EGI-Engage

Second release of the EGI Service Registry and Marketplace prototype

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Abstract

The EGI marketplace has the ambition of becoming the platform where an ecosystem of EGI-related services, delivered by EGI providers and partners, can be promoted, discovered, shared and accessed, including EGI offered services as well as discipline and community-specific tools and services enabled by EGI and/or provided by third parties under defined agreements. This document details the work done to release the second version of the EGI Service Registry and Marketplace prototype. It is the result of the subsequent work done on the first release of the two demonstrators of the EGI Service Registry and Marketplace, one based on PrestaShop and the second on Open IRIS. The two Marketplace demonstrators both reached the Alpha service phase according to the EGI Integrated Management System (IMS). The PrestaShop demonstrator was selected to be further enhanced and will be moved into production (Beta) by the end of the project, going one-step further than was originally planned.

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TERMINOLOGY

A complete project glossary and acronyms are provided at the following pages:

- https://wiki.egi.eu/wiki/Glossary
- https://wiki.egi.eu/wiki/Acronyms

Contents

Executive summary

This document details the work done to release the second version of the EGI Service Registry and Marketplace prototype. It is the result of the subsequent work done on the first release of the two demonstrators of the EGI Service Registry and Marketplace, one based on PrestaShop and the second on Open IRIS. The EGI marketplace has the ambition of becoming the platform where an ecosystem of EGI-related services, delivered by EGI providers and partners, can be promoted, discovered, shared and accessed, including EGI offered services as well as discipline and community-specific tools and services enabled by EGI and/or provided by third parties under defined agreements.

In the last months, the design activity progressed with a further refinement and extension of the data model defined in D3.7[1]. Service options for all the services in the external EGI catalogue and data to profile both customers and orders were defined. Furthermore, the three main workflows to be implemented in the Marketplace were identified and detailed. The first is about the authentication, and manages the login procedure, including the customer registration during the first access. The second allows customer to discover and select services. The last, Check-Out, allows customers to submit an order, which can include multiple services, together with a set of information to profile the customer and the nature of the request.

The two Marketplace demonstrators implemented the required specifications and, after their assessment, both systems adequately covered the current workflows as well as supported the data model, reaching the Alpha service phase according to the EGI Integrated Management System (IMS) and demonstrating that both could be adopted to implement the EGI Marketplace.

Therefore, other factors were considered to choose the technology such as its long-term sustainability, availability of expertise, ready-to-use features that could be helpful in the future. As final decision, PrestaShop were selected since it was considered easy to maintain, thanks to the wide community of developers and the availability of expertise within the EGI collaboration, more attractive for the commercial world and with many ready-to-use features to extend the Marketplace features (e.g. to implement the pay-for-use support).

A plan was defined to enhance the PrestaShop based prototype and making it operational, reaching the Beta service phase by the end of the project. As main activities, it includes the recording of the service orders and the related profiling information in the RT[2] system, the development of a customer dashboard to view/manage orders and the integration with the EGI web site and the application on demand platform.

In parallel the design activity will also continue. This will include enriching the data model with new information that the CheckIn service will make available (e.g. VO membership), to improve the profiling and extended to represent other service categories from EGI partners, such as the

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[1] https://documents.egi.eu/document/2914
[2] https://rt.egi.eu/rt/index.html

thematic community platforms. The Terms of Access and Use of the marketplace will be also defined before moving the service into production. Finally, the criteria to on board and monitor services in the marketplace will be identified to guarantee an adequate quality to the EGI customers.

1 Introduction

This deliverable describes the work done to implement the second release of two marketplace demonstrators based on PrestaShop and Open IRIS platforms. EGI-Engage funding supported the deployment of these tools, their customization to meet a number of requirements and provides effort for the integration of the selected platform with the EGI tool ecosystem; in both cases, the development of the software was not part of the activity.

PrestaShop is a free, open source e-commerce solution. The software is published under the Open Software License (OSL). It is written in the PHP programming language and uses a MySQL database. PrestaShop is currently used by 250,000 shops worldwide and is available in 60 different languages. PrestaShop has its strength in being like a traditional online store that most people are already familiar. It gives an attractive and simple to use interface, as well as a set of functionality that is immediately useful, like the support of commercial transactions when building products and services. The adoption of PrestaShop offers a large community of existing users that EGI may be able to leverage and could help in designing a marketplace ready to attract commercial actors, such as SMEs.

Open IRIS (Integrated Resource and Information System) is a platform that was originally developed as a Swiss wide project to facilitate sharing of research resources of many different types within Switzerland. In the course of evaluating the requirements for the EGI marketplace the opportunity was taken to work with a variety of organizations outside of Switzerland to validate the different marketplace concepts as well as drive the direction of the development of the system to broaden its features and to increase adoption[3]. This has resulted in Open IRIS now being used in several other countries by hundreds of researchers daily with currently over 4000 registered users as well as several institutional partners. Historically Open IRIS has been focused on instrumentation and lab services, however, the objective is to be a single point where researchers can find and use all forms of resources needed to conduct their research. This includes resources within their organization, including those of the researchers, as well as resources from other organizations or commercial providers. Open IRIS is tailored for the research world, so it looked promising to be easily adapted to the EGI environment.

The selected service registry and marketplace will be paramount in order to make EGI services more easily discoverable and accessible.

The document is structured as follows:

- Section 2: Describes the high-level service architecture defining the workflows and the data model implemented in the two demonstrators. Customisations applied to the underlying technologies are explained, as well as the integration with other EGI tool.

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[3] Production instance at Institut Curie, http://iris.curie.fr

- Section 3: Lists the requirements satisfied in this release.
- Section 4: Gives details on the two prototypes, describes the evaluation procedure and the motivation for the choice of the PrestaShop technology.

The document concludes with the feedback on satisfaction, a draft dissemination and exploitation plan, and future plans.

Tool name	EGI Marketplace
Tool url	PrestaShop based demonstrator: http://marketplace.egi.eu/ Open IRIS based demonstrator: http://egi.science-it.ch
Tool wiki page	PrestaShop: N.A. Open IRIS: https://wiki.systemsx.ch/display/openiris/Open+IRIS
Description	The EGI Marketplace demonstrators show and promote EGI services. End users can discover the services and request access to them by specifying a set of options.
Value proposition	The EGI Marketplace will facilitate the discovery and the access to the EGI services.
Customer of the tool	EGI Foundation, NGIs, RIs, service providers, academic organizations.
User of the service	Prospective EGI users: research groups, individual researcher, site admins, academic organizations, SMEs, etc.
User Documentation	PrestaShop: https://www.prestashop.com/en/documentation Open IRIS: https://wiki.systemsx.ch/display/openiris/Open+IRIS
Technical Documentation	N.A.
Product team	PrestaShop: CYFRONENT Open IRIS: SWING
License	N.A.
Source code	N.A.

2 Service architecture

The EGI marketplace prototype has been implemented adopting and customising technologies developed by third parties. In particular, two demonstrators have been established leveraging their existing architecture, one based on PrestaShop and the other based on Open IRIS.

2.1 High-Level Service architecture

The high-level service architecture of the two demonstrators is based on the underlying technologies of PrestaShop and Open IRIS, please refer to the PrestaShop[4] and Open IRIS[5] documentation for more details.

This section focuses on the description of the data model and workflows that have been implemented into the two prototypes. In addition, different alternatives for the pay-for-use support in the marketplace are depicted.

Finally, PrestaShop and Open IRIS customisations needed to fully implement the specifications are described.

