KER 2: Services enabling federated computing in EOSC

Final Review meeting, 12/09/2023

Alessandro Paolini
EGI-ACE WP7 leader
Senior Service Delivery Officer at EGI Foundation
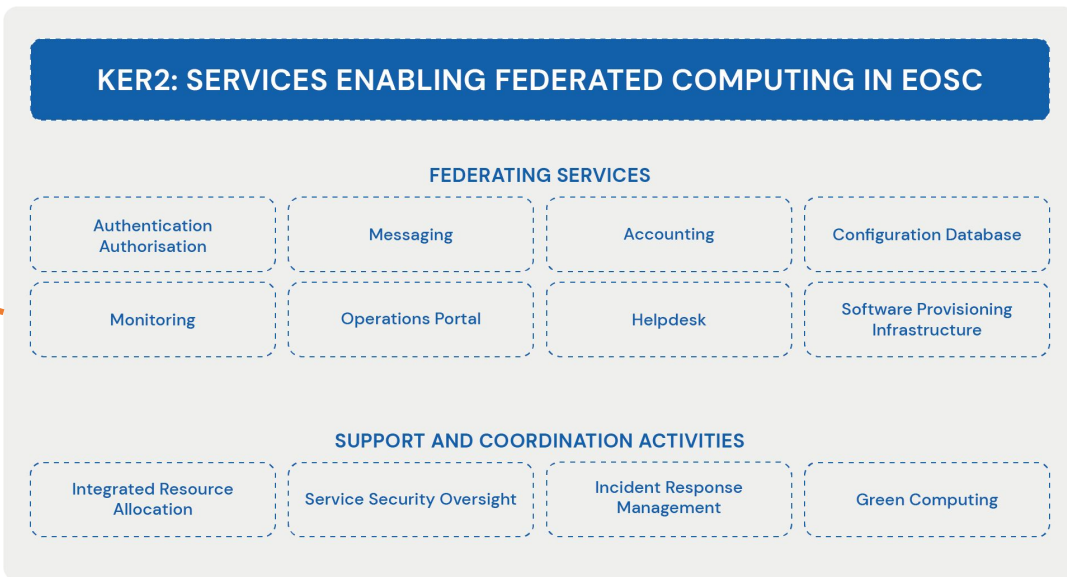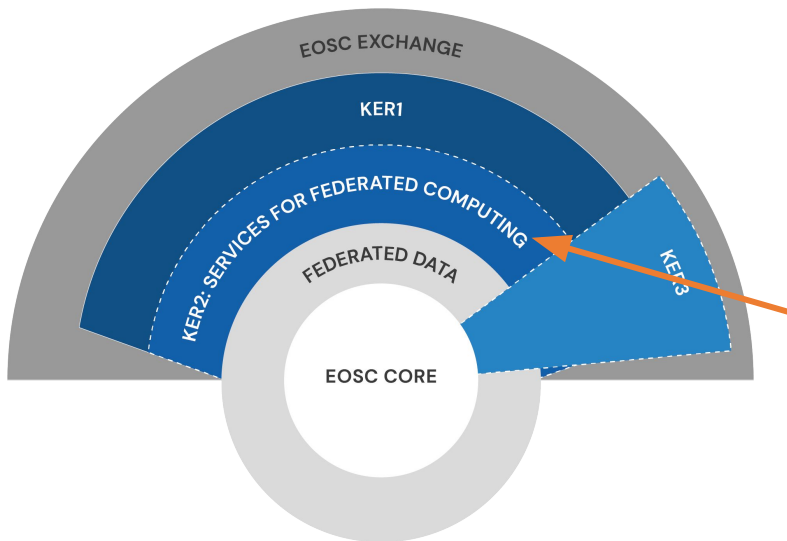
Dissemination level: Public

