

**EGI-Engage**

Final report on EGI Service Registry and Marketplace

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Abstract

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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>

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**Executive summary**

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# Introduction

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# Summary of the past activities

This section summarises the main activities on the Marketplace already reported in other deliverables. In particular, it is focused on a short description of the concept of the EGI marketplace, the assessment of the technologies that we carried out before starting the implementation of the prototypes, and the assessment of the two prototypes based on Open IRIS and PrestaShop technologies.

## Concept of EGI Marketplace

In the European Research Area, the emergence of various research infrastructures that will need access to communication, computing, and data infrastructures to perform collaborative compute- and data intensive science is evident. Such research infrastructures would benefit from a shared e-infrastructure that offers the generic capabilities communities need to build their own research platforms. Important elements of this ideal shared e-infrastructure are already present, but further work needs to be done both at the technical level (for greater integration) and at the organisational/governance level (for shared governance, harmonised access policies, and suitable business models that ensure long-term availability).

Even though services are available, it may be difficult for researchers to discover and access them. EGI attempts to address this issue by developing a marketplace as a service concept to deliver research resources. Electronic markets can play a central role on facilitating the exchange of research knowledge, ICT resources, services, as well as payment options along side the traditional free at point of delivery model. This means creating a platform where the availability of services can be advertised together with the related access policies and service levels and a customer can easily order and access them.

In addition, the marketplace can enhance visibility for resource and service providers, raising awareness of what they can provide as well as helping to promote cross-disciplinary research.

In particular, the following potential benefits can be expected from developing a digital marketplace:

* Ensure efficient resource usage at the institutional, national, and international level.
* Allow cost sharing with accounting, billing, and enabling of fair usage of resources.
* Facilitate resource discovery at the institutional and inter-institutional level.
* Facilitate service order and access.
* Allow researchers and institutions to focus on value creation as opposed to maintaining redundant resources.
* Researchers can discover expertise that can be tapped into based on usage of resources registered.
* Remove administrative burdens from technology platforms allowing them to focus on technology delivery.
* Increase competitiveness by providing a low cost of entry to expensive technologies for small academic institutions and businesses.
* Facilitate inter-disciplinary research by providing access to technologies typically considered outside of a particular field.
* Avoid re-developing the same solution (tool duplication).
* Provide opportunities for collaborative improvements of services and resources.
* Possible reduce costs by facilitating complex application implementation and integration (e.g. issuing of persistent identifiers, providing links between resources and services).

The methodology that we adopted to define the concept of the EGI Marketplace included the following activities:

* A survey and several interviews were conducted to get the requirements from researchers and research resource providers.
* In addition, service scenarios for resource usage and resource providers were defined.
* Other related research marketplaces were examined to understand how our activity compares to them.
* A Business Model to describe and classify an EGI marketplace and in an “open science commons” space was defined.

As outcome, detailed requirements and a set of recommendations were defined for both business and technical perspectives.

For more details, please, refer to the D2.3 Concept of EGI Marketplace[[1]](#footnote-1).

## Technology assessment

Before starting the development of the Marketplace prototypes, we analysed existing solutions, open-source tools and extensions to implement the EGI marketplace demonstrator. This analysis was based on the previously defined concept of the EGI marketplace and to the related collected requirements.

Various solutions were considered to identify the most promising to satisfy our needs: AppDB, GOCDB, FIWARE Marketplace Generic Enabler, Open IRIS, PrestaShop and WooCommerce. The list of evaluated technologies included:

1. EGI tools that can be extended to become a marketplace (namely, GOCDB and AppDB)
2. Technologies supported by other initiatives (OpenIRIS and FIWARE)
3. Generic web tools with features suitable to the implementation of marketplaces (WooCommerce, WordPress).

Experts in development, design and operations of user-facing tools and/or a marketplace from various academic organizations, were appointed. The following metrics were taken into consideration by the evaluators:

* adequacy of the solution against requirements
* possible costs in terms of licenses and support
* solution supportable in terms of expertise within the EGI collaboration.

Another important factor that has been identified to assess the sustainability and costs in terms of licenses and support is the size of the user base of each tool. Tools with extensive list of user groups and broad adoption across different sectors have larger chances of receiving community support compared to specific technologies adopted by few communities. On the other hand, in these cases integrating ad-hoc features and maintaining them over time may be expensive if these capabilities are not adopted for upstream release and software is not open source.

As a result of this consultation and analysis, Open IRIS[[2]](#footnote-2), with its increasing user base and the Swiss Federation support, and PrestaShop[[3]](#footnote-3), a free, open source e-commerce solution largely adopted in the commercial world with a wide community behind it were identified as the most promising solution to fully fulfil the marketplace requirements.

Details of this analysis are available in D3.2 Design of the EGI Service Registry and Marketplace[[4]](#footnote-4).

## Development of the Marketplace prototypes

As follow-up of existing solutions’ analysis, the assessment of technologies to implement the EGI marketplace was been further refined taking into account the originally defined criteria in D3.2 as well as the requirements generated by the definition of the EGI service catalogue, which is one of the outcomes of the EGI Integrated Management System framework[[5]](#footnote-5).

As outcome of this activity, we set-up two distinct marketplace prototypes aiming at comparing the features of the two selected solutions, one based on PrestaShop and the second on Open IRIS.

A preliminary task for the development of the prototypes was the definition of the data model for the marketplace. It reflects the EGI service catalogue structure and is made of a three-level hierarchy where the first level contains the EGI service areas (the marketplace service categories) and the second level maps to the EGI services (the marketplace sub-categories). Furthermore, there is an additional level that defines the EGI service options (the marketplace products). The service options represent the products that the end user can discover, request and access via the marketplace.

The deployment of the two EGI marketplace demonstrators required a prior analysis of the relation between the marketplace and the EGI service catalogue with its Integrated Management System (IMS) process and procedures. In the context of this, a first study of the marketplace interfaces was conducted. These interfaces concern other EGI tools that are relevant to complement the marketplace with additional business logic related to the maintenance of service information, and the management of service access including the management of user registration and authorization when required. Such analysis was further enhance in the last months and related results are described later in this document.

The development of the Marketplace prototypes was completed in two phases with the releases of two versions. First version of the prototypes were created using built-in features of Open IRIS and PrestaShop and only a sub-set of the Marketplace data model was implemented. After this phase, it was clear that both technologies needed customisations to answer to EGI needs. Such customisations were implemented before releasing the second version of the prototypes that fully implemented the Marketplace data model and the Marketplace workflows, which were defined in the meantime.



Figure 1. Second release of the EGI Marketplace based on Open IRIS technology.

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.



Figure 2. Second release of the EGI Marketplace based on PrestaShop technology.

Details on the two releases of the EGI Marketplace prototypes are available in D3.7 First release of the EGI Service Registry and Marketplace prototype[[6]](#footnote-6) and D3.13 Second release of the EGI Service Registry and Marketplace prototype[[7]](#footnote-7).

# 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.

## 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[[8]](#footnote-8) and Open IRIS[[9]](#footnote-9) 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.

### 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 Appendix I.

#### 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.

|  |  |  |
| --- | --- | --- |
| 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 |

#### 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/project, 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 |

### 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.

#### 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. |

#### 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.

#### 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:   + single user   + representing a research group/community/project   + 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. |

### 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.

#### PrestaShop

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

* Additional Product Attributes/Custom Product Fields Module[[10]](#footnote-10): 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[[11]](#footnote-11): 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[[12]](#footnote-12): 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.

#### Open IRIS

The main changes on Open IRIS were related to:

* 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.

## Integration and dependencies

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

# Prototypes

## PrestaShop prototype

Customer can easily navigate to the service tree from the marketplace homepage.



Figure 3. 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.



Figure 4. 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 5. 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 6. 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.



Figure 7. 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 8. 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 9. 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 10. Service order profiling in the cart

## Open IRIS prototype

Customer can easily navigate to the service tree from the marketplace homepage.



Figure 11. The EGI Marketplace based on Open IRIS 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 read only fields in figure 10, the other attributes are manually provided by the customer through the form fields.

