EGI Strategy 2015-2020

Enabling collaborative data- and compute-intensive science

www.egi.eu

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Enabling collaborative data- and compute-intensive science

EGI is an international collaboration that federates the digital capabilities, resources and expertise of national and international research communities in Europe and worldwide.

Our main goal is to empower researchers from all disciplines to collaborate and to carry out data- and compute-intensive science and innovation.

Executive summary

EGI is an international collaboration that creates and delivers open solutions for science and research infrastructures. We do this by federating expertise between communities and across national boundaries, resources and digital capabilities.

Our vision is to enable all researchers from all disciplines to have easy, integrated and open access to the advanced digital capabilities, resources and expertise needed for collaboration and data/compute intensive science and innovation.

Our mission is to create and deliver open solutions for science and research infrastructures by federating digital capabilities, resources and expertise between communities and across national boundaries.

The Strategy Map depicts our high-level goals, our target groups, service offerings and major themes. Emphasis will be placed on supporting existing EGI research communities and attracting new ones linked to emerging research infrastructures. To serve these communities better, we will consolidate existing IaaS capabilities and expand into PaaS and SaaS domains with pre-configured and customisable platforms that can be easily deployed and managed. We will also make it easier to share, discover and process distributed open data.

We will consolidate our outreach and engagement efforts, focussing on a handful of channels to provide access to expertise and facilitate co-development projects.

We will also improve our position among policy makers as a trusted source of policy advice and as a centre of excellence for the implementation of policy actions.

We aim, with this strategy, to support the implementation of the digital European Research Area (ERA), to contribute to the development of the data economy and the related connected digital single market in Europe, and ultimately to contribute to the development of an Open Science Commons.

As EGI, we have a long tradition of federating distributed capabilities - from the technical to the human - and we are well positioned to support the integration and efficient operation of the services and resources needed to increase the impact on digital and open science, research and innovation.

Priorities that aim to improve processes and capabilities within the EGI federation are grouped in five strategic themes:

With *(I) "Engage and support user communities"* we aim to consolidate our outreach network and create a network of dedicated competence centres for long-term engage-ment with research communities.

Through *(II) "Design, develop and deploy solutions"* we will promote open innovation processes and source the best ideas from the community for advancing our current services. We will strengthen our skills in managing distributed teams and we will reinforce adoption of and compliance to open standards.

With *(III) "Serve, support and improve live services"* we aim to continuously improve the maturity of service management throughout the federation. We will regularly review user satisfaction and collect suggestions to implement through innovation projects.