Disclosing Party: Project Consortium

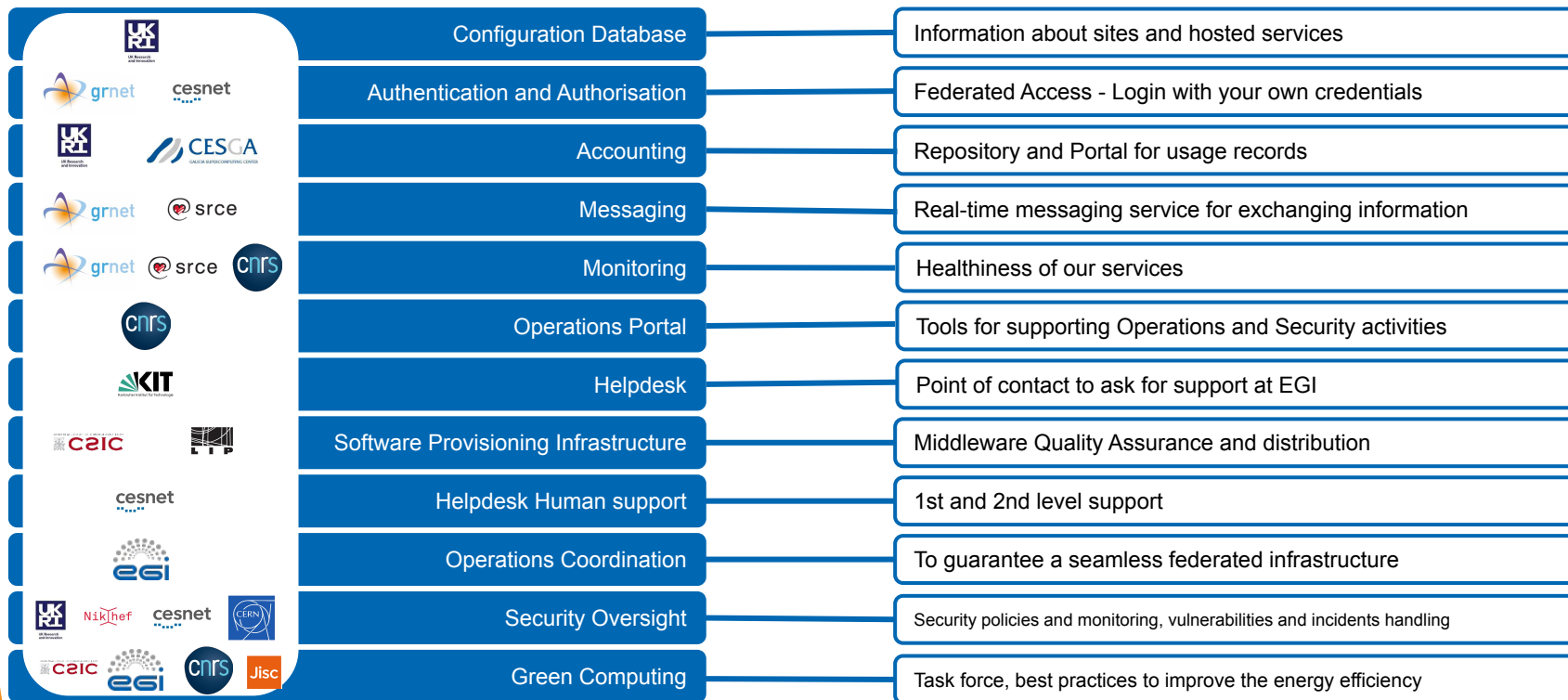**Recipient Party:** European Commission

Outline

- KER2 and Services Management Tools overview
- Integration with EOSC
- Expansion of capabilities: HPC and Cloud
- Dissemination and communication
- Innovation:
    - Improvements in the Service Management Tools
    - Support the providers in increasing their maturity level
    - Green Computing
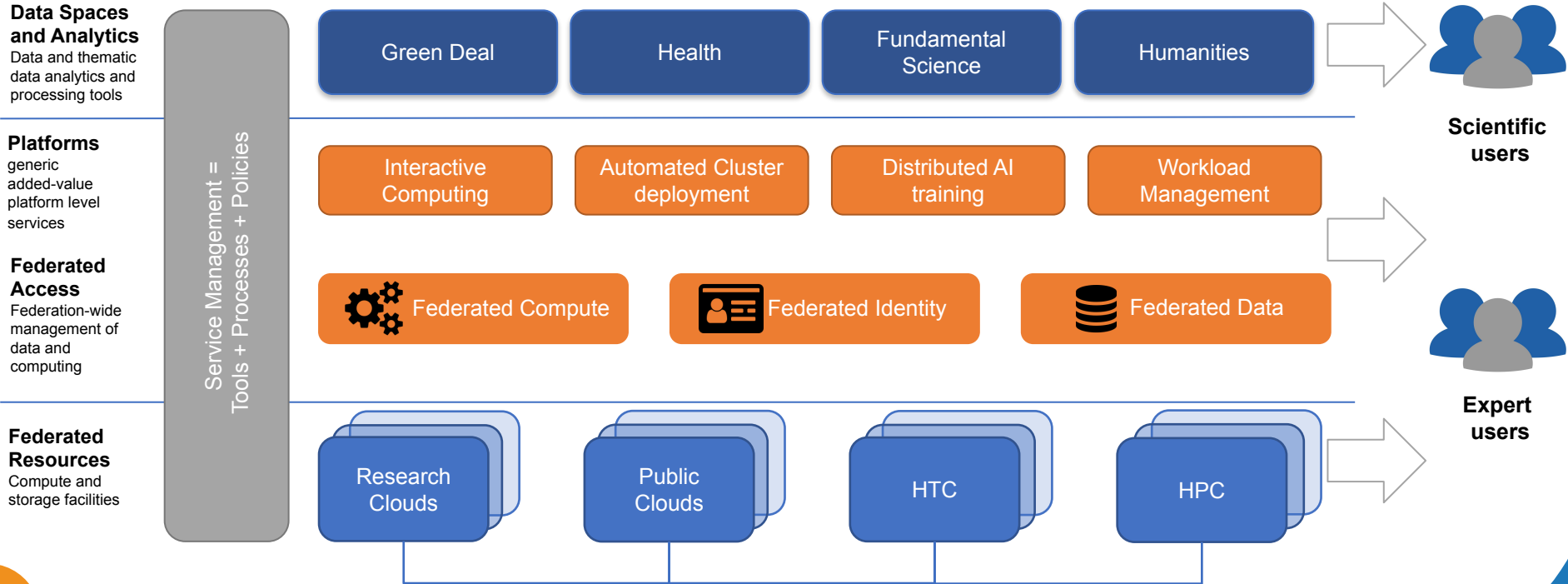- Final take-away from KER2

KER 2 OVERVIEW

KER2: SERVICES ENABLING FEDERATED COMPUTING IN EOSC

FEDERATING SERVICES

Authentication Authorisation	Messaging	Accounting	Configuration Database
Monitoring	Operations Portal	Helpdesk	Software Provisioning Infrastructure

SUPPORT AND COORDINATION ACTIVITIES

Integrated Resource Allocation	Service Security Oversight	Incident Response Management	Green Computing

- **Provided by:** WP7, T2.2

The EOSC Compute Platform

Data Spaces and Analytics
Data and thematic data analytics and processing tools

Green Deal	Health	Fundamental Science	Humanities

Scientific users

Platforms
generic added-value platform level services

Interactive Computing	Automated Cluster deployment	Distributed AI training	Workload Management

Federated Access
Federation-wide management of data and computing

Federated Compute	Federated Identity	Federated Data

Expert users

Federated Resources
Compute and storage facilities

Research Clouds	Public Clouds	HTC	HPC

Service Management = Tools + Processes + Policies

Alignment with the EOSC Core

Integration of the Core Services

EGI Services published in the EOSC Marketplace

- Order management activity integrated
- Services available in the EOSC ecosystem