2.1.1 Data Model

The data model of the marketplace reflects the EGI service catalogue structure (https://www.egi.eu/services & https://www.egi.eu/internal-services). It is made of a three-level hierarchy where the first level contains the EGI service areas (categories in the marketplace) and the second level maps to the EGI services (sub-categories in the marketplace). Furthermore, an additional level defines the EGI service options (products in the marketplace). The service options represent the products that the end user could access or purchase in the marketplace.

The marketplace data model has been already detailed in the D3.7 First release of the EGI Service Registry and Marketplace prototype. It has been updated and extended in this second release, defining service options for all the services in the external EGI service catalogue.

In the following, the data associated with a customer (customer/user profile) and to a service order are described. The complete data model is described in **Error! Reference source not found.**.

2.1.1.1 Customer/User profile

Each customer/user of the EGI marketplace needs to be registered to submit service orders. Customers are required to register during their first login into the marketplace, the registration allows the marketplace to gather enough information to create and store a customer profile in its internal database. Part of the data is retrieved by the EGI CheckIn service, which provides user authentication, and additional data is gathered from the same customers completing a form.

The following table shows the attributes that comprises the customer profile, specifying the source of the information (CheckIn or the Marketplace) and if an attribute is mandatory or optional.

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[4] https://www.prestashop.com/en/documentation
[5] http://iris.science-it.ch

Attributes	From	Mandatory/Optional
Name	CheckIn service	Mandatory
Surname	CheckIn service	Mandatory
e-mail	CheckIn service	Mandatory
Display name	CheckIn service	Mandatory
EGI unique identifier	CheckIn service	Mandatory
Country	Marketplace	Mandatory
Institution	Marketplace	Mandatory
Department	Marketplace	Mandatory
Departmental web page	Marketplace	Optional
Linkedin profile	Marketplace	Optional
ResearchGate profile	Marketplace	Optional
Supervisor name	Marketplace	Optional
Supervisor profile	Marketplace	Optional

2.1.1.2   Service order profiling

The EGI marketplace associates to each service order a set of customer information, which is gathered during the Check-Out phase. Such information, complemented with the customer profile and the order details (the service options), enables the marketplace to implement a service order profile, which allows for appropriate service order management, accordingly to the EGI Integrated Management System (IMS) processes and procedures.

The table below shows the customer information that is linked to a service order. Such information can be extended in the future according to emerging needs.

Attributes	Value	Note
Customer type	Dropdown: single user, research group/community/projec t, private company	The typical model will be to work within the context of a community/project or a private company. However, the single user case is also supported.
Reason to request access to the EGI services	free text	In order to determine if the resources requested are the best for the task.
Research group/project/ community or company name (only if the customer represents a research group/ community/project or a private company)	only in cases when not a "single user"	It maps to the VO name. In the case the customers is already using the EGI infrastructure (VO list not empty), the VO name could be chosen from a drop down menu listing all the customer VOs (retrieved during the authentication) plus the option to specify a new VO.
Additional Information on the project **(only if the customer represents a research group/ community/project or a private company)**	Project name: text Project web site: URL	To be expanded in the future. In some cases it can be automatically filled in querying the operations portal if the project is already using the EGI infrastructure

2.1.2 Workflows

This section describes the procedures or workflows implemented in the two marketplace prototypes. For each procedure, the following information is provided:

- Overview: short description of the workflow
- Trigger: events that start a workflow
- Involved entities: all the entities that play a role in the workflow
- Input: input data
- Output: output data
- Steps: step-by-step description of the workflow
- Integration with other EGI tools: list of the EGI tools involved in the workflow and description of their interfaces with the marketplace

The following workflows are currently implemented:

- **Authentication**: The login procedure including the user registration during the first access.
- **Discover and order services**: Finding and ordering services within the marketplace.
- **Check-Out**: Submitting a service order together with a set of information to profile it.

2.1.2.1 Authentication and user enrolment

Overview:

The customer logs into the EGI marketplace through the CheckIn service.

Trigger:

- The customer can decide to log in while they are visiting the marketplace.
- The customer starts the checkout process.

Involved entities

- Customer
- Marketplace
- CheckIn service

Input

- User credentials (federated or social login)

Output

- Personal customer information including the unique EGI identifier
- Customer's VO membership list

Steps

Step	Conditions	Tool	Action
1	N/A	Marketplace	Redirect the customers to the CheckIn service. Only required to complete the order process.
2	N/A	CheckIn service	Authenticate the customers and provide the Marketplace with personal customer information (including the unique EGI identifier) and VO membership list.
3	After successful authentication and during first login	Marketplace	Complements the personal customer information already provided by the CheckIn service. The Marketplace asks the customer to complete a form with the following attributes: • Country (mandatory) • Institution (mandatory)

			• Department (mandatory)
			• Departmental web page (optional)
			• Linkedin profile (optional)
			• ResearchGate profile (optional)
			• Supervisor name (optional)
			• Supervisor mail (optional)
			These additional attributes are stored in the Marketplace and the customer will not be required again to provide them.
			Customers can update their profile at any time.
4	Successful authentication	Marketplace	After the customer has successfully logged in, the Marketplace shows their name on its web interface.

Integration with other EGI tools

Tool	Integration
CheckIn service	Perform the customer authentication on behalf of the marketplace and provide it with customer information (including the unique EGI identifier) and VO membership list.

2.1.2.2 Discover and order services

Overview:

The customer navigates via the service catalogue exposed in the EGI Marketplace and selects one or more services. This can be done before or after authentication. The Marketplace exposes services according to the service catalogue structure:

- First level: service categories
- Second level: services
- Third level: service options

Trigger:

- The customer accesses directly the marketplace or through the EGI web site.

Involved entities

- Customer

- Marketplace

Input

- No input

Output

- List of services including service options.

Steps

Step	Conditions	Tool	Action
1	N/A	Marketplace	The customer navigates through the service catalogue published in the marketplace.
2	N/A	Marketplace	The customer selects one or more services specifying a set of service options.

Integration with other EGI tools

There are no dependencies from the EGI tools.

2.1.2.3 Check-Out

Overview:

Define or update the customer profile, and gather information on the user or research community/project/private company willing to exploit the EGI services and common options for the selected services. Forward all the information to a back end system that will take care of managing the service order.

Trigger:

- Customer starts the Check-Out process after he has selected one or more services.

Involved entities

- Customer
- Marketplace
- CheckIn service
- Operations Portal

Input

- Personal customer information including the unique EGI identifier.
- Customer's VO membership list.
- Service list including options selected by the customers.

Output

- Personal customer information including the unique EGI identifier
- Customer type: single user or representing a research group/community/project/private company
- Reason to request access to the EGI services
- Only for customers representing a community:
  - Information on the project
  - VO information
    - New or existing
    - VO name

Steps

Step	Condition	Tool	Action
1	Only if the customer is not authenticated.	Marketplace CheckIn	Automatically starts the authentication process redirecting the customers to the CheckIn service.
2	Successful authentication.	Marketplace	Presents to the customers the selected service options and their profile, as gathered during the authentication process, and requests them to fill in a form with the following fields: • Customer: o single user o representing a research group/community/project o representing a private company • Reason to request access to the EGI services
3 v1	Only if the customer represents a research community/project or a private company	Marketplace Ops Portal	Request to the customer to fill in an additional form with the following fields: • User group name: It maps to the VO name. In the case the customers is already using the EGI infrastructure (VO list not empty), the VO name could be chosen from a drop down menu listing all the customer VOs (retrieved during the authentication) plus the option to specify a new VO. • Information on the project will be automatically filled in by querying the

			operations portal if the customer select an existing VO in the User group name field.
3 v2	Only if the customer is a single user	Marketplace	Check if the amount of resources requested by the customer is less than the threshold defined to access the applications on demand platform: • If yes, mark the customer as user eligible for the applications on demand platform. • If no, mark the customer as a normal user.
4		Marketplace	Submit/record the service order and the customer profile to a backend system
5		Marketplace	Send a confirmation e-mail to the customers: "your order is being processed…"

Integration with other EGI tools

Tool	Integration
CheckIn	Authenticate the customer when needed.
Operations Portal	Provide the marketplace with information related to already existing projects (VOs).
Marketplace backend	Receive the service request and the customer profile from the marketplace backend.