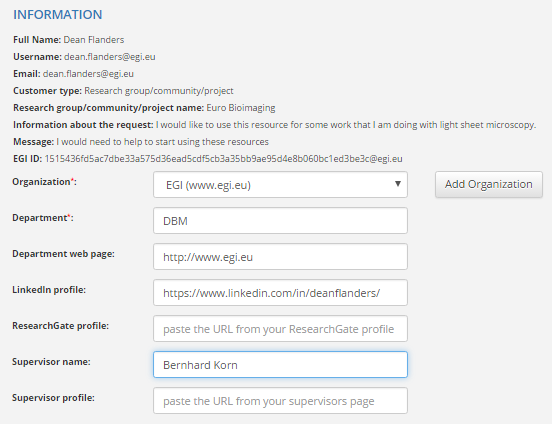


Figure 10. Form to gather the user profile. Fields in grey are filled in with values retrieved by the EGI CheckIn service and cannot be modified.

When a service category is selected, a new view showing all the services under the category is shown. Figure 11 shows the service view for the Cloud Compute service. The customer can then select the service they would like to order.

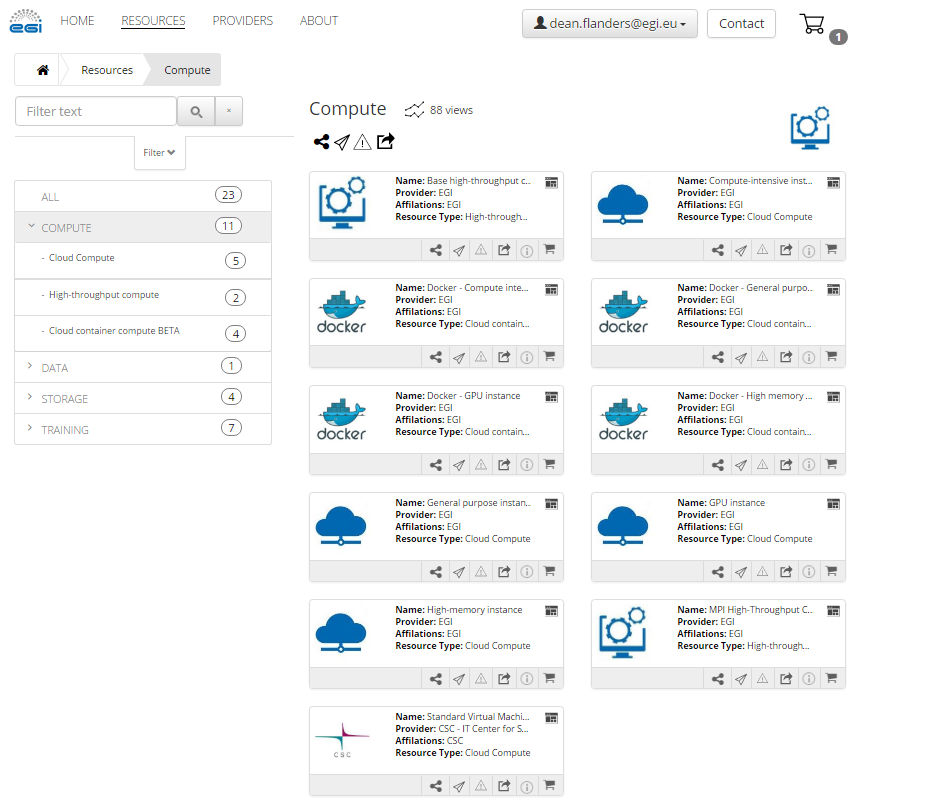


Figure 11. Service category view - Compute

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

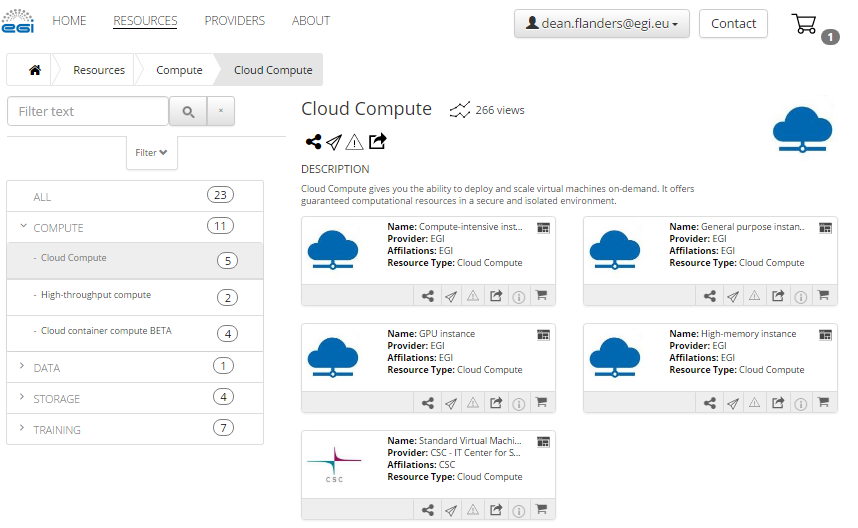


Figure 12. Service view - Cloud Compute

After a customer selects a service, a view listing all the options for the specific service is shown. As example, Figure 12 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 13 (see the data model in Appendix I).

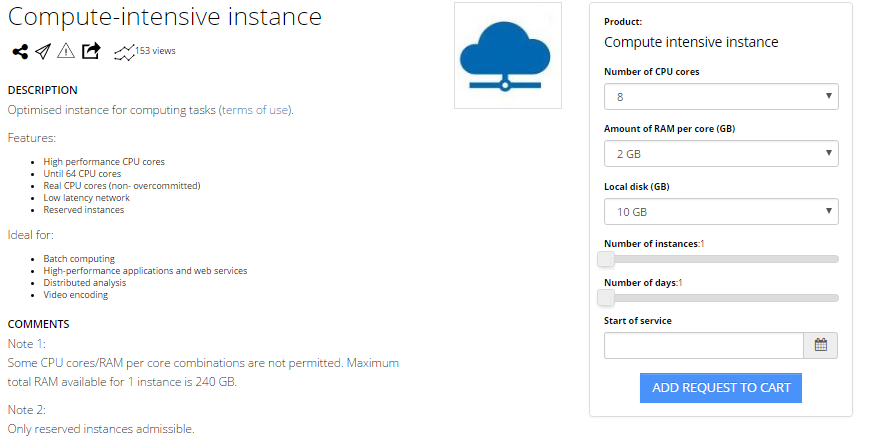


Figure 13. View to order a service. Compute-Intensive Instance in Cloud Compute service

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.

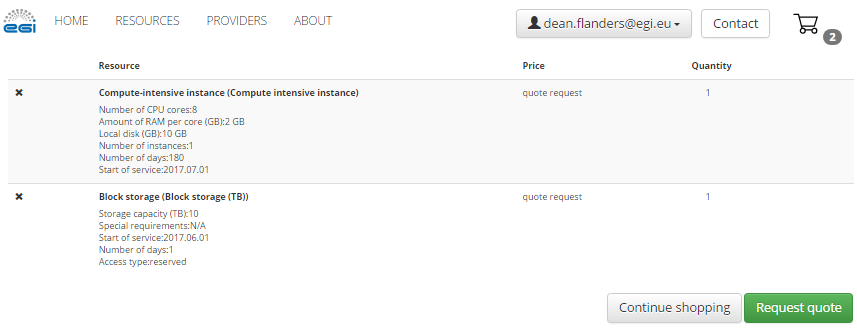


Figure 14. List of selected service options in the Cart

In the cart, the customer is asked to provide some additional information that allows the profiling of the service order, see Figure 15. The order can only be submitted after the acceptance of the terms of service.