Through *(IV) "Influence policies"* we will continue to develop our competences in digital infrastructure and open science policy while improving the engagement with the European Commission and the Member States.
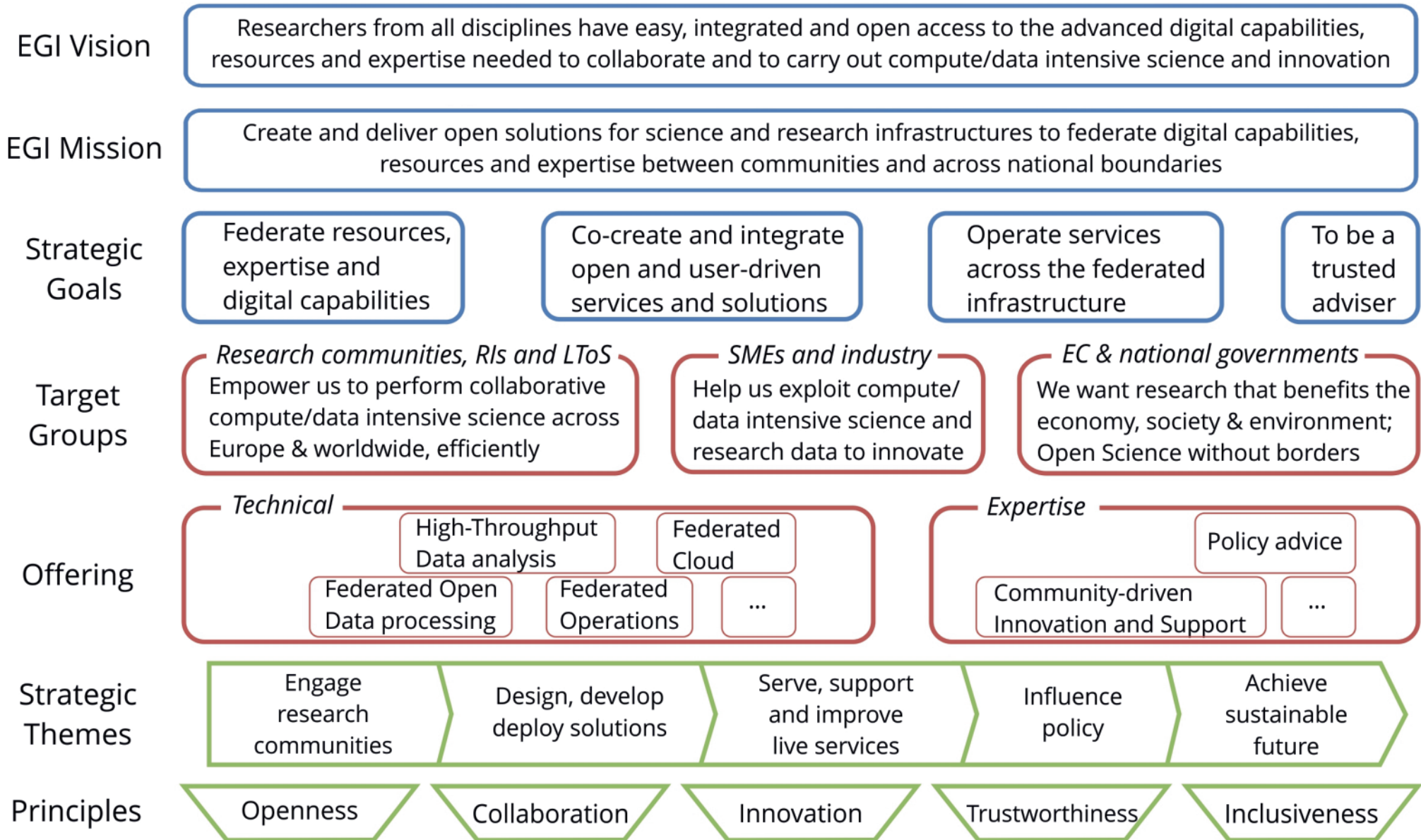
We will also continue to develop and promote the vision for an Open Science Commons.

In order to *(V) "Achieve sustainable future"* we will continue to develop the EGI strategy collaboratively to improve cohesion. We will work towards long-term, sustainable funding for operating EGI core services. At the same time we will focus on raising funds for innovation, we will continue to explore different business models, while improving discoverability and reuse of services and solutions.

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Strategy map

EGI Vision

Researchers from all disciplines have easy, integrated and open access to the advanced digital capabilities, resources and expertise needed to collaborate and to carry out compute/data intensive science and innovation

EGI Mission

Create and deliver open solutions for science and research infrastructures to federate digital capabilities, resources and expertise between communities and across national boundaries

Strategic Goals

Federate resources, expertise and digital capabilities	Co-create and integrate open and user-driven services and solutions	Operate services across the federated infrastructure	To be a trusted adviser

Target Groups

Research communities, RIs and LToS
Empower us to perform collaborative compute/data intensive science across Europe & worldwide, efficiently

SMEs and industry
Help us exploit compute/data intensive science and research data to innovate

EC & national governments
We want research that benefits the economy, society & environment; Open Science without borders

Offering

Technical
- High-Throughput Data analysis
- Federated Cloud
- Federated Open Data processing
- Federated Operations
- ...

Expertise
- Policy advice
- Community-driven Innovation and Support
- ...

