EVER-EST VRE Use Case Validation Plan

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Definitions and Acronyms

Acronym	Description
COTS	Commercial Off-The-Shelf
KPI	Key Performances Indicator
MEA	Multi-Sensor Evolution Analysis
PM	Project Month
SMART	Specific Measurable Achievable Relevant Timely
VRC	Virtual Research Community
VRE	Virtual Research Environment
WP	Work Package

Applicable Documents

Document ID	Document Title
[1]	European Virtual Environment for Research - Earth Science Themes, Grant Agreement N° 674906 – Available on the EVER-EST Alfresco Platform under WP1 Management Folder
[2]	EVER-EST Description Of Work
[3]	D.6.4 Deliverable: EVER-EST Data Management Plan version 1.1
[4]	D1.1 Deliverable : EVER-EST Project Management Plan WP1
[5]	D 2.4 Deliverable : Training Strategy and Plan
[6]	D 3.1 Deliverable : VRE Detailed Definition of Use Cases version 1.1
[7]	D 4.1. Deliverable: Research Objects in Earth Science version 1.1
[8]	D. 5.1 Deliverable: EVER-EST VRE Infrastructure and Services Design version 1.1
[9]	D.6.1 Deliverable: EVER-EST Deployment Plan version 1.0

1 Introduction

A number of documented validation procedures shall be carried out to evaluate the functionalities of the EVER-EST Virtual Research Environment (EVER-EST VRE) against the user requirements.

The user requirements validation and overall impact assessment of the EVER-EST VRE solution deployed by WP6 shall be made in terms of:

a) the fulfilment of EVER-EST VRE smart objectives and measurement of performance through the project key performance indicators which were defined in the proposal;

b) a sound assessment of EVER-EST VRE added values to the pre-selected VRCs and sustainable advantages for potential new user communities' uptake.

The requirement validation and impact assessment of the VRE may lead to new user requirements being identified by the individual use cases, which will be analysed and potentially implemented in subsequent system updates. The results of this assessment will be included in the overall VRE assessment report to be delivered by WP3 at the end of the project.

1.1 Document scope

This document defines the plan for the user requirement validation and impact assessment of EVER-EST VRE. Particularly, the document defines the management plan to validate and confirm that the EVER-EST VRE infrastructure is compliant to EVER-EST VRE user requirement, its operational and performance requirements and supports VRCs use cases, as defined in [AD6].

For the scope of this document, the following definitions[1] apply:

- Verification: the evaluation of whether or not a product, service, or system complies with a regulation, requirement, specification, or imposed condition. It is often an internal process. Implies answering the following question: "Are we building the product right?";
- Validation: the assurance that a product, service, or system meets the needs of the customer and other identified stakeholders. It often involves acceptance and suitability with external customers. Implies answering the following question: "Are we building the right product?".

Verification activities to verify whether components and systems are compliant to design, well-engineered, error-free and properly integrated are out of the scope of this document and will be addressed in WP5 and WP6 deliverables at a later stage of the project according to [AD2]. Coordination with the verification activities under WP6 is however within the scope of this plan.

VRC validation test case specifications will be finalised by the VRCs for the relevant use cases. The VRCs validation test and demonstration reports will be analised to provid the overall impact assessment of the deployed solution.

This validation plan is a living document that will be updated in the course of the project to align it to the system integration activities and overall project schedule milestone completion.

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[1] **Project Management Body of Knowledge** by the Project Management Institute (PMI).

