



# VRE4EIC

**A Europe-wide Interoperable Virtual Research Environment  
to Empower Multidisciplinary Research Communities  
and Accelerate Innovation and Collaboration**

**Deliverable D2.3**

**Use-case report – First version**

Document version: 1.0 – 13/10/2016

# VRE4EIC DELIVERABLE

Name, title and organisation of the scientific representative of the project's coordinator:

Mr Philippe Rohou    t: +33 4 97 15 53 06    f: +33 4 92 38 78 22    e: philippe.rohou@ercim.eu

GEIE ERCIM, 2004, route des Lucioles, Sophia Antipolis, F-06410 Biot, France

Project website address: <http://www.vre4eic.eu/>

Project	
Grant Agreement number	676247
Project acronym:	VRE4EIC
Project title:	A Europe-wide Interoperable Virtual Research Environment to Empower Multidisciplinary Research Communities and Accelerate Innovation and Collaboration
Funding Scheme:	Research & Innovation Action (RIA)
Date of latest version of DoW against which the assessment will be made:	14.01.2015
Document	
Period covered:	M1-M36
Deliverable number:	D2.3 (previous D2.2.1)
Deliverable title	Use case report – First version
Contractual Date of Delivery:	30/09/2016
Actual Date of Delivery:	13/10/2016
Editor (s):	euroCRIS
Author (s):	Anne Asserson, Dragan Ivanovic, Laurent Remy, Valerie Brasse, Zhiming Zhao, Daniele Bailo
Reviewer (s):	Laura Hollink, Maria Theodoridou
Participant(s):	TU Delft, INGV, UvA
Work package no.:	2
Work package title:	Requirements, use cases and usability, and evaluation
Work package leader:	TU Delft
Distribution:	
Version/Revision:	1.0
Draft/Final:	Final
Total number of pages (including cover):	88

## What is VRE4EIC?

VRE4EIC develops a reference architecture and software components for VREs (Virtual Research Environments). This e-VRE bridges across existing e-RIs (e-Research Infrastructures) such as EPOS and ENVRI+, both represented in the project, themselves supported by e-Is (e-Infrastructures) such as GEANT, EUDAT, PRACE, EGI, OpenAIRE. The e-VRE provides a comfortable homogeneous interface for users by virtualising access to the heterogeneous datasets, software services, resources of the e-RIs and also provides collaboration/communication facilities for users to improve research communication. Finally it provides access to research management /administrative facilities so that the end-user has a complete research environment.

## Disclaimer

This document contains description of the VRE4EIC project work and findings.

The authors of this document have taken any available measure in order for its content to be accurate, consistent and lawful. However, neither the project consortium as a whole nor the individual partners that implicitly or explicitly participated in the creation and publication of this document hold any responsibility for actions that might occur as a result of using its content.

This publication has been produced with the assistance of the European Union. The content of this publication is the sole responsibility of the VRE4EIC consortium and can in no way be taken to reflect the views of the European Union.

The European Union is established in accordance with the Treaty on European Union (Maastricht). There are currently 28 Member States of the Union. It is based on the European Communities and the Member States cooperation in the fields of Common Foreign and Security Policy and Justice and Home Affairs. The five main institutions of the European Union are the European Parliament, the Council of Ministers, the European Commission, the Court of Justice and the Court of Auditors (<http://europa.eu/>).

VRE4EIC has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 676247.

# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
<b>2</b>	<b>Relationship between the tasks</b>	<b>7</b>
<b>3</b>	<b>Semi structured documentation of use cases</b>	<b>8</b>
<b>4</b>	<b>Requirements</b>	<b>10</b>
4.1	Requirements from D2.1	10
4.2	Additional information on requirements	10
<b>5</b>	<b>Use-cases</b>	<b>11</b>
5.1	Actors	11
5.2	Use-cases per category	13
5.2.1	Data identification and citation	13
5.2.2	Data curation	14
5.2.3	Data cataloguing	17
5.2.4	Data processing	21
5.2.5	Data optimization	26
5.2.6	Data provenance	27
5.2.7	Collaboration, training and support	28
5.2.8	Privacy, security, trust and legal requirements	33
5.2.9	FURPS+ and ISO 25010:2011	35
5.3	Summary of “additional requirements” identified	36
<b>6</b>	<b>High-Level Use-cases</b>	<b>37</b>
6.1	Introduction	37
6.2	High-level Use-Cases description	39
<b>7</b>	<b>Visionary Use-cases</b>	<b>60</b>
<b>8</b>	<b>Alignment with Architecture</b>	<b>61</b>
<b>9</b>	<b>Conclusion and next steps</b>	<b>63</b>
<b>10</b>	<b>References</b>	<b>64</b>
<b>11</b>	<b>Appendix - Traceability matrices</b>	<b>65</b>

# 1 Introduction

Following the first requirements collection (see D2.1), use-cases are elaborated to express the possible users' interactions with the system.

Use-cases provide:

- Context to the requirements, articulating these requirements towards an objective the user wants to realise,
- Test scenarios for acceptance testing, i.e. a "black-box" view of the system, what the user inputs and what he expects as output, unaware of the system's internal behaviour,
- Advocacy material to demonstrate to potential VRE users and developers what the e-VRE is expected to do.

Requirements are at the core of the 4 views of the target system (eVRE) between the business view and the technical implementation: use-cases defines the upper view at business level, the requirements describe the functional view, then applicative modules implements the functions, and finally these modules run on technical components (such as databases, servers, network...).

The use-cases development consists in building the upper view from the requirements, while the architecture definition made in WP3 is building the lower applicative view from the requirements. At least one person from each team is aware of the work done by the other team, ensuring the coherence of both activities. Also, traceability is maintained between use-cases, requirements, system functions and components. Once the reference architecture is defined and stabilised, the use-cases will serve for testing purposes of the architecture.

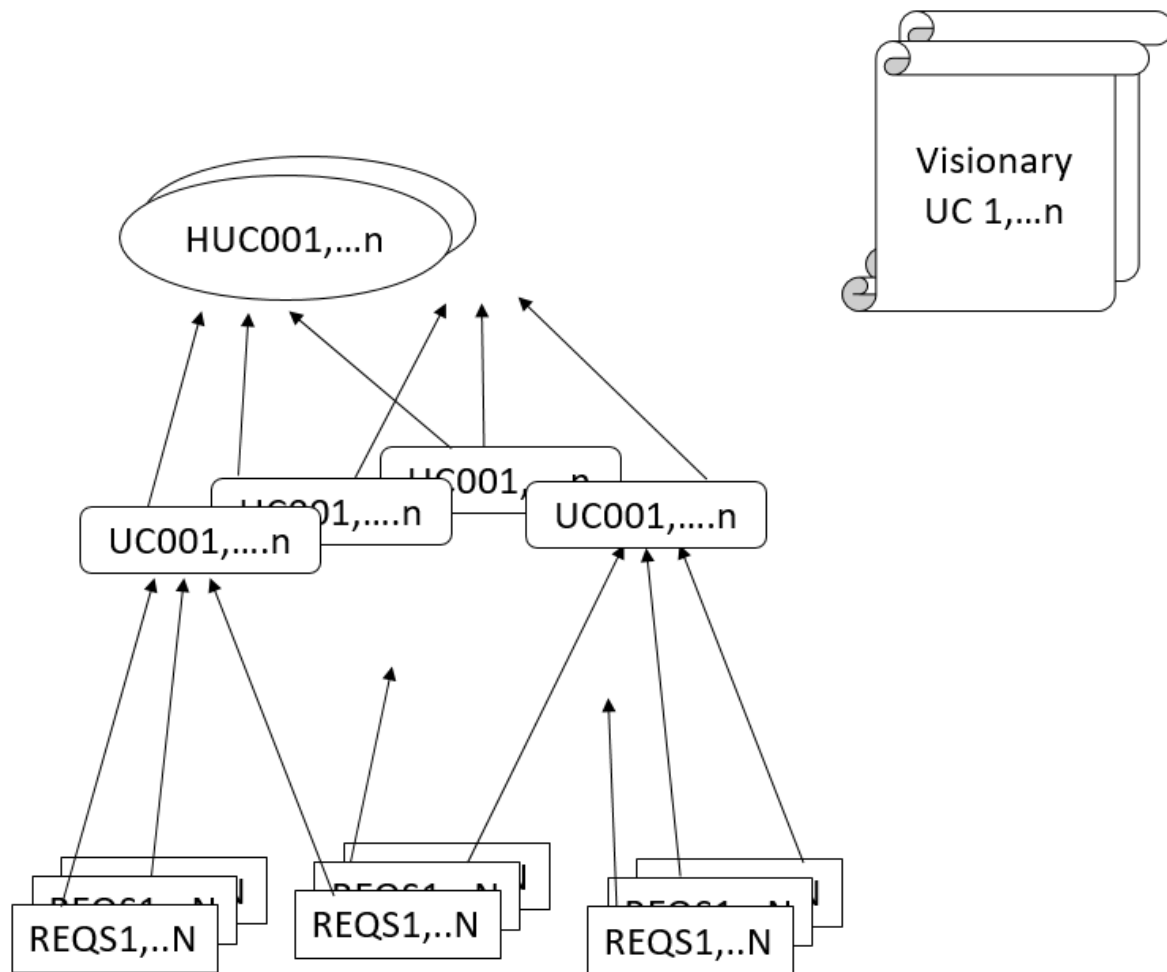
The use-cases can also be used by WP7, Task 7.1, to engage the VRE target group communities. The use cases will reflect the real work practice of the end-users of the VRE prototypes to maximize their uptake and exploitation. Also, the use-cases will be used to define the content of engagement and training activities in Task 6.3.

The use-case documentation uses the standard UML use-case diagram and the documentation template inspired from "Applying use cases, A practical guide", Geri Schneider & Jason P. Winters.

Use-cases can be, and are, expressed at several levels of granularity:

- Step 1: Low level use-cases are built by assembling requirements in a coherent sequence;
- Step 2: High-Level use-cases are described re-using the (low level) use-cases;
- Step 3: "Visionary" use-cases are independent of the requirements, represent several scientific domains and reflect the advanced research goals of the project.

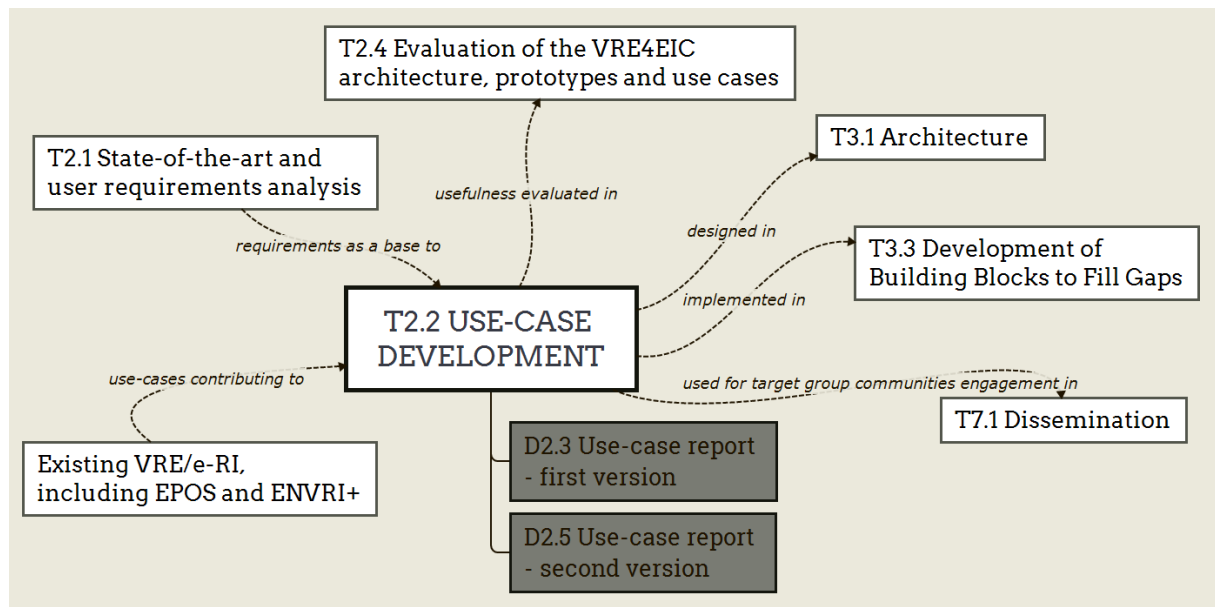
The following figure represents the relations between requirements and use-cases following these steps:



The relation between the visionary use-cases and the High-level use-cases or directly with the Use-cases will be analysed in the Use-case report Second version, as well as the relation with the use-cases developed in the EPOS and the ENVRIplus projects.