2.1.3 Pay-for-Use support

An analysis on how to implement the pay-for-use support in the Marketplace has also been performed. As result, three different options have been defined.

- EGI acts as a broker / or individual provider offers listed separate, but aggregated on the service level: Under service level, differentiate each option according to the access mode, for free or for pay. Then, e.g., for Cloud Compute service, the Marketplace will expose the options "General purpose instance" and "General purpose instance for pay", etc.
- EGI acts as a broker: Add the pay-for-use attributes directly in the service options (product in the marketplace). A flag "for pay" will be added as extra service option. If this option is selected the access policies will change accordingly.
- Direct contracts between customers and providers: An additional category, related to the pay-for-use providers, will be added in the first level of the data model hierarchy (service

categories). Under this category, all the providers will be listed. Under each provider, all its products will be listed.

These three different options are currently in discussion within the Pay-for-Use working group. The Marketplace prototypes have implemented the first one for demonstration purposes. This will be updated according to the decision of the Pay-for-Use working group.

2.1.4 Technology customisation

In order to satisfy the requirements and the specifications above described, both PrestaShop and Open IRIS technologies needed customisations.

This section summarises the changes applied.

2.1.4.1 PrestaShop

The basic PrestaShop tool was enriched with the following plugins to extend its functionalities:

- Additional Product Attributes/Custom Product Fields Module[6]: It allowed to add new fields on the product pages. It was essential to implement all the service options as specified in the data model.
- Custom Checkout and Customer and Address Fields manager Module[7]: It allowed to easily add new fields on checkout pages and collect more data about the customers with extra fields on the registration form and customer account area. It was needed to implement both the customer and service order profiles.
- Dynamic Product Price Module[8]: It allowed to define dynamic prices based on the values that customers defined for the service options. It was needed in order to implement the experimental pay-for-use support.
- Google Accounts login-in module for PrestaShop: It was needed in order to extend the login functionality of PrestaShop.

In addition, ad-hoc customisations were needed to implement the authentication and user enrolment, and the Check-Out workflows. In particular, to retrieve customer information from the CheckIn service, to prevent the service order submission before the customer profile is completed and to profile the service orders. Minor changes were also done to adjust the service options, the service list in the cart and the e-mail templates. All the changes were applied to both the PrestaShop basic code and the extra modules listed above.

2.1.4.2 Open IRIS

The main changes on Open IRIS were related to:

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[6] http://addons.prestashop.com/en/20201-additional-product-attributes-custom-product-fields.html
[7] http://addons.prestashop.com/en/19736-custom-checkout-and-customer-and-address-fields-manager.html
[8] http://addons.prestashop.com/en/19389-dynamic-product-price.html

- Integration of the Open IRIS authentication mechanism with the EGI CheckIn service;
- Development of the user enrolment procedure according to the specifications;
- Development of a cart allowing the submission of multiple service orders:
- Implementation of the service hierarchy as described in the specification.

In particular, last point was particularly complex to achieve considering that Open IRIS were designed to show services in a flat mode and categorise them via keywords. The concept of a service hierarchy did not exist in Open IRIS and its introduction requested relevant changes.

2.2 Integration and dependencies

Both prototypes have been integrated with the EGI CheckIn service and have a dependency on it for the user authentication.

3 Release notes

3.1 Requirements covered in the release

- Authentication and user enrolment workflow.
  - Integration with the EGI CheckIn services to manage user authentication.
  - Gathering of customer data from the CheckIn service[9].
  - Form to gather additional customer data during the registration.
- Discover and order services workflow.
  - Implementation of the three level hierarchy of the EGI service catalogue as specified in D3.7. See Appendix I for a full specification of the data model.
  - Implementation of a custom form for each service option.
  - Registration of the service providers in the system. Each provider is linked to a set of services and visible in the service pages.
- Check-Out workflow.
  - Customised cart allowing to gather additional information to profile the service orders.[10]
- Basic pay-for-use support.
  - Implement the first option for experimental aims: Under service level, each option is differentiated according to the access mode (for free or for pay).

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[9] The customer's VO membership list cannot be retrieved from the CheckIn service yet.
[10] The Check-Out workflow was entirely implemented except for the interface with the Operations Portal since the customer's VO membership list cannot be retrieved from the CheckIn service yet.

4 Prototypes evaluation

After the completion of the developments, the two prototypes were assessed to decide which technology to adopting for the EGI marketplace.

Both prototypes sufficiently implemented the specifications demonstrating that both technologies are suitable, although customisations were needed for both. The unique lacking features are the retrieval of the customer's VO membership list from CheckIn, which is not supported yet, and the interface with the Operations Portal to automatically retrieve project information, which directly depends on the customer's VO membership list.

The following two sections shortly describe the two prototypes. Following this the outcome of the assessment is reported.

4.1 PrestaShop prototype

Customer can easily navigate to the service tree from the marketplace homepage.
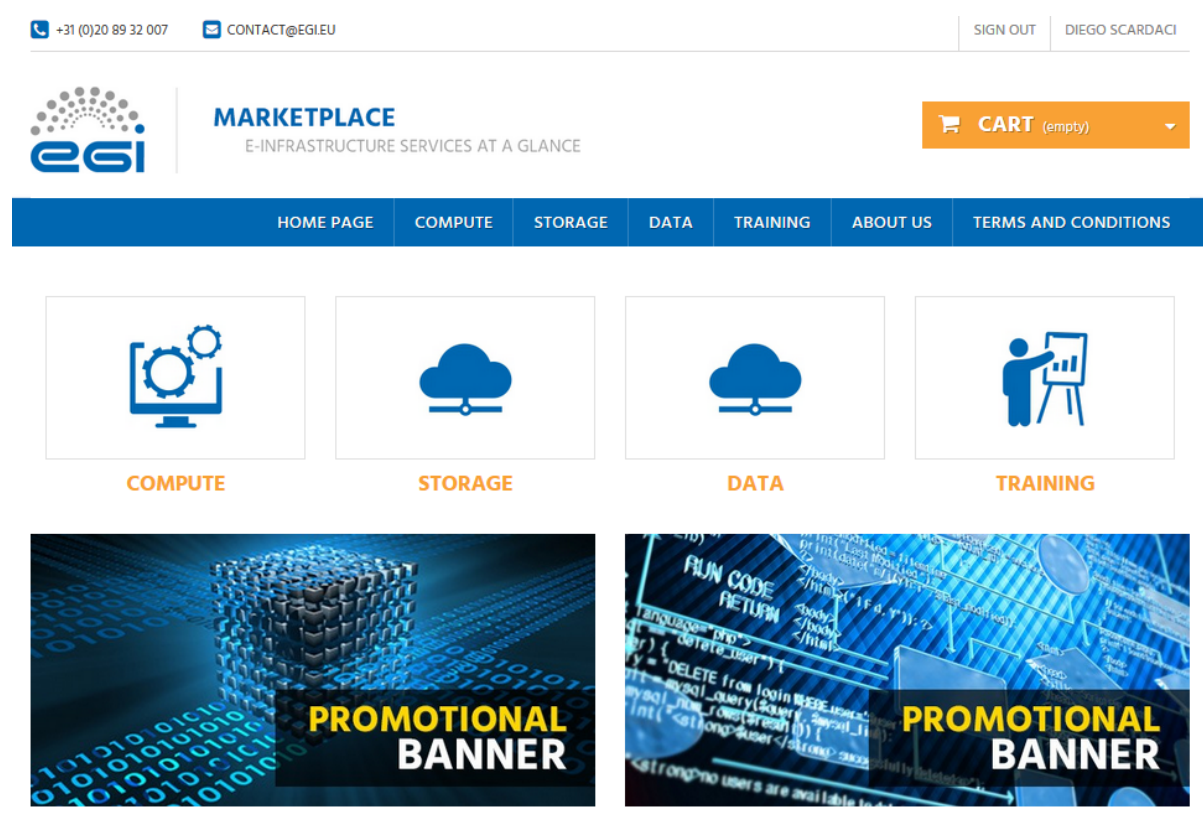
Figure 1. EGI Marketplace based on PrestaShop technology.

