EGI Council Participant: EMSO

# Participating in EGI Impact Report: EMSO

# 2023

egi.eu

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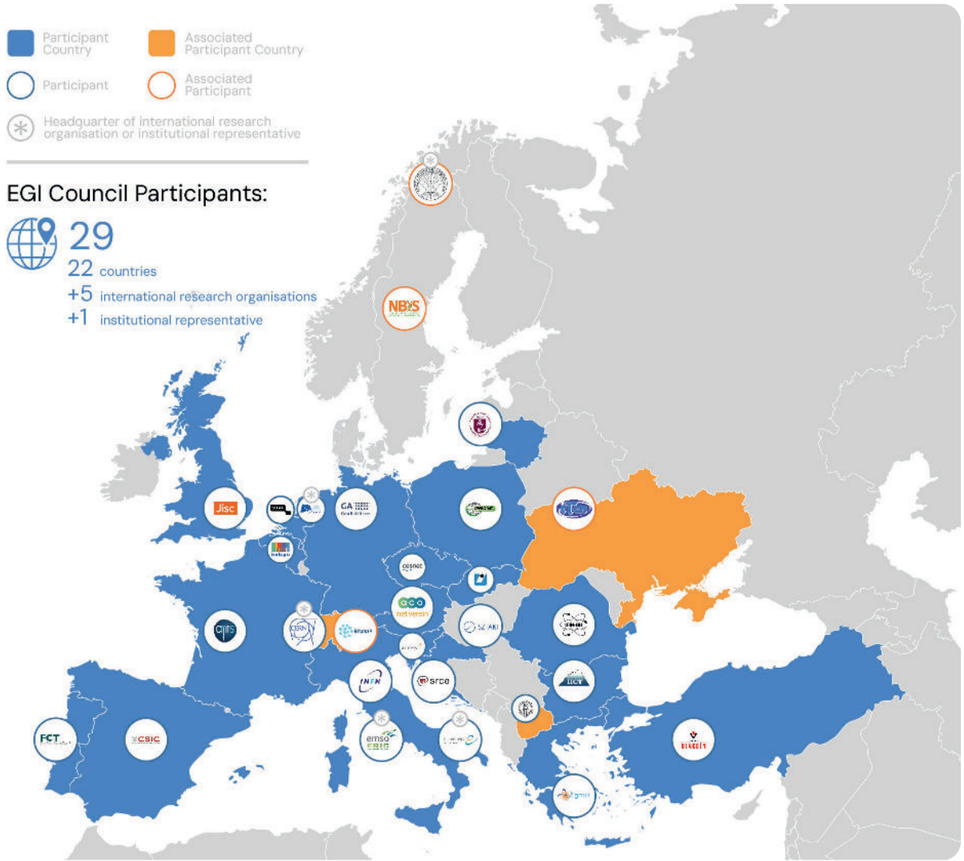
# About EGI

EGI is the federation of computing and storage resource providers united by a mission of delivering advanced computing and data analytics services for research and innovation.

The EGI Federation believes that all researchers should have seamless access to services, resources and expertise to collaborate and conduct world-class research and innovation. The EGI Federation is coordinated by EGI Foundation, an organisation with headquarters in Amsterdam. The Foundation offers a service federation and management platform, enabling the data centres to harmonise and integrate their services by connecting to a common hub. Moreover, it engages with international research communities using these services in order to understand and satisfy their demands for advanced computing for research.

The mission of EGI is pursued by coordinating and provisioning an international federated infrastructure that pools together service providers from both the public and private sectors in Europe to develop, integrate and deliver digital services for compute and data-intensive research and innovation. As an open initiative with a global outlook, the EGI Federation also connects service providers beyond Europe, following the collaboration needs of the served communities.

The latest Annual Report provides an extensive overview of the results that have been achieved through our collaborative efforts in 2023.




Map of EGI Council Members - 2023

# About EMSO

The European Multidisciplinary Seafl oor and water column Observatory (EMSO) aims to explore the oceans, to gain a better understanding of phenomena happening within and below them, and to explain the critical role that these phenomena play in the broader Earth systems.

EMSO consists in a system of regional facilities placed at key sites around Europe, from North East to the Atlantic, through the Mediterranean, to the Black Sea. Observatories are platforms equipped with multiple sensors, placed along the water column and on the seafloor. They constantly measure different biogeochemical and physical parameters, that address natural hazards, climate change and marine ecosystems. EMSO offers data and services to a large and diverse group of users, from scientists and industries to institutions and policy makers. It is an extraordinary infrastructure to provide relevant information for defi ning environmental policies based on scientifi c data.

EMSO is a consortium of partners sharing in a common strategic framework scientific facilities (data, instruments, computing and storage capacity). Formally it is a European Research Infrastructure Consortium (ERIC), legal framework created for pan-European large-scale research infrastructures.

# Overall EGI impact

EMSO-ERIC contributes to the Federation's mission to deliver open solutions for advanced computing in research and innovation, coordinating and provisioning an international federated infrastructure that pools together service providers from both the public and private sector in Europe to develop, integrate and deliver digital services for compute-and data-intensive research and innovation. In particular EMSO ERIC contributes to facilitating access to general & specialised ICT resources at pan-European scale and to making expert support teams across Europe accessible.