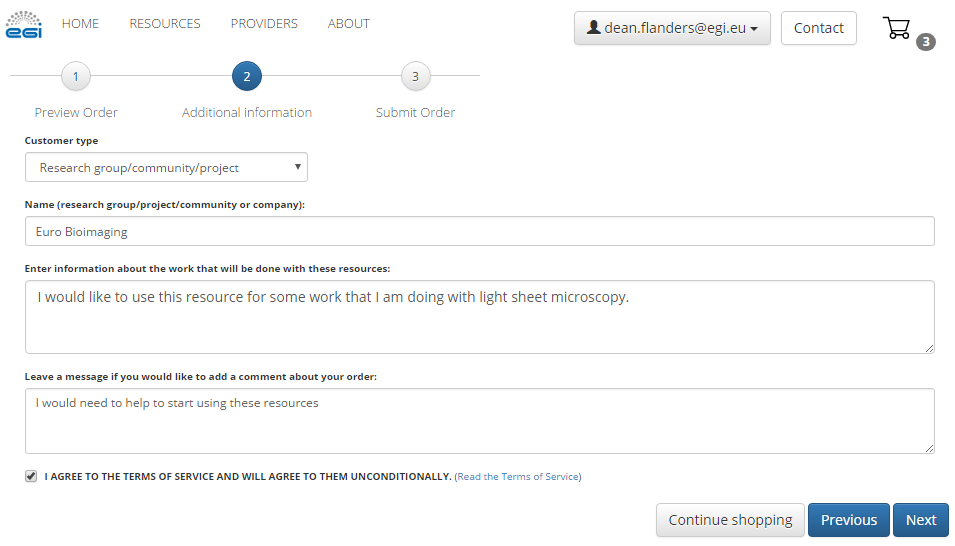


Figure 15. Service order profiling in the cart

## Evaluation

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.

# Marketplace as tool to automate EGI IMS processes

## Relationship between the EGI Service Catalogue and the marketplace

When operational, the EGI marketplace will become the unique place where a new customer could discover a service (or group of services), get information about it by browsing the service catalogue, and submit an order, specifying quantity, quality and duration. It will expose all the live EGI services, following the same structure of the service catalogue, exposing service options to allow customers to properly define their orders.

Furthermore, the marketplace will partially automate the service order management implementing procedures to handle the customers’ requests and triggering related IMS processes. It will act as an orchestrator of the several EGI tools involved in such processes exploiting the customer and service order profile information collected through its workflows.

### Relationship and impact on the EGI tools

The introduction of the Marketplace on the EGI tool ecosystem implies changes on other tools to both remove redundancies and implement new workflows. This is particularly relevant for tools that already offer features related to the service order management, such as e-Grant and the Applications on Demand service (AoDs). E-Grant had been implemented before the service catalogue was defined and since then has been providing a mechanism to support on-demand access to a subset of the services of the catalogue (Compute and Storage), while the AoDs partially implements a service discovery and a user profiling features to identify small research groups (the so-called Long Tail of Science).

Now that the Marketplace has been introduced into the picture, such e-Grant and AoDS features have become redundant. For this reason, we planned to convert e-Grant to a backend service for SLA/OLA management that will be integrated as plugin into the Operations Portal. In this way, it could benefit of already available interfaces towards other EGI tools (e.g. the monitoring system). In addition, e-Grant logic will be extended to cover the whole service catalogue. Also the AoDs will need significant changes, it will entirely rely on the marketplace for the user profiling and for exposing its service options (the applications) to the customers.

About the relationship with other EGI tools, the marketplace will be integrated with the EGI AAI CheckIn service delegating to it the process to register, authenticate, authorise and profile the customers. Customers’ information retrieved by CheckIn could be integrated by the Marketplace as needed.

GOCDB could be used by the Marketplace to automatically retrieve information about service instances and service providers.

An analysis is still on going to define the interface between the Marketplace and the AppDB. In particular, to understand how to expose the AppDB VMops dashboard to the EGI customers via the Marketplace. As first step, access to the VMops dashboard will be granted to AoDS users requesting Cloud Compute or Cloud Container Compute services.

## Service order management through the Marketplace

Once a customer submits an order via the Marketplace, it will be properly pre-processed by the same Marketplace and stored in a Service Order Management tool.

### Service order pre-processing

The pre-processing consists on an analysis of the ordered services. Indeed, a customer could request services of different nature, in terms of both service type (e.g. Cloud Compute and a FitSM training) and amount of resources (few resources or a large set of resources), which needs to be managed in different ways according to the EGI IMS. The Marketplace creates a service order for each sub-set of requested services that could be managed homogeneously. For example, if a customer orders some Cloud Compute and Online Storage resources and a FitSM training, the marketplace will create two service orders, one for the Cloud Compute and Online Storage services, the other for the FitSM training. In such way, the Service Order Management tool could trigger the right IMS process to deal with the specific customer’s request.

Service orders are grouped as follows:

* Cloud Compute, HTC Compute, Cloud Container Compute, Online Storage, Archive Storage
* Data Transfer
* Training Infrastructure
* FiTSM
* Applications on Demand service: this group includes both Applications on Demand service options and any combination of the service in the first group under the condition that the amount of requested resources are lower than predefined thresholds.

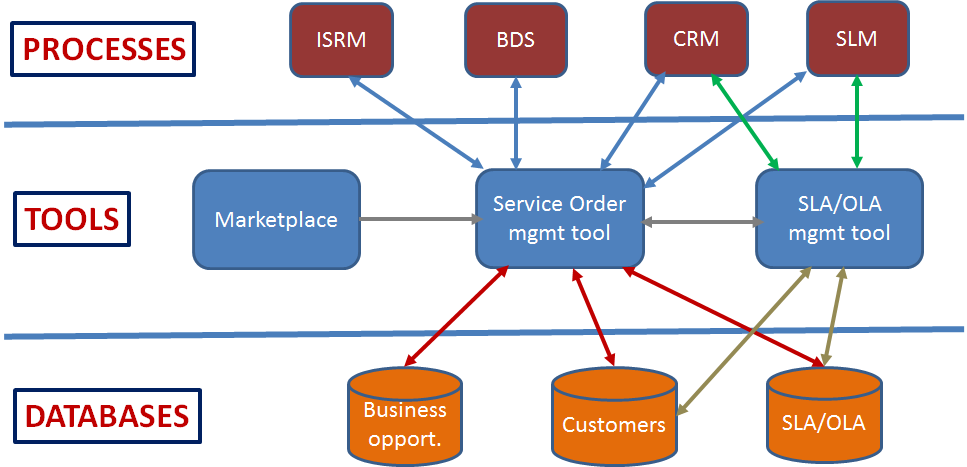
### Service order management tool

The Marketplace stores the following information in the Service Order Management tool:

* **Customer profile:** information allowing to identify the customer;
* **Service order profile:** information allowing to identify the service order typology (e.g. from a single user, a large community, a private company, a new or existing customer, etc.);
* **Service order:** list of services ordered by the customer.

Currently, the Service Order Management tool was implemented via a dedicated “service order” queue in the EGI ticketing system based on RT technology. We decided to adopt this technology since it already provides many of the needed features and could be easily extended. Details on the service order-queue are available in the following section.

After a service order is recorded, it will be managed according to the EGI IMS processes with a series of manual and automatic actions. The following picture shows the interactions that happen during the management of a service order between the Marketplace, the Service Order management and the SLA/OLA management tools with the EGI IMS processes and databases.



A detailed description of all the processes and steps to manage a service order according to the EGI IMS is showed in Figure 10. The complexity of such workflow requires the creation of as much automatisms as possible to make the customer support effective. Currently, we already defined and implemented a workflow that, with a minimal human intervention, allows serving orders for the AoDs. It is described later in this section.

Automatisms to serve other order typologies will be defined and implemented gradually. EGI tools will be enriched of new features accordingly as, for example, we have already planned to do integrating e-Grant as backend system for SLA/OLA management into the Operations Portal.

#### Service order queue specification and tickets

After the user submits a service order through the marketplace, a new ticket will be created in the service order queue of the EGI RT ticketing system.

This section describes the structure of the tickets, representing service orders, created by the marketplace in this queue.

