

H2020-EINFRA-2015-1

VI-SEEM

VRE for regional Interdisciplinary communities in Southeast Europe and the Eastern Mediterranean



Deliverable D6.1

Framework for VRE resource and service provision

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Status –Version: Final - e

Date: June 15, 2016

Distribution - Type: Public

Abstract: Deliverable D6.1 – “Framework for VRE resource and service provision” provides the details of the framework for the VRE resource and service provision for the implementation of the calls envisaged in the duration of the project as well as best practices for future calls.

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The VI-SEEM project is funded by the European Commission under the Horizon 2020 e-Infrastructures grant agreement no. 675121.

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Document Revision History

Date	Issue	Author/Editor/Contributor	Summary of main changes
June 15 st , 2016	a	Ioannis Liabotis, Stelios Erotokritou	Initial version of ToC
June 17 th , 2016	b	Stelios Erotokritou	Contributions to sections 3 and 4
June 24 th , 2016	c	Ioannis Liabotis	Contribution to section 1, 2, 3, 4
June 25 th , 2016	d	Stelios Erotokritou, Ioannis Liabotis	Draft document, overall editing and corrections
June 28 th , 2016	e	Ioannis Liabotis, Demetris Antoniadis, George Antonopoulos, Ognjen Prnjat	Comments to draft d, executive summary, conclusions, final additions and corrections

Preface

In the last decade, a number of initiatives were crucial for enabling high-quality research - by providing e-Infrastructure resources, application support and training - in both South East Europe (SEE) and Eastern Mediterranean (EM). They helped reduce the digital divide and brain drain in Europe, by ensuring access to regional e-Infrastructures to new member states, states on path to ascension, and states in European Neighborhood Policy area – in total 14 countries in SEE and 6 in EM.

This VI-SEEM project brings together these e-Infrastructures to build capacity and better utilize synergies, for an improved service provision within a unified Virtual Research Environment (VRE) for the inter-disciplinary scientific user communities in the combined SEE and EM regions (SEEM). The overall objective is to provide user-friendly integrated e-Infrastructure platform for regional cross-border Scientific Communities in Climatology, Life Sciences, and Cultural Heritage for the SEEM region; by linking compute, data, and visualization resources, as well as services, models, software and tools. This VRE aspires to provide the scientists and researchers with the support in full lifecycle of collaborative research: accessing and sharing relevant research data, using it with provided codes and tools to carry out new experiments and simulations on large-scale e-Infrastructures, and producing new knowledge and data - which can be stored and shared in the same VRE. Climatology and Life Science communities are directly relevant for Societal Challenges.

The driving ambition of this proposal is to maintain leadership in enabling e-Infrastructure based research and innovation in the region for the 3 strategic regional user communities: supporting multidisciplinary solutions, advancing their research, and bridging the development gap with the rest of Europe. The VI-SEEM consortium brings together e-Infrastructure operators and Scientific Communities in a common endeavor.

The overall objective is to provide user-friendly integrated e-Infrastructure platform for Scientific Communities in Climatology, Life Sciences, and Cultural Heritage for the SEEM region; by linking compute, data, and visualization resources, as well as services, software and tools.

The detailed objectives of the VI-SEEM project are:

1. Provide scientists with access to state of the art e-Infrastructure - computing, storage and connectivity resources - available in the region; and promote additional resources across the region.
2. Integrate the underlying e-Infrastructure layers with generic/standardised as well as domain-specific services for the region. The latter are leveraging on existing tools (including visualization) with additional features being co-developed and co-operated by the Scientific Communities and the e-Infrastructure providers, thus proving integrated VRE environments.
3. Promote capacity building in the region and foster interdisciplinary approaches.
4. Provide functions allowing for data management for the selected Scientific Communities, engage the full data management lifecycle, link data across the region, provide data interoperability across disciplines.
5. Provide adequate user support and training programmes for the user communities in the SEEM region.

6. Bring high level expertise in e-Infrastructure utilization to enable research activities of international standing in the selected fields of Climatology, Life Sciences and Cultural Heritage.

