**EGI-InSPIRE**

Collaborative Software Provisioning in EGI

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| AbstractThis document describes a collaborative model for provisioning software and e-Infrastructures for the use of the Research Communities in the EGI ecosystem. This model illustrates how EGI as an infrastructure provider and Technology Providers as software providers can work together in a lightweight and flexible manner towards this shared common goal. |

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1. Delivery Slip

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1. Application area

This document is a formal deliverable for the European Commission, applicable to all members of the EGI-InSPIRE project, beneficiaries and Joint Research Unit members, as well as its collaborating projects.

1. Document amendment procedure

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1. Terminology

A complete project glossary is provided at the following page: <http://www.egi.eu/about/glossary/>.

1. PROJECT SUMMARY

To support science and innovation, a lasting operational model for e-Science is needed − both for coordinating the infrastructure and for delivering integrated services that cross national borders.

The EGI-InSPIRE project will support the transition from a project-based system to a sustainable pan-European e-Infrastructure, by supporting ‘grids’ of high-performance computing (HPC) and high-throughput computing (HTC) resources. EGI-InSPIRE will also be ideally placed to integrate new Distributed Computing Infrastructures (DCIs) such as clouds, supercomputing networks and desktop grids, to benefit user communities within the European Research Area.

EGI-InSPIRE will collect user requirements and provide support for the current and potential new user communities, for example within the ESFRI projects. Additional support will also be given to the current heavy users of the infrastructure, such as high energy physics, computational chemistry and life sciences, as they move their critical services and tools from a centralised support model to one driven by their own individual communities.

The objectives of the project are:

1. The continued operation and expansion of today’s production infrastructure by transitioning to a governance model and operational infrastructure that can be increasingly sustained outside of specific project funding.
2. The continued support of researchers within Europe and their international collaborators that are using the current production infrastructure.
3. The support for current heavy users of the infrastructure in earth science, astronomy and astrophysics, fusion, computational chemistry and materials science technology, life sciences and high energy physics as they move to sustainable support models for their own communities.
4. Interfaces that expand access to new user communities including new potential heavy users of the infrastructure from the ESFRI projects.
5. Mechanisms to integrate existing infrastructure providers in Europe and around the world into the production infrastructure, so as to provide transparent access to all authorised users.
6. Establish processes and procedures to allow the integration of new DCI technologies (e.g. clouds, volunteer desktop grids) and heterogeneous resources (e.g. HTC and HPC) into a seamless production infrastructure as they mature and demonstrate value to the EGI community.

The EGI community is a federation of independent national and community resource providers, whose resources support specific research communities and international collaborators both within Europe and worldwide. EGI.eu, coordinator of EGI-InSPIRE, brings together partner institutions established within the community to provide a set of essential human and technical services that enable secure integrated access to distributed resources on behalf of the community.

The production infrastructure supports Virtual Research Communities (VRCs) − structured international user communities − that are grouped into specific research domains. VRCs are formally represented within EGI at both a technical and strategic level.

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# Introduction

EGI is dependent on the software products coming from a wide spectrum of Technology Providers and their associated communities around the world. This software is critical in supporting the production infrastructure and enabling access to the distributed computing and data resources needed for its research communities. Some of the open source software that EGI uses is generic in its nature (e.g. Operating System distribution) while some of it is specific to the use cases coming from EGI and its research communities. With the current end of centrally funded Technology Providers providing support and coordination to their affiliated product teams, the EGI community is moving to a model where individual teams will need to establish direct technical and managerial relationships to develop and promote their activities.

There does, however, remain a shared common goal in the EGI ecosystem, for as far as the Technology Providers and EGI are concerned:

*“The overarching shared goal of EGI and its affiliated Technology Providers is to work together to provide a common, versatile, scalable and flexible infrastructure at a European level for consumption and integration by research communities coming from the academic and publicly funded sector.”*

So, while EGI is not currently in a position to provide direct financial support to the product teams that produce this software, it *is* able to offer some ‘in-kind’ benefits to the developers as part of a collaboration within the EGI ecosystem between three principal stakeholders:

* EGI as an infrastructure provider
* Research Communities as infrastructure consumer
* Technology Providers as suppliers of software, solutions and services.