* **Ticket subject:** it is a string with the following format:

“Service order, [Customer Name] [Customer Surname], [Service 1], [Service 2], … , [Service N]”

For example:

“Service order, Diego Scardaci, CloudCompute, OnlineStorage”

* **Generic information:** this section contains generic information about the service orders such as an Order reference number, a Request status, etc. The following table lists and describes all the attributes of this section.

|  |  |  |
| --- | --- | --- |
| **Attributes** | **Mandatory/**  **Optional** | **Note** |
| Order reference number | Mandatory | Same value of the PrestaShop order reference |
| Order status | Mandatory | Possible values:   * New * Approved * Rejected * Suspended   Default value: “New”. |
| AoDs | Mandatory | Yes/NO. Flag to identify orders that has to be served by the Applications on demand platform. |
| SLA | Optional | The marketplace leaves this attribute empty. It will contain a link to the SLA document (manually provided by an operator). |

* Customer/User profile: information retrieved by the EGI CheckIn service integrated with additional information gathered by the Marketplace during the registration process. The following table lists and describes all the attributes of this section.

|  |  |  |
| --- | --- | --- |
| **Attributes** | **Mandatory/**  **Optional** | **Note** |
| Name | Mandatory |  |
| Surname | Mandatory |  |
| e-mail | Mandatory |  |
| Display name | Mandatory | Human readable username |
| EGI unique identifier | Mandatory | Unique identifier assigned to the customer by CheckIn |
| Country | Mandatory |  |
| Institution | Mandatory |  |
| Department | Mandatory |  |
| Departmental web page | Optional | URL |
| Linkedin profile | Optional | URL |
| ResearchGate profile | Optional | URL |
| Supervisor name | Optional |  |
| Supervisor profile | Optional | URL |

* **Service order profile:** customer information associated to each service order gathered during the Check-Out phase in the Marketplace. Such information enables an appropriate service order management, accordingly to the EGI Integrated Management System (IMS) processes and procedures. The following table lists and describes all the attributes of this section.

|  |  |  |  |
| --- | --- | --- | --- |
| **Attributes** | **Mandatory/**  **Optional** | **Note** | |
| Customer typology | Mandatory | | * single user * representing a research community/project * representing a private company |
| Reason to request access to the EGI services | Mandatory | | free text |
| User group name | Optional  (**Only if the customer represents a research community/project or a private company, leave empty in the other case)** | | It is a text that 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 | Optional  (**Only if the customer represents a research community/project or a private company, leave empty in the other case)** | | Project name: text  Project web site: URL  To be expanded in the feature. It could be automatically filled in querying the operations portal if the project is already using the EGI infrastructure. |

* **Service orders:** List of strings that contain the service options for each ordered service.

Service orders are represented in the ticket with the following sintax:

*[Service Area]/[Service]/[ServiceOption]?[Attribute1=XX]&[Attribute2=YY]&..&[AttributeN=ZZ]*

For example:

*Compute/CloudCompute/GeneralPurposeInstance?NumberOfCPUCores=2&AmountOfRAMPerCPUCore=2&LocalDisk=10&NumberofVMInstances=5&NumberOfDays=200&StartOfService=20170501&AccessType=Opportunistic*

### Serving AoDs orders

A semi-automated workflow to manage AoDS orders has been already defined and is described in this section.

First of all, the Marketplace needs to identify users eligible for the AoDS. This is done during the service-order pre-processing phase.

A customer that submit a service order through the marketplace will be identified as an eligible user for the AoDs if he/she is a single user and one of the following conditions will be respected:

* If he/she directly requests access to one or more applications hosted in the AoDs (service options of the Applications on Demand service);
* If he/she orders one or more of the following services Cloud Compute, HTC Compute, Cloud Container Compute, Online Storage, Archive Storage with an amount of requested resources lower than predefined thresholds;

In such case, the marketplace marks the service order as an order for the AoDs and store this information in the Service Order Management tool (set the AoDS flag to “yes” in the ticket related to the service order).

The Service Order Management tool notifies AoDs administrators that will review the request and decide to approve or reject it updating the “Order status”. This is the only manual step of the process.

A change on the “Order status” attribute triggers the Service Order Management tool that checks the new value and perform an action according to the new value. If the user’s request has been rejected, an e-mail with the motivation is sent to the user. Otherwise, if the order has been approved, the tool contacts the CheckIn service to enable the user as an AoDs user. From a technical point of view, this means that the user will be registered as member of the AoDs VO, vo.access.egi.eu.

After that, the user is enabled to access the AoDS and will be notified about the outcome. The Service Order Management tool will also provide the user with the information on how to access the requested AoDs applications. Direct links to access such applications are also available in the Marketplace AoDs section that will act as the front-end platform of the service.

[Add architecture picture]

#### Identify orders eligible for the AoDs

This section describes the formula that has been defined to identify orders eligible for the AoDs.

As described above, services ordered by a customer are grouped during the pre-processing performed by the marketplace. Only two service group types can be accessed through the AoDs:

* Groups that include one or more of the following services: Cloud Compute, HTC Compute, Cloud Container Compute, Online Storage, Archive Storage.
* Groups that include only Applications on Demand service and related options (the applications).

While the second group type (Applications on Demand service and related options) is always eligible for the AoDs, the first one can be served via the AoDs only under certain conditions:

* All the resources have been requested with “opportunistic” access mode (not reserved);
* The amount of requested resources should be lower than some predefined thresholds.

Currently, we have defined the thresholds described in the two following tables:

|  |  |  |  |
| --- | --- | --- | --- |
| Thresholds | Max value | Involved Services | Description |
| Total number of CPU cores | 20 cores | Cloud Compute and Cloud Container Compute | Include all the ordered cores for the General Purpose Instance options of Cloud Compute and Cloud Container Compute services[[13]](#footnote-13). |
| Total amount of RAM | 40 GB | Cloud Compute and Cloud Container Compute | Consider the total amount of memory ordered for the General Purpose Instance options of Cloud Compute and Cloud Container Compute services[[14]](#footnote-14). |
| Total block storage capacity | 100 GB | Online Storage | Consider the total amount of ordered block storage |
| Total object storage capacity | 100 GB | Online Storage | Consider the total amount of ordered object storage |

Figure 12. Cloud - Thresholds per AoDs.

|  |  |  |  |
| --- | --- | --- | --- |
| Thresholds | Max value | Involved Services | Description |
| Total number of CPU hours | 1000 CPU/hour | HTC Compute | Total amount of CPU/hours ordered for Base HTC[[15]](#footnote-15). |
| Amount of RAM per CPU core | 4 GB/core | HTC Compute | All the orders related to HTC compute must require not more than 4 GB per CPU core. |
| Total file storage capacity | 100 GB | Online Storage | Consider the total amount GB per of ordered file storage |

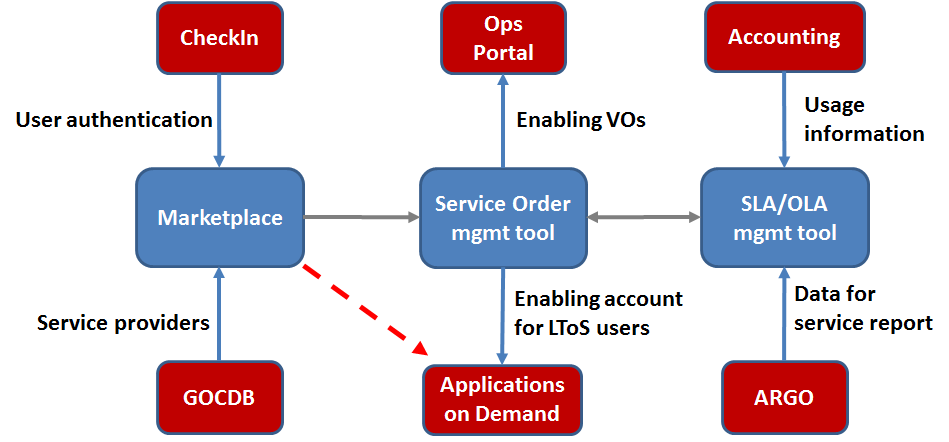
Figure 13. HTC -Thresholds per AoDs.

These thresholds will be validated and fine-tuned in the next months. Changes could be applied to both the “max values” and the threshold set if needed.