1.2   Relations with other EVER-EST work packages

This deliverable has direct relation to deliverables that derive from WP4, WP5, and WP6. As described in [AD3], a strong synergy between this deliverable and the other WPs deliverables is maintained throughout the entire project lifecycle.
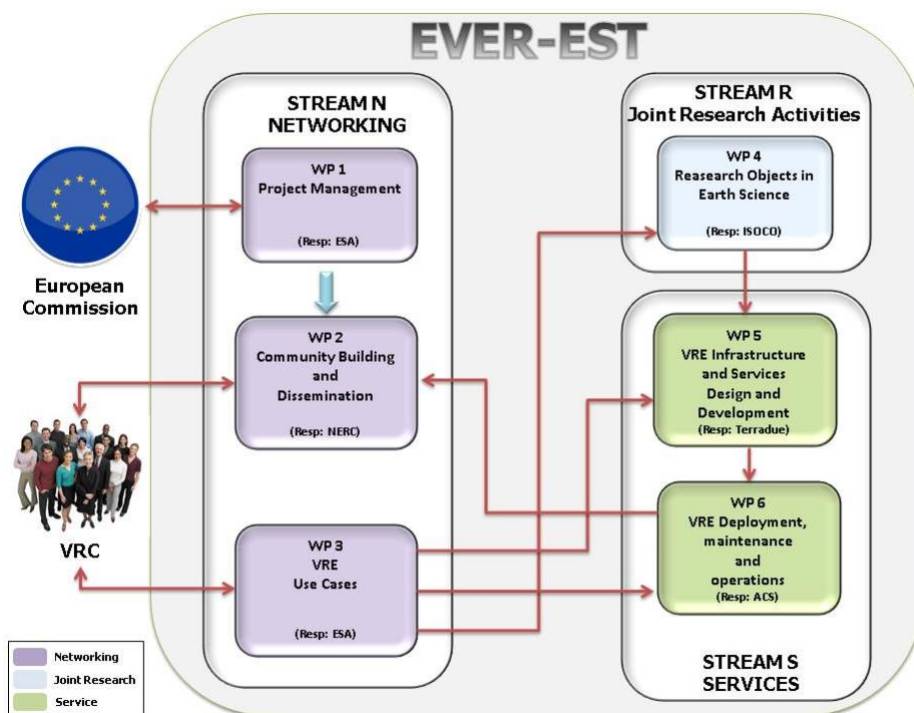

Figure 1: WP dependencies

For example, as stated in AD11, the coordination and feedback loop with WP4, WP5, WP6 is of critical relevance to assure a prompt and effective feedback to the other WPs for timely implementation and resolution. To support this:

- The planning and design of the user test case specification will be initiated as early as possible in the project and continuously be aligned to the components and system deployment and integration status and coordinated with the system verification test run and results obtained under WP6;
- The feedback collection loop will be streamlined by defining common templates for both the verification and validation test case specification and reports. The templates, based on best practices and guidelines for system validation and verification management will be integrated in a shared test environment accessible by all partners involved as described in this plan.

1.3   EVER-EST VRE deployment and integration plan

For the planning of WP3 validation activities, the following development and deployment milestones defined in [AD9] are of relevance, in order to ensure the alignment with the overall project planning:

- M14 Research Objects and V1 Services Delivery;
- M17 VRE V1 Deployment;
- M18 Final Services Delivery;
- M24 VRE Final Deployment.

Deploying the full system, as early as possible in the project, will permit a full year of validation of the EVER-EST VRE by WP3 and VRCs user communities.

The role of user acceptance testing in the overall logic of EVER-EST technical development and deployment further detailed in WP6.1 delivery is recalled in Figure 2.
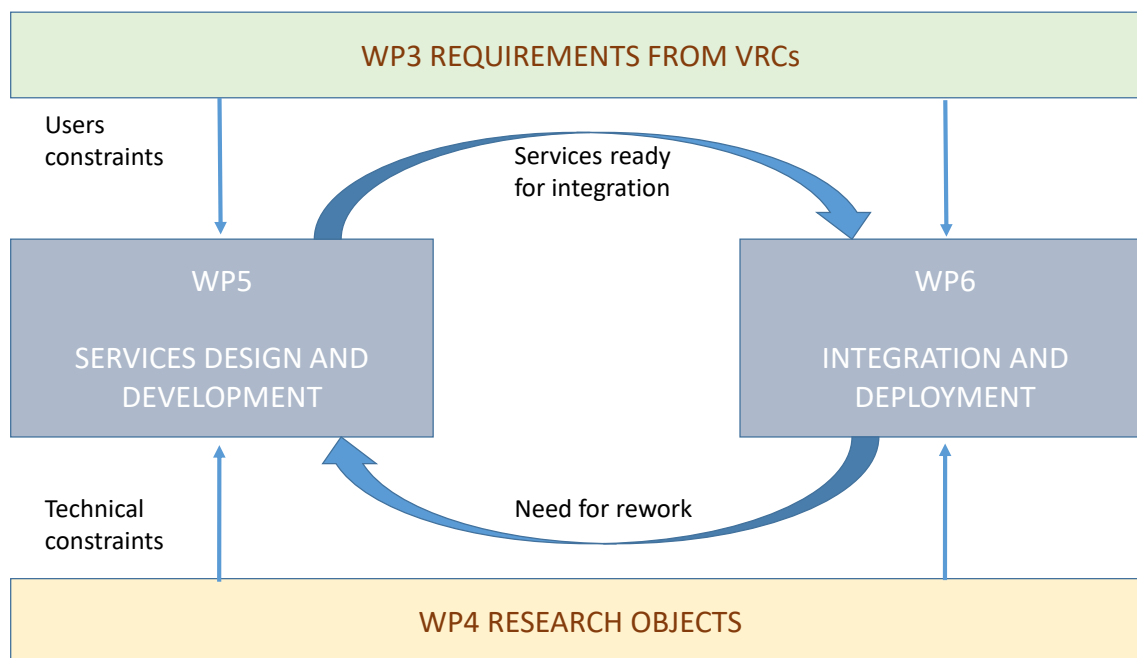
Figure 2: Overall logic of EVER-EST technical development