AAI:

- EGI Check-in is part of the EOSC AAI Federation

Helpdesk:

- The EGI Helpdesk integrates with EOSC Helpdesk using the "Full integration" option of the <u>EOSC Helpdesk: Architecture and Interoperability Guidelines</u>

Monitoring:

- EGI Monitoring results are aggregated and exposed to the EOSC Monitoring
- Monitoring service accepts results with a push model:
    - <u>Combine results of existing ARGO Tenants</u>

Accounting:

- Collection of relevant metrics, generation of integrated metrics, forwarding to EOSC Accounting

Security Coordination:

- Policies, procedures, vulnerability and security incidents handling
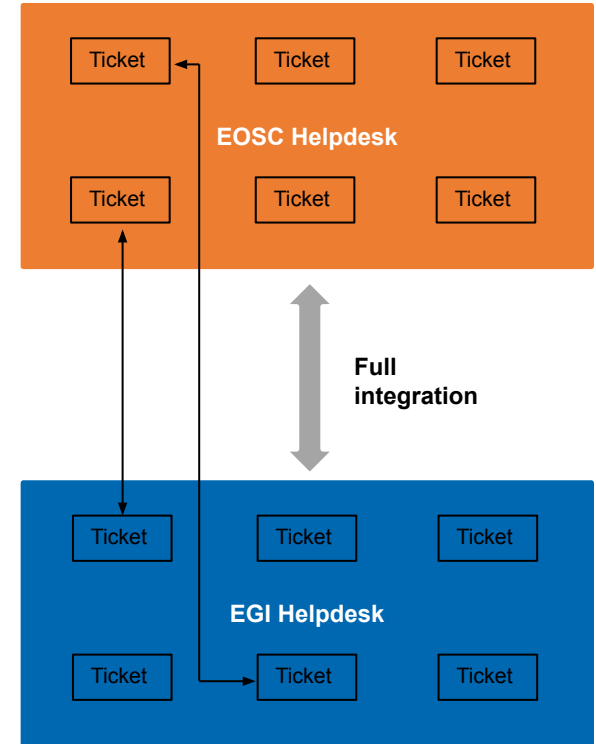
Impact on Open Science

Objective: "...deliver integrated computing, platforms data spaces and tools as an integrated solution aligned with major European cloud federation projects and HPC initiatives.

36 EGI-ACE services in EOSC out of 413 (9%)

189 EGI-ACE orders out of 538 (35%)
10 services in the 'most ordered top 20'

The EGI-ACE services are made available for users through the EOSC Portal and its Marketplace, as well as through an 'Open Call' which is a web form that is continuously available on the EGI-ACE website and attracts user communities to describe their access request alongside the usage case.

Cloud integration programme

- The EGI Cloud federation, with 23 federated providers in 2021, was an important asset to the project.
- EGI-ACE has been running an ambitious extension programme to increase the capacity and geographical footprint of this federated infrastructure.

EASY ➞ **EXPERT**

AAI level
- Joining the 'AAI federation'
- It provides single sign-on across clouds and between EGI-ACE and EOSC services.

Target by commercial providers:

- CloudFerro

- T-Sytems

Application and Data Federation level
- joining the application federation (through AppDB) and the data federation (through DataHub) besides the AAI federation
- enable the exchange of applications and scientific datasets between EOSC and those national clouds

Under discussion with national cloud providers of:
- Moldova
- Latvia
- Armenia
- Georgia

Full integration
- Integration with Federating Services, and Coordination Activities.
- Involvement in international resource allocation and delivery scenarios with Service Level Agreements.