In case of a customer orders together services belonging to the two service types eligible per AoDS (e.g. Cloud Compute with opportunistic access type and satisfying the thresholds and an applications of the AoDs), the request will be considered as a single order and only one ticket will be created in the service order queue. Otherwise, the orders will be split as specified in section 6.1.

### Tools to manage service orders

[Which tools are involved in service order mgmt]



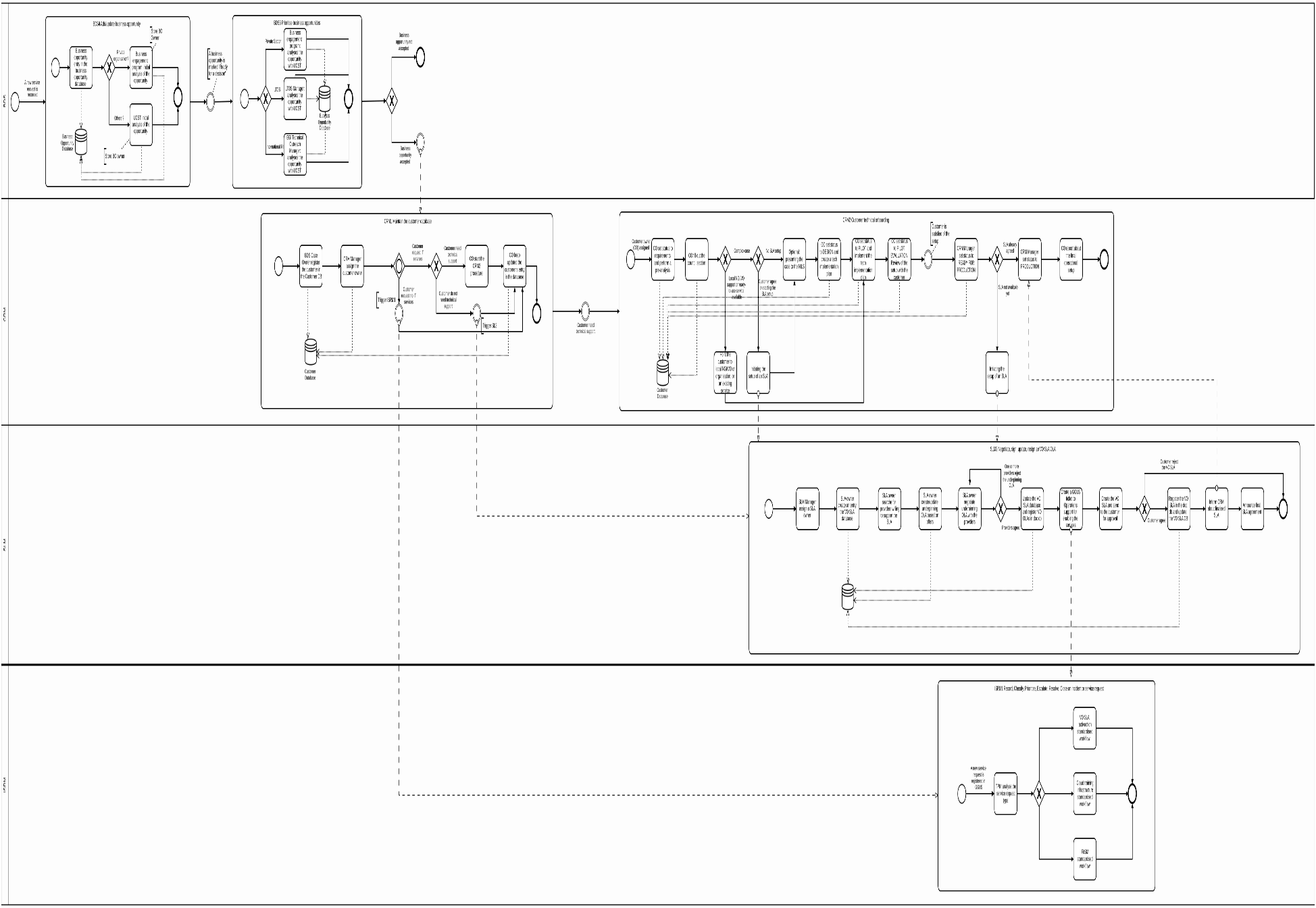


Figure 14. Service Order Management according to the EGI IMS.

# Enabling pay-for-use through the Marketplace

An analysis on how to implement the pay-for-use support in the Marketplace was performed in the last months. As result, three different options were defined.

1. 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.
2. 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 attribute. If this option is selected the access policies will change accordingly.
3. 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 options were discussed within the Pay-for-Use working group that decided to adopt the second solution: EGI acts as a broker.

Then, a flag “for pay” will be included as extra attribute in the forms to order service options that could be accessed in pay-for-use mode. A clear explanation of the different access policies (for free and for pay) will be included in the service option descriptions highlighting the different level of services offered according to the chosen policies.

Furthermore, it will be clarified that access to large resource set for free requires agreement with the NGIs and are correlated with the national research infrastructure roadmap of each country.

The role of EGI as broker will facilitate the meet between the demand and the offer. Thanks to its expertise, EGI could analyse customers’ requirements, provide them with advices and technical support and identify the best providers to satisfy their needs.

The Pay-for-Use mode will be enabled into the Marketplace in the coming months and will be tested in the context of the NextGEOSS project[[16]](#footnote-16) where EGI is a member with exactly these duties, supporting project use cases and identifying the Cloud providers of the EGI Federation that satisfy their needs in the best possible way.

# Moving to production

After the objective to design and the development a prototype of a Service Registry and a Marketplace for the EGI infrastructure was fully achieved with the release of two demonstrators[[17]](#footnote-17), once based on Prestashop and the other based on Open IRIS, 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 included:

* The implementation of the service order pre-processing described in section 6.2.1.
* The implementation of the first version of the Service Order Management tool with the recording of the service orders and the related profiling information in the RT[[18]](#footnote-18) system, see section 6.2.2 for details.
* The integration of the Marketplace with the Applications on Demand service.
* The implementation of the semi-automatic workflows to serve orders for AoDs described in section 6.2.3.
* The customisation of the PrestaShop customer dashboard to view/manage orders according to the needs of EGI.
* The integration of the Marketplace with the EGI web site.

All these activities were already completed or planned to be completed by the end of the project. Only the integration of the Marketplace with the EGI web site could be slightly postponed since it could be convenient collecting some feedback from our customers before.

Furthermore, according to the EGI IMS, a Service Design and Transition Package (SDTP) for the Marketplace was created in order to ensure proper evaluation, define the necessary pieces of information regarding the service design, delivery and transition planning. The SDTP also lists all the requisites the service has to satisfy to be moved in Beta (e.g. perform the service risks assessment, activate the support through EGI helpdesk, agree OLA/UA with the involved providers, etc.).

Many of the items covered by the plan have been already deeply described in Section 6 “Marketplace as tool to automate EGI IMS processes”. In this section details will be provided for the other points:

* The integration of the Marketplace with the Applications on Demand service.
* The customisation of the PrestaShop customer dashboard to view/manage orders according to the needs of EGI.
* The integration of the Marketplace with the EGI web site.

## Integration with the Application on Demand service

The Application on Demand service (AoDs) is the EGI’s response to the requirements of researchers, scattered across Europe, without dedicated access to computational and storage resources, as well as other facilities needed to run scientific applications.

In a nutshell, the Service offers:

* **Applications** that are offered "as a services" through online graphical environments.
* **Portals, science gateways** and **Virtual Research Environments** that offer integrated development environments to port custom applications with High-throughput computing and cloud resources.
* **Cloud** and **High-throughput** compute resources suited for both compute/data intensive applications and for the hosting of scientific services.
* **Online Storage** resources for storing scientific data that serve as input and output for computational jobs.
* A network of **Consultants** and supporters who can provide guidance on the use of the service.

The AoDs operates as an open environment where any provider can integrate and share applications and compute/data components. The following applications/components are already integrated in the service and are available for users to access:

* Thematic applications for supporting Life Sciences disciplines: Galaxy, ClustalW2, Chipster, NAMD and AutoDock Vina;
* Generic utilities: Docker, Apache Tomcat, Hadoop, Marathon, and Chronos;
* Thematic applications for supporting Engineering disciplines: GnuPlot, Octave and the Statistical R for Computing and Jupyter Notebook;
* Thematic applications for supporting Art and Humanities disciplines: the parallel Semantic Search Engine.