The time available between M24 to M36, following final deployment will allow corrective, preventive and evolutionary maintenance, in order to assure VRE compliance with use cases.

1.4   VRCs data set and ROs population

The VRCs have an active and important role both in the testing and in the finalisation of the reference data set used for running the test cases, and supporting EVER-EST VRE population activities described in [AD09].

The VRE population activities, under task 6.3, involve the insertion of VRC data and knowledge resources within the VRE and, where possible, the integration/linking of data catalogues belonging to the different VRCs communities. Within this task the EVER-EST VRE will be populated with the resource knowledge (e.g. documents and software to be preserved), algorithms and the processing building blocks used in the experiments conducted by the Virtual Research Communities and which will be shared with the wider community.

The VRCs will also assist with the enrichment of the resources knowledge, inserting cross-linked information between these resources using the semantic services.

As defined in [AD9], this activity will progress in successive phases, according to the successive versions of the VRE and to the availability of data and metadata from VRCs and will cover:

- Creation of new Research Objects and linking of the related resource and service implementation using the RO-Hub User Interface. This activity is on-going since the beginning of the project and it is part of the learning-by-doing activities described in [AD5] and [AD7];
- Upload of users' files to the Seafile storage system, this has been in place since M11 and will have a substantial update when V1 of integrated VRE becomes available;
- Upload of users' files to additional storage systems. The use of additional storage systems is currently under assessment, based on the needs of the user communities and on the availability of suitable infrastructures within the consortium.

2   EVER-EST VRE User Requirements Validation Process

As detailed in [AD6], user requirements have been elicited from use cases and user scenarios according to the main e-services categories preliminarily identified in [AD1]:

- Common Services;
- E-collaboration Services;
- E-research;
- Digital Information Services;
- E-learning Services;
- Preservation and Curation Services.

Requirements are defined in [AD6], illustrated in Table 1 are rated: Mandatory (M – *shall*), Highly Desirable (HD-*should*) or Desirable (D- *may*). The following user requirements validation methods will apply:

- Design review: identifies an element of the design which satisfies a requirement; evidence of validated design documents, unambiguously show that the requirement is met in that all aspects of the requirements have been taken into consideration;
- Inspection: performed by visually inspecting an element (e.g. source code);
- Demonstration: validation performed by executing a function of the service or software; verified by measurement of product performance and functioning. A demonstration is limited to performing a single function, while a test is a more complex set of actions with specific of pre-conditions, input data and/or expected results;
- Test: similar to demonstration, but requiring the definition of input data, test conditions and expected outputs.

EVER-XX-YYY	Requirement Title A	Rate
Requirement	Requirement Text For readability, several sub requirements might be grouped in the same box. Sub requirements are identified by letters a) b) c). All sub-requirements shall be verified individually.	
Source	Traceability versus Proposals, VRE Use Case.	
Validation Method	Validation Methods: Inspection, Demonstration, Test or Review of Design.	