The VI-SEEM project kicked-off in October 2015 and is planned to be completed by September 2018. It is coordinated by GRNET with 15 contractors from Cyprus, Bulgaria, Serbia, Hungary, Romania, Albania, Bosnia-Herzegovina, FYR of Macedonia, Montenegro, Moldova (Republic of), Armenia, Georgia, Egypt, Israel, Jordan. The total budget is 3.300.000 €. The project is funded by the European Commission's Horizon 2020 Programme for Excellence in Science, e-Infrastructure.

The project plans to issue the following deliverables:

Del. no.	Deliverable name	Nature	Security	Planned Delivery
D1.1	Project management information system and “grant agreement” relationships	R	CO	M01
D1.2	3-Monthly progress report	R	CO	M03n *
D1.3a	First period progress reports	R	CO	M18
D1.3b	Final period progress reports	R	CO	M36
D2.1	Internal and external communication platform, docs repository and mailing lists	DEC	PU	M02
D2.2	Promotional package	DEC	PU	M04
D2.3	Dissemination and marketing plan	R	PU	M05
D2.4	Training plan	R	PU	M06
D2.5	Promotional package with updates	R	PU	M16
D2.6	1st Dissemination, training and marketing report	DEC	PU	M18
D2.7	2nd Dissemination, training and marketing report	R	PU	M35
D3.1	Infrastructure and services deployment plan	R	PU	M04
D3.2	Service registry, operational and service level monitoring	R	PU	M12
D3.3	Infrastructure overview, assessment and refinement plan	R	PU	M18
D3.4	VRE AAI Model and compatibility with other eInfrastructures	R	PU	M27
D3.5	Final infrastructure overview and assessment report	R	PU	M36
D4.1	Data sources and services deployment plan	R	PU	M06
D4.2	Description of the initial deployed data services	R	PU	M11
D4.3	Description of the final data platform available to VRE users	R	PU	M23
D4.4	Final report on data, services, availability and usage	R	PU	M35

D5.1	Detailed technical implementation plan for VRE services and tools	R	PU	M04
D5.2	Data management plans	R	PU	M06
D5.3	User-oriented documentation and training material for VRE services	R	PU	M13
D5.4	Report on integrated services and the VRE platform	R	PU	M14
D5.5	Final report on integrated services and the VRE platform	R	PU	M36
D6.1	Framework for VRE resource and service provision	R	PU	M09
D6.2	1st Report of open calls and integration support	R	PU	M20
D6.3	Sustainability and business model	R	PU	M24
D6.4	2nd Report of open calls and integration support	R	PU	M36

Legend: R = Document, report, DEC = Websites, patent fillings, videos, etc., PU = Public, CO = Confidential, only for members of the consortium (including the Commission Services).

* $n=1,2,3,\dots,12$

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- [1] Project VI-SEEM-675121 - Annex I - Description of the action
- [2] The HPC World project, <http://www.hpcworld.eu>
- [3] Handbook of HPC e-Science Infrastructure Allocation Reviewing, Selection and Management, <https://sciencenode.org/announcement/hpcworld-presents-handbook-hpc-e-science-infrastructure-allocation-reviewing-selection.php>
- [4] The EUDAT2020 project, <https://www.eudat.eu>
- [5] VI-SEEM D5.1 - Detailed technical implementation plan for VRE services and tools

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Glossary

EGI	European Grid Infrastructure
EM	Eastern Mediterranean
EUDAT	European Data Infrastructure
GPU	Graphics Processing Unit
LAS	Live Access Server
SEE	South East European
SEEM	South East Europe and Eastern Mediterranean
UI	User Interface
VI-SEEM	VRE for regional Interdisciplinary communities in Southeast Europe and the Eastern Mediterranean
VO	Virtual Organization
VM	Virtual Machine
VRE	Virtual Research Environment

Executive summary

What is the focus of this Deliverable?

This deliverable describes the framework that will be used in the context of the VI-SEEM project for providing access to users of the VI-SEEM services and the associated resources. It provides the foundation for the access policies that will be used throughout the duration of the project to ensure the best possible utilization of the VI-SEEM services and resources, serving also as a long-term guide for the provision of Virtual Research Environment (VRE) services.

What is next in the process to deliver the VI-SEEM results?

The contents of this deliverable will form the basis for the other work packages so as to make efficient use of the e-Infrastructure services. The framework for VRE resource and service provision defines how the services offered by WP3 (e-Infrastructure), WP4 (data) and WP5 (application-level) will be provisioned to the VI-SEEM users.