Initially, the AoDs was designed including a Frontend, the User Registration Portal, that partially implemented a service discovery and a user profiling features to identify small research groups (the so-called Long Tail of Science). Now that the Marketplace is available, these features have become redundant. The Marketplace already profiles the customers and, in addition, gathers information on service orders allowing to identify AoDs users. Furthermore, it has been considered more convenient offering to potential customers a unique point of access to all the EGI services (the Marketplace).

For such reasons, we decided to integrate the AoDs with the Marketplace for both exploiting its profiling features and exposing its service options (the applications) to the customers. The Marketplace also lists the links to access the applications and, then, can be used as a full frontend for the AoDs.

For this aim a new service category was introduced in the Marketplace data model, “APPLICATIONS”, and the AoDs was including in such category.

The new main page of the Marketplace is showed in the following image.



Figure 15. Marketplace homepage with the new "APPLICATIONS" service category.

AoDS service options, included in the third level of the Marketplace data model hierarchy, are the same applications offered by the AoDs.

Customers can order such applications together with other EGI services following the usual Marketplace workflows.



Figure 16. Applications on Demand service page in the Marketplace. Customers can order one or more applications together to other EGI services.

When the customer selects one application, he/she is redirected to a page, see Figure 15 and Figure 16, where the following elements are available:

* A form to submit the order allowing only to choose the time period to access the application. All the other attributes are not changeable since AoDs offers to each user a grant, providing a pre-defined quota of resources, for running the applications.
* Description of the application.
* Direct link to access the application after the user is authorised
* List of service providers supporting the application.

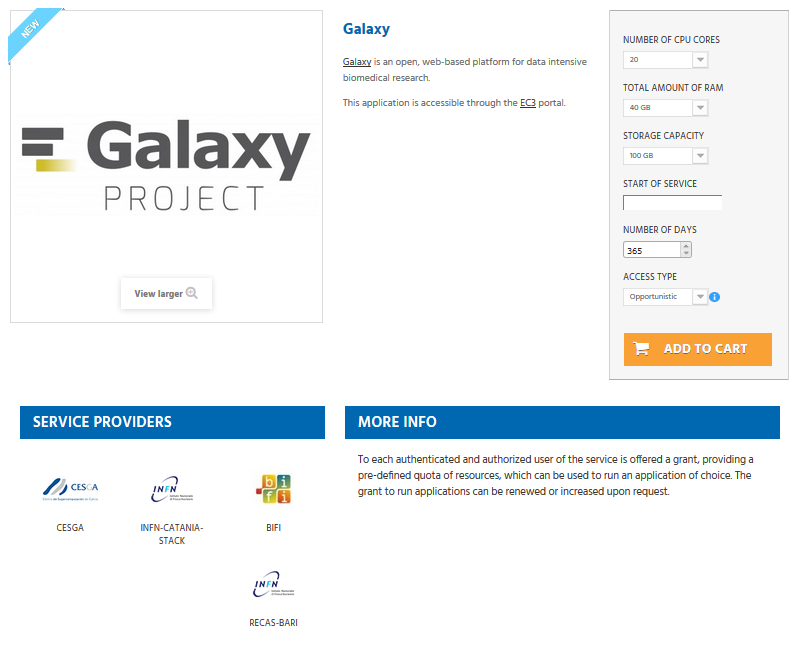


Figure 17. Example of a page allowing to request access to the Galaxy application.

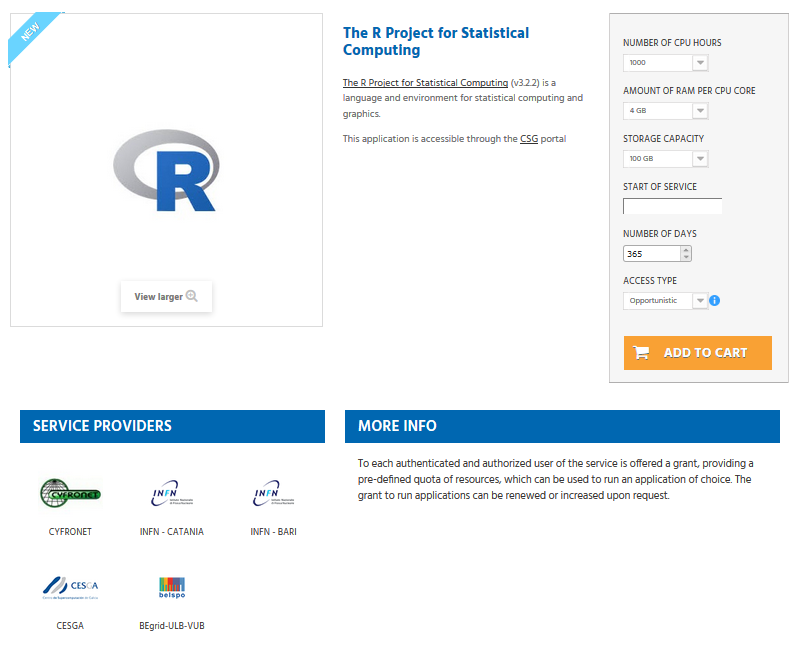


Figure 18. Example of a page allowing to request access to the R application.

Furthermore, … [AAI INTEGRATION]

## Customer dashboard

After a service order was submitted, a customer needs to be kept informed about its status. For this aim, we decided to customise the built-in PrestaShop customer dashboard.

In particular, we implemented the following changes:

* The Status column shows information about the service order status as reported in the related RT ticket. In case of more tickets were created for one order in Prestashop, status of each request is reported in the “Details” section.
* A new column, SLA, was added. This column report the URL to retrieve the SLA document when an order is approved.

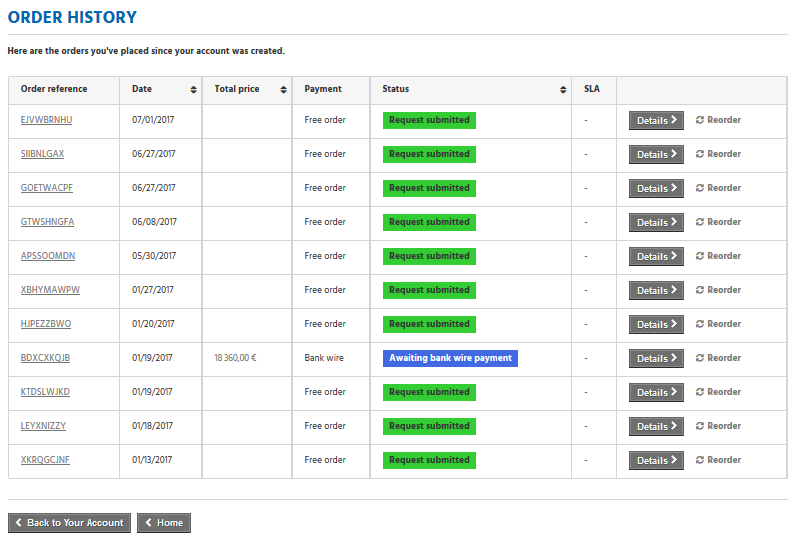


Figure 19. Customised PrestaShop customer dashboard.

[ADD a picture containing the details view]

## Integration with the EGI web-site

The EGI web site shows the EGI external service catalogue at <https://www.egi.eu/services/>. See the following image.