Table 1 Requirement table template

The criteria for the validation methods associated to each requirement are summarized below:

Validation Method	Criteria
Review	Whenever the design and build-in quality (e.g. performance) is critical to meet the requirement. A review of the designed component implementing the requirement, will give an assessment of compliance to it (might be combined with testing).
Inspection	Whenever the component implementing the requirement is static and has no dynamic functional criteria, which can be tested.
Demonstration	Whenever a review is not sufficient to assess the total quality of the component

	implementing the requirement and/or testing is not practical due to, for instance, extreme demands on time or other factors.
Test	Test is mandatory whenever the component implementing the requirement has dynamic functional criteria, which can be tested and cannot easily be determined by other methods. Whenever only by using the product it will be possible to verify the requirement. Simulation might be necessary when a test does not approximate the quality parameters of the requirement (e. g performance).

Table 2 Verification methods evaluation criteria

2.1 EVER-EST VRE performances and operation requirements validation

The EVER-EST e-infrastructure shall provide access to generated dataset and research objects as specified in the use case and detailed in [AD6]. A major challenge for EVER-EST e-research service integration is to meet the performance and operational requirements success criteria defined by the table below:

Performances/Operational	Evaluation Criteria
Efficiency	There should be immediate, clear advantages for the scientists, either in terms of time required to carry out work, or as actual tasks, which could not be performed outside of the environment. This is the most important requirement, since the VRE is aiming to improve the efficiency of the research work, and scientists will not adopt an environment, which is perceived as decreasing such efficiency.
User friendliness	All operations should be intuitive and reflect the researcher's way of working. A steep learning curve may imply refusal to adopt the environment after a few attempts.
Flexibility	Science normally implies the investigation of, sometimes very, different lines of thought. This is why working environments with rigid structures and procedures should be avoided.
Easy integration of new software tools	The environment should provide interactive access to data processing tools (also to COTS), and the flexibility and simplicity to implement further tools (to maintain the state of the art).

Table 3 Performances/operational evaluation criteria

2.2 Test roles and actors

During the test execution, the test roles in the table below are identified:

Roles	Description
EVER-EST VRE User Communities Representative	WP3 Leader in charge for the assessment of the user requirements and sub-requirements defined in AD8 elicited from the pre-selected VRC needs and challenges.
EVER-EST VRE VRCs Scientist /Researcher	VRC scientist/researcher using the infrastructure during the research life cycle to generate research results and provided services.

EVER-EST VRE services End User	End user of the VRC communities provided services and results, using the VRE infrastructure.
EVER-EST VRE Operator/System Administrator	In charge of the integration and operation of EVER-EST VRE infrastructure, this role is further described in AD11.

Table 4 Test roles and actors

2.3 Test environment

The test environment for the validation of EVER-EST VRE will be described in more detail in WP5 and WP6 deliverables. Test actors will be provided with remote access to the VRE infrastructure to run the user acceptance validation activities. A shared environment is being set up integrating test schedule, test case specification, test results and reports templates, tailored to user validation and system integration test activities, for open read and write access. The collaboration environment will be opened to all partners to share the test specification and results at their generation, assuring an effective and real-time communication and feedback to all the partners.

2.4 EVER-EST VRE user requirements validation approach

The EVER-EST VRE user requirement validation process is composed of the following main steps:

- Test Cases Management;
- Test Cases Specification;
- Test Cases Execution;
- Test Cases Reporting.

The validation activities will be run by the VRC under the coordination of WP3 Leader, in collaboration with all WPs.

2.4.1 Test Cases Management

User requirement and the latter validation methods were defined in [AD6]. For each requirement/sub-requirements test case specification activities have been already started, at this point in time, to make sure that the test design assures the appropriate user requirements coverage.

The user requirement test validation planning is driven by the schedule of the deployment of each components and its integration. With the objective of anticipating the validation activities as much as possible and provide a continuous feedback while the infrastructure components are deployed and integrated, each requirements is being preliminarily and independently assessed by WP3 through reviews, inspections and demonstration validation methods whenever applicable. This is being performed in parallel with the integration of the components, which is necessary for running the validation tests and report about the compliance of the dynamic functional behaviour and/or end-to-end VRCs validation test specifications.

To this purpose, the EVER-EST VRE User Communities Representative (e.g. WP3 Leader) will be continuously part of the WP5 and WP6 technical review meetings, which shall monitor the component integration status and the system verification progress, and provide constant feedback to the VRCs concerning the validation activity results.

