PT, ES)



Cloud Compute



High-Throughput Compute



HPC



HPC Integration handbook:
<https://zenodo.org/record/6396471>

Task 7.3 - HPC integration in EGI-ACE

Objective: *Provide interoperability guidelines for HPC systems with the EOSC Compute Platform delivered by EGI-ACE*

Explore the usage and integration of HPC guided by 4 scientific pilot use cases with combined cloud and HPC needs, focusing on the areas of:

1. **Access federation:** Federated Authentication and Authorization
2. **Application federation:** Portable execution of container-based workloads
3. **Data federation:** Data transfers between systems
4. **Operation federation:** Presence in EOSC Portal, A/R monitoring, Usage accounting, Resource allocation, CRM...

HPC as a Service

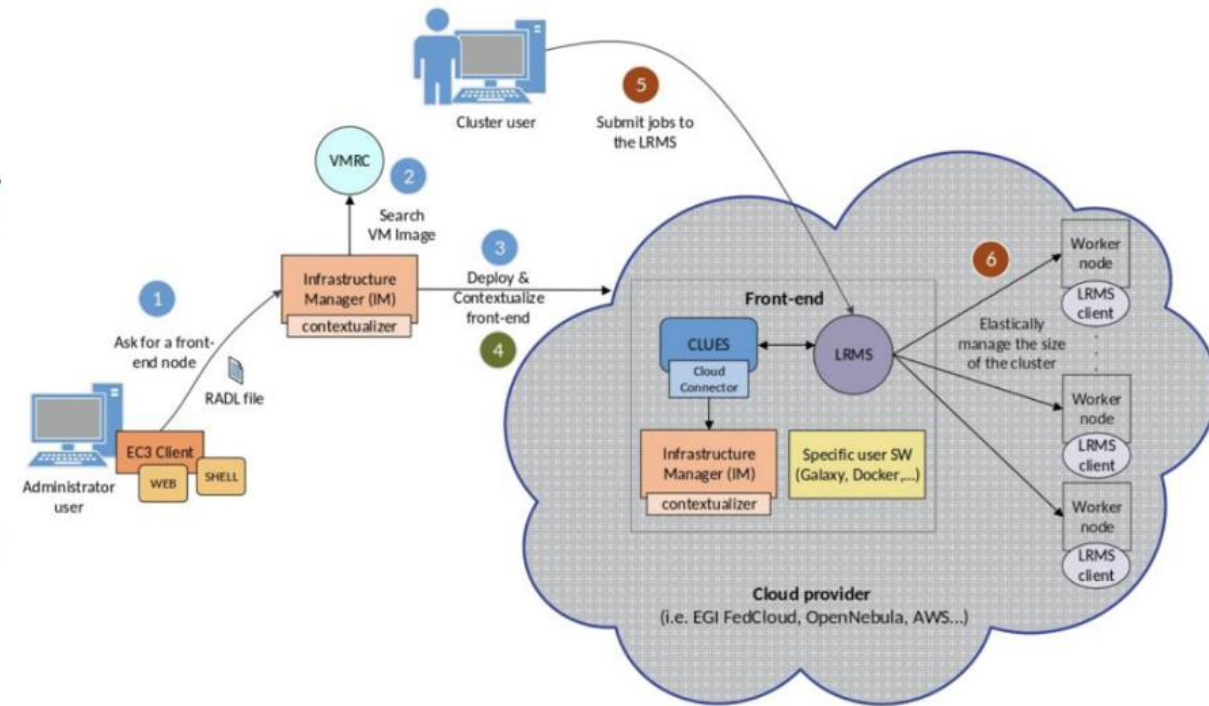
Use existing cloud APIs to create virtual infrastructures with HPC Capabilities

- PCI Passthrough for specialised hardware like GPU and infiniband
- Tools developed for proper configuration of devices at nodes