The login can be started on each page of the marketplace. During the first login, the customer is requested to register. Part of the customer information is collected by the CheckIn service, see

grey fields in Figure 2, the other attributes are manually provided by the customer through the following form.

YOUR ACCOUNT DETAILS

*Required field

FIRST NAME *

Diego

LAST NAME *

Scardaci

EGI UNIQUE IDENTIFIER *

8928610e52953cc132912e007a62a59695c3

COUNTRY *

Italy

INSTITUTION *

EGI Foundation

DEPARTMENT *

UCST

DEPARTMENTAL WEB PAGE

LINKEDIN PROFILE

RESEARCHGATE PROFILE

SUPERVISOR NAME

test

SUPERVISOR PROFILE

Figure 2. Form to gather the user profile. Fields in grey are filled in with values retrieved by the EGI CheckIn service and cannot be modified.

When a service category is selected, a new view showing all the services under the category is shown. Figure 3 shows the service view for the Cloud Compute service.

The customer can then select the service they would like to order.
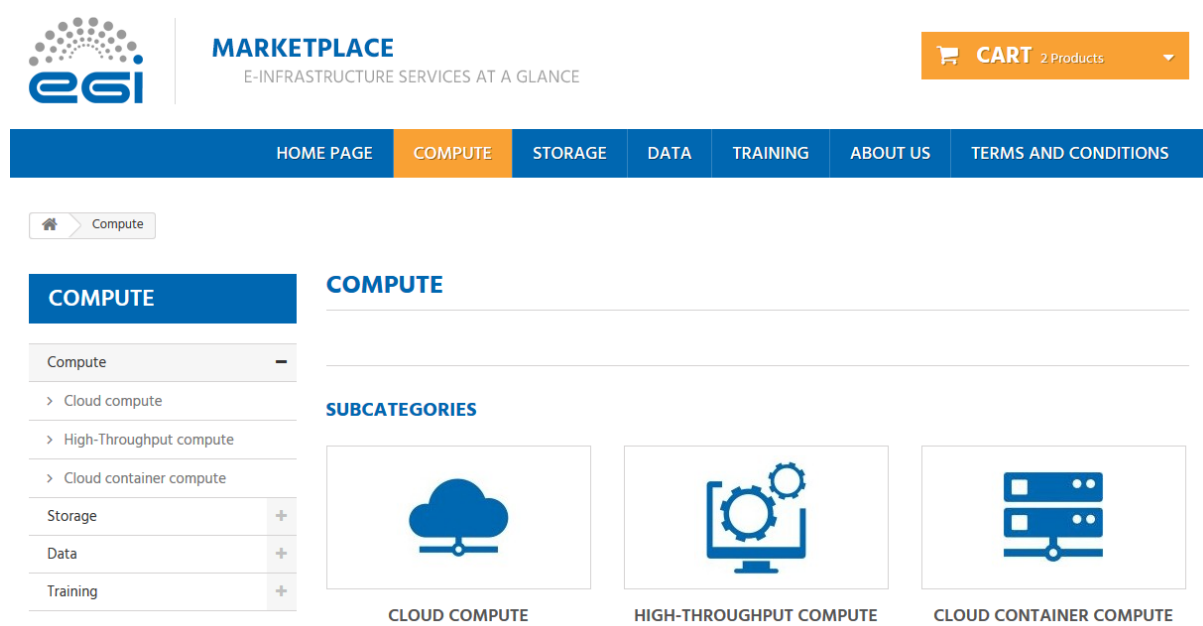
Figure 3. Service category view - Compute

Each service page shows a short description of the service and provide links to the terms of use, the default SLA and to a more detailed description. Figure 4 shows the Cloud Compute service page.
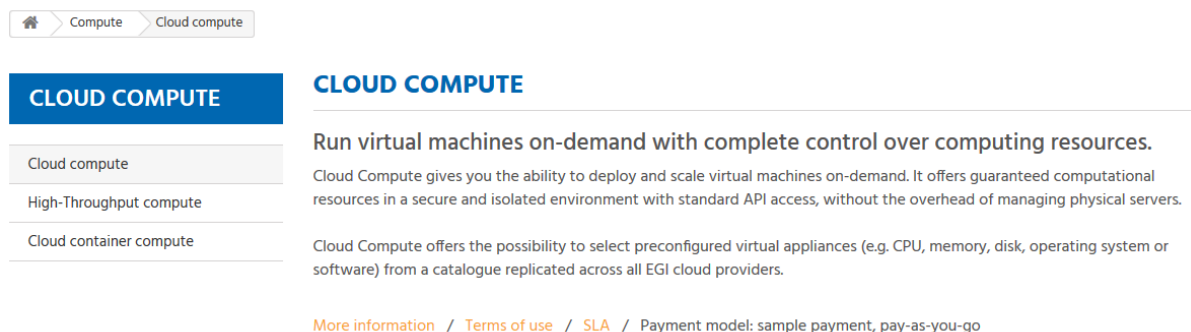
Figure 4. Service view - Cloud Compute

After a customer selects a service, a view listing all the options for such specific service is shown. As example, Figure 5 shows two options for the Cloud Compute service: Compute-intensive instance and High-memory instance.
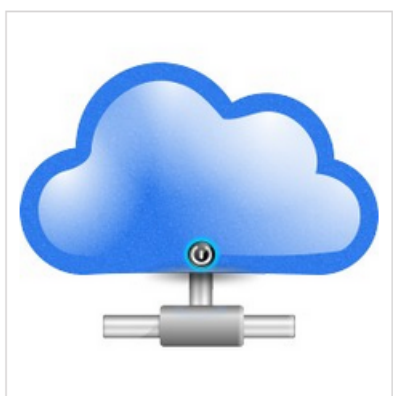
Compute-intensive instance

Optimised instance for computing tasks.

Features:

High performance CPU cores
Until 64 CPU cores
Real CPU cores (non- overcommitted)
Low latency network
Reserved instances

Ideal for:

Batch computing
High-performance applications and web services
Distributed analysis
Video encoding

Request access

+ Add to Compare

High-memory instance

Optimised instances for tasks that require more memory relative to virtual CPUs.

Features:

High amount of RAM per CPU core.
Up to 240 GB of RAM in total.
Reserved instances

Ideal for:

Running in-memory database
Running in-memory stores (e.g. redis, memcached)
In-memory big data processing engines (e.g. Apache Spark).

Request access

+ Add to Compare

Figure 5. Example of service options - Cloud Compute

Selecting one service option, the customer is then forwarded to a view that allows them to add a service to the cart. They have to specify the additional attributes requested for the specific service option (see the data model in Appendix I).