As a whole, the EGI ecosystem is *user driven* or *user orientated*, meaning that one principal rule of conduct in EGI is to attract research communities to use EGI and to deliver an operational infrastructure that satisfies their needs. The main architectural building block in the EGI Platform architecture that satisfies this shared goal in a user-driven ecosystem is the concept of *Community Platforms*. The collaboration that EGI provides with individual product teams is built around the delivery of high-quality software that can be integrated into Community Platforms that are tuned to the specific needs of the targeted research community.

In this context, the generic term *Technology Provider* encompasses a variety of activities and institutes providing software for using in the EGI ecosystem. An initial classification indicates the type of contribution a Technology Provider is adding into the EGI ecosystem is as follows:

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| **Technology Provider** |
| Product Team | Provides a software component that requires bundling/integration with other components to provide purpose and functionality. This includes re-usable libraries, (command-line) tools, plug-ins, etc. – any software that cannot be invoked or configured as a software service, or provided in a Software as a Service model. |
| Platform Integrator | Assembles software that is partially developed and/or maintained by others into a self-sufficient well-behaving collection of software services. Includes producing integration code to achieve this goal. Frequently uses software in a specific configuration that is different from a configuration of the same software in a different context (i.e. Community Platform). |
| Software Service Provider | Provides software services as part of a specific platform, for example the EGI Core Infrastructure Platform. Software Service Providers are themselves responsible for the maintenance of the used software – the difference to Resource Providers is that the latter employ a certain set of software solely to expose physical resources for shared access and use, not the functionality of the software itself. |

# What EGI can offer to Technology Providers

There are a number of services that EGI can offer that could be very useful to individual product teams as they lose some of the coordination activities they had access to when previously part of larger Technology Providers. Some of these are directly related to service levels and the necessary infrastructure to provide these.

The following provides an initial list of EGI services for individual product teams that they may wish to use:

* **Technical release coordination:** The UMD Release Team is currently being established to coordinate the release of a number of individual software components with the UMD as a target, i.e. the release of implemented software is taken through the Software Provisioning Process and eventually published in the UMD.

This activity is provided in close coordination with the Technology Coordination Board (see below).

* **Strategic technical coordination:** Coordinated by the Technology Coordination Board, strategic decisions are being made that affect the EGI Operational Infrastructure. Driven by requirements and scenarios coming from the research communities through the UCB and the operations network (through the OMB), participating Technology Providers get access to information about future needs of the stakeholders of their software in EGI, and thus the chance of proactively aligning their own strategic goals based on that information.
* **Priority placement in the EGI Software Repository Portal:** Software components for which EGI has backing from committed product teams will be presented more visibly. Graded by overall commitment level the presentation will attract attention to the component in question over other elements without Technology Provider commitment.
* **Access to partnering programmes:** Committed and proven Technology Providers may get access to EGI partnering programmes. This may be as little as “EGI partner” branding or much more.
* **Priority access to booth and demonstration space:** A number of priority options are possible for EGI’s Technology Providers. For example, partners may get priority access to demonstration space at EGI-organised conventions. Preferential access to booking space in the exhibition area at EGI Forums could be provided.
* **Priority in allocating sessions and workshops:** To help support EGI’s Technology Providers in promoting their achievements, priority could be given in allocating technical sessions at EGI Forums.
* **Inclusion in project proposals:** To support innovation and evolution of the production infrastructure, EGI will initiate and contribute to project proposals for EC framework programmes and other funding schemes. EGI’s Technology Providers, where applicable, may be included in consortium discussions and project proposals.