Deploy elastic clusters with EC3

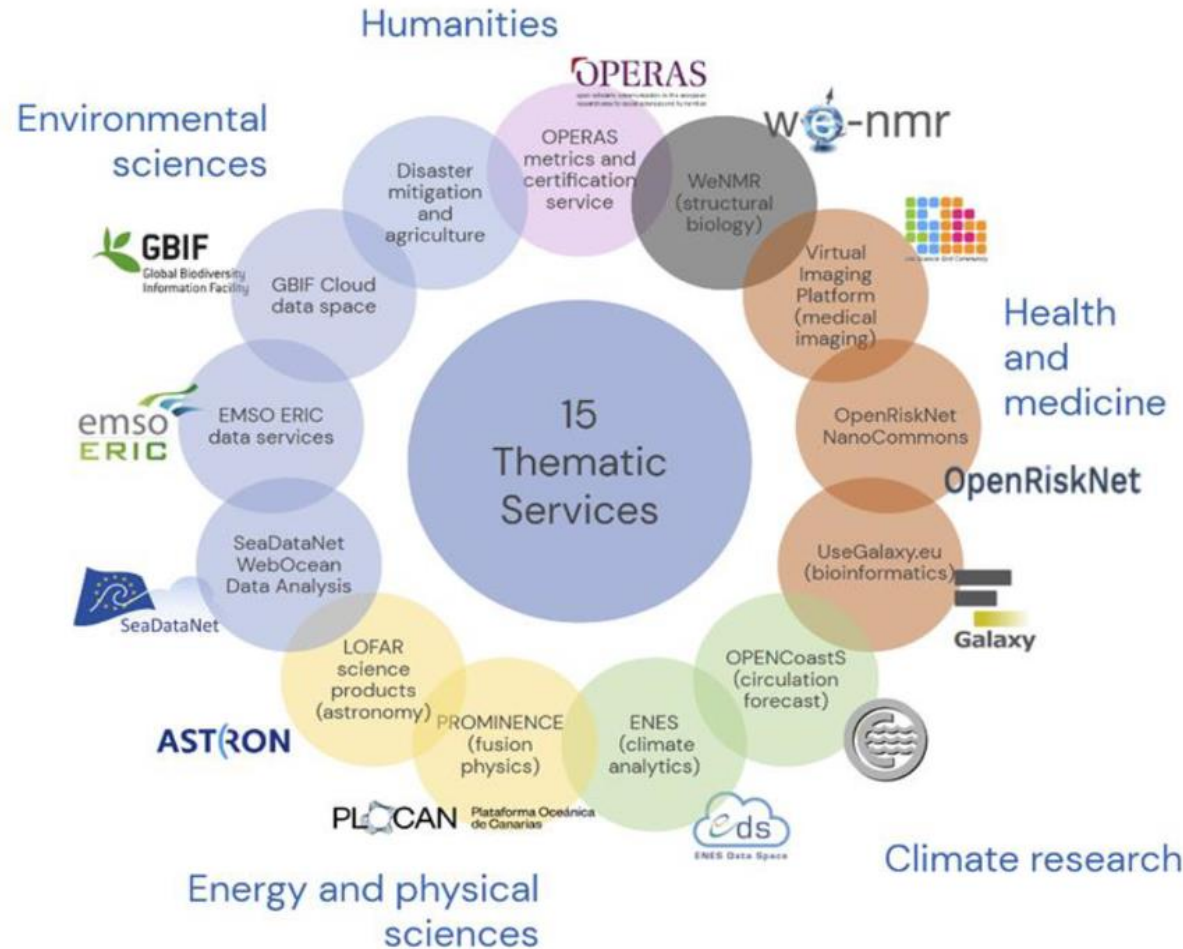
- SLURM + shared filesystem
- Automatic elasticity of worker nodes based on load (e.g. number of pending jobs)