Reached by OpenStack clouds from:
- Greece (GRNET)
- Italy (INFN CNAF)
- Germany (GSI)
- Hungary (ELKH Cloud)
- Ireland (Walton Institute)
- China (CSTCloud)
- South Africa (ILIFU)

Federated Resources
Expansion of the EGI Cloud
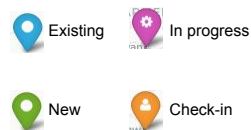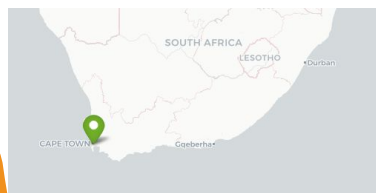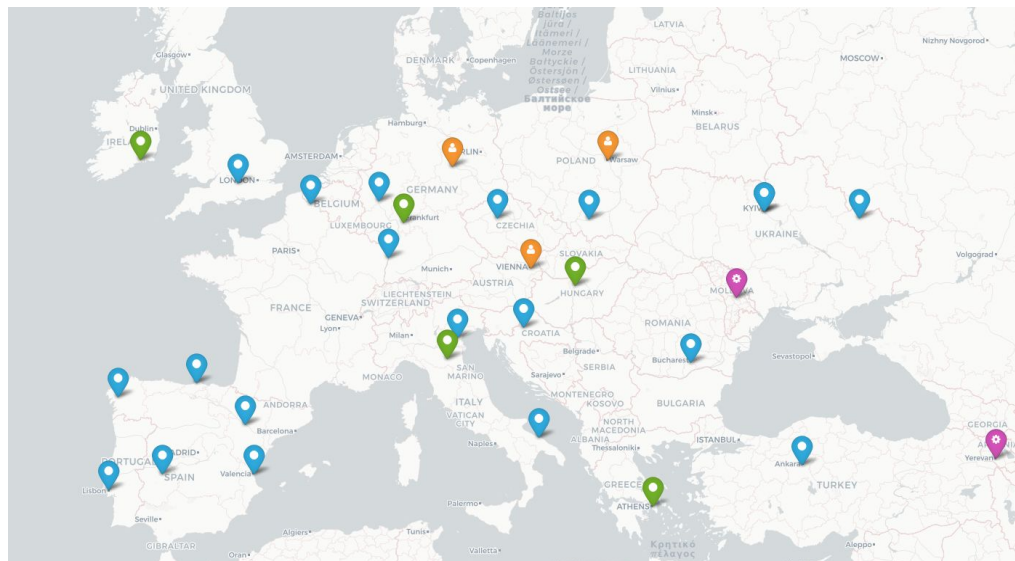
Seven new fully integrated providers
- CNAF, GSI-LCG2, GRNET-OpenStack, ILIFU, CNIC, WALTON, ELKH-Cloud

New integration points for enabling Open Science
- AAI
- Application sharing with AppDB
- Data sharing with DataHub

Expansion beyond EU
- South Africa, China, Eastern countries

Existing   In progress

New   Check-in

A fully integrated cloud: ELKH Cloud in Hungary

- For Hungarian researchers from the Eötvös Loránd Research Network (ELKH) and their international collaborators
- Setup started in 2015, established in 3 phases, operation since 2021

ELKH Cloud	
vCPU	5900
vGPU	512*
RAM	28 TB
SSD	338 TB
HDD	1250 TB
Network speed	100 Gbps

*theoretical maximum 2060

Supported 'user projects' on ELKH Cloud:

Year	Projects
2016	21
2017	58
2018	88
2019	106
2020	131
2021	179
2022	207
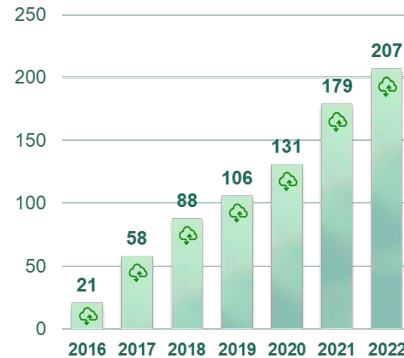
Supported community from EGI-ACE:

OpenBioMaps
sustainable diversity

Elevating integration for:

AI4PublicPolicy

(A pay-for-use SLA)