Strategic Themes

Engage research communities	Design, develop deploy solutions	Serve, support and improve live services	Influence policy	Achieve sustainable future

Principles

Openness	Collaboration	Innovation	Trustworthiness	Inclusiveness

EGI and its context

EGI today

Over the last decade, EGI has built a federation of long-term distributed compute and storage infrastructures that support research and innovation.

This international e-infrastructure has delivered unprecedented data analysis capabilities to more than 38,000 researchers from many disciplines.

The federation brings together more than 350 data and compute centres worldwide. EGI is governed by EGI.eu and funded through a combination of membership fees, national and EC funding.

Today, EGI provides both technical and human services, from integrated and secure distributed high-throughput and cloud computing, storage and data resources to consultancy, support and co-development.

The research supported by EGI is diverse. Examples include the search for the Higgs boson at the Large Hadron Collider particle accelerator at CERN;

finding new tools to diagnose and monitor diseases such as Alzheimer's, or the development of complex simulations to model climate change.

EGI's benefits for research communities

1. Ensuring uniform and reliable availability of resources to researchers on a local, national and European scale
2. Enabling faster production of scientific results through collaboration across organisational and national boundaries
3. Promoting open and collaborative science and ensuring open access to shared resources and expertise
4. Allowing researchers to focus on their research rather than managing their e-infrastructure needs
5. Providing effective use of resources in different administrative domains to ensure the most effective return on infrastructure investments
6. Facilitating the innovation and sharing of solutions by building a thriving ecosystem through community events

and collaborative services.

The organisational and governance structure of EGI builds on EGI.eu, a not-for-profit foundation established under Dutch law in the Netherlands.

The foundation has participants and associated participants drawn from NGIs, EIROs , ERICs, and other legal entities. These entities participate in the foundation independantly or as the representative of a national e-infrastructure consortium.

EGI.eu participants form the governing body (EGI Council). Participants and associated participants also provide the physical resources and shared services that enable EGI to deliver, improve and innovate services for communities. EGI.eu coordinates areas such as overseeing infrastructure operations, user community support, contact with technology providers, strategy and policy development, flagship events and dissemination of news and achievements.