In this “first version”, 59 use-cases and 19 high-level use-cases are identified and described. 26 “additional” requirements are also identified in order to fill gaps in the use-cases flow.

## 2 Relationship between the tasks



The T2.2 *Use-case development* task follows the T2.1 *State-of-the-art and user requirements analysis* task. It relies on the requirements list obtained by T2.1 to design the use-cases. It also uses the experience from the EPOS and ENVRIplus projects.

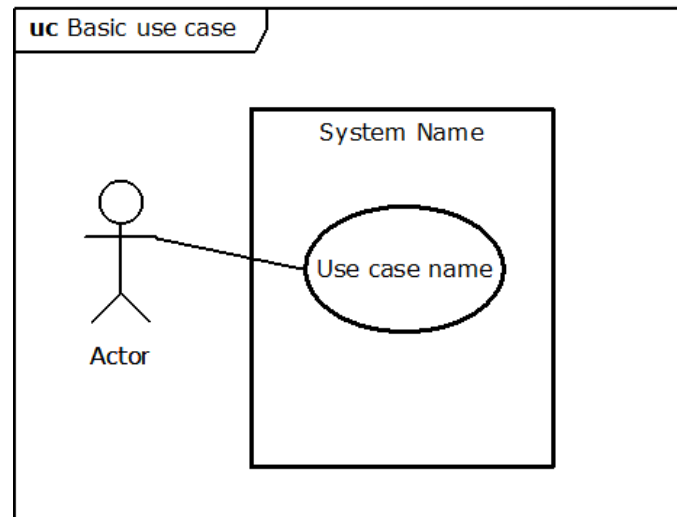
The designed use-cases based on the requirements gathered in D2.1 are also linked to the components designed in T3.1 *Architecture* on the basis of D2.1, and partially implemented in T3.3 *Development of Building Blocks to Fill Gaps*.

The use-cases will also be used to engage target group communities within T7.1 *Dissemination*.

The T2.4 *Evaluation of the VRE4EIC architecture, prototype and use-cases* task will collect feedbacks on the usefulness of the use-cases and on to which extent the use-cases can be implemented.

### 3 Semi structured documentation of use cases

The use-case documentation template is based on the documentation template in “Applying use cases, A practical guide”, Geri Schneider & Jason P. Winters, and adapted to the scientific context of VRE4EIC. For each use-case represented in a use-case diagram, a document describes it.



UML Use-case diagram

#### Use Case Name

<Brief description. Usually a paragraph or less.>

#### Actors

<A list of the Actors who communicate with this Use Case>

#### Priority

<How important is this Use Case to the project?>

#### Status

<What point are we in developing this Use Case?>

#### Pre-Conditions

<A list of conditions that must be true before the Use Case starts>

#### Post-Conditions

<A list of conditions that must be true when the Use Case ends, no matter which Scenario is executed.>

#### Extension Points

<If the Use Case has extension points, list them here.>

#### “Used” Use Cases

<If the Use Case uses other Use Cases, list them here.>

#### Flow of Events

<This could be in text, in an Activity diagram, in a Sequence diagram, or any or all of them.>

#### Activity Diagram

<An activity diagram of the flow of events, or some significant or complex part of the flow of events.>



**User Interface**

<For systems which interface with people, include a description of the user interface, possibly using storyboards.>

**Scenarios**

<They should at least be listed here, but may also include a brief description.>

**Sequence Diagrams**

<If you don't have separate documents for Scenarios, you might include sequence diagrams for them here.>

**Subordinate Use Cases**

<If the Use Case has subordinate Use Cases, show them here. Or you could include a Use Case diagram for the subordinate Use Cases. Or both. Also tell what subsystem is responsible for this subordinate Use Case.>

**Diagram of Participating Objects**

<A class diagram showing all the classes whose objects interact to implement this use case. You can also show interfaces to the Use Case here, and which of the classes implement the interfaces.>

**Other Artifacts**

<This can include references to the subsystem the Use Case belongs to, an analysis model, a design model, code, or test plans.>

*Use-case documentation*

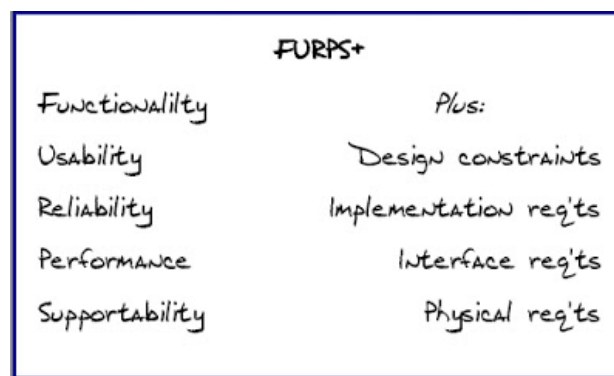
## 4 Requirements

### 4.1 Requirements from D2.1

The collected requirements (D2.1) have been classified in the following categories:

- Data identification and citation (prefix: IRQ)
- Data curation (prefix: CRQ)
- Data cataloguing (prefix: CLRQ)
- Data processing (prefix: PRQ)
- Data optimization (prefix: ORQ)
- Data provenance (prefix: PVRQ)
- Collaboration, training and support (prefix: CTRQ)
- Privacy, security, trust and legal requirements (prefix:SRQ)
- FURPS+ and ISO 25010:2011 (non-functional requirements, prefix: NRQ)

Note: the FURPS+ acronym, devised by Robert Grady of HP, refers to the non-functional requirements categories named Functionality (Generality of Feature Set, reusability, security), Usability, Reliability, Performance, Supportability, and the constraints (+) on design, implementation, interface and physical properties, of the system.



The set of requirements has first been analysed category by category to identify use-cases by aggregating requirements from a category. Then, the use-cases have been completed by referencing requirements or other use-cases from any category.

Finally, the high-level use-cases are defined across categories.

### 4.2 Additional information on requirements

A survey and e-RI characterizations are 2 means used in addition to the initial interviews that allowed to gather the initial requirements.

The survey brings information about the level of expectation from (potential) users related to the requirements, thus allowing to prioritise the requirements.

The e-RI characterizations bring light on the identified requirements that are or will be implemented at RI level. With this information, a clearer picture can be obtained of the part of requirements and thus use-cases, that can be executed at RI level and orchestrated at VRE level, versus the one that are executed at VRE level.

## 5 Use-cases

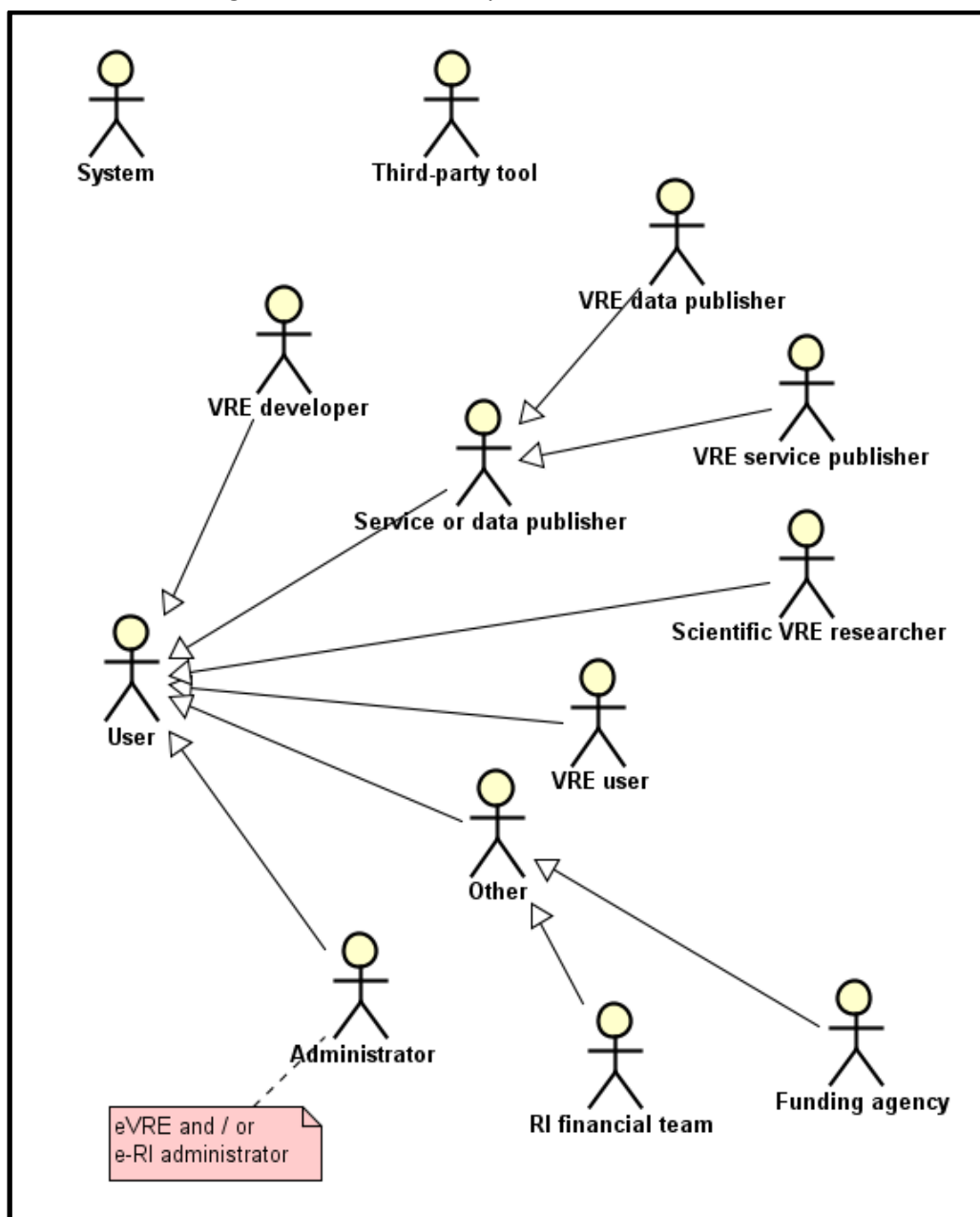
In this section, requirements from D2.1 are orchestrated into use-cases, and the actors executing these use-cases are given.

Requirements, and therefore use-cases, have been defined at several levels of details or granularity. To make these levels explicit, some use-cases “include” other smaller use-cases (to avoid repeating them).

Another relationship is the “extends” one. A use-case extending another one has additional steps.