The annual membership fee contributed by EMSO-ERIC to the EGI Foundation in 2023 was 10,000 EUR. The EGI Federation is composed of e-infrastructure providers from national and community initiatives, forming one of the largest distributed computing infrastructures for researchers in the world, integrating about 1,243,400 CPU cores and over 1,4 Exabyte of storage space from hundreds of data centres.

In 2023, the EGI Federation served around 95,000 users (+12%) from over 260 research communities. EGI users consumed 7 Billion HTC CPU hours (-1.04%), 12 Million Cloud CPU hours +17%), ran over 372 M computational jobs (+13.4%) and published over 2,900 open access publications.

As of the previous year, the research community with the largest number of users is Medical and Health Sciences (+43% annual increase in 2023), while the community with most extensive HTC CPU/h consumption is WLCG.

From the scientific communities engaged in 2023, the one with most extensive Cloud CPU/h consumption is Pangeo (+2959% annual increase in 2023).

Moreover, EGI engaged with a total of 265 scientific communities (10 new communities); 19 SMEs and business pilots, and 1 additional Research Infrastructure included in the ESFRI Roadmap, raising the total of number of ESFRI partners/users of EGI to 23.

# EGI's contribution to EMSO excellence in science

EGI federates hundreds of resource centres that are located at participant countries, organizations and at collaborating e-Infrastructures worldwide. This federated infrastructure supports data- and compute-intensive research across Europe and the world. In 2023, our federation was used by over 260 scientific communities, and has been accessed by around 95,000 users.

Research Infrastructures and multi-national research collaborations are the largest adopters of EGI Services, the main contributors of thematic portals, and operate community-specific compute, storage and data systems based on EGI federation capabilities.

# Services from EGI and Providers

EGI and EMSO stipulated an SLA (Service Level Agreement) in 2016. Since then EMSO benefits from the following services:

- EGI Cloud Compute
- EGI Online Storage
- EGI Check-in

During 2023 the EMSO-DEV  consumed 465,608 cloud compute CPU-hours through EGI, from the INFN-Bari site (Italy).

Outside the SLA allocation the EMSO-ERIC community consumed 1,800,439 cloud compute CPU-hours through EGI: 359,304 from CESGA (Spain), and 1,441,135 from INFN-Bari (Italy).



# Methodology

Data for this impact report has been collected from the following sources.

- Infrastructure contributions, infrastructure usage by research communities: EGI Accounting System
- List of research publications by supported research communities (table 1)

**AMS-02**
https://ams02.space/publications

**ILC**
https://inspirehep.net/literature?sort=mostrecent&size=25&page=1&q=international%20Linear%20Collider%20&earliest_date=2021--2021

**ALICE**
https://alice-publications.web.cern.ch/publications

**INSTRUCT**
https://instruct-eric.eu/content/publications-list

**ATLAS**
https://cds.cern.ch/collection/ATLAS%20Papers?ln=en

**JUNO**
https://inspirehep.net/

**AUGER**
https://www.auger.org/science/publications/journal-articles

**KM3NET**
https://www.km3net.org/about-km3net/publications/pubblication/; https://inspirehep.net/literature?q=collaboration:KM3NeT year:2021

**BELLE**
https://belle.kek.jp/belle/publications.html; https://inspirehep.net/literature?q=collaboration:belle year:2021

**LifeWatch**
https://www.lifewatch.eu/catalogue-of-virtual-labs/medobis/publications/

**BIOMED**
https://vip.creatis.insa-lyon.fr/documentation/

**CTA**
https://www.cta-observatory.org/science/library/

**CLARIN**
https://beta.clarin.openaire.eu/search/advanced/research-outcomes?sortBy=resultdateofacceptance,descending&type=publications&year=range2021:2021

**CMS**
http://cms-results.web.cern.ch/cms-results/public-results/publications/CMS/index.html

**DUNE**
https://inspirehep.net/literature?q=collaboration:DUNE year:2021

**EISCAT_3D**
https://eiscat.se/scientist/publications/

**LOFAR**
http://old.astron.nl/radio-observatory/lofar-science/lofar-papers/lofar-papers: https://lofar-surveys.org/publications.html, or https://ui.adsabs.harvard.edu/search/q=full%3A(%22designed%20and%20constructed%20by%20ASTRON%22)%20OR%20title%3A%22LOFAR%22%20year%3A2021-2021%20property%3Arefereed%20-bibstem%3A(%22AN%22%20OR%20%22MNRAS.tmp%22)&sort=date%20desc%2C%20bibcode%20desc&p_=0

**LCHb**
https://cds.cern.ch/collection/LHCb%20Papers?ln=en

**LSST**
https://ui.adsabs.harvard.edu/ with year:2021 author:("LSST*" OR "Vera C. Rubin*") collection:astronomy property:refereed