In particular, the content of this deliverable will be used in the following VI-SEEM activities:

- WP6.2 - Implementation of open calls for access to VRE resources
- WP6.3 - Integration of the new applications to the VRE environment
- WP6.4 - Sustainability and business model
- WP4.1 – Data services design
- WP4.3 – Data collection and provisioning
- WP4.4 – Data analysis
- WP5.1 – Refinement of service requirements & tech assessment for integration
- WP5.3 – Development VRE platform
- WP5.4 – Overall integration of services

What are the deliverable contents?

Section 1 provides the introduction and motivation of this document as well as a description of the work that has been performed by WP6 T6.1 for producing this deliverable. Section 2 provides a description, characterization and classification of the VI-SEEM services and resources that will assist the reader to understand the types of services offered and therefore the underlying requirements in terms of access policies. Section 3 provides a review of the best practices in provision of related services and underlying resources as identified in the literature and practices by relevant e-Infrastructure projects. Section 4 provides the VI-SEEM framework for resource and service provision combining and analyzing the requirements and best practices. Finally, Section 5 provides the conclusions and recommendations derived.

Conclusions and recommendations

The deliverable includes a detailed overview of VRE resource provisioning framework. In particular, it gives guidelines and recommendations regarding:

- Types and characterization of services and resources offered by VI-SEEM VRE.
- Best practices in the European and world-wide context for offering such services and resources.

- Main principles of the framework for service and resource provision to be used, with the aim to:
 - Make services and resources provided by the VRE available for free to as many as possible researchers from the region of South Eastern Europe and the Eastern Mediterranean (SEEM), and the wider user community (for open and free resources).
 - Promote most efficient usage of the underlying infrastructure services provided by the VI-SEEM service provider partners.
 - Promote scientific excellence and improve the competitiveness of the researchers in the SEEM region.
- Main characteristics of running the open calls envisaged to be implemented by T6.2, defined based on the above principles.

1 Introduction

This deliverable describes the framework that will be used in the context of the VI-SEEM project for providing access to users of the VI-SEEM services and the associated resources. It provides the foundation for the access policies that will be used throughout the duration of the project to ensure the best possible utilization of the VI-SEEM services and resources, serving also as a long-term guide for the provision of Virtual Research Environment (VRE) services.

The VI-SEEM VRE is composed of several types of services ranging from access to multiple types of computational services, storage services and underlying resources, as well as software, data, workflow repositories and application specific services. All those services have different characteristics in terms of availability, costs and therefore access modalities.

WP6 has worked on the characterization and categorization of those services based on the above characteristics and researched the best practices to identify relevant and suitable access policies. These best practices are combined and adapted to satisfy the requirements of the complex VI-SEEM VRE.

The service provision framework for the VRE resource and service provision is based on the following principles:

- To make services and resources provided by the VRE available for free to as many as possible researchers from the region of South Eastern Europe and the Eastern Mediterranean (SEEM) and the wider user community (for open and free resources).
- To promote the best and most efficient usage of the underlying infrastructure provided by the VI-SEEM resource provider partners.
- To promote scientific excellence and improve the competitiveness of the researchers in the SEEM region.
- To promote scientific collaboration and exchange of knowhow between the experienced research groups and the less experienced but potentially excellent new research teams of the region.
- To open up the knowledge and data produced in the region to all researchers in Europe and beyond where possible.
- To offer user and application enabling support to the user communities which require it.
- To serve the scientific fields of Life Sciences, Climate Research and Digital Cultural heritage which are identified as most relevant for the region.
- To provide the opportunity to researchers of all countries to have access to the services offered by VI-SEEM.

The rest of the document is structured as follows.

Section 2 provides a description, characterization and classification of the VI-SEEM services and resources that will assist the reader to understand the types of services offered and therefore the underlying requirements in terms of access policies. Section 3 provides a review of the best practices in provision of related services and underlying resources as identified in the literature and practices by related e-Infrastructure projects. Section 4 provides the VI-SEEM framework for resource and service provision combining and analyzing the requirements and best practices. Finally Section 5 provides the conclusions and recommendations.