### 5.1 Actors

Here are the actors fulfilling the roles described by the use-cases:



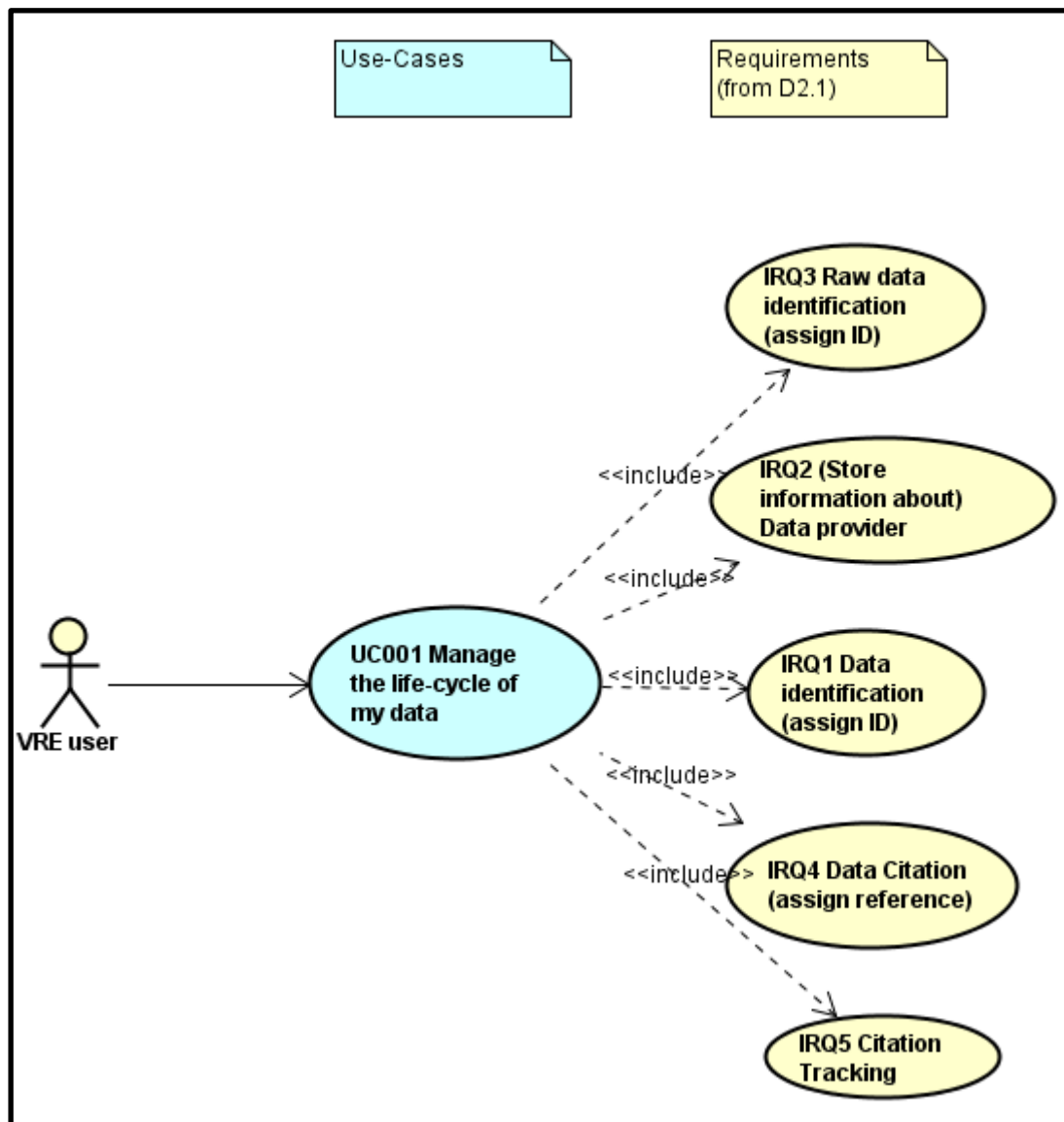
They can be described as such:

- User: global actor representing any user accessing the eVRE (according to its definition, "VRE users" only concern people that want to access research data)
  - VRE developer: including commercial (large IT companies, SMEs, entrepreneurs) and non-commercial (universities, not-for-profit organisations, foundations, VRE related projects) developers
  - VRE user: including academic and governmental researchers, research managers, educators, students, innovators, entrepreneurs and the interested citizens
  - Scientific VRE researcher: including academics who conduct research on VREs, for instance on VRE components and VRE communities
  - Service or data publisher: this actor represents any user that register services in the eVRE, or that publish some data.
    - VRE data publisher: i.e. publishers who wish their data to be available to VRE users, including research institutions and archives, universities, governmental organisations, various researchers and other data publishers
    - VRE service publisher: i.e. publishers of services that can be triggered from the VRE environment
  - Other: at the same time, we envision other potential target groups, such as journalists, educators and students, although these groups are not key to the project
    - Funding agency: funding agencies that publish calls for research fundings
    - RI financial team: the financial team of a specific RI
  - Administrator: a specific user that has specific rights to manage users in the platform
- System: this actor represents the eVRE platform itself, for automatic behaviors
- Third-party tool: this actor represents tools not included in the eVRE platform

## 5.2 Use-cases per category

### 5.2.1 Data identification and citation

By orchestrating the requirements under the category named “Data identification and citation”, the following use-case has been defined:



It can be elaborated as follows:

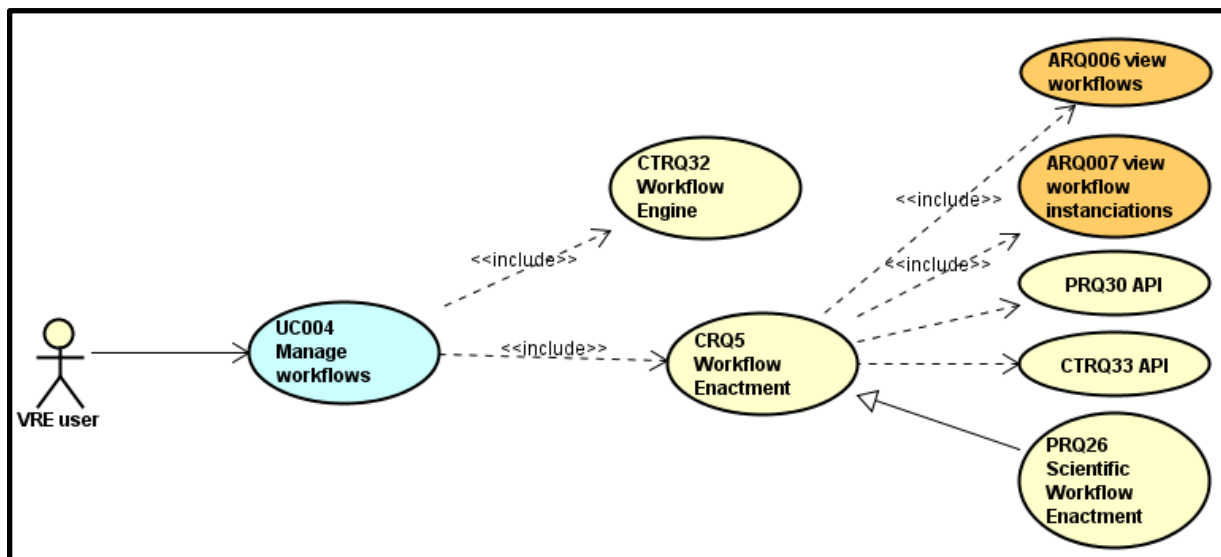
#### UC001 - Manage the life-cycle of my data

1. As a <VRE user>, I generate a raw dataset through an equipment / a survey form / any e-RI...
2. I request e-VRE to assign an ID to my raw dataset = **IRQ3** (= e-VRE generates an ID + adds it to the dataset catalog + (?) adds it to the metadata where it is stored)
3. I complete in the e-VRE the information about myself, my project, my organisation, as a data provider (information stored in a catalog in e-VRE) = **IRQ2**
4. I work on the raw dataset and produces new versions of it [in my e-RI]
5. I request e-VRE to assign IDs to each version = **IRQ1**, and to keep the generation graph (link between raw data and edited version) = xxxRQ
6. I confirm / add the data provider as being the same as in 3. = **IRQ2**
7. For each dataset (raw and edited), e-VRE assigns a reference = **IRQ4** (stored in e-VRE catalog and published in repositories / ...)
8. In e-VRE, I can track which publications cite my datasets = **IRQ5**

## 5.2.2 Data curation

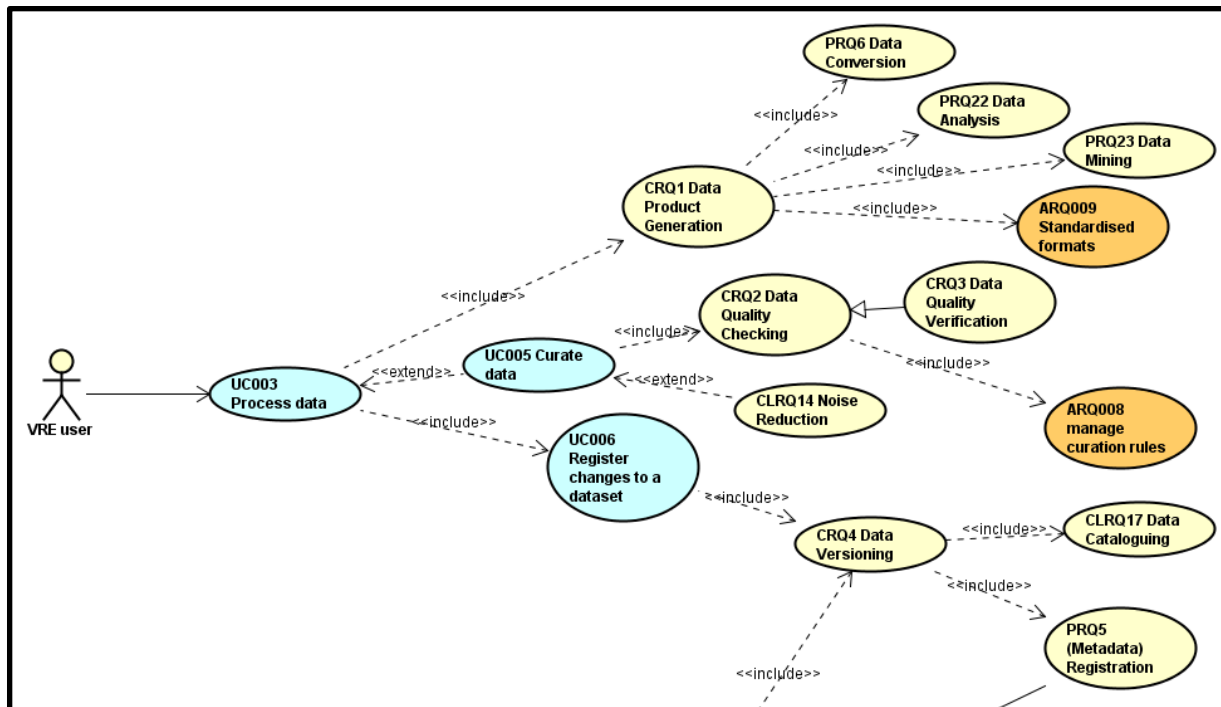
By orchestrating the requirements under the category named “Data curation”, the following use-cases have been defined.