2.4.2 Test case specification

Detailed test case specification activities will focus on the design and specification of the test cases: user acceptance test criteria, expected results, pre-condition, post-condition, flow of events (as described by the test specification template in Annex A) necessary to verify the EVER-EST platform functionalities will be covered by the test. Traceability between the test procedures and requirements will be established. Any non-conformances raised will be dealt in accordance with the procedure described in the following sub-chapter.

2.4.3 Test case execution

During the test case execution, each step (i.e. actions), specific data, and test case results shall be documented and the outcome recorded and reported in the collaboration test environment shared reports.

2.4.4 Test case reporting

Each test shall be signed-off by the test actor responsible for the test, confirming that the system meets the test case stated objectives and the acceptance criteria defined in the test. Whenever an error or a non-conformance is corrected, no-regression test will be run to check that there is no regression of functions linked to that correction.

Anomalies encountered during the tests and non-conformances shall be tracked in accordance with the anomaly and non-conformance procedure described in WP6 deliverables and briefly summarized below.

Any problems with the performance of the VRE or functionalities that fail to conform to the specified user requirements shall be passed onto WP6 for further assessment and resolution, and addressed by WP5 in accordance with the overall logic of EVER-EST technical development described in, Figure 1 further detailed in [AD9].

2.4.5 Anomaly and non-conformances management

During the system verification under WP6 and validation activities under WP3, test execution anomalies and non-conformances will be managed through the EVER-EST infrastructure environment integrated anomaly management tool described in the WP6 deliverables.

Anomalies and Non-Conformance will be further classified according to the criteria below:

- Severity: High, Major, Minor;
- Status: Open, Closed, Deferred;
- Date: Reported/Fixed.

3 EVER-EST VRE User Requirements and Use Case Validation Management

3.1 EVER-EST VRE user requirements validation process

The EVER-EST VRE User Requirements validation process is based on:

- Identifying the validation methods associated with each requirements during the user requirements eliciting phase;
- Designing user requirements validation test cases specification as early as possible in the project;
- Planning and running the test case while component delivery and system deployment and integration are progressing;
- Reporting on test results and providing feedback to WP6
- Confirming that the system meets the test case stated objectives.

The EVER-EST WP3 Leader will be provided with a remote access to the EVER-EST infrastructure logical partition for the test execution, in order to initiate the requirement validation process in accordance with the relevant validation methods and by defining the detailed test case for each requirement and sub-requirement while integration is progressing.

The integration sequence from V1 to the Final Version release for validation testing will be provided in WP6 deliveries in the coming months. A preliminary indication of the components that will be integrated after V1 can be found in [AD6].

After the deployment of V1, during the one month timeframe to the Final Services Delivery the VRCs will be provided with access credential to the test environment to independently verify the V1 implemented functionalities for the specific use case.

3.2 EVER-EST VRE VRCs user scenarios validation process

The EVER-EST VRE VRCs will validate the user scenarios in general terms, testing and validating the platform performance with respect to usability and results, thereby independently validating the user requirements/sub requirements covered by the user scenario designed test case. Each VRC will define is own specific VRC test specifications for the user scenarios.

Once the VRE is fully deployed, each VRC will independently tests the end-to-end functionalities and operational/performance requirements provided by EVER-EST infrastructure running the VRC specific use case. This will allow to further improve the hands-on learning-by-doing while providing fast response and feedback on the requirements defined in the early stage of the project. Testing user scenarios will provide early warning of system anomaly, non-conformances and performance degradation to be recorded as described in the previous chapter.

The impact assessment of the EVER-EST VRE solution deployed by WP6 shall be made by the VRCs demonstration reports (D3.3 to D3.6 in [AD2] in terms of:

a) user community up take (both by those represented in the project and outside the EVER-EST consortium), in the form of written reports following user testing;
b) the added value to these VRCs; this will be included in the reports mentioned above;
c) in more general terms, the beneficial impact on society will be also evaluated with reference to the activities carried out by the specific community.

3.3   EVER-EST VRE Overall Impact Assessment

At the end of the project under T3.6 WP3 shall compile user requirements validation results, the VRC specific impact assessments, use case validation report, and provide evidence of:

a)   The compliance to EVER-EST user requirement;
b)   the fulfilment of EVER-EST VRE smart objectives and measurement of performances through the project key performances indicators defined in table 6;
c)   the overall assessment of EVERST VRE added values to the preselected VRCs and sustainable advantages for potential new user communities uptake;
d)   an indication of waived/superseded/new user requirements and new use cases which have been identified by the assessment as potential new requirements to be implemented in subsequent infrastructure updates or possible follow on of the project.