2 VI-SEEM resources, services and their access characteristics

2.1 HPC resources

The VI-SEEM HPC resources available consist of clusters with low-latency interconnect or supercomputers. Two of these supercomputers, Avitohol from Bulgaria and Leo from Hungary, can be found in the November 2015 top500 list of supercomputers (at 389th and 402nd place respectively), while the ARIS supercomputer from Greece was present at the June 2015 list (at 468th place). Most of the systems are based on CPUs with x86_64 instruction set, some of them are equipped with accelerators, some BlueGene/P systems are available, as well as one based on the Cell processor (PS3 cluster IMAN1-Booster/King).

HPC resources are usually allocated to scientific projects for a specific period of time, i.e. months or a year and are limited by the total amount of core hours allocated to the research group to achieve the work of the project. HPC resources are considered as limited resources which need to be managed properly in order to maximize their efficiency and to achieve the desired outcomes. Due to the nature of HPC resources, which includes state of the art hardware, possible provision of accelerators (such as GPUs and Xeon Phi co-processors) and the tight integration of their nodes via specialized fast interconnects (such as InfiniBand), HPC allocations should only be provided to projects/applications that really require such resources. Therefore, the “need for HPC” is one of the main criteria when evaluating users requesting access to such resources. HPC resources are not unlimited therefore a well-defined selection process for the provision of such resources needs to be defined.

2.2 Cloud resources

Cloud resources provided by the project can be used in one of two ways. Cloud resources that provide the ability to launch VMs with public IPs will provide the possibility to deploy VRE services, for their main or backup/fail-over instance, as was envisioned in the project proposal. VMs that possess only private IPs will be used for distributed data processing where necessary. Due to better processing capabilities of HPC resources, it is expected that data processing will be carried out using HPC resources instead.

Commercial cloud providers provide cloud resources based on a pricing model which accounts for the usage of such resources over time, with a different price tag based on the performance characteristic of the associated Virtual Machine (VM). A number of VI-SEEM partners have dedicated a number of cloud VM resources for usage in the project. The pool of such resources will be allocated to applicants and potential users based on a selection process that involves the evaluation of a relevant access proposal.

2.3 Grid resources

Grid resources available by the project will mostly be provided by clusters that already have installed Grid middleware and are part of the European Grid Infrastructure (EGI).

Some clusters that are not certified at the level of the EGI will have to be incorporated through appropriate means, e.g., by using modified BDII services.

Similar to the allocation of HPC and Cloud resources, Grid resources will be allocated to appropriate applications that are suitable for such usage and requirement. The selection process for Grid resources can be less strict than the one used for HPC resources but it has to also be defined.

2.4 Storage services and data

VI-SEEM resource provider partners offer various types of storage resources including HPC scratch space, Grid storage, VM attached Volumes, tape or disk archiving systems and repository linked file systems. Via this types of storage, a number of related services are being deployed. Data services, further described in detail in deliverable D4.1 “Data sources and services deployment plan”, are:

- Simple data sharing
- Data repositories
- Data archiving
- Work storage space / Local storage
- Data search and catalogue
- Data analysis

The customers/users of these data services are data providers and data consumers. A user can act as both a data provider and a data consumer exchanging one of these two roles. The two categories of users (providers/consumers) should have different access policies. Data providers utilize storage space that is provided by VI-SEEM partners who provide resources. As this storage is not unlimited and comes with a price, specific limitations on the amount of storage and the duration of data retention for each user/project must exist. For data consumers, unless privacy or copyright issues exist, users should in general be allowed unlimited access to the available data sets.

2.5 Application services

2.5.1 Software environment

The VI-SEEM software environment is a set of application software components, libraries, compilers, debuggers, profilers and other development tools that will be available to VI-SEEM users who have access to HPC/Cloud/Grid computational resources. Most software environment components are open source and freely available software which have been optimally installed in the available computational resources. Provision of the software environment comes as a service to any user that gets access to the infrastructure as long as it is open source/free software. When a commercial software license is needed, users will need to have the appropriate form of license for them to be allowed to use the specific software upon VI-SEEM compute resources.

2.5.2 Workflow and code repositories

Workflow and code repositories usually require small amounts of storage space and it is envisaged that after quality control, researchers should be provided with the appropriate storage to store their workflows / pipelines for them to be accessible and freely available for other researchers to access without any form of restrictions.