They can be elaborated as follows:



#### UC004 - Manage workflows

1. As a <VRE user>, I want to provision a workflow to link together the software services as they access appropriate data = **CTRQ32**
2. Once the workflow is created, I want to instantiate it and control its execution = **CRQ5**
  - a. For this steps, I need to view the existing workflows (= **ARQ006**) and their instantiations (= **ARQ007**)
  - b. I should be able to indicate a scientific workflow, so that the instance of the process is recorded = **PRQ26**



UC003 - Process data

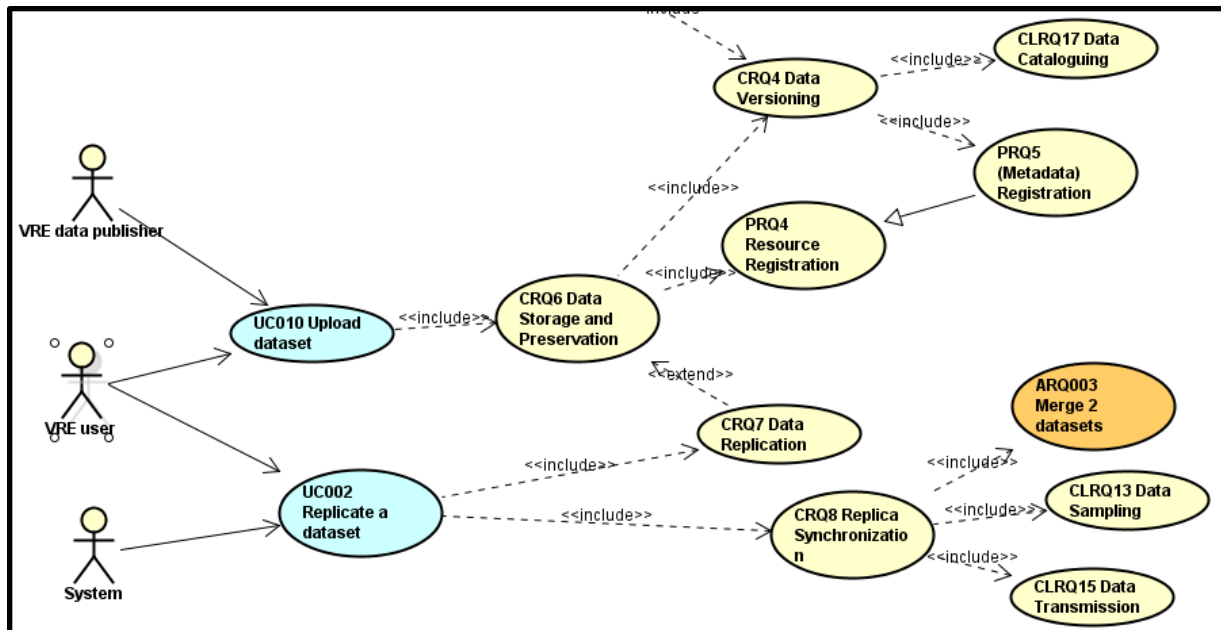
See 5.1.5 Data processing

UC005 - Curate data

1. As a <VRE user>, I want to detect and correct (or remove) corrupted, inconsistent or inaccurate records from datasets =**CRQ2**
  - a. This operation can be done either automatically, which is to say that there must be curation rules (=ARQ008), or manually (=CRQ3)
2. Extension Point: I want to remove noise from scientific data =**CLRQ14**

UC006 - Register changes to a dataset

1. As a <VRE user>, after curating and/or transforming the data, I want to assign a new version to the dataset =**CRQ4**
  - a. This implies to add and update some metadata description =**PRQ5**
  - b. It also implies to attach the metadata to the new dataset =**CLRQ17**



#### UC010 - Upload dataset

1. As a <VRE data publisher> or a <VRE user>, I want to deposit (over long-term) the data and metadata or other supplementary data and methods according to specified policies, and make them accessible on request =CRQ6
  - a. This operation includes the registration of the dataset =PRQ4
  - b. It also includes the first versioning of the dataset =CRQ4
  - c. Extension Point: to improve the security link to the storage, data can be replicated by the system =**CRQ7**

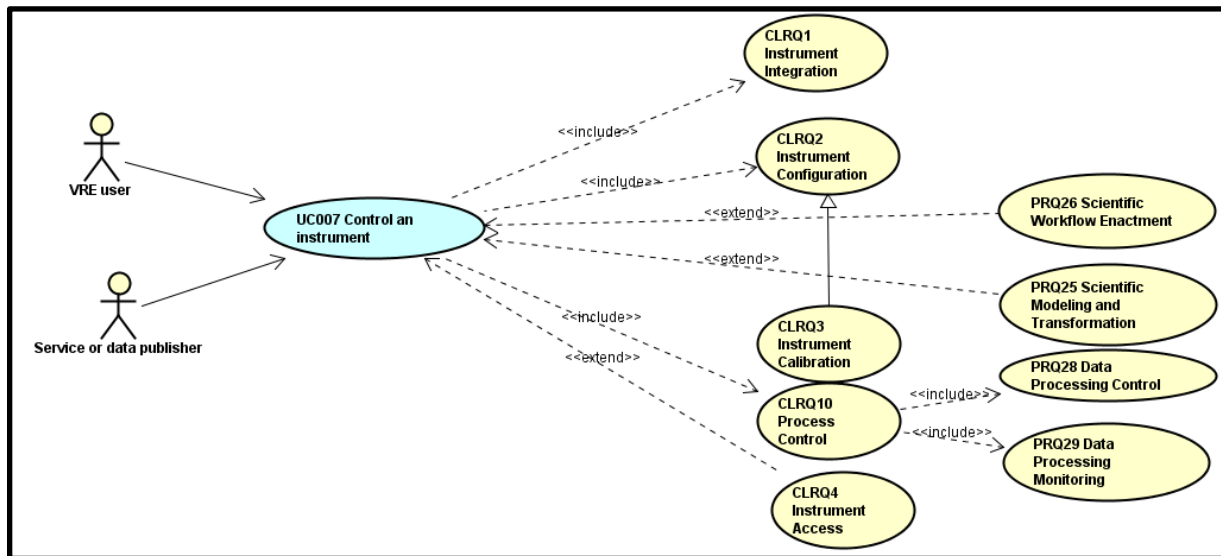
#### UC002 - Replicate a dataset

1. As a <VRE user> or the <System>, I should be able to create, delete and maintain the consistency of copies of a data on multiple storage devices =**CRQ7**
2. I should also be able to synchronize the replica =**CRQ8**
  - a. First step is to select a subset of the dataset =**CLRQ13**
  - b. Second step is to transfer data = **CLRQ15**
  - c. Last step is to merge the two datasets =**ARQ003**



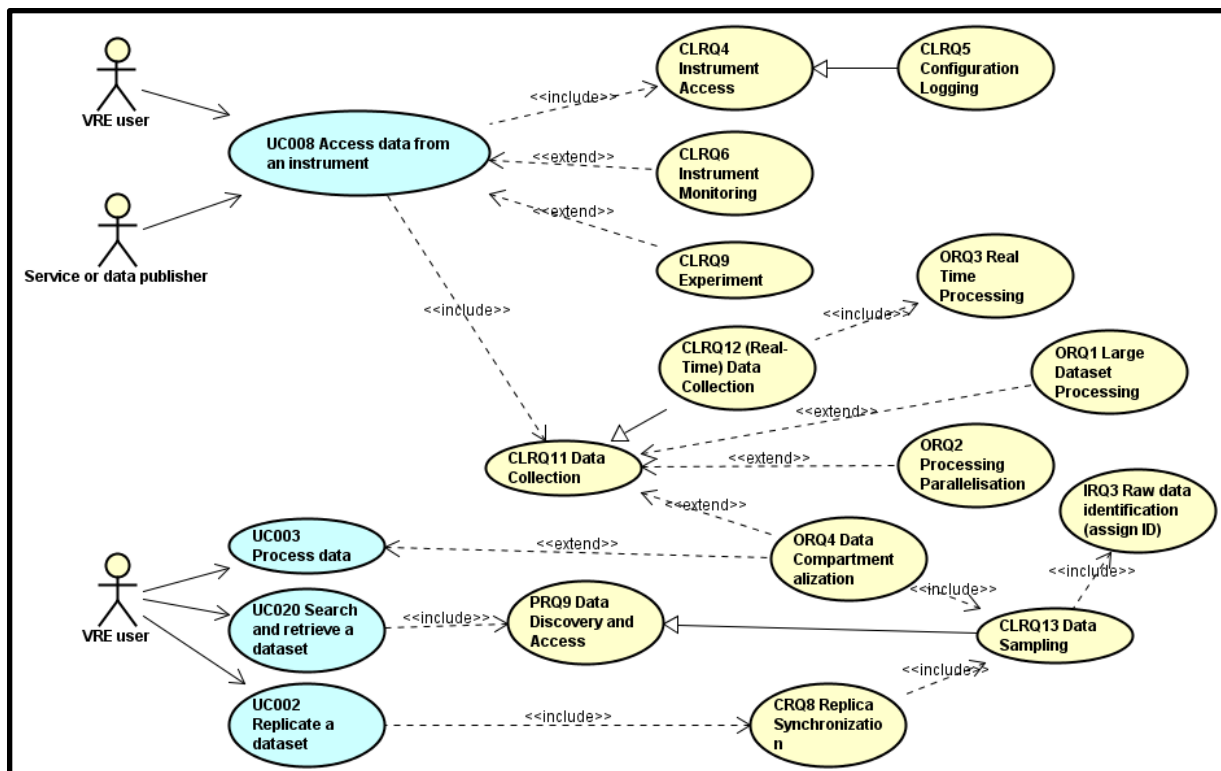
### 5.2.3 Data cataloguing

By orchestrating the requirements under the category named “Data cataloguing”, the following use-cases diagrams have been defined. After each diagram short description of shown use case is provided.



#### UC007 - Control an instrument

1. A user (<VRE user> or <Service or data publisher>) integrates an instrument or sensor which is going to be used for generating data = **CLRQ1**
2. The user configures the instrument/sensor = **CLRQ2**, the user can control and record the process of aligning or testing a sensor against dependable standards or specified verification processes = **CLRQ3**
3. The user receives input status, applies a set of logic statements or control algorithms, and generates a set of analogue / digital outputs to change the logic states of devices = **CLRQ10** (the control of the instrument state includes ability to initiate the calculation and manage the outputs to be returned to the data requester - **PRQ28**; and ability to check the states of a running service instance - **PRQ29**)
4. The user can extend this use case by specializing a Workflow Enactment, which supports the composition and execution of a series of computational or data manipulation steps, or a workflow, in a scientific application = **PRQ26** (Extension point). Besides that, the VRE user can create a mathematical model which can be used to transform the instrument outputs = **PRQ25** (Extension point)
5. The <VRE user> can update the state of the instrument = **CLRQ4**



#### UC008 - Access data from an instrument

1. A user (<VRE user> or <Service or data publisher>) reads the state of an instrument/sensor = **CLRQ4**, and collects configuration information or (run-time) messages from the instrument/sensor (or the sensor network) and outputs into log files or specified media = **CLRQ5**
2. Also, the <VRE user> can check the state of the instrument/sensor or the sensor network which can be done periodically or triggered by events = **CLRQ6**
3. The system (the actor <System>) can provide information about experiments logs, research objects and research methods to the user = **CLRQ9**
4. The user obtains digital values from the instrument, associating consistent timestamps and necessary metadata = **CLRQ11**, as well as the instrument data obtained in real-time = **CLRQ12**. The system should support big data processing (*ORQ001*), parallelisation of individual processing (*ORQ002*) and data compartmentalization (*ORQ004*). Also, the system should support that the instrument data obtained in real-time could be also processed in real-time (*ORQ003*).

#### UC003 - Process data

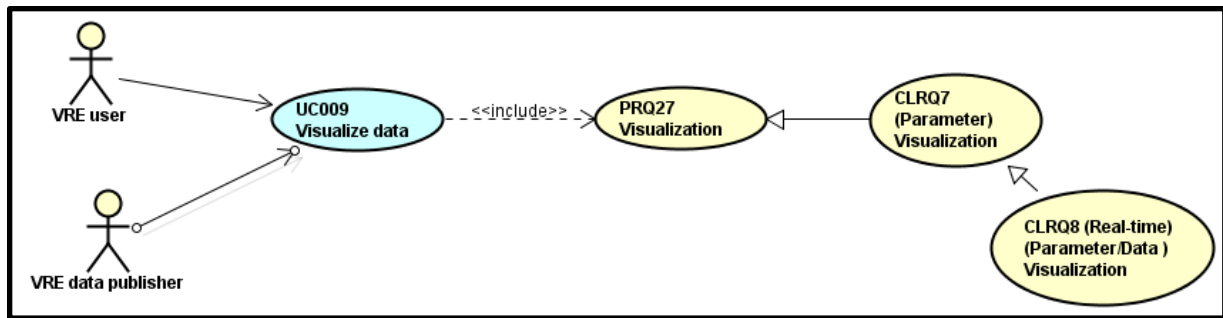
See 5.1.5 Data processing

#### UC020 - Search and retrieve a dataset

See 5.1.5 Data processing

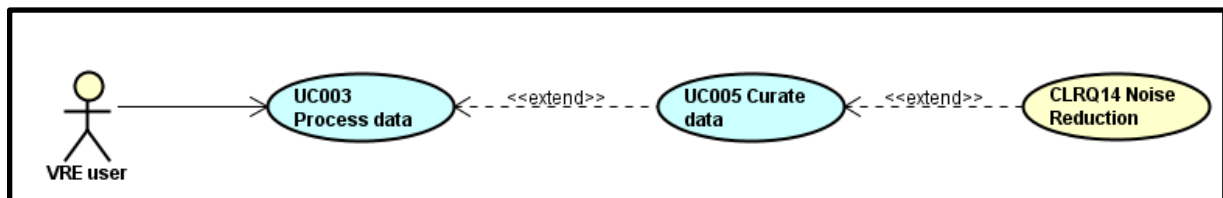
#### UC002 - Replicate a dataset

See 5.1.3 Data curation



#### UC009 - Visualize data

1. A user (<VRE user> or <VRE data publisher>) can graphically illustrate scientific data to enable scientists to understand and gain insight from this data = **PRQ27**
2. The type of diagram can be selected, as well as the subset of data which should be visualized on the diagram. Also, the layout of the diagram can be customized.
3. Moreover, the user can also display the values of parameters and measured variables = **CLRQ7, even when these are** obtained in real-time = **CLRQ8**.