# What EGI needs from Technology Providers

EGI needs a range of Technology Providers within the EGI ecosystem delivering software ranging from low-level infrastructure components to high-level software environments to provide usable, reliable, stable and scalable software with defined maintenance and support services around the components they make available to the EGI community. These components may be software services, complete fully assembled virtual machine images ready for operation, or individual libraries that serve no purpose on their own but form a critical foundation for building other services. Those components that EGI uses within its production infrastructure will be expected to have a higher quality level and higher-level of support. Individual research communities can use their own quality criteria in assembling their Community Platforms for deployment within EGI’s production infrastructure.

Therefore, for the purpose of being able to inform the EGI ecosystem about the products coming from an individual Technology Provider, EGI.eu would like to collect and maintain the following data about your product team’s activities:

1. What is the product you are maintaining?

What does the software do? What is the value proposition that it provides? What are the benefits for others to make use of it?

1. What are your future plans for the product?

Tell us about your roadmap and future plans and release dates. This will help us and others know what you are doing and when to expect it.

1. What support (and how) are you willing to provide to those that use your products?

Is there a helpdesk that people can use? Should users join a discussion email list to resolve support issues?

1. Do you want to find out about new requirements from the EGI community?

EGI is always receiving input from its users? Do you want to be involved in requirement’s workshops and help us improve the service we offer to our users?

1. Do you want to place your software (or links to it) as part of the EGI Software Repository?

The software repository provides a well-known location for the EGI community to contribute and consume software that can be linked to other EGI services such as the Applications Database, Training Marketplace and Virtual Machine Images.

1. Which level of collaboration would you like to establish with EGI.eu?

Does your team prefer to work very independently or are you interested in more intensive relationship with closer collaboration and coordination? What type of services from EGI would you need or being interested in?

1. Would you be interested in looking into formalising the support relationship with EGI?

If so, which would be the details and extent of the support? And what would your team expect in return?

NB: A Technology Provider’s commitments to collaborate with EGI (item 6 above), and a more formalised service agreement where applicable (item 7 above) are separate issues. For example, EGI.eu expects some product teams to combine a high-level of independence in terms of collaboration commitment with low or non-existent service levels. At the same time however, it is not unthinkable that some product teams may choose independence in collaboration, but commit to high service levels nonetheless.

# Working together

In an ecosystem as rich as EGI’s it is necessary to balance each stakeholder’s needs and capabilities in order to provide a maximum benefit to the users in the ecosystem.

For EGI, this means that a number of Technology Providers are needed that provide software ranging from low-level components to high-level services, or complete platforms. The EGI Production Infrastructure is a composition of three software platforms, the EGI Core Infrastructure Platform, the EGI Cloud Infrastructure Platform, and the EGI Collaboration Platform; all three are owned and operated by EGI. The Community Platforms that integrate with the EGI Core Infrastructure or EGI Cloud Infrastructure Platform however are owned[[1]](#footnote-1) by the Research Communities that use them.

Software is needed for all platforms, whether as part of EGI’s production infrastructure, or as part of Community Platforms. And in an operational infrastructure as complex as in EGI, it is likely that there will be many releases of all kinds of software available at almost any point in time. Furthermore, many components of the operational infrastructure are maintained in the fashion of Open Source projects, where a group of individuals and/or institutes contribute on best effort basis to the project.

To manage this complexity, EGI.eu proposes to classify the collaboration with Technology Providers in three different aspects:

* Technical / Architectural
* Procedural / Collaborative
* Formal / Contractual

## Technical/architectural cooperation

The software produced and maintained by Technology Providers comes in a wide spectrum of complexity, and covering different use cases and targets. Usually, different targets in the architecture are associated with different roles and responsibilities. For example, a team developing a crucial library that is re-used in a number of Community Platforms does not need to spend time worrying about delivering a certain service target for a service integrated into the EGI Operational Infrastructure (e.g. the Accounting database service). Likewise, a Platform Integrator most likely focuses on configuration and deployment aspects of software that is maintained and developed by a different Technology Provider.