EGI in numbers
as of May 2015

EGI is:
23 countries + CERN + EMBL

EGI Federation:
52 countries + CERN + EMBL

Virtual Organisations:
200+

Users:
~38,000

Resource centres:
~350

Federated CPU cores:
500,000+

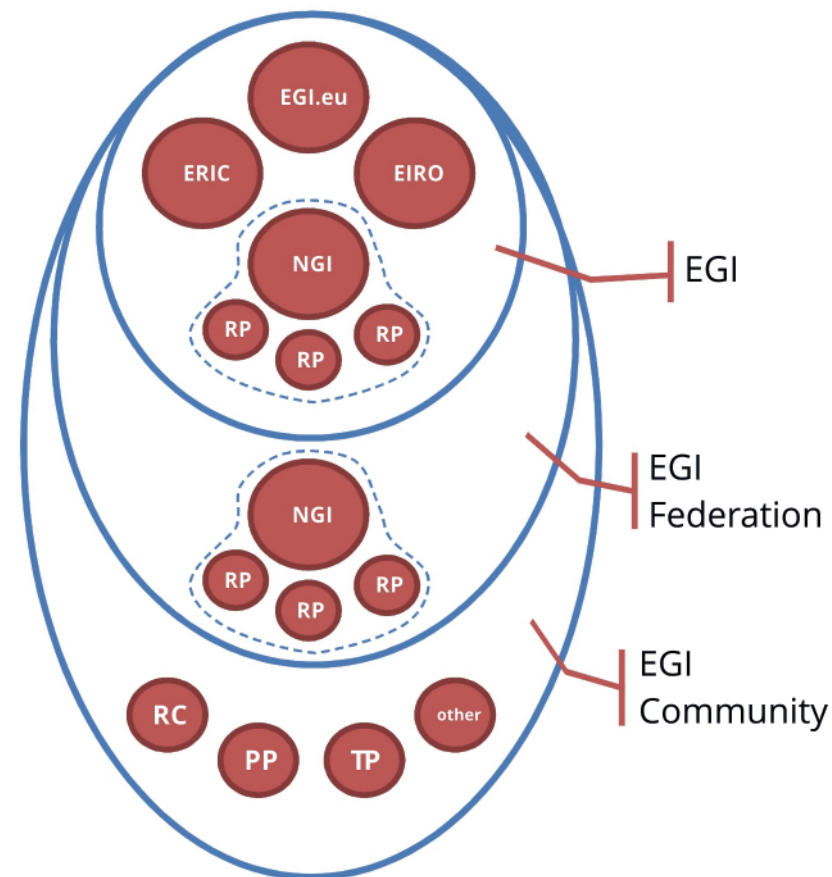Federated storage (disk):
~290 PetaBytes

Computational jobs per day:
~ 1,5 million

Virtual machines deployed:
~ 2,2 thousand per day

Defining EGI, EGI Federation and EGI Community

EGI
EGI.eu, the EGI.eu Participants and Associated Participants, their related organisations represented within EGI.eu that contribute to the objective of the foundation

EGI Federation
EGI plus all Resource Providers (RPs) and representing organisations that established an MoU with EGI.eu

EGI Community
The EGI Federation plus the served research communities (RC), the Technology Providers (TP) and all other organisations having agreements with EGI.eu

The context in which we operate

Europe's ambitions are: (I) to create a connected single digital market in which the free movement of goods, persons, services and capital is ensured and where individuals and businesses can seamlessly access and exercise online activities under conditions of fair competition, and a high level of consumer and personal data protection, irrespective of their nationality or place of residence; (II) to create a unified research area , an open space for knowledge, research and innovation; this European Research Area (ERA) will enable researchers, research institutions and businesses to work and co-operate freely across borders.

A key part of this ambition is the development of international research infrastructures (RIs) that will play a vital role in the advancement of knowledge and technology in various domains. The emerging research communities around these RIs will need access to federated computing platforms that integrate different types of resources and enable access vast, shared data collections.

New research methods that require the support of new computing and data management models will be explored. Virtual research environments (VREs) will become the foremost access points for researchers; these environments will integrate the capabilities and resources researchers need to collaborate and organise their digital research workflows.

Technologies evolve and open up new possibilities for conducting, sharing and managing digital research. The cloud delivery model has enabled Infrastructure as a Service (IaaS) with a high degree of autonomy for users to acquire on demand and configure computing resources from a shared pool. On demand access to configurable resource pools is expanding from servers to different types of resources such as networks, storage pools, applications and services.

At the same time, open science calls for broad engagement in the scientific

Europe's ambition is to create (I) a connected single digital market for goods, persons, services and capital and (II) a unified research area, an open space for knowledge, research and innovation

New international research communities are emerging and have diverse needs to develop their own research workflows

Virtual Research Environments are the key integration point of capabilities and resources for researchers

> On-demand access to configurable computing resource pools is expanding to different types of resources

> **Open Science**: umbrella term that refers to the opening of the creation and dissemination of scholarly knowledge towards a multitude of stakeholders, from professional researchers to citizens.

process, from production to dissemination. If successfully implemented, open science will stimulate larger collaborations and accelerate scientific discovery, ultimately bringing greater benefits for society.

As a key capability to realise the single digital market and as a way to boost the data economy, the EC will launch a European Cloud initiative including cloud services certification, contracts, switching of cloud services providers and a research open science cloud.

Open science can be considered as a production and dissemination system that needs (I) integrated, easy and fair access to several types of shared resources (physical, digital, intellectual), (II) an engaged community that contributes to the scientific process and collaborates in the management and stewardship of those resources, (III) a suitable governance structure that manages access and resolves potential conflicts, and (IV) financial support for long-term sustainability.