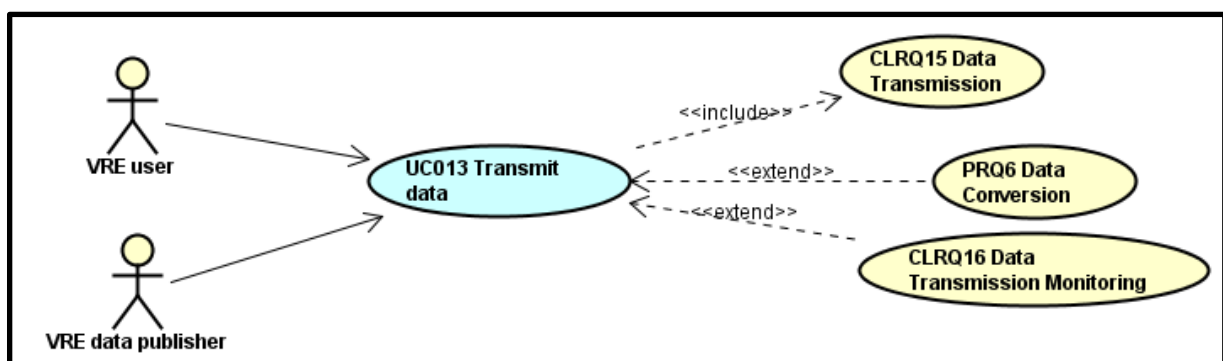


#### UC003 - Process data

See 5.1.5 Data processing

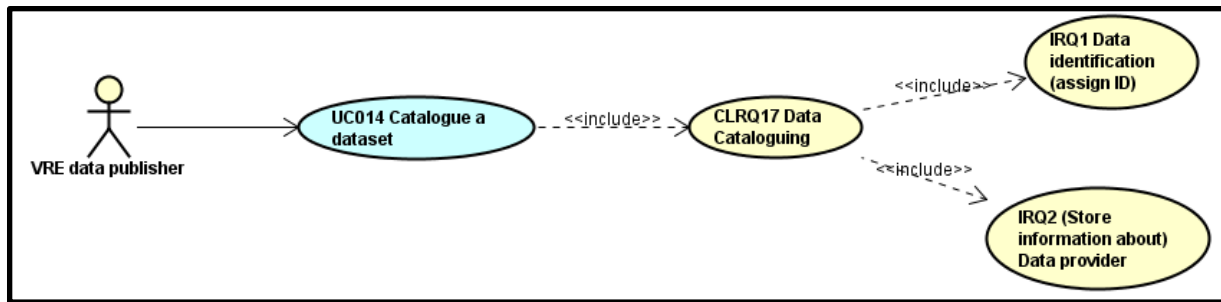
#### UC005 - Curate data

See 5.1.3 Data curation



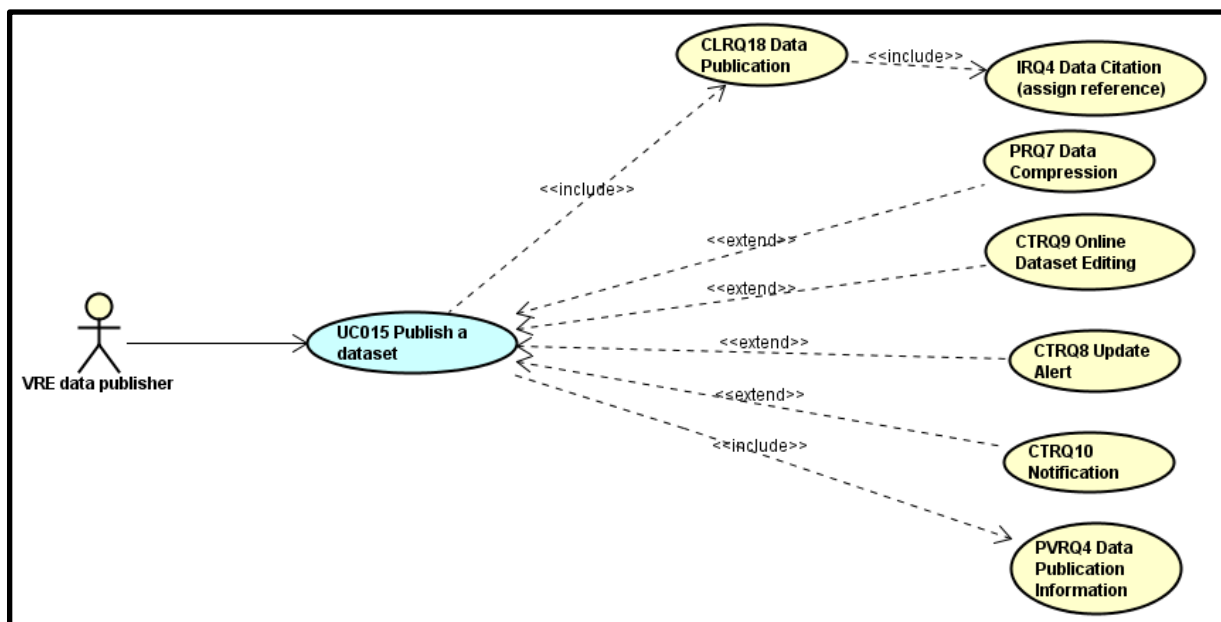
#### UC013 - Transmit data

1. A user (<VRE user> or <VRE data publisher>) can select data which should be transmitted
2. The user can define and invoke a conversion of data from one format to another format = **PRQ6** (Extension point)
3. The user selects the protocol and invokes exposing data, the system retrieves access point to those data = **CLRQ15**
4. The user can check and report the status of the data transferring process against specified performance criteria = **CLRQ16**



#### UC014 - Catalogue a dataset

1. A user (<VRE data publisher>) associates a data object with one or more metadata objects which contain data descriptions = **CLRQ17**
2. The system (the actor <System>) assigns a unique identifier to data content, but the user can also assign (global) unique identifiers (e.g. DOIs, ePIC, URIs) to data content = **IRQ1**
3. Moreover, the user specifies information about data providers = **IRQ2**. In this process, the user can select his/her personal data or affiliation data as information for data providers.



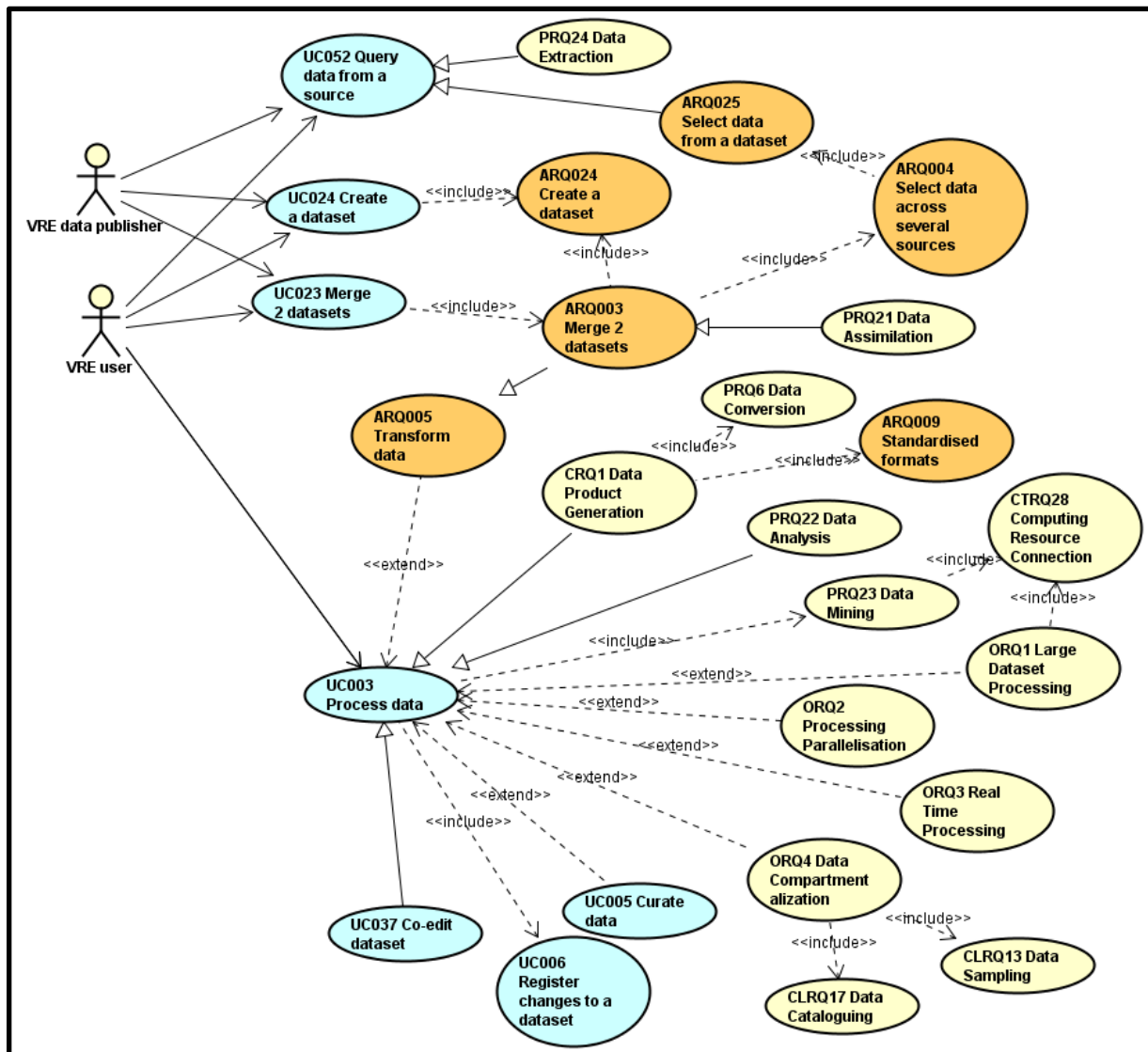
#### UC015 - Publish a dataset

1. A user (<VRE data publisher>) provides clean, well-annotated, anonymity-preserving datasets in a suitable format = **CLRQ18**, by following specified data-publication and sharing policies to make the datasets publicly accessible or to those who agree to certain conditions of use, and to individuals who meet certain professional criteria = **PVRQ4**
2. The system (the actor <System>) assigns an accurate, consistent and standardised reference to the data object, which can be cited in scientific publications = **IRQ4**
3. Before publishing dataset, the user can edit dataset online = **CTRQ9**, and at the end can encode information using reduced bits by identifying and eliminating statistical redundancy = **PRQ7**
4. The system can send notification that new dataset is available to the user = **CTRQ10**
5. Also, the system can display information about new published dataset to the other VRE users in the area: What's New in the Virtual Research Environment Platform - **CTRQ8**

## 5.2.4 Data processing

By orchestrating the requirements under the category named “Data processing”, the following use-cases have been defined.

They can be elaborated as follows:



UC052 - Query data from a source

1. As a <VRE user> or a <VRE data publisher>, I want to query data from a source, either a dataset (**ARQ025**) or unstructured documents (**PRQ24**)

UC024 - Create a dataset

1. As a <VRE user> or a <VRE data publisher>, I want to create datasets in the platform =**ARQ024**
2. The previous step could be the first step of a longer process, as the created datasets could then be catalogued, curated, etc.