Ideal for testing & development, training environments

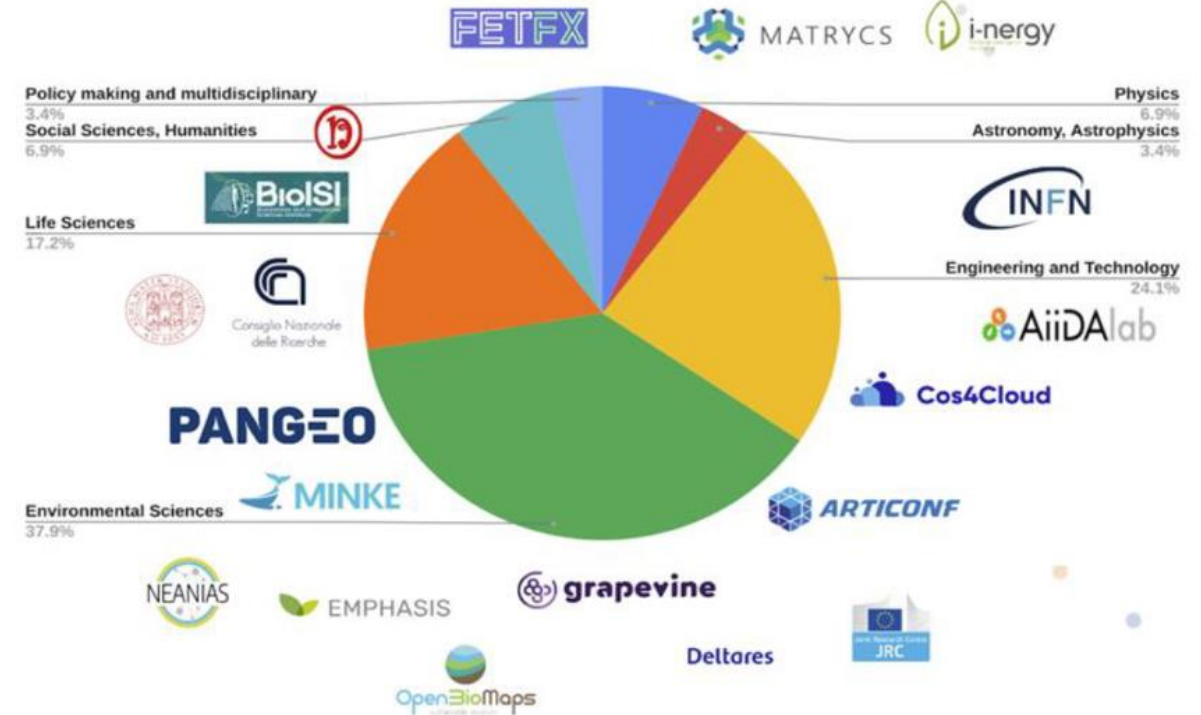


EC3 <https://servproject.i3m.upv.es/ec3/>

Thematic applications and application services



In the consortium



EGI-ACE: Main Activities and Achievements

- Service delivery in EOSC:
 - **35** services from the consortium
 - **8** services from external providers – empowered by our services
- Integration of Thematic Services:
 - **15 Thematic Services** (VREs, Data Spaces)
- Number of users of EGI-ACE services:
 - **76,000** on Thematic Services
 - **1,300** on the Platform and Infrastructure services

Our vision for a 'Collaborative Compute Continuum'



International research infrastructures and projects



**Resource brokering
and access support**
Shepherds and Competence Centres

Service
Level
Agreement



Technical federation

Identity portability + Data portability + Application portability

Operation
Level
Agreement

e.g:



**National and international
compute infrastructures**



**Aligned
science
and
compute
priorities**

Project administrative summary

Skills
4 eosC

● Skills for the European
● Open Science
● Commons



Supporting | eosC

Funded by
the European Union

Skills4EOSC has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101058527.

- Skills4EOSC, Grant agreement ID: 10158527, HE EC
- **Budget:** EC funding: €6 476 658
- **Consortium:**
 - 44 **Participants**, 18 **Countries** (“**Key doers**” in Open Science in their Country/Region/Domain)
 - 2 ESFRI Research Infrastructures
 - GARR (Italy) is the coordinator
- **Effort:** 761 PMs, ≈ 63.5 FTEs
- **Duration:** Sept 2022 – Aug 2025 (36 months)