Figure 6. View to order a service. Compute-Intensive Instance in Cloud Compute service

After the customer has added to the cart all the services they want to order, they can start the Check-Out by going to the cart. The cart lists all the services and the related options selected, see Figure 7.

Figure 7. List of selected service options in the Cart

In the cart, the customer is asked to provide some additional information that allows the profiling of the service order, see Figure 8.

The order can only be submitted after the acceptance of the terms of service.

Figure 8. Service order profiling in the cart

4.2 Open IRIS prototype

Customer can easily navigate to the service tree from the marketplace homepage.
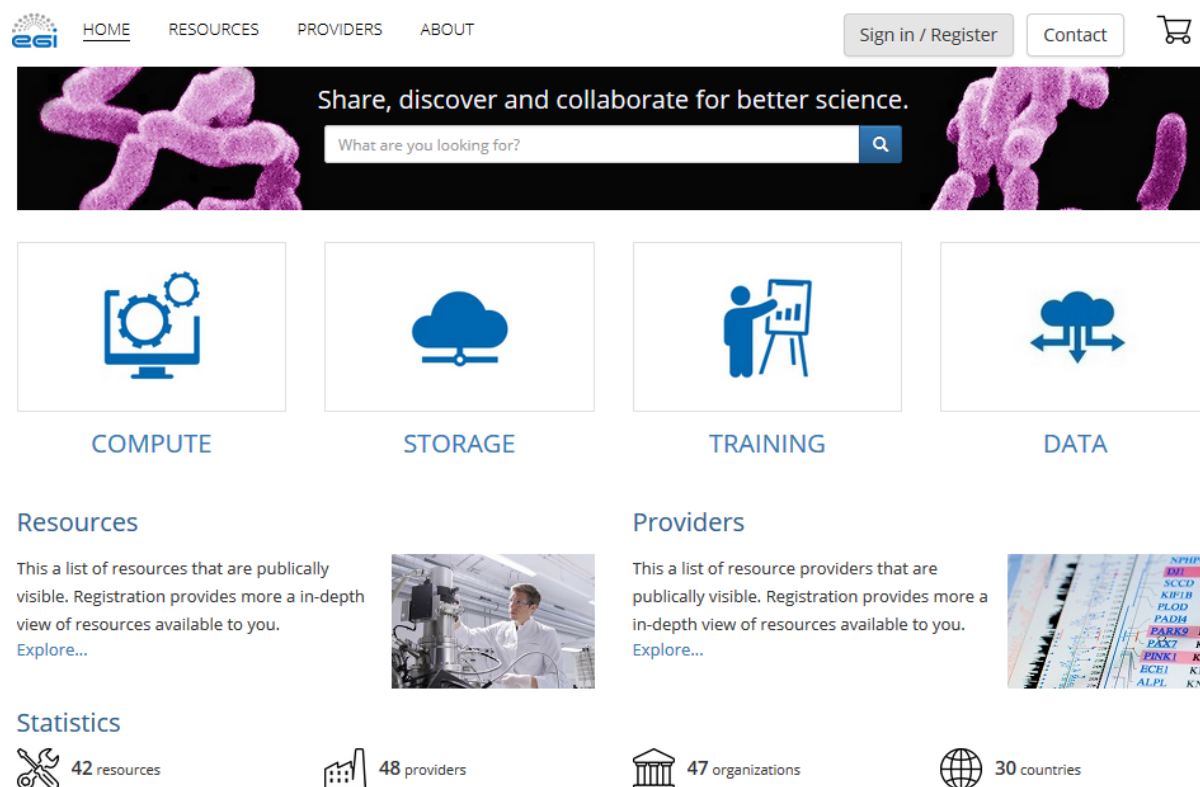
The login can be started on each page of the marketplace. During the first login the customer is requested to register. Part of the customer information is collected by the CheckIn service, see read only fields in figure 10, the other attributes are manually provided by the customer through the form fields.

Figure 10. Form to gather the user profile. Fields in grey are filled in with values retrieved by the EGI CheckIn service and cannot be modified.

When a service category is selected, a new view showing all the services under the category is shown. Figure 311 shows the service view for the Cloud Compute service. The customer can then select the service they would like to order.

Figure 11. Service category view - Compute

Each service page shows a short description of the service and an overview of the items available. Figure 412 shows the Cloud Compute service page.
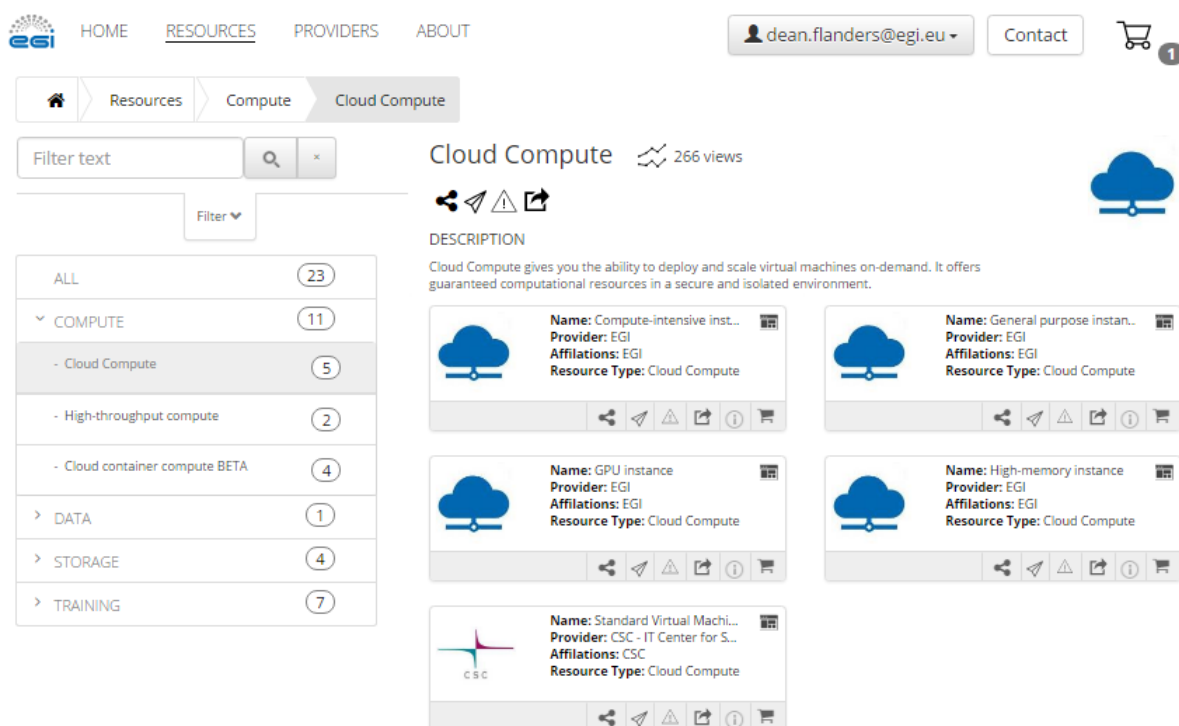
Figure 12. Service view - Cloud Compute

After a customer selects a service, a view listing all the options for the specific service is shown. As example, Figure 512 shows five options for the Cloud Compute service: Compute-intensive instance, High-memory instance, General purpose instance, GPU instance, Standard virtual machine.

When selecting a service option, the customer is then forwarded to a view that allows them to add a service to the cart. They have to specify the additional attributes requested for the specific service option as shown in Figure 513 (see the data model in Appendix I).

Figure 13. View to order a service. Compute-Intensive Instance in Cloud Compute service

After the customer adds to their cart all the services they want to order, they can start the Check-Out by clicking on the shopping cart icon. The cart lists all the services and the related options selected, see Figure 14.