Expanding from the view of e-IRG on the e-Infrastructure Commons, we believe that open science can be organised as a commons-based peer production process, allowing the infrastructures and knowledge resources to be governed as commons. In this context, a 'commons' refers to the institutionalised community governance of the production and/or sharing of a particular type of resource, ranging from natural to intellectual.

In an Open Science Commons, researchers can easily access distributed sources of knowledge and develop skills, identify and book scientific instruments to conduct experiments, discover and access datasets for analysis and reuse, and access computing platforms and capacity to produce new research results. All these shared resources are managed collectively through multi-level governance (e.g. community-specific, country-specific) that encourages sharing and promotes collaboration. Participants feel engaged with the governance, management and

preservation of shared resources for everyone's benefit, with the support of all stakeholders.

Developing an Open Science Commons means that we have to open resources and lower barriers to access. Firstly, this can be achieved by adopting open standards for interfaces or formats, and using open licenses for content-related resources. Resources from different domains should be easy to pool together and integrate into wider research processes. Secondly, there is need for rules to govern access to resources and their management. Third, that appropriate business models are in place to ensure preservation of the research results and capacity building to serve the user demand. Implementing this vision, while ensuring its healthy development, will require all key stakeholders to contribute, from funding agencies to the private sector, from research Infrastructures to knowledge institutions.

Zooming in the digital part of research within the European landscape, we observe the emergence of various research infrastructures that will need access to networking, computing and data infrastructures to perform collaborative compute and data intensive science. Such research infrastructures would benefit from a shared infrastructure backbone offering the generic capabilities they need to build their own research platforms. Important elements of this backbone infrastructure are already present, but further work needs to be done both at the technical level for greater integration, and organisational/ governance level for a shared governance, harmonised access policies and suitable business models that ensure long term availability. The technical infrastructure would also need to be complemented with a knowledge infrastructure, e.g., as a set of organised competence centres that provides access to expertise and support digital skills development.

Open science is recognised as a leading approach to increase efficiency and effectiveness in the research process

A European Open Science Cloud can boost the data economy

Vision, mission and strategic goals

EGI vision

Researchers from all disciplines have easy, integrated and open access to the advanced digital capabilities, resources and expertise needed to collaborate and to carry out data/compute intensive science and innovation

EGI mission

Create and deliver open solutions for science and research infrastructures by federating digital capabilities, resources and expertise between communities and across national boundaries

At the core of our strategy, we have shared vision and mission statements that inspire us to contribute to our goal and that guide our decisions on priorities, actions, and responsibilities.
Our vision statement identifies the area of work ("collaborate and carry out data/compute intensive science and innovation"), aligns with the principles of open science ("… all disciplines …", "… open access …"), and recognises the importance of both digital and intellectual inputs to the research process ("advanced digital capabilities, resources and expertise"). Overall, it well integrates well with the overarching vision of contributing to the development of an open science commons.
Our mission statement clearly states that our focus is both creating solutions (e.g., combining products, services and expertise to solve specific problems or creating new capabilities) that are open (e.g., based on open standards and open

processes) and also delivering them (operating reliable services). It also clarifies our core approach ("federating") that span across boundaries of research communities or nations.
Our primary target groups are:
(I) research infrastructures, research communities and 'long tail researchers' that conduct compute and/or data intensive science as part of research activities;
(II) SMEs and industry that could benefit from access to the digital capabilities or resources available to the research sector;
(III) policy makers who seek science and research policy advice, and need support with policy implementation.

The services to our primary target groups include a range of technical and support solutions that technology providers and research communities co-create and deliver as a federation, supported directly or indirectly by

funding agencies. The strategic actions that are specific to our target groups and our services are explained later in this document. To support these groups of users, manage our services and achieve our strategic goals, we have identified **five strategic themes** that describe our main operating processes as a federation:
1) "Engage research communities";
2) "Serve, support and improve live services";
3) "Design, develop and deploy solutions";
4) "Influence policy"; and
5) "Achieve sustainable future".