2.5.3 Application-specific services

Application specific service in the context of VI-SEEM are portals that allow their users to perform specific tasks such as performing complex queries for the acquisition of data, performing simple computation on existing or user defined data to derive meta data or extract information, perform visualization of datasets etc. The underlying infrastructure that supports such services usually consists of virtual machines provided by the VI-SEEM cloud infrastructure and the service providers can provide such resources as seed resources. By using seed resources, a number of users can have unrestricted access to such application specific services. However, when utilization and performance constraints require the deployment of a high amount of underlying resources, special resource provision arrangements need to be put in place to ensure adequate quality of service.

2.5.4 Summary of resource characteristics

The following table provides a summary of the service types, resource types and the corresponding provisioning methodology that should be used.

Service Type	Resource Type	Provisioning Type
HPC resources provisioning	Limited	Based on evaluation of project proposals
Cloud resource provisioning	Limited	Based on evaluation of project proposals
Grid resource provisioning	Limited	Based on evaluation of project proposals
Storage/Data (data hosting services)	Limited	Based on evaluation of project proposals
Storage/Data (data access services)	Unlimited (virtual)	Unlimited / Limited by license and IPR issues
Software environment	Unlimited but tied to computational resources	Available with the corresponding computational resources
Workflow and code repositories (provider)	Unlimited in general	Open but quality control restrictions apply
Workflow and code repositories (consumer)	Unlimited (virtual)	Open / Limited by license and IPR issues
Application specific services	Unlimited / Limited	Unlimited for best effort quality of service / based on evaluation of project proposals for better than best effort quality of service.

Table 1 - Characterization of VI-SEEM services and resources

3 Best practices in provision of resources and services

3.1 Compute resources provisioning

The HPC World project [2] funded by the EC has published the “Handbook of HPC e-Science Infrastructure Allocation Reviewing, Selection and Management” [3], which includes practical, hands-on experiences resulting from several active peer review processes and provides suggestions for solving possible pitfalls for the various stakeholders involved in them.

It is based on a collection of best practices gathered by various large HPC infrastructure providers in different countries of the world, making recommendations for the efficient allocation of HPC resources.

In summary the main objectives of resource provisioning in HPC systems as proposed in the above handbook are:

- Enabling breakthrough science through an effective use of HPC infrastructures
- Maximizing the impact of research projects
- Continuously refreshing and enlarging the user base
- Ensuring open access to the available resources.

The provisioning system is based on research project proposals that request access to specific HPC resources - usually core hours, and an expert evaluation by peer reviewers. The details of such systems vary across the different providers worldwide however the main principles remain common:

- Transparency
- Management of conflicts of interest
- Confidentiality
- Prioritization
- Parallel assessment avoidance
- Fairness to the science
- Avoidance of parochialism
- Good communication

Figure 1 presents an overview of the review and provisioning process for HPC resources as taken from the “Handbook of HPC e-Science Infrastructure Allocation, Reviewing, Selection and management”.

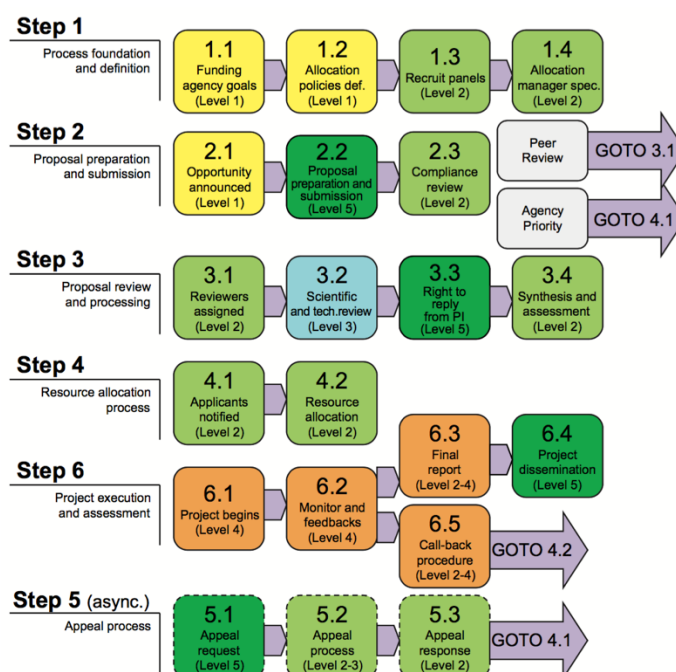


Figure 1 - The review process workflow as presented in the "Handbook of HPC e-Science Infrastructure Allocation, Reviewing, Selection and management"