Figure 14. List of selected service options in the Cart

In the cart, the customer is asked to provide some additional information that allows the profiling of the service order, see Figure 815. The order can only be submitted after the acceptance of the terms of service.

Figure 15. Service order profiling in the cart

4.3 Outcome of the assessment

The above-mentioned workflows were evaluated in both systems. It was found that both systems adequately covered the defined workflows as well as supported the data model demonstrating that both could be adopted to implement the EGI Marketplace.

Then, other factors were considered to choose the technology such as its long-term sustainability, availability of expertise, ready-to-use features that could be helpful in the future. As final decision, PrestaShop was selected for the following reasons:

- Widely used by other Internet web stores
- Easy to maintain as it has a wide community of developers
- Expertise within the EGI collaboration
- Ready-to-use feature to implement the pay-for-use support.

5 Feedback on satisfaction

The two demonstrators have been reviewed by the persons directly involved in the task JRA1.2 and personnel from the EGI Foundation.

The involved parties agreed that both the assessed solutions reached a good level of quality. Minor bugs were identified and addressed.

The reviewers identified two critical features that need to be implemented before moving the service into production:

- a customer dashboard, where the customer can manage his/her service orders
- recording of the service orders in another EGI tool (e.g. an RT queue) where it could be further managed according to the EGI IMS processes and procedures.

6 Plan for Exploitation and Dissemination

Name of the result	EGI Marketplace
DEFINITION	
Category of result	Software & service innovation
Description of the result	The EGI Marketplace will become the main instrument to advertise the EGI services, manage the customer service requests and facilitate access to services as much as possible.
EXPLOITATION	
Target group(s)	RIs, international research collaborations, single users, industry/SMEs, service providers, funding agencies and decision/policy makers.
Needs	There is an increasingly high demand for e-Infrastructure services for researchers. The EGI Marketplace platform provides a portal where researchers can easily discover and gain access to those resources.
How the target groups will use the result?	Resource providers within the EGI federation who are interested in providing services to internal and external resources can now expose them via the EGI Marketplace. In addition, researchers now have a common location to discover services and resources that they may require for their. The EGI Marketplace can then provide a framework for which e-Infrastructure services are provided to users internal and external to the EGI collaboration.
Benefits	The primary benefits are efficient sharing of resources and provision or e-Infrastructure services to researchers. Easy discoverability and access to the services.
How will you protect the results?	The EGI Marketplace prototypes are available to others to use freely. An open-source license (to be defined) will protect the customisations applied to the underlying technologies.
Actions for exploitation	Both prototypes are developed with a SaaS delivery model. The PrestaShop model offers a full service model, where the EGI Federation provides the services to add services into the store on the behalf of service providers. The goal is for that to transition to a self-service model. Open IRIS already offers a full self-service model where resource providers can login and register a resource provider and offer services via the platform. The creation of satellite marketplaces for service providers is already planned.
URL to project result	• PrestaShop prototype: http://marketplace.egi.eu/ • Open IRIS prototype: http://egi.science-it.ch
Success criteria	Effectiveness of the marketplace will be monitored by counting the number

	of accesses and the service requests performed through it. The latter value will be compared with the number of service requests managed through other traditional channels.
DISSEMINATION	
Key messages	Discover and access EGI services with a few clicks.
Channels	EGI web site, EGI newsletter, participation in conferences
Actions for dissemination	• Participation to conferences • Article in the newsletter • Promotion in the EGI web site • Marketplace link added to the EGI dissemination material (e.g. leaflet)
Cost	N.A.
Evaluation	Number of accesses and the service requests performed through the Marketplace.

7 Future plans

The EGI Marketplace project was fortunate enough to produce two valid prototypes. Though PrestaShop was selected for the main EGI Marketplace, Open IRIS is already gaining adoption in usage by research labs and core facilities to manage their resources (currently over 4000 users registered on the platform during the course of the project and a recent partnership with Thermo Fisher Scientific).

Several activities related to the EGI marketplace are planned for the next months. The main objective is enhancing the PrestaShop based prototype and making it operational, reaching the Beta service phase according to the EGI IMS by the end of the project. To reach this aim, a short-term roadmap has been defined that includes the following items:

- Recording of the service orders: After a customer submits an order via the marketplace, it will be registered in an ad-hoc queue defined in the EGI RT system. The ticket representing the order will contain all the needed information to manage it according to the EGI IMS processes (service options, customer profile, and order profile).
- Customer dashboard: Customers can view/manage their orders via a dashboard embedded in the marketplace. It will be developed customising the order history view already available in PrestaShop.
- Integration with the EGI web site and the application on demand platform: In the long term, the marketplace will become the main point of access to the EGI services. As first steps, the marketplace will be integrated with the EGI web site and the application on demand platform. An automatic mechanism to identify customers eligible for the application on

demand platform, based on customer and service order profiles, will be developed. Customers will be automatically redirected to such platform when certain conditions are respected.

- Testing and bug fixing.

At the same time, the design activity will continue. The data model will be enhanced as required, in particular to enrich the information to profile customers and service orders, exploiting new information that the CheckIn service will make available (e.g. VO membership). Further analysis will be done to introduce the pay-for-use support in collaboration with the pay-for-use working group. Service design activities will be extended to properly represent other service categories from EGI partners, such as the thematic community platforms. The Terms of Access and Use of the marketplace will be also defined before moving the service in production. Finally, criteria to on board and monitor services in the marketplace will be defined to guarantee an adequate quality to the EGI customers.

Appendix I. EGI Marketplace data model

The data model of the marketplace reflects the EGI service catalogue structure (https://www.egi.eu/services & https://www.egi.eu/internal-services). It is made of a three-level hierarchy where the first level contains the EGI service areas (categories in the marketplace) and the second level maps to the EGI services (sub-categories in the marketplace). Furthermore, an additional level defines the EGI service options (products in the marketplace). The service options represents the products that the end user could access or purchase in the marketplace.

The first two levels of the hierarchy are described in the table below.

Table 1. EGI Service Catalogue - first and second levels

Service area	Services
Compute	Cloud Compute, Cloud Container Compute and High-Throughput Compute
Storage	Online Storage, Archive Storage
Data	Data transfer, Content Distribution
Operations	Configuration Database, Service Monitoring
Security	Check-in, Attribute Management
Training	Training Infrastructure, FitSM

For all the services in the external catalogue, service options have been also defined. They are described in this appendix.

The following subsections describe the attributes that will be shown in the marketplace for each level of the hierarchy:

- Service areas (category in the marketplace)
- Services (sub-category in the marketplace)
- Service options (what the customers can order in the marketplace)

Finally, data to describe service providers in the marketplace are also defined. Each service in the marketplace will be linked to one or more providers.

Service areas (category in the marketplace):

Each category in the Marketplace demonstrators is described with the attributes shown in the table below.

Table 2. Service areas

Attribute	Definition	Notes
Name	Name of the category	The first level category maps to the EGI service area: • Compute • Storage • Data • Operations • Security • Training
Description	Description of the category	Inspired by the description of the EGI service areas in the service catalogue: short, punchy and expressing the value

Service areas in the EGI Marketplace demonstrators:

The following table lists the four categories that were included in the EGI marketplace demonstrators with the related description.

Table 3. Service areas in the EGI Marketplace demonstrators.

Service Area	Description
Compute	Services for processing data supporting different computing models
Storage	Services for storing/retrieving files
Data	Services for moving or distributing data
Training	Services for skills development

Services (sub-categories in the marketplace):

The EGI Marketplace demonstrators present services to the end-users with a set of attributes described in the table below. These attributes are inherited and sometime specialised by the service options.