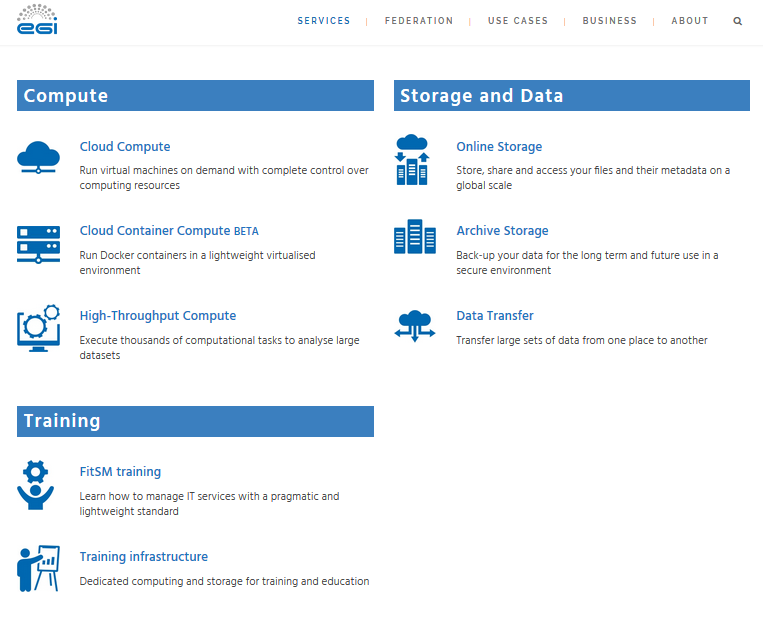


Figure 20. EGI Service Catalogue in the corporate web site.

Customers can retrieve more information about each specific service, visiting the dedicated web page, see the below image showing the Cloud Compute page as example:

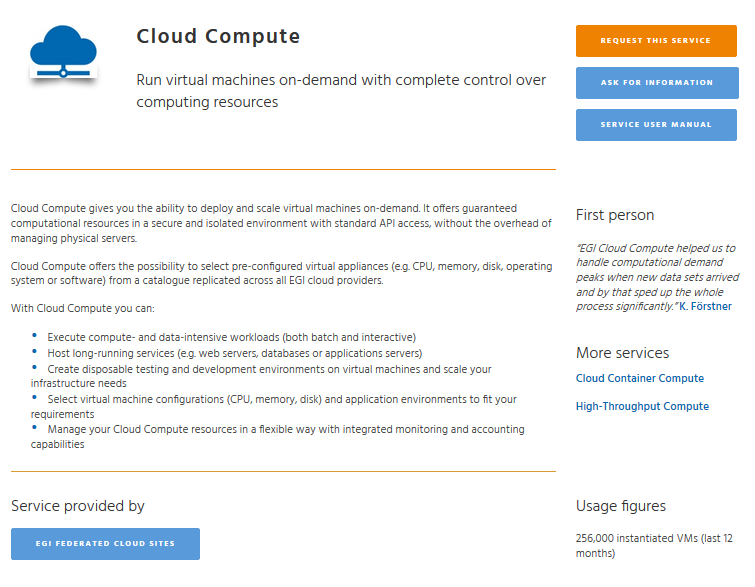


Figure 21. Page in the EGI web-site describing the Cloud Compute service.

Furthermore, customers can request more information about one or more services clicking on the “REQUEST THIS SERVICE” button and filling in a generic form. The form is the same for all the services and customers need to specify which services are interested of.

Integration between the EGI web site and Marketplace will be done linking the “REQUEST THIS SERVICE” button to the Marketplace page describing the service the customer is interesting of. Such page, in addition to the service presentation, lists also all the service options available for the given service facilitating, from one side, the customer on better specifying his requirements, and on the other side, EGI as service provider, collecting more and structured information in order. This is the base for implementing service order automation in the future.

See below, as example, the Marketplace page of the Cloud Compute service.

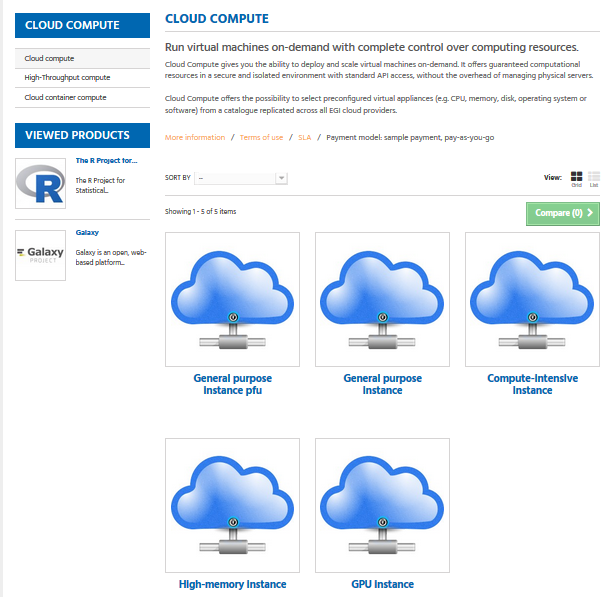


Figure 22. Cloud Compute service in the EGI Marketplace.

In the future, a tighter integration between the web site and the Marketplace could be implemented. The Marketplace could be included in the web-site top menu and all the applications described in the web site could be linked to the related entries into the Marketplace.

# Publishing of thematic platforms

Now that the marketplace is going to become operational, after a first phase where only EGI services will be published, this new tool will be opened to the whole EGI collaboration and partners.

The marketplace has the potential to become an important instrument to better promote and provide visibility to the thematic community services that are fundamental enablers of research and mediators of access to the EGI services. As thematic community service, we intend all the services and platforms that make use in some form of the EGI services.

The service design activity performed in the last months to integrate the Application on Demand service with the marketplace can be also considered as a driver for the integration of other platforms in the coming months. Indeed, the new “APPLICATIONS” service category was thought as the container for all the thematic platforms that will be exposed through the Marketplace in the future.

When a thematic platform will be integrated into the Marketplace, a new entry for such service will be created under the “APPLICATIONS” category and the related service options will be defined and exposed to the customers. We will explore the possibility to split such category in sub-categories taking into account the different scientific disciplines served by the EGI infrastructure.

When possible, as we already did for the AoDs, the Marketplace AAI based on the CheckIn service will be made interoperable with the thematic platform AAI allowing a transparent access to the applications from the Marketplace, for authorised customers. In such way, the Marketplace will act as a sort of unique Frontend for accessing the several applications and tools available in the EGI infrastructure (for some examples see https://www.egi.eu/use-cases/scientific-applications-tools/), hugely decreasing the barriers to discover and access them.

## Requirements to expose services in the marketplace

Service that will be published in the marketplace should satisfy some criteria such as guarantee a certain level of quality of the service, being compliance to generic security policies and EC regulations like GDPR, etc.

A preliminary work for the definition of such requirements was already completed and the results are described in this section. The requirement list will be fine-tuned and updated according to the feedback collected and the experience gained during the first phase of service boarding.

Services were classified in two categories:

* Services in the EGI catalogue: community platforms, in the form of scientific applications/VREs, will be introduced in the EGI service catalogue. EGI financially supports the operations of the service. If the supplier is also a technology provider, the supplier retains IPs of the software produced. EGI and the supplier agree on how to maintain and further develop the service (new features).
* External services: leaving the ownership and funding of the service to the organization developing and operating it, but promoting the service in the EGI service marketplace as an "EGI powered" community service, operated by a partner, in the context of a partnership agreement.

For each of this category requirements were defined. They are described in the following table.

|  |  |  |
| --- | --- | --- |
| Requirements | Services in the EGI Catalogue | External services (from external partner’s catalogues) |
| Belongs to EGI catalogue | * Yes (EGI is the provider) | * No (Partner is the provider) |
| Published in EGI marketplace | * Yes | * Yes, if requirements in this table are met and if the partner agrees |
| Agreement type | * OLA or UA (underpinning agreement) established | Contract between the EGI Foundation and the Service Provider including:   * Motivation of the collaboration * Acceptance of the requirement list * SLA defining EGI Service Components (where applicable) |
| Readiness | * TRL 8 or higher | * TRL 8 or higher |
| Quality of Service | * Min Availability/Reliability (thresholds defined by EGI) * Service is monitored and registered in GOCDB | * Min Availability/Reliability (thresholds defined by service provider) * Minimal monitoring in place by EGI (where possible) to ensure online services are up and running |
| Support | * Mandatory via the EGI support system (GGUS) | * Mandatory (support channel defined by provider) |
| Acknowledgement policy | * EGI acknowledgement mandatory | * EGI acknowledgement mandatory if service relies on components provided by EGI |
| Annual report on scientific publications and users | * Mandatory for services where it is applicable | * Mandatory if service relies on components provided by EGI |
| Service Performance Report | * Mandatory (requires report from supplier) | * No |
| Interoperation levels:   * Level 1: AAI * Level 2: AAI, accounting, monitoring, service registration | * Level 2 (mandatory) | * Level 1 (mandatory where applicable) |
| Compliance to EGI policies | * Mandatory | * Compliant to generic security policies and EC regulations |
| Terms of use | EGI defined:   * Service: Acceptable Use Policy and Conditions of Use[[19]](#footnote-19) * Content (where applicable): <depends on the service> * Software (where applicable): The service code software is licensed under <depends on the service> and is available upon request. | * Defined by Provider |

# Future plans

(1 PM) Import data from external tool

Should be available in PS. Only possible conversion is needed.