3.4   Test sases schedule

The overall planning of the user requirements validation and specifically of the test cases execution is highly demanding and will require a prompt feedback from WP3 to the other WPs, as highlighted in the Figure 3.
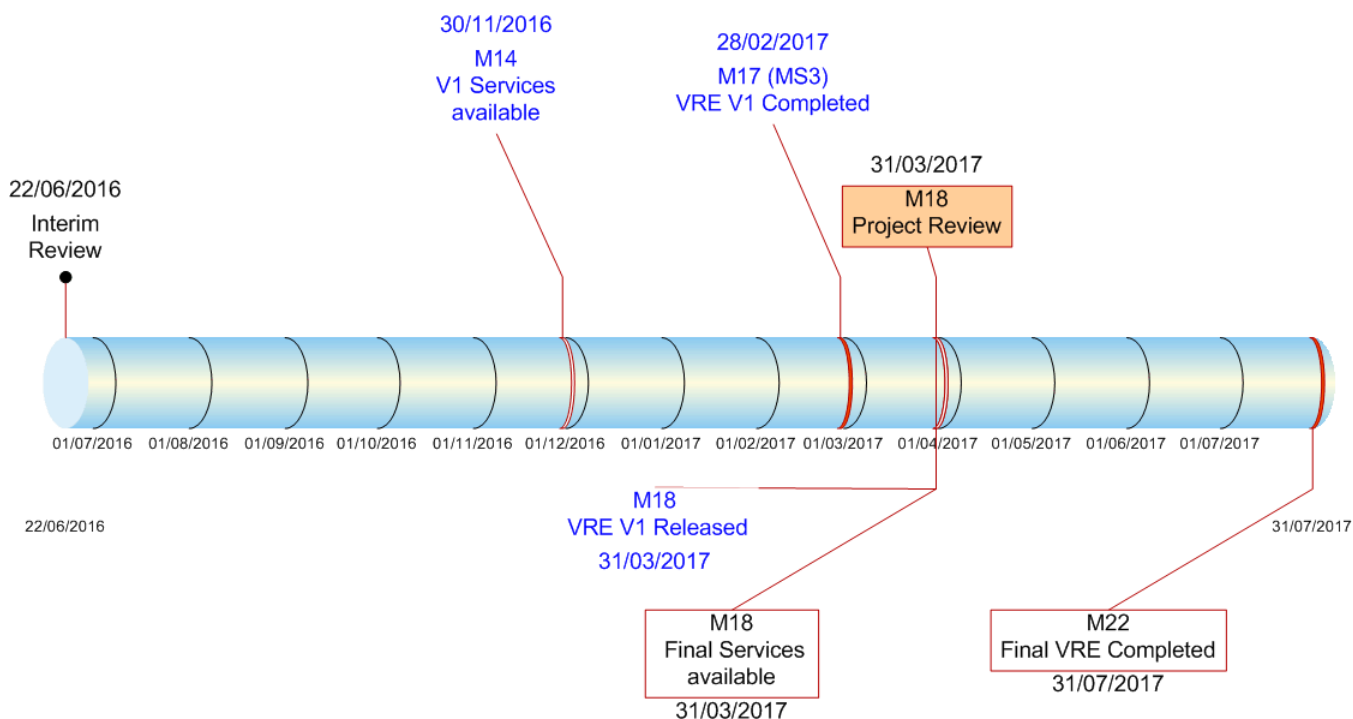
Figure 3: High-Level time constraints

Research Objects and V1 Services Delivery Milestone

During this stage of the project, validation management activities are being focused on the test case specification and in the preparation of the test environment and tools. The detailed test cases schedule will be aligned to V1 component deployment and integration completion status. As a result of this phase, the detailed user requirement test case specification at V1, will be finalized while the V1 component integration is progressing.

VRE V1 Deployment to Final Services Delivery

During this stage of the project, activities will be focused on the execution of the test case covered by V1 deployed infrastructure. Tests execution will be planned in accordance to the availability of V1 components as defined by the master delivery schedule, in [AD9]. Validation activities will be run under WP3 management in strict coordination with WP5 and WP6 assuring a continuous feedback from WP3 to WP5 and WP 6 while the deployment is progressing for each of V1 subcomponent until VRE Final Deployment.