Table 4. Services (sub-categories in the marketplace).

Attribute	Definition	Notes
Name	Name of a specific service as assigned by the service provider	Format: Free text Example: Cloud Compute
Unique ID	Global unique and persistent identifier of a specific service Note: this allows to map a service to a specific organization/e-Infrastructure	Format: DOI or any other relevant standard; it should contain information about the identifier type and value. Additional info: A PID can be used ideally resolvable to a landing page or a machine readable data typed metadata page. It should be assigned by the CoS owner.
Short description	High-level description of what the service does in terms of functionalities it provides and the resources it enables access to. It may include the value (benefit) to a customer and their users delivered by a service	Format: Free text Additional info: It may provide also information related to the offered capacity, number of installations, underlying data that is offered. Benefits are usually related to alleviating pains (e.g., eliminate undesirable outcomes, obstacles or risks) or producing gains (e.g. increased performance, social gains, positive emotions or cost saving).
Description	Longer description of what the service does in terms of functionalities it provides and	Format: Free text

	the resources it enables access to the service	
Web page	URL to a webpage providing more information about the service	Format: URL Additional info: This webpage is usually hosted and maintained by the service provider. It contains current and additional information, such as what APIs are supported or links to the documentation.
Service phase	Phase of the service design selected among: beta: service being developed while available for testing publicly production: service available in the live environment meeting security/performance requirements	Source: UK Government Service Design Manual Format: Closed enumeration
Category	Link to categories this service belongs to	Format: Closed enumeration
Service condition	Restrictions that apply to this service	Format: List of sentences, each of them defining a condition
Payment Model	Supported payment models and restrictions that apply to each of them	Format: List of sentences, each of them stating the type of payment model and the restriction that applies to it. Additional info: Example of types of payment models are: free, pay-as-you-go, subscription, membership Variable pricing for corporate customers, higher education, etc.
Term of use	URL to a document containing the rules	Format: URL

	which one must agree to abide by in order to use the service	
SLA	URL to a document containing information about the levels of performance that a service provider is expected to achieve (service level agreement)	Format: List of URLs

Services in the second release of the marketplace:

Services that were included in the second release of the Marketplace classified for service areas.

Table 5. Services in the second release of the marketplace.

Service area	Services
Compute	Cloud Compute, Cloud Container Compute and High-Throughput Compute
Storage	Online Storage, Archive Storage
Data	Data transfer
Training	Training Infrastructure, FitSM

Service options:

The service options includes some common options described in the table below.

Table 6. Common service options.

Common service options	Description	Notes
Description of the research activity	Information on the research activity that needs to access the EGI services. In particular, relevant when access for free is requested.	This attribute has to be requested to the customer in the Cart and not in the service option form.
Access type	Reserved or opportunistic (does not apply	When applicable, this attribute

	to the training and to some Cloud Computing options).	has to be requested in the service option form.
Start and end dates	Specify the period in which users will access the services. The period can also be undefined.	

- **Compute/Cloud Compute**

Service description: Cloud Compute gives you the ability to deploy and scale virtual machines on-demand. It offers guaranteed computational resources in a secure and isolated environment with standard API access, without the overhead of managing physical servers.

Cloud Compute offers the possibility to select preconfigured virtual appliances (e.g. CPU, memory, disk, operating system or software) from a catalogue replicated across all EGI cloud providers.

Table 7. Cloud Compute service options.

Service option (Instance types)	Description	Attributes
General purpose instance	Base performance instance type. Features: - Accessible in opportunistic or reserved ways - CPU cores could be overcommitted Ideals for: - Web services - Micro-services - Development environments - Building server - Small database	Number of CPU cores: [1,2,4,8] Amount of RAM per CPU core (GB): [1,2,4] Local disk (GB): [10,20,40]

	• Test environments	
Compute-intensive instance	Optimised instance for computing tasks. Features: • High performance CPU cores • Until 64 CPU cores • Real CPU cores (non-overcommitted) • Low latency network • Reserved instances Ideals for: • Batch computing • High-performance applications and web services • Distributed analysis • Video encoding	Number of CPU cores: [8,12,16,20,24,28,32,64] Amount of RAM per CPU core (GB): [2,4,8] Local disk (GB): [10,20,40] Note 1: Some CPU cores/RAM per core combinations are not permitted. Maximum total RAM available for 1 instance is 240 GB. Note 2: Only reserved instances admissible.
High-memory instance	Optimised instances for tasks that require more memory relative to virtual CPUs. Features: • High amount of RAM per CPU core. • Up to 240 GB of RAM in total. • Reserved instances Ideal for: • Running in-memory database	Number of CPU Cores: [2,4,8,12,16] Amount of RAM per CPU core (GB): [16,32,48,64,80,96,112,120] Local disk (GB): [10,20,40] Note 1: Some CPU Cores/RAM per core combinations are not permitted. Maximum total RAM available for 1 instance is 240 GB. Note 2: Only reserved instances admissible.

	• Running in-memory stores (e.g. redis, memcached) • In-memory big data processing engines (e.g. Apache Spark).	
GPU instance	GPU-enabled instances. Features: • 1 or 2 GPU cores • 8 CPU cores for each GPU core • Large memory Ideals for: • graphics and general purpose GPU compute applications	Number of GPU cores: [1,2] Number of CPU cores per GPU core: [8] Amount of RAM (GB): [24,50] Local disk (GB): [280] Note 1: The amount of RAM will be 24GB with 1 GPU core or 50GB with 2 GPU cores. Note 2: Only reserved instances admissible.

- **Compute/Cloud Container Compute**

Service description: Cloud Container Compute (in Beta phase) gives you the ability to deploy and scale Docker containers on-demand. It offers guaranteed computational resources in a secure and isolated environment with standard API access, without the overhead of managing the operating system. The result is improved performance, ideal for development work.

Same options as the Cloud Compute service.

- **Compute/High-throughput Compute**

Service description: High-throughput Compute allows you to run computational jobs at scale on the EGI infrastructure. It allows you to analyse large datasets and execute thousands of parallel computing tasks.

High-throughput Compute is provided by a distributed network of computing centres, accessible via a standard interface and membership of a virtual organisation. EGI offers more than 650,000 cores of installed capacity, supporting about 1.6 million computing jobs per day.

This service supports research and innovation at all scales: from individuals to large collaborations.

Table 8. High-throughput Compute service options.

Service option	Description	Attributes
Base	It allows the execution of large numbers of independent or loosely coupled computing tasks. Limited parallel and multi-thread computing can be supported as well.	Number of CPU cores: [1-32] Amount of RAM per CPU core (GB): [4-8] Other technical requirements: [text]
MPI	It allows parallel computing, with support of MPI protocol and libraries.	Number of CPU cores: [1-256] Amount of RAM per CPU core (GB): [4-8] Parallelism (Threads): [8-24] Other technical requirements: [text]

- **Storage/Online Storage**

Service description: Online Storage allows you to store data in a reliable and high-quality environment and share it across distributed teams. Your data can be accessed through different standard protocols and can be replicated across different providers to increase fault-tolerance.

Online Storage gives you complete control over the data you share and with whom.

Table 9. Online Storage service options.