Within the EGI Community, we identify **principles that underpin our cooperation**. These principles support our vision, shape our culture and are the basis for our decision-making.
> Openness: we communicate clearly and with integrity; we have a transparent governance structure; we pursue an open infrastructure through adoption of open standards and open licenses.
> Collaboration: we strive to provide on-going opportunities to cooperate, communicate and partner with others in the community to advance our goals and objectives.
> Innovation: we listen to and understand the needs of our stakeholders and users; we look for ways to improve operational performance, processes and services; we have an attitude of continuous learning.
> Trustworthiness: we are good stewards of our resources and uphold the faith and confidence our stake-holders and our research communities have placed in us.
> Inclusiveness: we strive to be inclusive and open to all countries and all research communities including those with limited resources.

The key actions that support our strategy are presented from the perspectives of our target groups, service offerings and five strategic themes.

EGI principles

> Openness
> Collaboration
> Innovation
> Trustworthiness
> Inclusiveness

EGI strategic goals

Federate digital capabilities, resources and expertise	> We federate computing clusters, IaaS cloud, storage, data and other types of ICT resources from national and community infrastructures at European scale and beyond. > We organise networks of experts by scientific discipline or technology domain and form dedicated competence centres to support the research communities.
Operate services across the federated infrastructure	> We operate federation-enabling services for the benefit of our members. > We operate services on top of the federated infrastructures for the benefit of research communities.
Co-create and integrate open and user-driven services and solutions	> We innovate with research communities and technology providers by co-designing services and co-developing technologies that enable the delivery of solutions on top of the federated infrastructure. Solutions are open in the sense that open standards are adopted when possible and re-use is facilitated.
Be a trusted adviser on compute/data intensive science	> We provide expert advices to policy makers to help them shape national and European policies. > We consult with research communities and provide these communities with high-quality technical services and the expertise they need to speed up their research process.

Value proposition

Our target groups
We identify five main target groups as beneficiaries of our services to consider:

Target group	Key actions
Existing EGI research communities	*We will continue to support and enhance existing services, propose innovations, and ensure that we are seen as a reliable and trustworthy service provider* > Raise the quality of existing services by improving service standards throughout the federation and offering SLA-based services. > Regularly review satisfaction levels so that we can learn and improve our services. > Organise pilots to evaluate innovative services on real use cases.
Emerging research infrastructures	*We engage a broad range of research infrastructures within the ERA supporting them to better serve their research communities* > Focus on the larger RIs and establish dedicated competence centres for co-creating solutions and long-term relationships > Promote software products developed by the EGI community to research infrastructures that want to develop services on top of in-house infrastructures > Organise pilots to evaluate requirements and subsequently add capabilities for research infrastructure that want to adopt infrastructure or platform as a service > Offer products, services and expertise for federating and operating infrastructures > Promote hybrid models where EGI resources are integrated with in-house resources

Target group	Key actions
Long Tail of Science (LToS)	***Enable the EGI Federation to serve LToS users locally through a common platform and engagement framework*** > Develop a platform for easy authentication and management of users from the LToS (e.g. federated authentication) > Define a general engagement and support framework that EGI members can adopt locally > Support EGI Federation members to develop capacity to serve LToS users
SMEs / industry	***Enable the EGI Federation to service SMEs and industry for research and innovation activities*** > Establish a network of EGI Federation members working with SMEs/industry > Define an engagement framework that considers the legal and organisational barriers to serve the private sector and identifies key services that can be proposed > EGI.eu operates as the coordinator for the framework while EGI members engage with SMEs > Establish relationships with organisations that have a multiplier effect (e.g., innovation clusters)
EC and national governments	***Support policy makers with expert advice and with actions that implement their policy priorities***

Our offering

We offer a unique suite of products and services that facilitate collaborative research to unlock meaning and insight. These will be developed according to the needs of our target groups.