The definitions for Technology Providers classifications were introduced in Section 1 and are only briefly repeated here:

* **Product Teams** deliver software components that require bundling and integration with other components to provide purpose and functionality, e.g. libraries.
* **Platform Integrators** assemble software that is partially or wholly developed by other Technology Providers into self-sufficient and well-behaving software service collections.
* **Software Service Providers** provide software services as part of a specific platform, for example the EGI Collaboration Platform.

## Procedural/collaborative cooperation

This aspect of the collaboration between Technology Providers and EGI captures the level of cooperative coordination, or relative independence of decision-making: Ranging from high independence to close cooperation and coordinated decision making, this activity includes a good amount of knowledge sharing and process integration between Technology Providers and EGI:

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| **Collaboration** |
| Community | Community collaboration maintains a strict focus on the direct research community for which the pertinent software items are developed and maintained for. Coordination is very loose between the respective Technology Provider and EGI, and decisions taken on this basis bear chances of unforeseen disruptions when the software is re-used outside the direct focus of the Technology Provider. |
| Contributing | Contributing collaboration includes close communication between EGI and the Technology Provider with regular exchange of reliable roadmaps and release schedules. The atmosphere of the collaboration is generally constructive and implies accepting certain mutual influence on decisions for the benefit of the shared goal. This includes the Technology Provider’s willingness and commitment to participate in discussions either remote of face-to-face, and in meetings in general. |
| Integrated | Integrated Technology Providers maintain the closest collaborative relationship with EGI. The software produced by such a Technology Provider will adhere to EGI’s quality criteria, and will undergo EGI’s Software Provisioning process. Fully integrating with EGI also implies the Technology Provider accepting that EGI may exert much larger influence on the technical and procedural cooperation.  |

## Formal/contractual cooperation

In some circumstances, both EGI and a Technology Provider may see benefit in formalising their relationship in contract-like agreements that incorporate mutual agreement on the quality of the service delivery. This frequently includes defining service levels for certain software maintenance services, such as 3rd level expert support, service desk support, etc.

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| **Support Commitment** |
| Unspecified | The relationship that EGI has with the Technology Provider does not require a service level commitment to be specified. |
| Best effort | The Technology Provider cannot guarantee any minimum level of support, other than providing as much and as best as is possible in any given circumstance. |
| Basic | A minimum level of support is guaranteed for the most common service targets. |
| Extended | Technology Providers commit to significant and measurable support for the software and services they are responsible for. |
| Premium | Premium support indicates the highest level of support which may include specialised and personal assistance, customised service levels, etc. |

## Which platform?

The introductory text of Section 4 presumes a certain architectural model that provides the necessary context for Technology Providers to place their own contribution into the EGI ecosystem.

This section summarises the necessary elements of the EGI Platform architecture; [R 1], [R 2] and [R 3] provide the strategic background, future plans and architecture in much greater detail.

Figure 1: The EGI Platform Architecture embedded in the EGI Strategy

The EGI Strategy comprises of three pillars: (1) Operational Infrastructure, (2) Community & Coordination, and (3) Virtual Research Environments, as indicated in Figure 1.

The Operational Infrastructure comprises of the *EGI production infrastructure* consisting of three platforms owned and operated by EGI, and any number of Community Platforms owned by the targeted Research Communities. EGI’s members, the Resource Centres and NGIs, own the physical infrastructure; on top of these they deploy the following EGI platforms:

* **EGI Core Infrastructure Platform** – Operational services necessary for the management of federated Distributed Computing and Data Infrastructures (DCDI).
* **EGI Cloud Infrastructure Platform** – A federated IaaS Cloud infrastructure.
* **EGI Collaboration Platform** – Tools & Services enabling cross-community collaboration.