Service option	Description	Attributes
Block storage	Block Storage is a block-level storage solution that allows you to expand the storage capacity of your instances in the EGI Federated Cloud. This means you can increase your storage without increasing the size or capacity of your instance or by provisioning new ones. Once you mount and	Storage capacity [TB]: [1, 5, 10, other] Special requirements (e.g. performance, close

	format your drive, you can use it just like a regular hard drive attached to your server. You can also detach your block storage volume from one server and attach it to another or you can delete your server, keeping your data intact and ready for the next time you need it.	to the computational resources, etc.): [text]
Object storage	Object storage manages data as objects. Each object includes the data itself, a variable amount of metadata, and a globally unique identifier. Cloud object storage allows relatively inexpensive, scalable and self-healing retention of massive amounts of unstructured data.	Storage capacity [TB]: [1, 5, 10, other] Interfaces: [CDMI, POSIX, SWIFT, to be specified by the users] Special requirements (e.g. performance, close to the computational resources, etc.): [text]
File storage	Highly scalable storage system accessible from anywhere allowing to easily share data through different standard interfaces. It assigns global identifiers to files and allows to organise your data using a flexible hierarchical structure.	Technology: [DPM, DCache, STORM, …, any] Special requirements (e.g. performance, close to a specific site, etc.): [text]

- **Storage/Archive Storage**

Service description: Archive Storage allows you to store large amounts of data in a secure environment freeing up your usual online storage resources.

The data on the Archive Storage can be replicated across several storage sites, thanks to the adoption of interoperable open standards. The service is optimised for infrequent access, which allows it to be delivered at a lower cost.

Table 10. Archive Storage service options.

Service option	Description	Attributes
Archive Storage	Archive Storage allows you to store large amounts of data in a secure environment freeing up your usual online storage resources. The data on the Archive Storage can be replicated across several storage sites, thanks to the adoption of interoperable open standards. The service is optimised for infrequent access. Main characteristics: • Store data for long-term retention • Store large amount of data • Free up your online storage	Amount of data (TB): [number]

- **Data/Data Transfer**

Service description: Data Transfer allows you to move any type of data files asynchronously from one place to another. The service includes dedicated interfaces to display statistics of on-going transfers and manage network resources.

Data Transfer is ideal to move large amounts of files or very large files. The Data Transfer service has mechanisms to ensure automatic retry in case of failure.

Table 11. Data Transfer service options.

Service option	Description	Attributes
Data Transfer	Data Transfer allows you to move any type of data files asynchronously from one place to another. The service includes dedicated interfaces to display statistics of on-going transfers and manage network resources. Data Transfer is ideal to move large amounts of files or very large files. The Data Transfer service has mechanisms to ensure automatic retry in case of failure. Main characteristics:	Tool: [FTS3, Globus Online]

- Ideal for very large files

- Able to handle large amounts of files

- Transfer process with automatic retry

- **Training/Training Infrastructure**

Service description: Training Infrastructure offers cloud compute and online storage for training activities. It is useful to organise onsite tutorials or workshops and online training courses or as a platform for self-paced learning.

For example, with the Training Infrastructure trainers can create and deploy any custom virtual machine images for the students. A library of existing virtual machines images is offered so that tutors can customise and use these according to their specific needs. This allows easy deployment, sharing and reuse of course materials.

The Training Infrastructure uses the same high-quality computing and storage environment that EGI provides to researchers.

Table 12. Training Infrastructure service options.

Service option	Description	Attributes
Cloud Training Infrastructure	The Training Infrastructure offers cloud compute and online storage for training activities. It is useful to organise onsite tutorials or workshops and online training courses or as a platform for self-paced learning. For example, with the Training Infrastructure trainers can create and deploy any custom virtual machine images for the students. A library of existing virtual machines images is offered so that tutors can customise and use these according to their specific needs. This allows easy deployment, sharing and reuse of course materials. The Training Infrastructure uses the same high quality computing and storage environment that EGI provides to researchers.	Location: [text] Aim of the training event: [text] Number of concurrent trainees: [number] Number of CPU cores (total): [number] Amount of RAM (total) (GB): [number] Online storage size (total) (GB): [number] Special requirements (e.g. VM images/apps available in the training infra, big instances,

		etc.): [text]

- **Training/FitSM**

Service description: FitSM is a lightweight standards family aimed at facilitating service management in IT service provision, including federated scenarios. FitSM training aims at providing those involved in operating federated infrastructures with the professional skills they need in order to effectively manage their services.

FitSM professional training is certified by TÜV SÜD, a global leader in standardisation and certification. The qualification programme offers three training levels: Foundation, Advanced and Expert.

<p align="center">**Table 13. FitSM service options.**</p>

Service option	Description	Attributes
Foundation level	Target audience: - All individuals involved in the provisioning of (federated) IT services - Candidates who wish to progress to advanced level of the qualification and certification scheme Contents: - Basic IT service management concepts and terms (based on FitSM-0) - Purpose and structure of FitSM standards and their relationship to other standards - Process framework underlying FitSM - Requirements defined in FitSM-1	Number of students: [number] Location: [text]
Advanced Level in Service Planning and Delivery	Target audience: - Individuals aiming to fulfil a coordinating role in the ITSM processes related to the planning and delivery of IT services - Candidates who wish to progress to expert level of the qualification and certification scheme	Number of students: [number] Location: [text]

	Contents:	
	• Repeat the most important foundation knowledge on (lightweight) ITSM	
	• Become familiar with the general aspects of implementing ITSM, the processes required to plan and deliver services effectively (according to the FitSM-1 standard), and important interfaces in a service management system	
	• ITSM processes in focus of this training: Service portfolio management, service level management, service reporting management, service availability and continuity management, capacity management, information security management, customer relationship management, supplier relationship management	
	Entry requirements:	
	• Must hold FitSM Foundation Certificate	
Advanced Level in Service Operation and Control	Target audience:	Number of students: [number]
	• Individuals aiming to fulfil a coordinating role in the ITSM processes related to the operation and control of IT services	Location: [text]
	• Candidates who wish to progress to expert level of the qualification and certification scheme	
	Contents:	
	• Repeat the most important foundation knowledge on (lightweight) ITSM	
	• Become familiar with the general aspects of implementing ITSM, the processes required to operate and control services effectively (according to the FitSM-1 standard), and important interfaces in a service management system.	
	• ITSM processes in focus of this training: Incident and service request management, problem management, configuration management, change management,	

	release and deployment management, continual service improvement management	
	Entry requirements:	
	• Must hold FitSM Foundation Certificate	
Expert level	**Target audience:**	Number of students: [number]
	• Individuals aiming to fulfil the role of internal or external consultant or auditor in the topic area of IT service management (ITSM).	Location: [text]
	Contents:	
	• Repeat the most important advanced level knowledge on (lightweight) ITSM	
	• ITSM-related frameworks and standards	
	• Understanding the organisational context of implementing ITSM (including federation structures and scope setting)	
	• Leadership and governance (including top management responsibilities, governance practices, effective communication and organisational change management)	
	• Planning and implementing ITSM (including service management planning, service design and transition and effective documentation)	
	• Monitoring, reviewing and improving ITSM (including capability & maturity assessment, key performance indicators, managing an audit program and conducting audits)	
	Entry requirements:	
	• Must hold both FitSM Advanced Certificates in Service Planning and Delivery (SPD) and Service Operations and Control (SOC)	
Consultancy	Advise on how to manage IT services with a pragmatic and lightweight standard.	Description of the consultancy:

		[text]

Service Providers:

The following table defines the attributes that identify the service providers within the EGI marketplace demonstrators.

<p align="center">**Table 14. Service providers.**</p>

Attribute	Definition	Notes
Name	Organisation or federation or part of an organisation or federation that manages and delivers a service or services to customers	Format: Free text Additional info: The entity with whom the customer signs the SLA; this entity will be able to give information about other contributors to the service
Description	Short description of the organisation or federation or part of an organisation or federation	Format: Free text
Contacts	Delegate of the organisation	Format: Name and e-mail
Logo	Organisation logo	Format: Image
Webpage	URL to the provider website	Format: URL