**NA62**
https://cds.cern.ch/collection/NA62%20Papers?ln=en

**OPENCOASTS**
http://opencoasts.lnec.pt/index_en.php

**PANOSC**
https://www.panosc.eu/publications/



**ELI-BEAM**
https://www.eli-beams.eu/publikace/

**ELI-NP**
https://www.eli-np.ro/scientific_papers.php

**EMSO-ERIC**
from the community representative; SLA https://documents.egi.eu/document/3539

**FUSION**
https://documents.egi.eu/public/ShowDocument?docid=3484

**HESS**
https://www.mpi-hd.mpg.de/hfm/HESS/pages/publications/

**Ice-Cube**
https://icecube.wisc.edu/science/publications/

**SeaDataNet**
https://www.seadatanet.org/Publications/Scientific-publications

**SKA**
https://ui.adsabs.harvard.edu/search/fq=%7B!type%3Daqp%20v%3D%24fq_database%7D&fq_database=database%3A%20astronomy&q=pubdate%3A%5B2021-01%20TO%202021-12%5D%20title%3A(SKA)&sort=date%20desc%2C%20bibcode%20desc&p_=0

**SNO+**
https://snoplus.phy.queensu.ca/results/collaboration-papers.html

**VIRGO**
https://pnp.ligo.org/ppcomm/Papers.html

**WeNMR**
https://explore.openaire.eu/ advanced search project outcomes. field to search "project" enter project name; Citation of HADDOCK web server: https://scholar.google.nl/scholar?hl=en&as_sdt=2005&cites=10355645612647046441&scipsc=&as_ylo=2021&as_yhi=2021; Citations of the AMBER web portal publication: https://scholar.google.com/scholar?as_ylo=2021&hl=en&as_sdt=0,5&sciodt=0,5&cites=6696812766870837905&scipsc=; Citations of the FANTEN web portal publication: https://scholar.google.com/scholar?as_ylo=2021&hl=en&as_sdt=0,5&sciodt=0,5&cites=10578718345045994565&scipsc=; Citations of the DISVIS/POWERFIT web portals publication: https://scholar.google.com/scholar?as_ylo=2021&hl=en&as_sdt=2005&cites=6482114501244947208&scipsc=’; Citations of the SpotON web portal: https://scholar.google.com/scholar?as_ylo=2021&hl=en&as_

**XENON**
https://inspirehep.net/literature?q=collaboration:XENON year:2021

# National institutional members of supported research communities (table 2)

**AMS-02**
https://ams02.space/collaboration/institute

**ALICE_**
https://alice-collaboration.web.cern.ch/General/Members/List_Institutes.html

**ATLAS**
https://atlas.cern/discover/collaboration

**AUGER**
https://www.auger.org/collaboration/institutions, https://www.auger.org/collaboration/funding-agencies

**BELLE**
https://belle.kek.jp/bdocs/collaboration.html

**BIOMED**
https://vip.creatis.insa-lyon.fr/

**CTA**
https://www.cta-observatory.org/about/cta-consortium/

**CLARIN**
https://www.clarin.eu/content/participating-consortia

**ILC**
https://linearcollider.org/team/

**INSTRUCT**
https://instruct-eric.eu/countries

**JUNO**
https://juno.ihep.ac.cn/collaboration.php

**KM3NET**
https://www.km3net.org/about-km3net/collaboration/members/

**LifeWatch**
https://www.lifewatch.eu/organisation-governance/

**LOFAR**
https://www.astron.nl/telescopes/

**LCHb**
https://lhcb-public.web.cern.ch/en/collaboration/Collaboration-en.html

**LSST**
https://www.lsstcorporation.org/international-contributors

**CMS**
https://cms.cern/collaboration/cms-institutes

**DUNE**
https://lbnf-dune.fnal.gov/about/countries-and-institutions-participating-in-dune/

**EISCAT_3D**
https://eiscat.se/wp-content/uploads/2016/12/EISCAT-Organogram-202x.jpg; https://eiscat.se/scientist/document/information/

**ELI-BEAM**
https://www.eli-beams.eu/about/cooperation/science/

**ELI-NP**
https://www.eli-np.ro/scientific_collaborations.php

**EMSO-ERIC**
http://emso.eu/organization/

**FUSION**
https://documents.egi.eu/public/ShowDocument?docid=3484

**HESS**
https://www.mpi-hd.mpg.de/hfm/HESS/pages/collaboration/

**Ice-Cube**
https://icecube.wisc.edu/collaboration/institutions/

**NA62**
https://greybook.cern.ch/experiment/detail?id=NA62

**OPENCOASTS**
http://opencoasts.lnec.pt/index_en.php

**PANOSC**
https://www.panosc.eu/partners/

**SeaDataNet**
https://www.seadatanet.org/About-us/SeaDataNet-AISBL/Members

**SKA**
https://www.skatelescope.org/participating-countries/

**SNO+**
https://snoplus.phy.queensu.ca/collaboration.html

**VIRGO**
https://apps.virgo-gw.eu/vmd/public/institutions

**WeNMR**
https://documents.egi.eu/document/2751

**XENON**
https://science.purdue.edu/xenon1t/?page_id=27

# EGI Membership Impact Report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