ELKH Cloud   SZTAKI   Wigner   ELKH | Eötvös Loránd Research Network

HPC integration with EOSC Compute Platform

D7.3 – Final version of the HPC integration handbook: https://go.egi.eu/hpc-integration/

Explored and tested the integration of High Performance Computing into cloud environment, by focusing on four key areas:

1. **Access Federation:** Allowing access to both resources with a single set of credentials.
2. **Application Federation:** Allowing running container based workflows in both environments.
3. **Data Federation:** Allowing free data movement between cloud and HPC systems.
4. **Operation Federation:** Presence in EOSC Portal, A/R monitoring, Usage accounting, Resource allocation, CRM…

This interoperability and federation features are tested via four different pilots:

A. **ELI-NP** (IFIN-HH)**:** deployment of HPC-capable systems on IaaS clouds (HPC as a Service).

B. **HEP** (CERN)**:** benchmarking, data transfer and execution of codes using federated authentication.

C. **ENES** (CMCC)**:** execution of container-based climate data analytics and visualization jobs on HPC.

D. **PROMINENCE** (UKAEA)**:** facilitate running containerised workflows on HPC resources from the PROMINENCE service.

DISSEMINATION AND COMMUNICATION

Aimed at potential suppliers: why to join

Aimed at existing suppliers: what's new

- Green Computing sessions at EGI 2022 and EGI 2023 Conferences

- HPC integration with EOSC Compute Platform
  - Ask me anything (EOSC Future) – June 2022
  - IEEE INTERNATIONAL SYMPOSIUM ON CONVERGENCE OF CLOUD & HPC (July 2022)
  - EGI 2022 Conference (September)
  - SuperComputing 2022 (November)

- Cloud integration models in a dedicated workshop at EGI 2022 Conference

- Security workshop and training at:
  - International Symposium on Grids & Clouds (ISGC) 2023 (March)
  - EGI 2022 and EGI 2023 Conferences

INNOVATION

New features of the Service Management Tools

- Operations Portal:
    - Security dashboard
        - New API CALL to identify sites vulnerable to critical vulnerabilities
        - Automate computing of KPI showing infrastructure patch status for vulnerabilities
    - VO Identity Card
        - Support of new Attribute Management systems
        - New methods for the API
- AAI – Check-in:
    - Improved the EGI Federation Registry for registering Service Providers
    - Transition to Keycloak technology replace MITREid Connect
    - Plug-in for accepting tokens on Compute services
- Accounting
    - New benchmark HepScore23 replaced the old one HepSpec06
- Software Provisioning Infrastructure
    - New infrastructure based on Nexus Repository OSS
    - Release workflows using Jenkins
    - Quality Assurance: automated testing
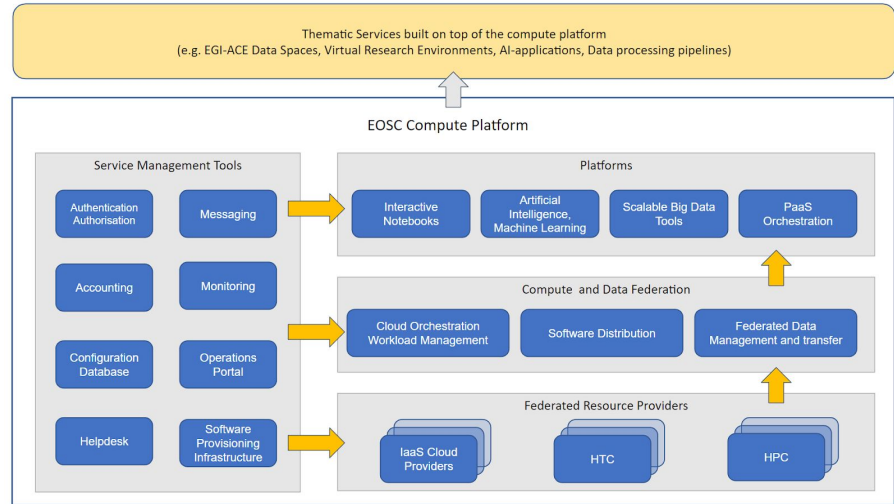
The integration of the EGI-ACE services