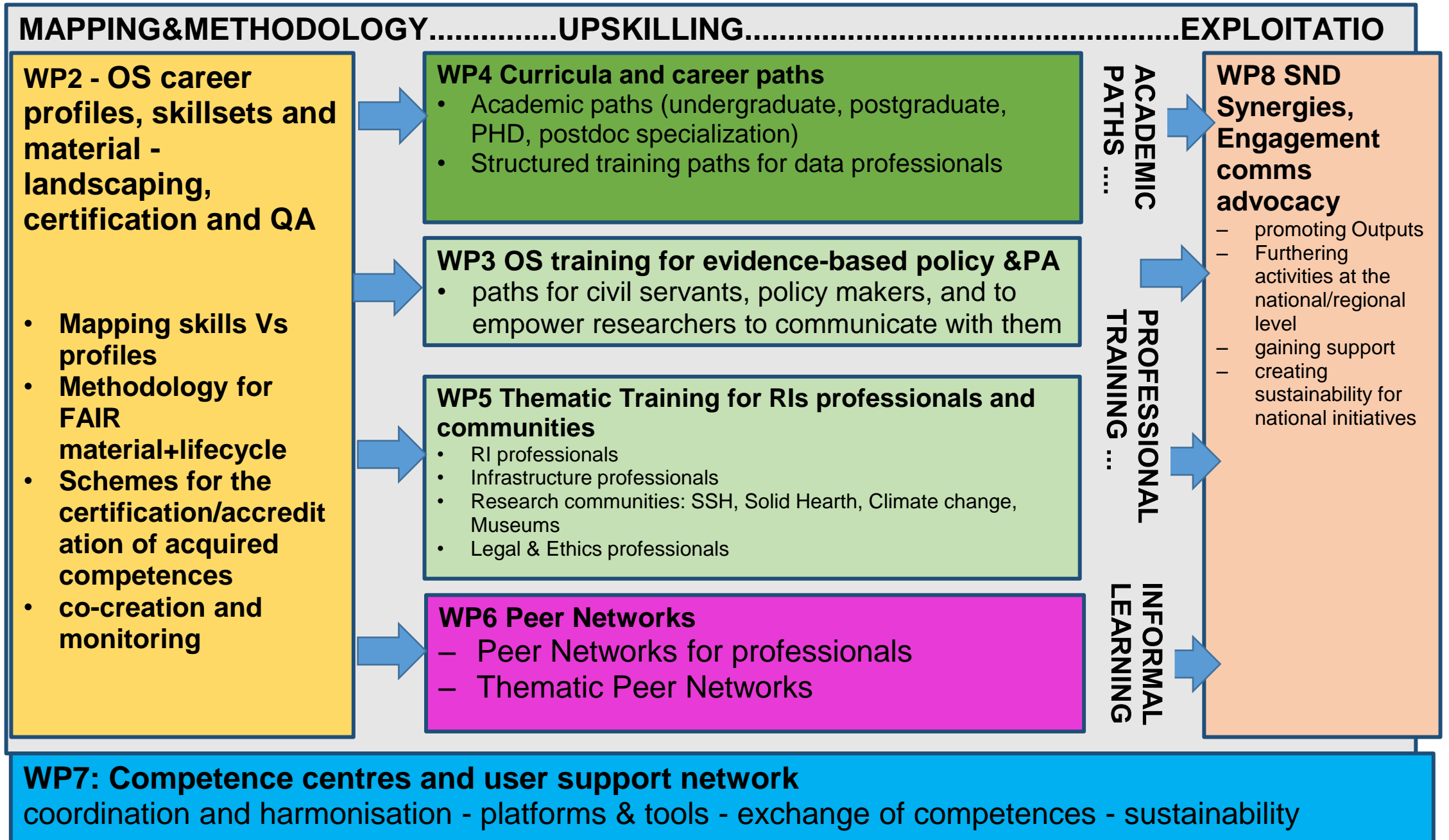
Skills
4 eosC

EuroCC Conference: HPC for the benefit of researchers and society, Sofia, 21-22 November 2022

Supporting |

eosC

Funded by
the European Union





Curricula and Learning paths for open science

WP4 Goal

Building curricula and learning paths for *Open Science ready Institutions*.



- Undergraduate students and PhDs
- Data stewards and data professionals
 - Data librarian and curators
 - Legal and ethical experts.



Objectives of WP4

Design harmonised **curricula and learning paths** for **OS professionals**, to ensure alignment, uniformity, quality and recognition of the acquired competences across Europe **and beyond**.