Due to the increased costs of acquiring and operating HPC resources the process for allocating such resources has been carefully designed (as depicted from the information provided in Figure 1) to ensure fair, transparent and efficient resource allocation and utilization for the benefit of excellence in science.

Grid and Cloud computing provisioning mechanisms are based on more light weight allocation mechanisms and usually do not undergo a strict peer review mechanism. In particular, Grid computing virtual organizations (VO) are being created and members of such virtual organizations have access to a fair share of resources in a set of distributed clusters around infrastructure providers. The share that each virtual organization will have in each of the grid sites is negotiated by the VO manager with each site manager individually. Then the VO manager has the responsibility for allowing individual users to join the VO and then install the appropriate software in order for applications to run.

Cloud compute resources management and provisioning is mainly based on the principles of elasticity and scale out, where usually a basic set of resources is provided to a user but when the user requires extra resources, these can be allocated from a pool of available ones. In a similar way to grid resources a “project” manager of resources can request a particular share from the cloud providers and then individual users are accepted by the “project” manager.

3.2 Data and storage resources and services provisioning

EUDAT [4] is running the largest data services infrastructure in Europe, providing a variety of storage services to all the different European scientific communities which require it. As part of its Collaborative Data Infrastructure EUDAT has recently run a call for collaboration among projects, where research communities, research projects and

individual researchers could apply to use EUDAT’s European scale data services, resources and expertise free of charge so that collaboration projects can be piloted.

The call was targeting all European communities and the selection criteria were the following:

- Relevance of the project to the EUDAT’s service offering and roadmap.
- The ability and experience of the researchers in pursuing the project objectives.
- The technical feasibility with regard to the availability of storage and network resources available via EUDAT.
- The benefits of the project for the immediate research community.
- Contribution to open access.

The proposals submitted were then evaluated by the EUDAT executive board which prioritized the projects and provided access to a number of selected projects.

Further to this call, several PRACE Tier-0 and DECI calls are offering compute resources coupled with storage resources for those projects that require extra storage services (more than the default scratch storage that is being offered to HPC compute projects). The need for storage resources was evaluated together with the need for HPC compute resources through the relative peer review process.

3.3 Application services resources provisioning

The application services provisioning model can follow the HPC, Grid or Cloud provisioning paradigm in accordance with the resources that are being used for the service to operate. In VI-SEEM it is envisaged that application level services will utilize VMs provided by the resource provider partners of the project.

More specifically, for the workflow and code repository services access will be provided to all interested researchers. When workflows or codes are to be stored the material will first be checked for their relevance and quality with regards to the scope of the VRE. Access to the workflows and codes will be free for all, with the only usage limitation being dependent on the relevant privacy, IPR and copyright constraints that will accompany the workflows or codes.

Three initial application services will be provisioned through the VI-SEEM Virtual Research Environment Portal. These are:

- The Live Access Server (LAS) for the Climatology scientific community
- ChemBioServer for the Life Sciences scientific community
- Clowder for the Digital Cultural Heritage community

Each of these online services is available for anyone to view, hosting data and providing different types of services for different types of users upon the hosted data.

The LAS provides basic viewer access to non-registered users, but upon logging into the server, users are able to visualize hosted datasets using various available parameters. These services are available to users who have an account – and no further applications are required for the processing that takes place.

The Clowder service hosting Digital Cultural Heritage community data can allow for non-registered users to view this data and to download them as well – without any restrictions.

Uploading of material/data to this service can only be done by service account holders. Depending on the type of data that are uploaded different amounts of processing are carried out – by processes called extractors, which allow for the data to be viewed and manipulated by users (registered and possibly unregistered) of the service. As an example, data that can be uploaded could be those depicting an ancient artifact and the processing carried out by the extractors permit users of Clowder to view the object in their browser, zoom in on it, but also move and rotate it to view it as a 3 dimensional artifact, change the angle of lighting and study its texture.