VRE Final Deployment to end of project

Test specifications will be continuously designed and updated, in the collaboration test environment until end of project. The timeframe from VRE Final Deployment to end of project will allow corrective, preventive and evolutionary maintenance, in order to assure VRE compliance with use cases.

User requirements will be assessed during this period according to the validation methods associated with the requirements and relevant test specification. Test Case execution will be managed by WP3 in coordination with WP6 to avoid, duplicated test run, gaps in requirements coverage, fulfillment of test pre-conditions, conflict of resources usage among various test roles and actors responsible to run the test.

After the final deployment of the EVER-EST VRE functionalities, each VRCs will be responsible for the finalisation of the VRCs specific validation test case specification execution and the analysis of the relevant test results and to provide the assessment of the impact of the VRE in terms of the added value brought to its own user virtual community in D3.3 to D3.6 deliverables.

4 Smart Objectives and KPI Compliance

The validation plan activities contribute to the validation of the project SMART objectives that are identified in Table 5 and Table 6, and to the overall assessment of the key performances indicators that are defined in Table 7. Each of the objective below will be validated as soon as the final version of EVER-EST infrastructure is fully deployed. Test specification will be define according to the relevant requirements coverage.

SM_OB#1.2	Deploy services to discover, access & process heterogeneous Earth Science (ES) datasets
Measured by	VRCs capability to manage the full research activity workflow lifecycle.
Achievable	Query/Access/Process components for heterogeneous ES data available through EVER-EST building block components.
Relevant	Heterogeneous data query, access and processing is vital for the VRE adoption by ES VRCs.
Timely	Services deployed in their final version in M22.

SM_OB#1.3	Deploy services to capture and store research activities workflows, processes and results
Measured by	VRCs capability to manage the full research activity workflow lifecycle
Achievable	Using the innovative Research Objects paradigm adapted to Earth Science
Relevant	Research workflow lifecycle mgt. is key to create new knowledge re-using pre-existing research results and knowledge
Timely	Research Object and RO-HUB finalized in M12; integrated in M22

SM_OB#1.4	Deploy services to share data, models, algorithms, results within and across communities
Measured by	Capacity to share models, data and knowledge across communities measured by feedback Received from VRCs and reported in WP3 deliverables
Achievable	Research Objects and Preservation services to allow resource sharing
Relevant	The improvement of data and knowledge sharing capabilities is the core objective of the EVER-EST VRE concept and design
Timely	Research Object study finalized in M12; integrated in VRE final version in M22

SM_OB#1.5	Ensure the long-term preservation of resources developed by existing VRC communities
Measured by	Preservation registries for data-related knowledge deployed and populated.
Achievable	Leverage on SCIDIP-ES project results to adapt preservation services in the VRE.
Relevant	Data related knowledge is key for data usability by heterogeneous user

	communities and for interoperability among them.
Timely	Preservation services integrated in their final version in M22.

SM_OB#1.6	**Innovative and user friendly environment for real-time collaborative working**
Measured by	Web portal deployment and VRCs usage statistics generated through the web portal.
Achievable	Based on Multi-sensor Evolution Analysis (MEA) technology.
Relevant	Web portal for accessing VRE functionalities will facilitate communities' engagement.
Timely	EVER-EST web portal for cooperative working available and integrated in M22.

Table 5 EVER-EST SMART objectives 1 - **VRE development & deployment**

SM_OB#2.1	**Validate and demonstrate the VRE functionalities within the Sea Monitoring VRC**
Measured by	Number of users reached (around 100 researchers); increased number of publications of web map layers of species and habitat distribution in space and time in key areas for biodiversity monitoring; increased number of publications on shared and clear protocols assessing a well-defined methodology for biodiversity monitoring.
Achievable	Sea Monitoring community can leverage on a well defined set of data catalogues which will be federated by the EVER-EST VRE and supported by tailored tools for data exploitation and exchange.
Relevant	This use case is an example of inter-disciplinary work in terms of disciplines involved, data and software used (biology, chemistry, physics, earth observation).
Timely	Each VRC will receive proper training on the VRE functionalities during the first phase of the project. The VRC will be able to use the VRE services starting from M18 and eventually require for changes and adaptation.