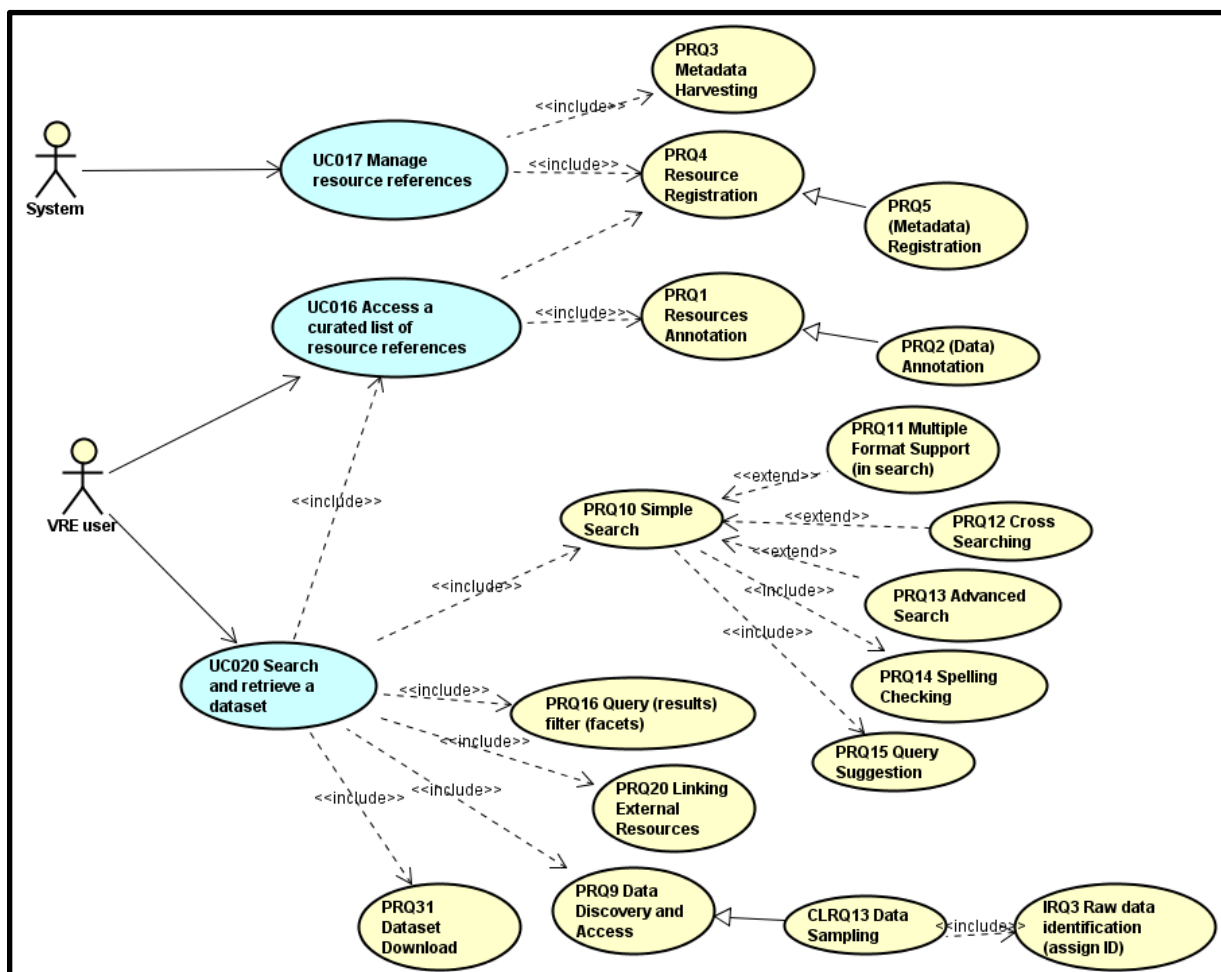
UC023 - Merge 2 datasets

1. As a <VRE user> or a <VRE data publisher>, I want to merge two datasets =**ARQ003**

- a. This includes to select data across several datasets =**ARQ004**
- b. Then the result of the selection is used to create a new dataset =**ARQ024**
- c. The merging action can be performed on any kind of data, including merging observational data with outputs =**PRQ21**

#### UC003 - Process data

1. A user (<VRE user> or <VRE data publisher>) selects and processes a set of data. The system should support filtering data by values of various parameters and applying complex functions for selecting subset of data expressed by language which is easy to learn by the user.
2. The system should support big data processing (**ORQ001**), parallelisation of individual processing (**ORQ002**), real-time processing (**ORQ003**) and data compartmentalization (**ORQ004**).
3. Also, the selected set of data can be transformed to other values = **ARQ005**, or the user can curate data (**UC005**)
4. The user describes changes of dataset = **UC006**
5. All these actions can be performed either by a unique user, or by several users in co-editing mode =**UC037**
6. The previous actions can all be described as data analysis =**PRQ22**
7. In a more formal way, the data can be processed against requirement specifications and standardised formats and descriptions =**CRQ1**
  - a. This could imply data conversion from one format to another format =**PRQ6**
  - b. This also implies that the system has a list of known standardised formats =**ARQ009**



## UC017 - Manage resource references

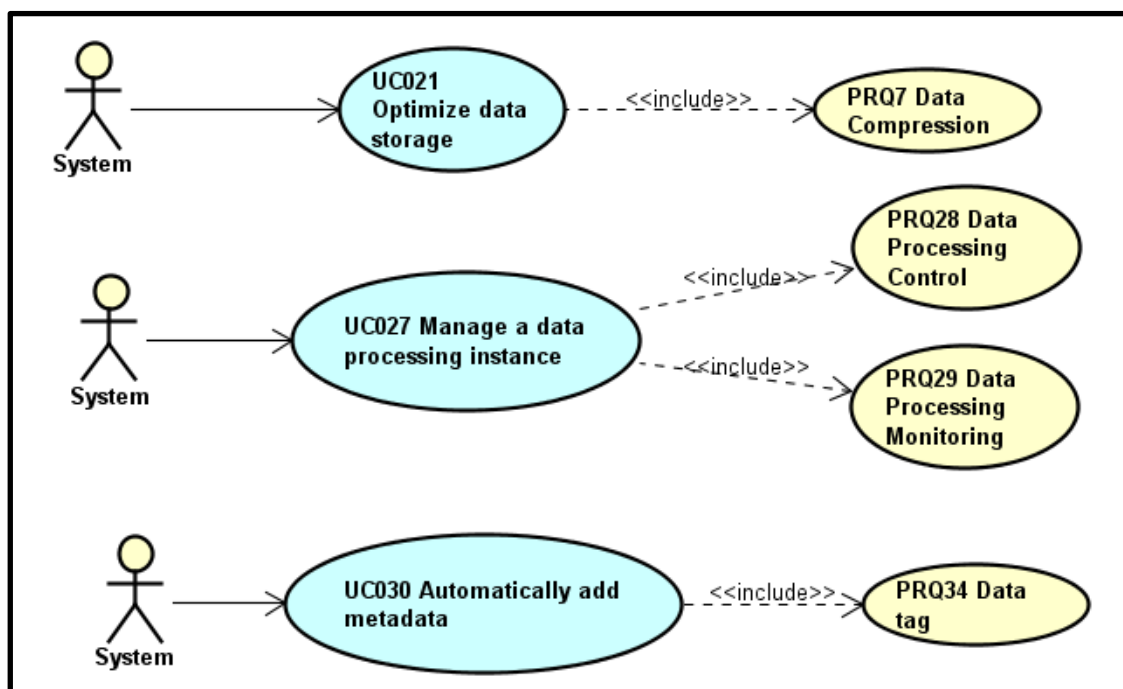
1. As a system (e-VRE), I periodically harvest metadata for objects, from a given list of sources =**PRQ3**
2. I create entries for the objects in a registry, and store the associated metadata =**PRQ4 / PRQ5**

## UC016 - Access a curated list of resource references

1. As a researcher / xx, I access a registry of resource entries =from **PRQ4**
2. For a given registry entry, I can access and/or create and modify (depending on my access level), notes associated to the registry entry =**PRQ1 & PRQ2**

## UC020 - Search and retrieve a dataset

1. As a researcher, I look for a dataset with given criteria in a curated list =**PRQ10 + UC016**
  - a. Extension point: Multiple format support (in search) =**PRQ11**
  - b. Extension point: Cross searching =**PRQ12**
  - c. Extension point: Advanced search =**PRQ13**
  - d. Includes: spelling checking of my search terms =**PRQ14**
  - e. Includes: search suggestions displayed as the query is typed =**PRQ15**
2. Once I have results for my query, some filters are proposed to reduce the list =**PRQ16**
3. Once I found an interesting dataset,
  - a. I follow the link to it =**PRQ20**
  - b. I retrieve the interesting data =**PRQ9**
  - c. or I download the dataset = **PRQ31**



## UC021 - Optimize data storage

1. The <System> should be able to encode information using reduced bits by identifying and eliminating statistical redundancy =**PRQ7**

## UC027 - Manage a data processing instance

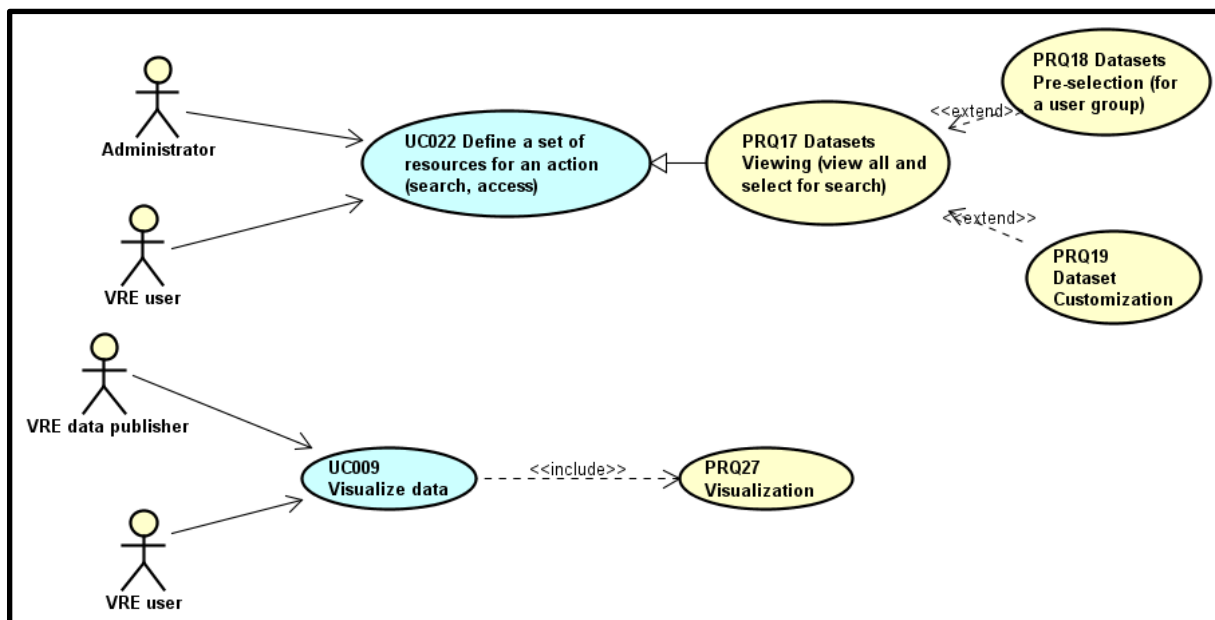
1. The <System> should be able to answer to queries by controlling the data processing =**PRQ28**



- For long running data process, the <System> should provide the states of running process instances =**PRQ29**

#### UC030 - Automatically add metadata

- The <System> should be able to automatically tag the data to inform the data user on what level this data can be shared =**PRQ34**