Solution	Key actions
High-Throughput Data analysis	***Maintain existing HTC services; ensure a high-level of reliability and improve integration with VREs*** > Simplify integration with VREs (technical, processes) > Promote SLA-based resource provision > Support different types of AAI
Federated Cloud	***Consolidate IaaS services and improve usability; introduce a key set of PaaS that can be dynamically deployed and operated*** > Expand the capabilities supported by the IaaS cloud (e.g. support for Docker, dynamic network) > Integrate a number of PaaS (e.g. genomics, text mining, statistics) > Improve certification of compliance of interfaces to standards > EGI affiliated resource providers focus on expanding capacity
Federated Open Data processing	***Integrate a generic easy-to-use platform that allows users to share, discover, and process open data. The platform also provides interfaces to existing storage solutions*** > Identify a key set of services to support key research infrastructures and the long tail of science > Demonstrate scalability and reliability of technologies; involve user communities > Release new services as part of the EGI service catalogue > Ensure alignment and integration with capabilities from other e-infrastructures

Solution	Key actions
Federated operations	*Consolidate operational tools, processes and services; improve user experience; productise software and services for external adoption* > Enable operational tools to plug external authentication mechanisms (especially federated authentication) > Define business models and documentation for offering tools and services outside the EGI community > Improve maturity of IT service management across the federation > Introduce a marketplace that enables the promotion services and products from EGI and from the supported user communities
Community-driven Innovation and Support	*Establish thematic competence centres together with key user communities as mechanisms to innovate and co-create new solutions, and support researchers* > Establish thematic competence centres in collaboration with research communities > Develop training material
Policy advice	*Research on policies and prepare input and advice that help policy makers shape future policies for more effective digital and open science*

Our strategic partnerships

Our vision is ambitious and we recognise that we cannot realise it in isolation. For that we need to establish key partnerships with organisations and/or projects that complement and expand our capabilities and skills. In particular:

> We need to strengthen the collaboration and integration with other European e-Infrastructures (e.g. EUDAT, EU-T0, GÉANT, OpenAIRE, PRACE)

> We need to consolidate and expand peer agreements with infrastructures similar to EGI outside Europe to support European researchers to collaborate with their international peers

> We need to establish key partnerships with technology providers who can bring innovative software to be integrated into the EGI infrastructure

> We need to engage with both national and international research infrastructures (for example ESFRIs) not just as pure consumers of services, but as co-creator of solutions that can be easily re-used

> We need to engage with key policy bodies that are influential in shaping recommendations for our domain (e.g., e-IRG)

> We need to establish collaborations with projects that generates potentially exploitable outputs of interest

> We need to establish collaborations with commercial cloud providers to facilitate our supported communities to combine publicly funded and commercial resources into a hybrid model

Strategic themes

1) Engage research communities

Improving our understanding of researchers' needs, and translating these needs into sound projects that will deliver effective solutions, is a critical part of our strategy. We need to be able to advise on best practices and the latest technologies.

Objective	Actions
Research communities understand the value of EGI	> We develop a clear EGI proposition, differentiated from that of other e-infrastructures and commercial providers > We have portfolios that clearly describe our technical capabilities, our services and solutions > We train our outreach network in the communication of our technical capabilities and the added value of our services
We have an effective outreach network	> We select the right people > We prepare the right information > We ensure appropriate funding
We create a range of dedicated competence centres	> We establish competence centres as mechanisms for long-term engagement with large research infrastructures

2) Design, build and deploy new services & solutions

When requirements for new features, services or solutions arise, the federation needs to be able to coordinate their implementation, acquire the appropriate resources and work in close collaboration with target users. Involving users in the development process is essential to meet the needs of the community and bolster adoption.