SM_OB# 2.2	**Validate and demonstrate the VRE functionalities within the Natural Hazard VRC**
Measured by	Number of users reached (around 50 researchers); usability feedback provided by the Natural Hazards Partnership (NHP) members engaged with the development of the Hazard Impact Model (HIM) forecasting system; demonstration of the VRE implementation for the NHP to encourage adoption by the wider hazard forecasting community both in the UK and in Europe; documented examples of new opportunities for collaboration with other agencies engaged with natural hazard forecasting.
Achievable	NHP will organise several opportunities to demonstrate this use case to relevant UK stakeholders with the objective of obtaining feedback on this specific

	deployment and use of the EVER-EST VRE both from organisations concerned with the forecasting of natural hazard and those involved with disaster response planning and management.
Relevant	The VRE will be used to support the development of specific modules of the Hazard Impact Model forecasting system for the UK e.g. those for flooding, extreme weather events, ground instability (landslides). As part of this use case the NHP will also look for opportunities to use the VRE for knowledge exchange with the Supersites VRC.
Timely	Each VRC will receive proper training on the VRE functionalities during the first phase of the project. The VRC will be able to use the VRE services starting from M18 and eventually require for changes and adaptation.

SM_OB# 2.3	Validate and demonstrate the VRE functionalities within the Land Monitoring VRC
Measured by	Positive usability feedback provided by the majority of users reached within the Land Monitoring (and possibly others) Virtual Research Community members (e.g. 50).
Achievable	Initial scenarios have been based on real Land Monitoring VRC operational scenarios. SatCen will organize appropriate events to collect user feedbacks and will report about these activities both in D3.6 and D2.5.
Relevant	The Land Monitoring use case provides a concrete case of cross-disciplinary interaction between Earth Scientists and Institutional entities.
Timely	Each VRC will receive proper training on the VRE functionalities during the first phase of the project. The VRC will be able to use the VRE services starting from M18 and eventually require for changes and adaptation.

SM_OB# 2.4	Validate and demonstrate the VRE functionalities within the Supersites VRC
Measured by	Number of users reached (around 100 researchers) and positive feedback received; increased use of EO/in situ data and science products by users; assessment of VRE usability performances through ad hoc metrics.
Achievable	VRE validation using two INGV Supersites. VRE demonstration by entire Supersite community.
Relevant	Globally distributed community and local Disaster Risk Reduction users will ensure a comprehensive test of research product generation and uptake by users.
Timely	Each VRC will receive proper training on the VRE functionalities during the first phase of the project. The VRC will be able to use the VRE services starting from M18 and eventually require for changes and adaptation.

Table 6 EVER-EST SMART objectives 1 - Virtual Research Communities

Each of the following Key Performance indicators will be measured and the relevant achievements reported in the overall assessment report D3.6 as part of the the overall impact assessment defined in Chapter 3.3.

KPI number	Objective / Result	Indicator
1-4	Establish a VRE for Earth Science	Number of user requirements successfully addressed Number of Earth Science Datasets managed by the system Number of algorithms managed by the system Number of workflows managed by the system
5	Establish a VRE for Earth Science	Facilitated sharing of experiences: number of positive feedbacks from the user community
6	Validate the VRE with four main Virtual Research Communities	Number of additional members of the VRC involved in the project
11	Impact on data providers	Number feedbacks regarding end-user experience

Table 7 EVER-EST KPIs

A. Test Case Specification

The following table defines the template to be integrated in the collaboration test environment for the test case specification description.

Test Case Title	User Requirement
Test Case Specification	[Describe the test case to be performed and objectives.]
Test role	[Describe the individuals involved in the testing, their roles, and their association with the test case.]
Preconditions	[Describe the preconditions for the test case. A precondition is the state of the system that must exist before a test case can be performed.]
Post Conditions	[Describe the post conditions for the use case. A post condition is a list of possible states the system can be in immediately after a test case has finished.]
Flow of Events	[Describe the flow of events that would be expected in normal conditions as well as any potential alternate flow of events, and exceptions/errors that may be expected.]
Inclusion/Exclusion Points	[Describe other test cases that may be included or excluded in the act of executing this test case.]
Special Requirements	[Describe any special requirements necessary to perform the test case.]
Expected Results	[Describe the results expected by the test.]
Acceptance Test Criteria	[Define acceptance test criteria.]

Table 8 Test case description template