4 VI-SEEM resources and services provision framework

The following sub-sections present the main classes of access to the VI-SEEM resources and services overall.

4.1 VI-SEEM development access

The VI-SEEM Development Access scheme facilitates the development and integration of the services to be prepared by the selected collaborating user communities. During this process, applications will be given access to the VI-SEEM infrastructure and necessary computational resources for a six month period, during which application developers are expected to develop and integrate the relevant services to the VRE platform.

VI-SEEM development access is continuously open for application developers to implement and deploy their services. Developers and applications that want to start development work in the infrastructure need to get the approval from the technical board. The amount of resources (computational, storage, etc.) that they require is specified in the applications questionnaire that was carried out at the beginning of the project by WP5 and WP4.

To facilitate an efficient service building and deployment process, we have defined an integration plan (see D5.1 [5]) where development of services should follow a specified timeline. Based on this, the integration plan has been divided into three phases. The timelines for these three phases were selected so that they are in accordance with major milestones of the project. In particular, the three integration phases will be implemented as follows:

1. The first integration phase will start in M5 of the project where 10 applications will be given access to the infrastructure and they will be expected to complete the development and integration of services by M12, when the 1st call for production access will be opened.
2. Sixteen applications that were selected to be part of the second integration phase will be given access to the infrastructure at any time between M5 and M12 of the project and will be expected to develop and integrate services by M18 of the project when the 2nd call for production access will open.
3. Finally, 11 applications which will be offered access during the third integration phase will be given access to the infrastructure at any time between M12 and M22 of the project, and will be expected to develop and integrate their services by M28 when the 3rd call for production access will open.

4.1.1 Services provided via development access

The services that are provided for development access are mainly the following:

- Access to HPC, Cloud, Grid resources.
- All storage services (Simple File Sharing, Repository, Search, Archive, Scratch Space) for data producers that are willing to share data.
- Workflow and Code repositories (for producers that are willing to share data).

- Application level services (for producers that are willing to share data and services).

4.1.2 Eligibility criteria for development access services

The eligibility criteria for development access are the following:

- Highest priority is given to researchers who are affiliated with one of the selected collaborating groups in the VI-SEEM project or
- Any researcher from the SEEM region that works in the thematic areas of interest to VI-SEEM partnership - in the scientific fields of Life Sciences, Climate Research and Digital Cultural Heritage.

4.2 Unlimited access

Unlimited access to services is given to authorized users, who can use a service without any restriction in the amount of time and the number of requests they can do to the services. The number of requests should remain within a predefined limit that depends on the expected normal usage and the service's deployment capability. Unlimited access might be open to everyone or might require registration depending on privacy, IPR and copyright issues).

4.2.1 Services provided via unlimited access

The services that are provided for unlimited access are mainly the following:

- Storage services (Repository, Search) for data consumers.
- Workflow and Code repositories (for consumers)
- Application level services (for consumers)

4.2.2 Eligibility criteria for unlimited access services

Eligible for unlimited access is in principle any researcher in the world. However special restrictions might apply based on the specific content that access is requested.

4.3 Calls for production use of resources and services

Calls for production of resources and services will target specific communities and research groups which have already began development of their projects.

These calls are intended for mature projects which require high amounts of resources and services for their intended project lifetime work plans. These calls are important, as they will allow researchers from one country/region to request and use resources of different architectures than those which may be available to them through similar national/regional calls. This advantage is expected to increase the capabilities and competitiveness of applying research groups.

These calls will be issued regularly throughout the project lifetime and have strict closing times. Calls will be open for application submissions for at least two months and their opening will be disseminated to all project partners and their relative contacts.

During this time, interested parties can submit applications for production calls and request for time on high-performance computing resources, cloud resources, time on grid resources and storage and data resources.

Once the submission period expires, received production call applications will undergo a transparent and impartial two-month peer-review process where applications will undergo both technical and scientific reviews.

Before the first call production access opens, an allocation panel will be established specifically for production calls which will be responsible for the final decision on how resources and services are distributed among the received applications. Such a panel will be composed of regional experts from VI-SEEM's scientific communities and especially those of Life Sciences, Climatology and Digital Cultural Heritage.