(1 PM) Export data in standard formats

Should be available in PS. Only possible conversion is needed.

(5 PM) SLA/OLA management tools (new e-GRANT): simple dashboard with 2 views (Operator and Dashboard) to manage OLA/SLA (for EGI Operator and Providers)

manage RT/JIRA tickets (?)

Manage targets of SLAs

Automatic generation of the SLA/OLA document (pdf) in the SLA/OLA management tools

Check service access request status, download/approve SLA

(6 PM) Interconnect the SLA/OLA management tools with the e-infra to enable services

(3 PM) Delegating to third parties the registration of new services in the marketplace:

you already assessed the feasibility of this feature during your analysis and told me that should be done via an external tools linked to PS.

(9 PM) Satellite marketplaces for 3rd party service providers:

Allow service registrations to main marketplace

Define views for satellite sites with harmonized access rights

Same look and feel for satellite sites with option to skin each satellite site separately

# Plan for Exploitation and Dissemination

*This section should provide a plan for exploitation and dissemination (PEDR) of the project results documented in this deliverable. If a plan was already provided in an earlier deliverable, then this plan should provide an update. The content will be used to update the catalogue of project results (*[*http://go.egi.eu/egi-engage-results*](http://go.egi.eu/egi-engage-results)*) and to develop an overall PEDR for the whole project.* ***You can create as many tables as the number of results being described.***

|  |  |
| --- | --- |
| *Name of the result* | *Short name for the result (results generated under the project could be any tangible or intangible output, more particularly data, knowledge or information whatever its form or nature, whether it can be protected or not.)* |
| *DEFINITION* | |
| *Category of result* | * *Technical input to standards: Technical specifications or extensions to standards adopted within the project* * *Policy & Procedure developments: Technical procedures directed at users, service and infrastructure providers (for example to govern access and allocation to resources), policy reports and recommendations, and strategic analysis* * *Software & service innovation: Software developments: (e.g.: workflows, Virtual Machines, applications), new software services deployed for the direct benefit of researchers (e.g.: web portals, gateways), e-Infrastructure Commons such as accounting, AAI, and the Federated Cloud platform and the Open Data platform, demonstrators and prototypes.* * *Business model innovation: Business and sustainability-related outputs (the EGI Service Marketplace concept, the contribution to the Innovation space for the big data value chain, sustainability plans, pay-for-use models)* * *Know-how: Includes all results from fact-finding activities (e.g. surveys, requirement gathering), but also the results from internal exercises (e.g. security challenges) and outputs that can be used for knowledge transfer as training materials.* |
| *Description of the result* | *Description of the result* |
| *EXPLOITATION* | |
| *Target group(s)* | *Describe who will use those results. Es: RIs, international research collaborations and the long-tail of science, industry/SMEs, service providers, Funding agencies and decision/policy makers, Standardisation bodies"* |
| *Needs* | *What are the needs of the target groups that the results aims to fulfil?* |
| *How the target groups will use the result?* | *How the project result will be used? How are you going to achieve the best benefits from the project outcomes? How can you make sure the results they owned are used:*   * *in further research activities other than those covered by the project concerned* * *in developing, creating and marketing a product or process* * *in creating and providing a service* * *in standardisation activities*   *Note: The exploitation does not need necessarily to be done by participants, who may prefer to ensure its use by another entity. Such indirect exploitation can be performed by licensing the results or assigning them to third parties, in accordance with the requirements established in the grant agreement "* |
| *Benefits* | *What are the expected benefits of the result when this will be used by the target groups?* |
| *How will you protect the results?* | *Protection of results is indeed essential in Horizon 2020, since an effective exploitation depends on it. Thus, participants must assess the possibility of protecting their results once these are generated. Please, describe what IP protection approach will you put in place for this result. This can range from simple attribution via open source license to full copyright for commercially exploitable results. (For more information you can read “How to manage IP in Horizon 2020: project implementation and conclusion”* [*https://www.iprhelpdesk.eu/sites/default/files/newsdocuments/FS\_IP\_Management\_h2020\_implementation\_0.pdf*](https://www.iprhelpdesk.eu/sites/default/files/newsdocuments/FS_IP_Management_h2020_implementation_0.pdf) |
| *Actions for exploitation* | *Please, describe the concrete actions that need to be executed to make the result reusable by the target group (e.g., for a software, this can include software packaging for distribution, documentation for the installation, etc). Once executed, the target groups should be able to use the results without barriers.* |
| *URL to project result* | *Link where the result will be made available* |
| *Success criteria* | *What are the success criteria in terms of adoption by the end of the project?* |
| *DISSEMINATION* | |
| *Key messages* | *What messages will you tell to the target groups when informing about the results?* |
| *Channels* | *What channels will you use to deliver the messages to the target? (e.g. Scientific publications, EGI web site, EGI newsletter, participation in conferences or trade fairs)* |
| *Actions for dissemination* | *Describe the concrete set of actions that will be put in place to disseminate this project output. When this result is ready, how will you reach to target group to ensure uptake of the result? (You can list the preliminary list of events where you plan to promote the results or material that will be produced or any other concrete actions that will be put in place during the project)* |
| *Cost* | *What is the expected cost of dissemination actions?* |
| *Evaluation* | *How will you evaluate the impact of the dissemination actions?* |

1. Appendix example

1. https://documents.egi.eu/document/2535 [↑](#footnote-ref-1)
2. <http://egi.science-it.ch> [↑](#footnote-ref-2)
3. <https://www.prestashop.com/en/> [↑](#footnote-ref-3)
4. <https://documents.egi.eu/document/2658> [↑](#footnote-ref-4)
5. <http://go.egi.eu/ServiceCatalogue> [↑](#footnote-ref-5)
6. <https://documents.egi.eu/document/2914> [↑](#footnote-ref-6)
7. <https://documents.egi.eu/document/3028> [↑](#footnote-ref-7)
8. <https://www.prestashop.com/en/documentation> [↑](#footnote-ref-8)
9. <http://iris.science-it.ch> [↑](#footnote-ref-9)
10. <http://addons.prestashop.com/en/20201-additional-product-attributes-custom-product-fields.html> [↑](#footnote-ref-10)
11. <http://addons.prestashop.com/en/19736-custom-checkout-and-customer-and-address-fields-manager.html> [↑](#footnote-ref-11)
12. <http://addons.prestashop.com/en/19389-dynamic-product-price.html> [↑](#footnote-ref-12)
13. Other options of the Cloud Compute and Cloud Container Compute services admit only reserved instances then an order including such options cannot be eligible for the AoDs. [↑](#footnote-ref-13)
14. Other options of the Cloud Compute and Cloud Container Compute services admit only reserved instances then an order including such options cannot be eligible for the AoDs. [↑](#footnote-ref-14)
15. MPI HTC service option is not eligible per the AoDs. [↑](#footnote-ref-15)
16. http://nextgeoss.eu/ [↑](#footnote-ref-16)
17. EGI-Engage D3.13 Second release of the EGI Service Registry and Marketplace prototype: <https://documents.egi.eu/document/3028> [↑](#footnote-ref-17)
18. <https://rt.egi.eu/rt/index.html> [↑](#footnote-ref-18)
19. <https://documents.egi.eu/document/2623> [↑](#footnote-ref-19)