Objective	Actions
We develop professional project and virtual team management skills across the federation	> We define a lightweight set of project management processes (small to large) to run distributed teams efficiently > We organise trainings, possibly at EGI community events
We stimulate innovation within and outside our community	> We organise thematic open innovation campaigns, and stimulate the implementation of the best ideas
Research communities contribute to the technical development of new features	> We co-develop new features together with research communities, supported by community contributions or EC/national innovation platforms > We promote agile methodologies that involve researchers for software development
We promote modular and open solutions based on standards	> We rely on a clear building block approach to improve sustainability and reusability of software components > We maintain a consistent roadmap throughout our research communities to minimise duplications
We provide certified and tested technologies	> We evaluate the quality of software components and release them in a trusted repository > We promote validated tools in a common marketplace, improving visibility in order to increase reuse > We evaluate compliance to standards

3) Support, serve and improve live services & solutions

Our user communities expect our federated services to meet agreed minimum service levels and quality standards. Our users expect service standards to improve and the range of our services to increase. Service standards and management varies between members of the federation and resource providers. We believe that adopting consistent service management standards throughout the federation will improve service reliability and quality, and, as a result, user satisfaction.

Objective	Actions
We continuously improve service management across the federation	> EGI resource providers implement an established service management standard compatible with FitSM (only for those services federated in EGI) > EGI.eu includes FitSM training, consultancy and auditing in its service portfolio > Incrementally improve the service quality of existing services by improving the service standards across the federation
We develop a services and solutions portfolio in collaboration with the user communities	> We establish an advisory board to streamline and guide evolution of the services and solutions portfolio > Regularly review user satisfaction in order to learn from them and improve our service

4) Influence policy

This strategic theme is about working with policy makers to support them in shaping policy for the research sector, to ensure that we promote the needs of research communities and our vision for the role of e-infrastructures, and to raise awareness of the value of EGI.

Objective	Actions
We are a trusted source of policy input for the EC	> We increase our effort in European lobbying and policy engagement, putting effort into consultations and meetings/workshops > We build an understanding of the policy and research landscape, so that we are clear how we can help shape policies
Members of the federation are included in national e-infrastructure roadmaps and supported in their engagement with EGI	> We provide research communities with evidence of the value of national e-infrastructures and federation at the EU level so that they promote these platforms among policy makers > We make it easier for EGI members to explain the value of EGI
We raise awareness about the value of our services	> We implement mechanisms for measuring and communicating the monetary value of services > We communicate the value for money of the services we provide to both user communities and funding agencies > We identify, measure and communicate a set of KPIs relevant to funding agencies > We organise campaigns to raise awareness of the importance of claiming what scientific publications benefited from EGI services > We ensure scientific publications supported by EGI are linked in OpenAIRE
Promote Open Science Commons with policy makers and other key stakeholders	> We support discussion workshops with various types of stakeholders to continue develop the vision > We develop policy papers and promote them

5) Achieve a sustainable future

Objective	Actions
Collaboratively develop the EGI strategy	> We develop and implement our strategy together, working on both joint EGI strategy and input to national strategies > We have clear actions; we refine and update our strategy and our actions as we learn from their implementation based on clear plans and responsibilities
Realise sustainable, long-term sources of funding for the operation of EGI core services	> We raise awareness among funding agencies about the importance of long-term commitment for operational services > We broaden the participants in EGI.eu to increase an economy of scale > We productise federated operations and promote these outside of EGI > We consolidate a policy to build up reserves to protect against adverse events
Attract funding for innovation	> We continue to attract new user communities with challenging requirements and potentially impactful outcomes; we develop joint projects for innovation
Develop complementary business models	> We develop a technical and legal framework to handle pay for use > EGI.eu develops skills and capacities to broker services where appropriate > We conduct a market research
Increase internal competences in collective bidding	> We analyse existing barriers and develop the necessary legal and organizational framework to bid collectively for services > We gather participants who are interested and able to bid and tender for work > We collaborate with other initiatives who have the expertise and create synergies to avoid duplication of effort and increase efficiency
Enable service providers and consumers to easily find the best match	> We create and operate a marketplace that enables EGI providers to advertise their services and consumers to acquire those services; the marketplace is supported with shared tools to administer the sales process

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This document was prepared by the EGI.eu Strategy & Policy team, with the collaboration of the members of the EGI.eu Executive Board and the EGI Council. We thank all contributors for their insights and the time spent in fruitful discussions.

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