On top of these, any number of Community Platforms may be deployed. Community Platforms that are deployed on top of the Core Infrastructure Platform are in reality actually deployed directly on physical resources, while being integrated with the EGI Core Infrastructure Platform. The number of platforms that can be deployed manually is limited and bounded by human resources at the Resource Centres. Community Platforms that integrate with EGI’s Cloud Infrastructure comprise of any number of Virtual Machine Images and can be deployed remotely.

EGI needs Technology Providers contributing software for all platforms indicated in Figure 1. The following information provided in an FAQ-style will help Technology Providers to position themselves within this ecosystem:

**Which Platform do my components fit in?**

This clearly depends on the components you are developing, and what your specific future plans are for these components. Some components are a clear and sole fit for a specific platform; some components such as low-level libraries may fit many platforms at the same time. While a clear fit with one platform simplifies coordination and cooperation, positioning your components as high-quality re-usable components across many platforms may be very beneficial for the sustainability of the responsible Product Team.

**Does EGI impose restrictions on number and size/complexity of Community Platforms?**

No, EGI does not impose any restrictions. The success of a Community Platform depends on how well it is supported by the responsible Platform Integrator and contributing Product Teams, and how well it actually satisfies the targeted Research Communities’ requirements, next to a number of other factors.

However, EGI expects that there will be a natural limit to the number of Community Platforms that integrate directly with the EGI Core Infrastructure Platform compared to those that are deployed on top of the EGI Cloud Infrastructure Platform. This is due to the expectation that the previous target large communities, while Cloud based Community Platforms most likely target medium-sized to smaller research communities.

**Does EGI prefer one type of Community Platform to another?**

No, EGI’s primary goal is to serve its user communities with high-quality software and e-Infrastructures. The type of Community Platform, whether to provide a Cloud based Community Platform or not is mainly driven by technical requirements, not preference.

**Do Platform Integrators always have to be Technology Providers?**

No, although ideally, each platform in this architecture will have a responsible Platform Integrator associated with it that originates from the Technology Provider sphere.

For the EGI-owned platforms EGI itself will fulfil this role. For Community Platforms EGI seeks to find Technology Providers fulfilling this role. Large research communities may take on this role for themselves.

**Do Platform Integrators have to contribute all software to their Community Platform?**

No, the spectrum ranges from Platform Integrators being their own exclusive Product Team (i.e. developing all components by themselves) to integrators the almost exclusively source components from Product Teams external to themselves. The Platform Integrator decides which model to follow based on many factors.

**Must all components be hosted in the EGI Software Repository?**

No. Clearly, EGI would prefer *all* components and Community Platforms hosted in the EGI Software Repository (in form of binary packages, not source code!) but in reality this is unlikely to happen. Community Platforms may require some of their components be installed from external repositories, but these dependencies must be clearly documented in the installation instructions of the platform.

**Where does UMD fit into this picture?**

The EGI Unified Middleware Distribution will comprise of the packages that are necessary to deploy components of the three EGI-owned platforms (Core Infrastructure, Cloud Infrastructure and Collaboration Platform) plus all those components that Technology Providers need to integrate with these three platforms.

## Examples

To illustrate how Technology Providers may position themselves in this ecosystem, we provide a number of examples that we think are archetypical and are likely to emerge in this or a similar setup. These examples are based on the Technology Providers and Product Teams EGI already cooperates with. However that does not imply that EGI requires these examples to manifest in the presented form, they are given as an indication as to what the possibilities this ecosystem and framework of cooperation is providing.

### PSNC

The QosCosGrid (QCG) Community Platform is entirely developed and integrated by PSNC. QCG integrates with the EGI Core Infrastructure Platform and is deployed directly onto the physical infrastructure.

PSNC acts as both Product Team and Platform Integrator for the QCG Platform and may be interested in close collaboration with EGI and is willing to align their roadmaps and release schedules with EGI. At the same time, PSNC is willing to commit to provide technical support beyond best effort for its community platform components.