Having more mature providers in service delivering

EGI-ACE integrate services from:
- EGI Foundation
- EGI Community

EGI Foundation Service Management System based on IT Standards ISO/IEC 20000-1:2018 and FitSM
- Outlines the requirements for design, transition, delivery and improvement of IT services
- Provides value for both the customers and the service providers
- Certification obtained in 2016
- SMS structured and organised into processes and procedures according to the standard

Main objective of the EGI SMS:
- bring all the EGI-ACE Service Portfolio under the same umbrella
- raise the maturity of the service providers

Integration with EGI F. SMS ISO20K/FitSM

Compute, Data Federation, Platform, Access Federation Services

- Lightweight approach
  - Not all of them might be included in the EGI Foundation portfolio
- Operational Level Agreements
  - Terms and conditions to operate the services
  - Description of the service, definition of Service Level Targets, provision of user support, etc…
- Registration in the Configuration database
  - Source of information for several services in the ECP
- Capacity plan, and Availability and Continuity plan
  - To assess and monitor the consumption of the resources
  - To assess and implement countermeasures to reduce the likelihood and the impact of availability and continuity risks
- Tracking incidents and service requests
  - Registration in the EGI Helpdesk
- Registration in the Suppliers Database
- Performance reports
  - According to requirements defined in the OLAs

Impact on Skills and Expertise
Improved service maturity through [FitSM](#)

- EGI-ACE delivered FitSM training to increase the maturity of service management within the consortium and among IT service providers of EOSC in general.
- Since January 2021, the project has delivered 18 FitSM training sessions
  - 13 foundation levels
  - 5 advanced levels
- 11 courses were held as 'in-house training', dedicated to the staff of a certain organisation/project/community
- 2 were 'open courses', being open for any attendee.

over 200 participants who gained **167** FitSM Foundation Certificates and **46** FitSM Advanced Certificates

FitSM is a lightweight standard for IT service management. It brings order and traceability with simple, practical support. It provides a standard conceptual and process model setting out realistic requirements and pragmatic implementation.

Green Computing

Green Computing surveys and follow-up project

- 2nd survey on Green Computing practices (Sept 2022)
  - To measure the progress made by partners in operating their data centres, specifically changes made to reduce their carbon impact and awareness of green issues and mitigations
  - Overall, the Power Usage Effectiveness (PUE), the water usage and CO_2 produced were the most tracked metrics
  - Respondents confirmed implementation of Green Computing policies, awareness raising programmes, green power initiatives, use of green energy suppliers and Green Labelled hardware and 'green' decommissioning services.

- Survey on software optimisation for energy efficiency (Q3 2022)
  - To take a snapshot of existing levels of awareness on Green Software.
  - To further make an informed decision on possible recommendations.
  - Main findings:
    - No energy efficiency criterion considered yet when choosing and procuring software.
    - GPU frameworks are used with a focus on optimising the performance of computational tasks.
    - The energy consumed by the clusters is measured mainly for cost management purposes.

- The Green Computing activities were an "exploratory exercise" in our Infrastructure:
  - The outcomes were valuable inputs for writing a follow-up project: GreenDIGIT

Final take-away from KER2

Coordination and oversight of the EOSC Compute platform

- EGI-ACE services published in EOSC Marketplace
- Services delivered through IT standards ISO20k and FitSM
- Integration of new cloud providers:
  - CNAF, GSI-LCG2, GRNET-OpenStack, ILIFU, CNIC, WALTON, ELKH-Cloud
- Integration of HPC systems with EOSC Compute Platform
- Requirements gathering according to EGI/EOSC Federation needs
- Green Computing activity carried on, increasing the awareness of the partners
- Workshops and training on Security, Cloud, HPC, Green Computing, and FitSM

Thank you!

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

EGI Foundation

@EGI_eInfra