Applications are expected to demonstrate a high level of technical and scientific maturity as scientific and technical excellence will be the key criteria used by the allocation panel when deciding how resources will be distributed.

Awarded projects will be able to use their allocation resources within one calendar year of their project setup and a final report which details both the scientific and technical work of the project as well as its research outcomes (publications, presentations) will be expected.

A relative guideline for production call applicants will be prepared so as to better guide applicants towards best preparing and submitting successful applications.

Calls for production usage of the resources and services are expected to be announced at M12, M18 and M28 of the project.

4.3.1 Services provided via production access

The services that are provided for development access are mainly the following:

- Access to HPC, Cloud, Grid resources
- All storage services (Simple File Sharing, Repository, Search, Archive, Scratch Space) for data producers
- Workflow and Code repositories (for producers)
- Application level services (for producers)

4.3.2 Eligibility criteria for production access

The eligibility criteria for production access is that researchers should be from the SEEM region who work in the thematic areas of interest to VI-SEEM partnership, in the scientific fields of Life Sciences, Climate Research and Digital Cultural Heritage.

Each call for production projects will provide further details on the eligibility and detailed priorities.

4.4 Preparatory access

Preparatory access is intended for research groups who require a limited allocation of resources for testing, development or optimization purposes of their projects.

Such projects will in general differ from production access projects in that they will be less mature and less developed and thus cannot successfully compete for large amounts of resources.

The call for such proposals will be open all year round and submitted applications will only undergo a technical review by staff from sites where relative requested resources can be provided.

Successful applications should have access to resources within a few days of their submission and these should be used within a 6 months' period.

Similar to production projects, a similar final report will also be expected from these type of projects.

4.4.1 Services provided via preparatory access

The services that are provided for development access are mainly the following:

- Access to HPC, Cloud, Grid resources
- All storage services (Simple File Sharing, Repository, Search, Archive, Scratch Space) for data producers
- Workflow and Code repositories (for producers)
- Application level services (for producers)

4.4.2 Eligibility criteria for preparatory access

The eligibility criteria for preparatory access are that researchers should be from the SEEM region and work in the thematic areas of interest to VI-SEEM partnership, in the scientific fields of Life Sciences, Climate Research and Digital Cultural Heritage.

Preparatory access call will provide further details on the eligibility and detailed priorities.

5 Conclusions

This document presents the framework that will be used in the context of the VI-SEEM project for providing access to users to the VI-SEEM services and associated resources. It provides the foundation for the access policies that will be used throughout the duration of the project to ensure the best possible utilization of the VI-SEEM services and resources, serving also as a long-term guide for the provision of Virtual Research Environment (VRE) services.

T6.1 made an analysis that leads to a classification of the VI-SEEM services and resources to facilitate the understanding of the underlying requirements in terms of access policies. Then a review of the best practices - regarding the provision of related services and underlying resources as identified in the literature and practices by relevant e-Infrastructure projects - was carried out. The following table summarizes the VI-SEEM Framework for resource and service provision based on the detailed analysis carried out by the task.

Service	Access type	Implementation comment
HPC access	VI-SEEM Development Access	Via VI-SEEM service integration plan
	VI-SEEM Production	Via the 3 planned open calls
	VI-SEEM Preparatory	Via continuously open call
Cloud access	Similar to HPC access (see above)	
Grid access	Similar to HPC access (see above)	
Data and Storage services (data producers)	Open to all users that get access to VI-SEEM services such as HPC, Grid, Cloud, and Data services via all types of call	
Data and Storage services (data consumers)	Generally, all registered users in VI-SEEM. Specific restrictions apply based on the data content (security, IPR, license)	
Software environment	Open to all users that get access to VI-SEEM services such as HPC, Grid, Cloud	
Workflow and code repositories	Open to all users that get access to VI-SEEM services such as HPC, Grid, Cloud or via the open calls for access	
Application specific services (as producers)	Open to all users that get access to VI-SEEM services such as HPC, Grid, Cloud or via the open calls for access	
Application specific services (as consumers)	Generally, all registered users in VI-SEEM. Specific restrictions apply based on the data content (security, IPR, license)	

Table 2 - VI-SEEM Framework for resource and service provision