*PSNC would therefore be classified as a contributing Platform Integrator with at least basic service commitment for the QCG platform.*

### Nordugrid

The Nordugrid collaboration, represented by Lund University, is developing and maintaining the ARC Community Platform, a high-throughput orientated system that primarily offers batch computation and scheduling of scientific workload. ARC integrates directly with the EGI Core Infrastructure Platform, with few external run-time dependencies.

Nordugrid would like to maintain their independence from EGI, but are willing to share and exchange information about roadmaps and release schedules. Technical support will be provided on a best-effort basis.

*Nordugrid therefore would be classified as a contributing Platform Integrator with best effort service commitment.*

### FZ Juelich

FZ Juelich serves as an example for a multi-Technology Provider institute. FZ Juelich acts as Platform Integrator for the UNICORE Community Platform, and at the same time as Product Team for the CANL-Java library, which is re-used in many other Community Platforms.

The popular CANL-Java library is thus critical to the EGI ecosystem and therefore FZ Juelich tightens its collaboration with EGI on this component, accepting strong influence on its release schedules coming from EGI and other Platform Integrators. Due to its criticality, FZ Juelich commits to one of the most challenging service level agreements in the EGI ecosystem for the CANL-Java component.

With respect to the UNICORE Community Platform, FZ Juelich is collaborating with a number of other institutes outside of the EGI ecosystem to jointly deliver the platform. The UNICORE platform supports a small, well-defined user community within EGI and maintains strong ties with it. Therefore, except for the minimum level of integration, FZ Juelich wishes to maintain its independence in serving this community.

*For CANL-Java, FZ Juelich would be classified as integrated Product Team providing premium support.*

*For UNICORE however, FZ Juelich would be classified as a community Platform Integrator providing best effort support.*

### INFN-Padova, Cesnet, WLCG

INFN-Padova and Cesnet are developing the CREAM CE and L&B components respectively that once were part of the gLite Grid middleware and the EMI distribution. After the EMI project, coordination into a consolidated platform or distribution has stopped and both components are now developed independently. Both Technology Providers serve a specific research community (for example the High-energy Physicists) alongside many other Technology Providers.

For this community, no Technology Provider exist to take on the responsibility of a Platform Integrator in assembling the necessary components into a consistent Community Platform, and therefore the WLCG community is maintaining a defined baseline of components for its own Community Platform.

*INFN-Padova and Cesnet, representing many other Technology Providers emerging from the EMI collaboration, would be classified as community Product Team with best-effort support commitment.*

*The WLCG would act as its own community Platform Integrator with unspecified support commitments (as they support themselves).*

# Conclusion

As the EGI community moves from the monolithic integrated project model in EGEE via the separate technology projects in EMI/IGE, into a more decoupled community driven collaboration, all stakeholders in the EGI ecosystem need to define the role they wish to play in a clearer way so that EGI as the intermediary between the Research Communities and the Technology Providers can properly disseminate the roles and benefits of the various software components and Community Platforms contributed by Technology Providers to the ecosystem.

This document presents the model EGI is proposing as a working basis for the business relationships between EGI and Technology Providers that wish to contribute to the EGI ecosystem. This model requires feedback and concrete input from existing and new Technology Providers to ensure that this model is contributing to the shared common goal, and to mutual benefit.

# References

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| R 1 | EGI Strategic Plan, <https://documents.egi.eu/document/1098>  |
| R 2 | D2.33 EGI Technical Roadmap, <https://documents.egi.eu/document/1706>  |
| R 3 | MS514 EGI Platforms Roadmap, <https://documents.egi.eu/document/1624> |
| R 4 |  |
| R 5 |  |

1. Ownership in this context means primarily the authority over the requirements and usage of the respective Community Platform, for as long as financial compensation is not involved. Concrete manifestation of ownership in financial terms may emerge in the future, when Research Communities are fully prepared for such relationships. [↑](#footnote-ref-1)