Define **“OS essentials”** to include in undergraduate and PhD courses and support professionals

Foster an **OS ecosystem** where researchers, public servants, and data stewards align curricula, training, practices and needs to make Open Science happen

Deliver **TTT (train-the-trainers) courses** for staff in **competence centres** and **beyond**

Tasks

- T4.1 Training curriculum for data stewards
- T4.2 Learning paths for data professionals
- T4.3 OS essentials at undergraduate level
- T4.4 OS ready PhD curricula
- T4.5 Integrating ELSI in curricula and learning paths for OS ready institutions

WP8: Synergies, stakeholder engagement, advocacy, and communications

Objectives

- a) Engage with key stakeholders, including funding agencies, policymakers, and civil servants and implement co-creation and feedback strategy with the OS community
- b) Promote the uptake of curricula, methodologies, QA & certification frameworks
- c) Liaise and establish synergies with relevant EOSC-related initiatives & projects
- d) Create synergies with national/regional/EU programmes relevant for OS to support longer-term sustainability and recognition of career profiles and QA & certification schemes
- e) Liaise with the EOSC governance and contribute to achieve the EOSC Partnership goals
- f) Communicate the project objectives and disseminate its key outputs



Tasks

T8.1 Stakeholder engagement

T8.2 Synergies with EOSC-relevant projects & initiatives

T8.3 Enabling synergies with national, regional and EC programmes and funding streams

T8.4 Liaison with the EOSC Partnership

T8.5 Advocacy kit for reaching out to funders and policy makers

T8.6 Communications and outreach

Thank you!

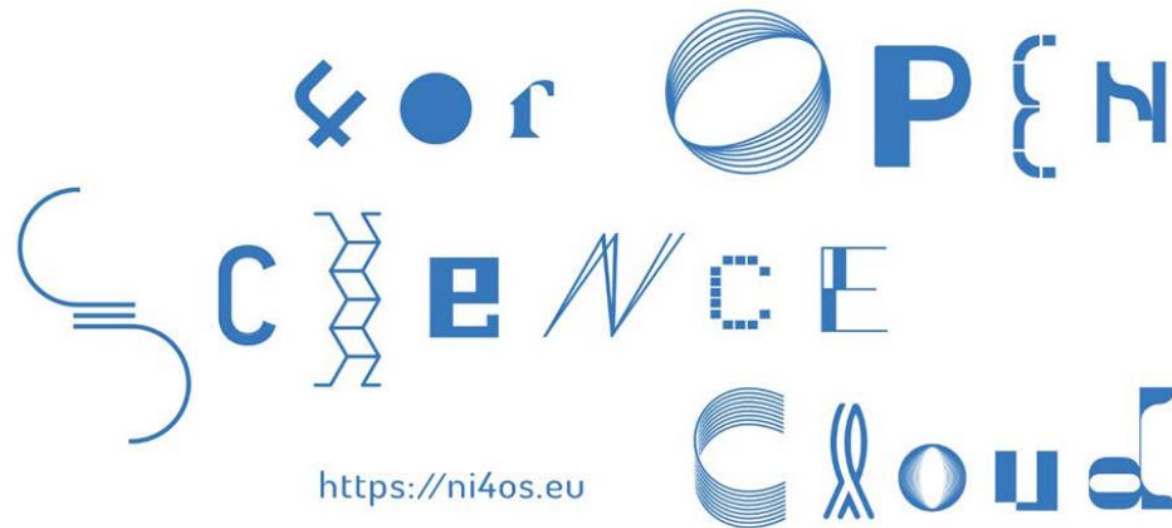
Contact: egi-ace-po@mailman.egi.eu
Website: www.egi.eu/projects/egi-ace

 [EGI Foundation](#)

 [@EGI_einfra](#)



 EGI-ACE receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101017557.



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QUESTIONS ?

**Skills
4 eosC**

- Skills for the European
- Open Science
- Commons

<https://www.skills4eosC.eu/>

<https://twitter.com/Skills4EosC>



Supporting 

 **Funded by
the European Union**

Skills4EOSC has received
funding from the
European Union's Horizon
Europe research and
innovation Programme
under Grant Agreement
No. 101058527.