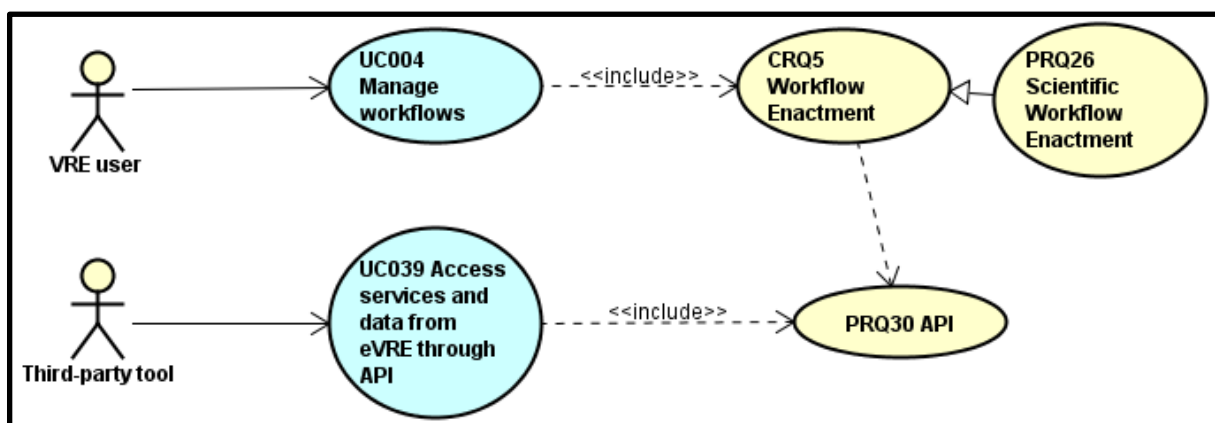


#### UC022 - Define a set of resources for an action (search, access)

- As a <VRE user> or an <Administrator>, I want to select a subset of dataset resources to be included in a data query =**PRQ17**
  - Extension Point: <Administrator> propose pre-selections for users within a department =**PRQ18**
  - Extension Point: <VRE user> register own lists of pre-selected resources =**PRQ19**

#### UC009 - Visualize data

See 5.1.4 Data cataloguing



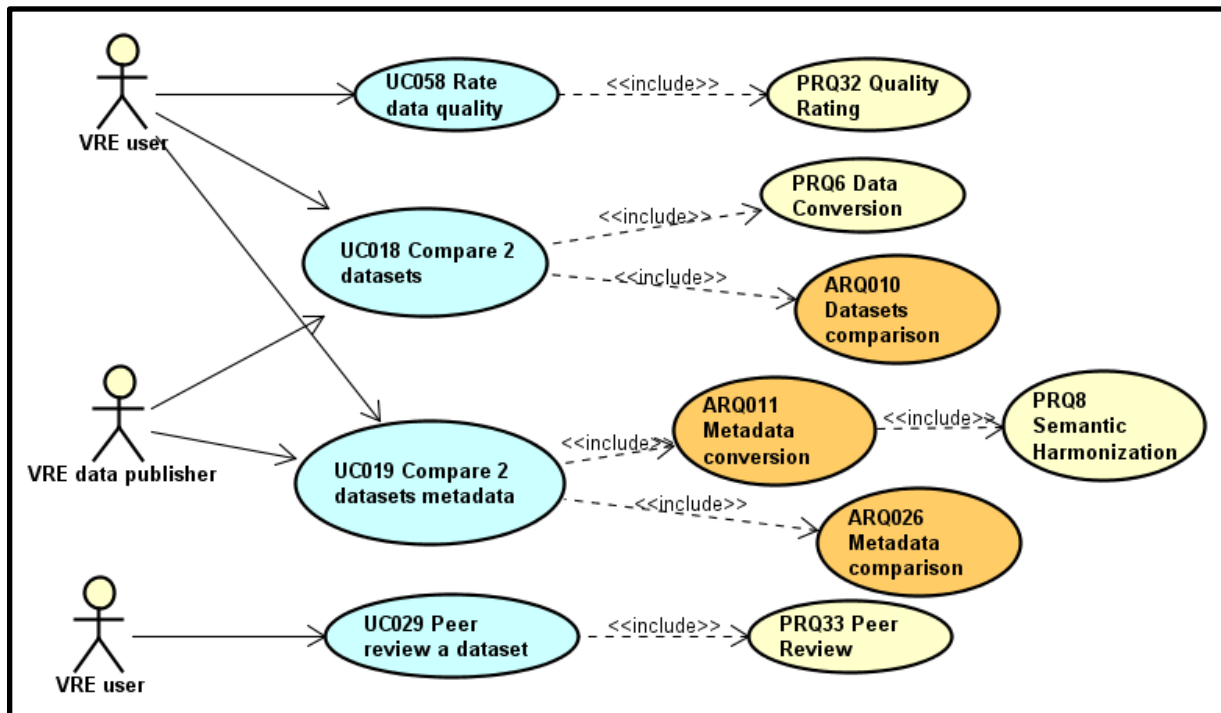
#### UC004 - Manage workflows

See 5.1.3 Data curation



UC039 - Access services and data from eVRE through API

See 5.1.8 Collaboration, training and support



UC058 - Rate data quality

1. As a <VRE user>, I want to rate data quality of a dataset =**PRQ32**

UC018 - Compare 2 datasets

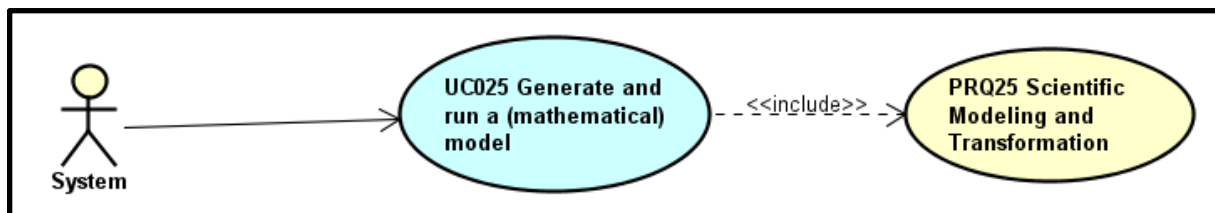
1. As a <VRE user> or a <VRE data publisher>, I should be able to convert data from one format to another =**PRQ6**
2. I should then be able to compare two datasets =**ARQ010**

UC019 - Compare 2 datasets metadata

1. As a <VRE user> or a <VRE data publisher>, I should be able to convert metadata from one format to another =**ARQ011**
  - a. This step includes semantic harmonization =**PRQ8**
2. I should then be able to compare the two metadata sets =**ARQ026**

UC029 - Peer review a dataset

1. As a <VRE user>, I want to use tools for peer review =**PRQ33**

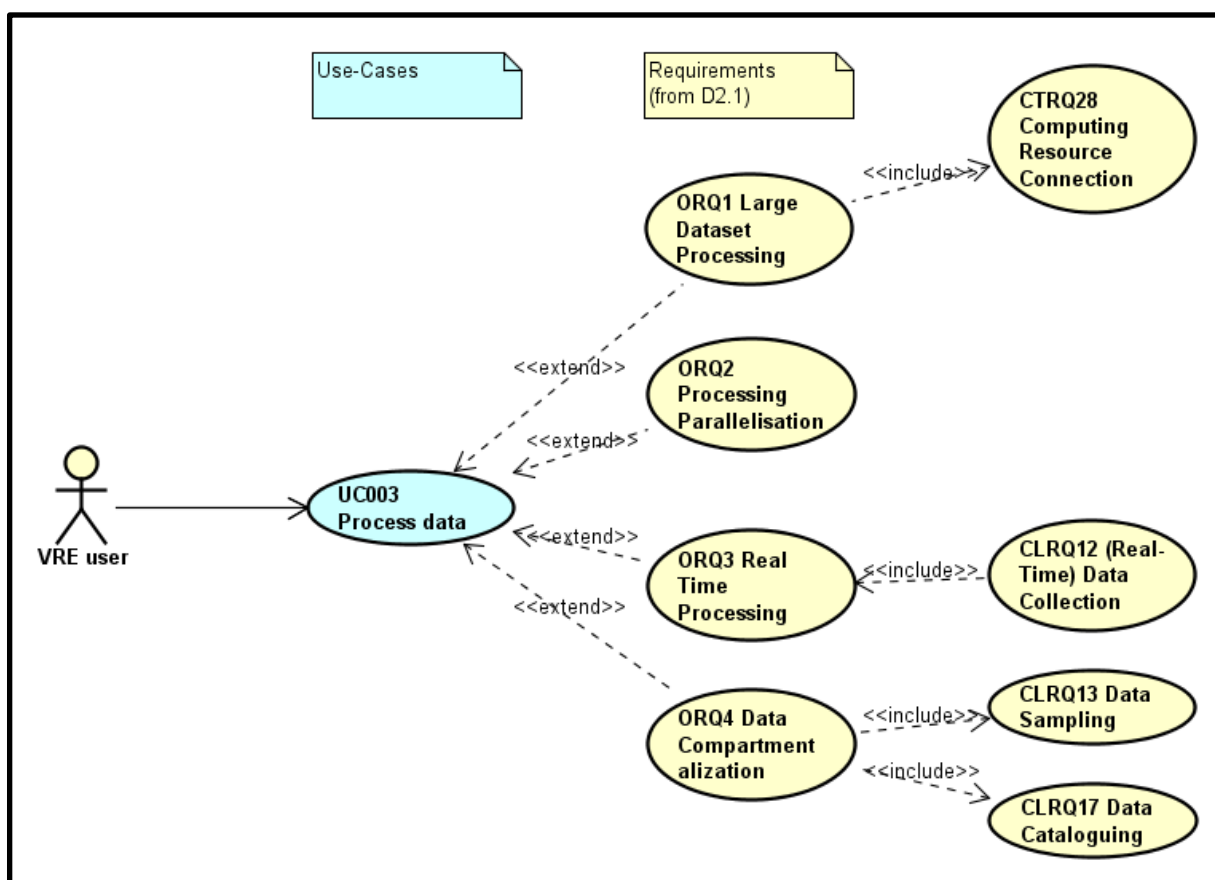


UC025 - Generate and run a (mathematical) model

1. The <System> should be able to support the generation of abstract, conceptual, graphical or mathematical models, and to run an instance of the model =PRQ25

## 5.2.5 Data optimization

By orchestrating the requirements under the category named “Data optimization”, the following use-cases have been defined:



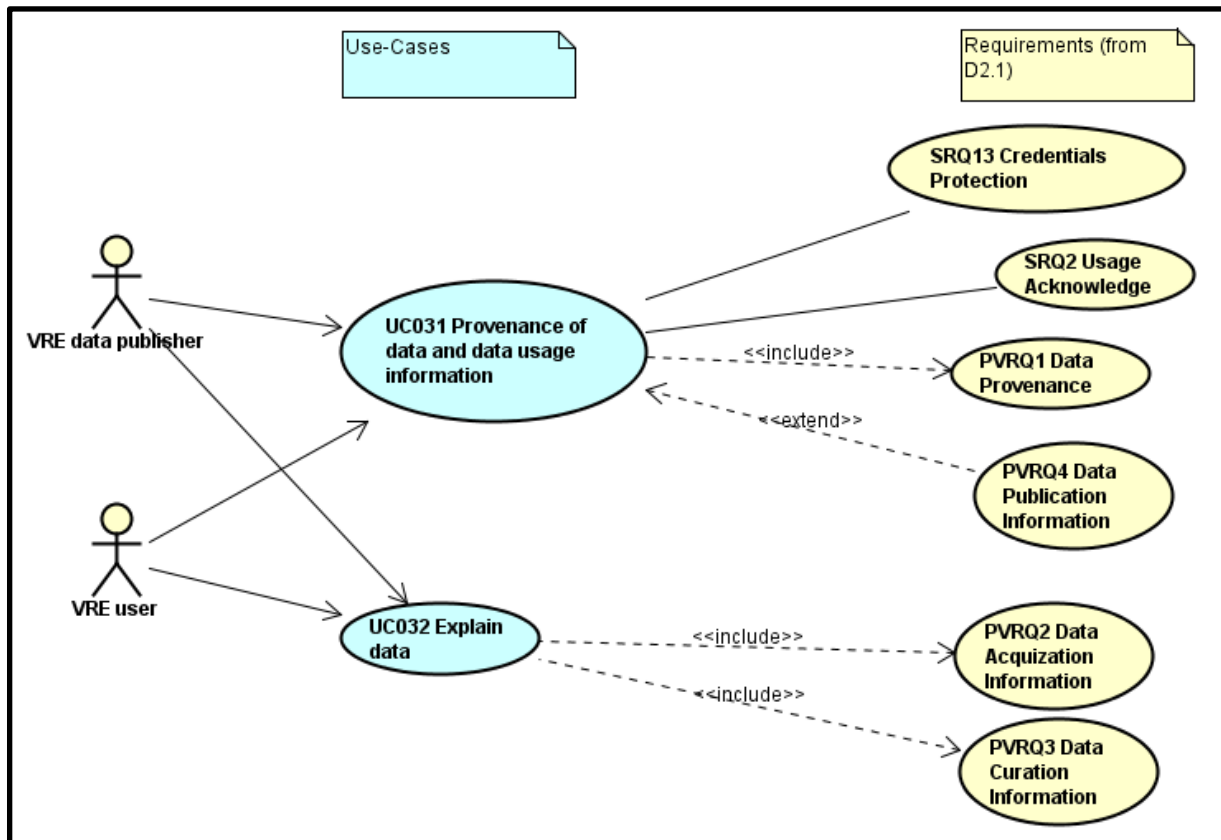
They can be elaborated as follows:

UC003 - Process data

*See 5.1.5 Data processing*

## 5.2.6 Data provenance

By orchestrating the requirements under the category named “Data provenance”, the following use-cases have been defined:



They can be elaborated as follows:

### UC031 - Provenance of data and data usage information

1. A user (<VRE data publisher> or <VRE user>) selects a data object and selects user interface option to define (<VRE data publisher>) or view (<VRE user>) “pathways of data” or the history of data information (provenance data) for a selected data object = **PVRQ1**
2. Also, the user can view or define data publication information for the selected object (e.g. which data was accessed, which data is not accessible, which query was carried out and when) = **PVRQ4**
3. The provided information should be in accordance with the non-functional requirement **SRQ13** (Credentials Protection - Ability to protect the users’ digital identities and credentials)
4. Also, VRE users should acknowledge the contribution of the Research Infrastructure in any output (i.e. publication, patent, data, etc.) deriving from research conducted within its realms = **SRQ2**

### UC032 - Explain data

1. A user (<VRE data publisher> or <VRE user>) selects a data object and selects user interface option to define (<VRE data publisher>) or view (<VRE user>) data acquisition information (e.g. detailed information about scientific questions and investigation design, observation or measurement methods or measurement devices) = **PVRQ2**

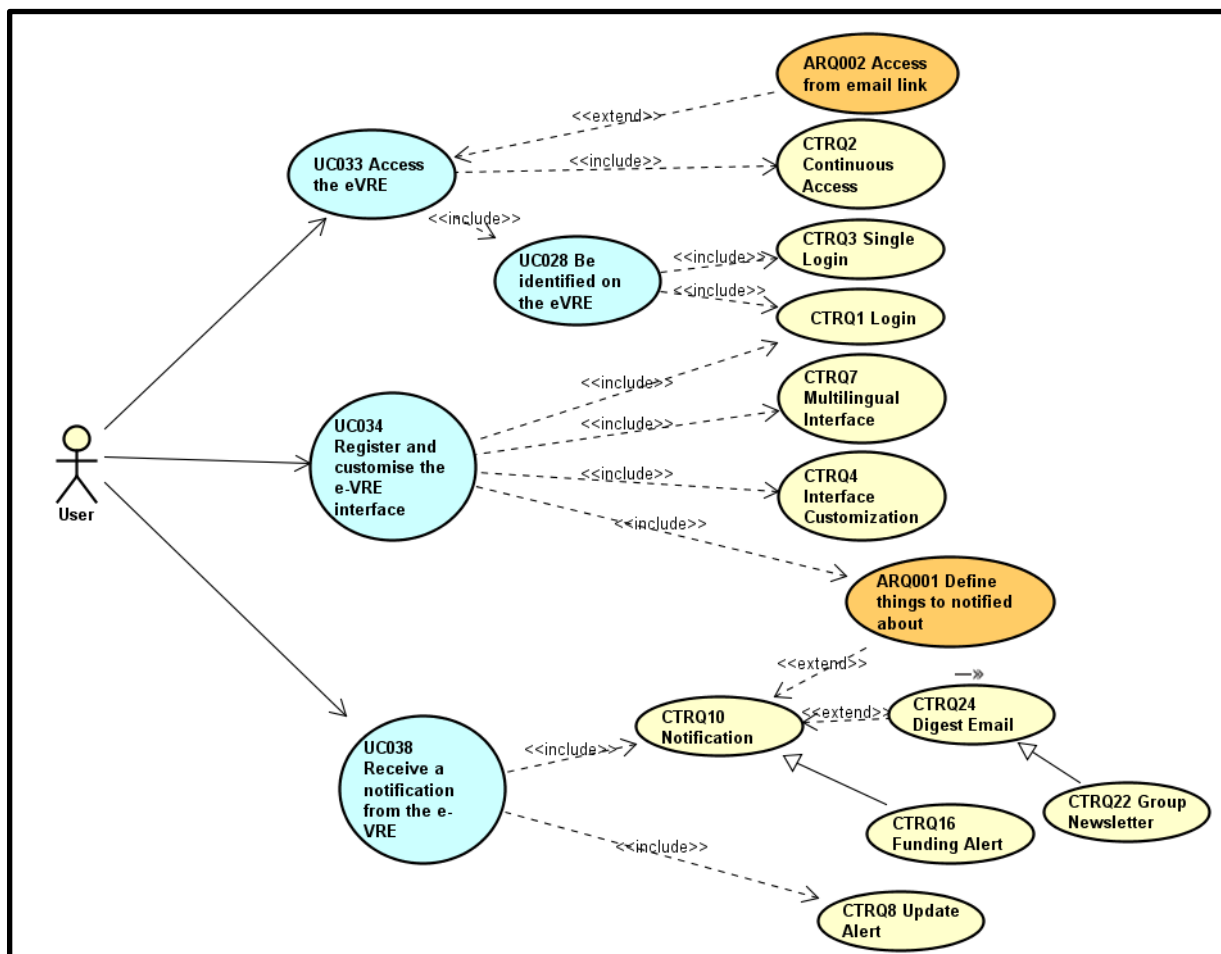
- Also, the user defines or views data curation information for the selected data object (e.g. the exact description of measurements, metadata to assist with correct future interpretation and data replication) = **PVRQ3**

### 5.2.7 Collaboration, training and support

By orchestrating the requirements under the category named “Collaboration, training and support”, the following use-cases have been defined.

Note: PRQ already used for Data processing requirements so all requirements have been prefixed with CTRQ.

The use-cases can be elaborated as follows:



#### UC033 - Access the eVRE

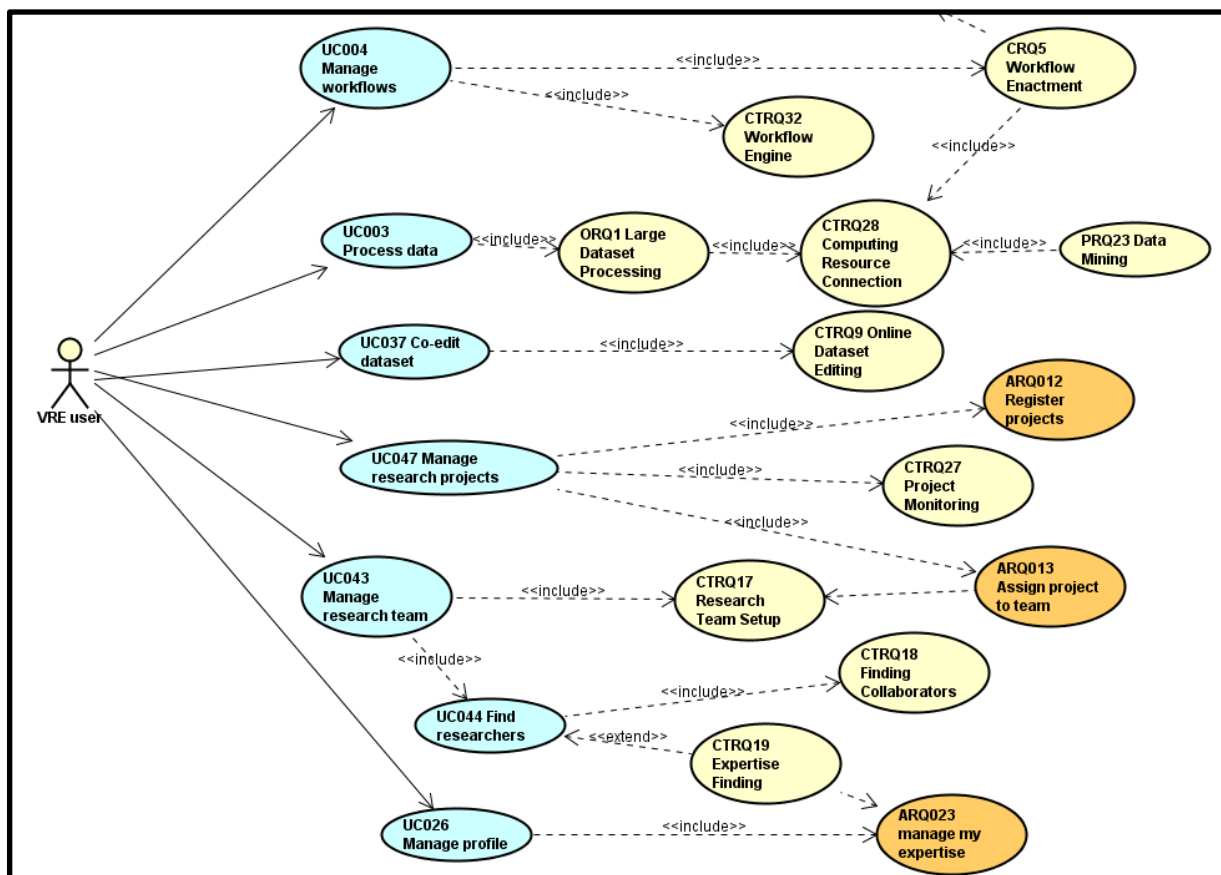
- As a <User>, I want to access the software, services and datasets anywhere with internet connection = **CTRQ2**
- Extension Point: I should be able to access the eVRE directly from an email link, when my account is created = **ARQ002**
- I want to be identified on the eVRE = **UC028**
  - I want to login with a user account and a password = **CTRQ1**
  - I want to gain multiple accesses to the system with one login = **CTRQ3**

## UC034 - Register and customise the e-VRE interface

1. As a <User>, I want the system to identify who I am and load my preferences =**CTRQ1**.
2. I want to manage my preferred language for the interface =**CTRQ7**.
3. I want to customize the interface and the functionalities to improve my user experience =**CTRQ4**.
4. I also want to define what I will be notified about =**ARQ001**.

UC038 - Receive a notification from the e-VRE

1. As a <User>, I want to find What's New in the Virtual Research Environment Platform =**CTRQ8**.
2. I also want to receive notifications when certain information are available to me =**CTRQ10**.
  - a. Extension Point: collation/digest of e-mail groups =**CTRQ24**.
    - i. Can be refined by: group periodic newsletter =**CTRQ22**.
  - b. Extension Point: define things to be notified about =**ARQ001**.
  - c. Can be refined by: automated alerts about funding opportunities =**CTRQ16**.



## UC004 - Manage workflows

*See 5.1.3 Data curation*

### UC003 - Process data

*See 5.1.5 Data processing*

### UC037 - Co-edit dataset

1. As a <VRE user>, I want to edit a dataset collaboratively with other users =**CTRQ9**.

## UC047 - Manage research projects

1. As a <VRE user>, I want to register projects in the platform =**ARQ012**
2. I want to assign project to team =**ARQ013**
3. I want to monitor involved research project progress = **CTRQ27**

## UC043 - Manage research team

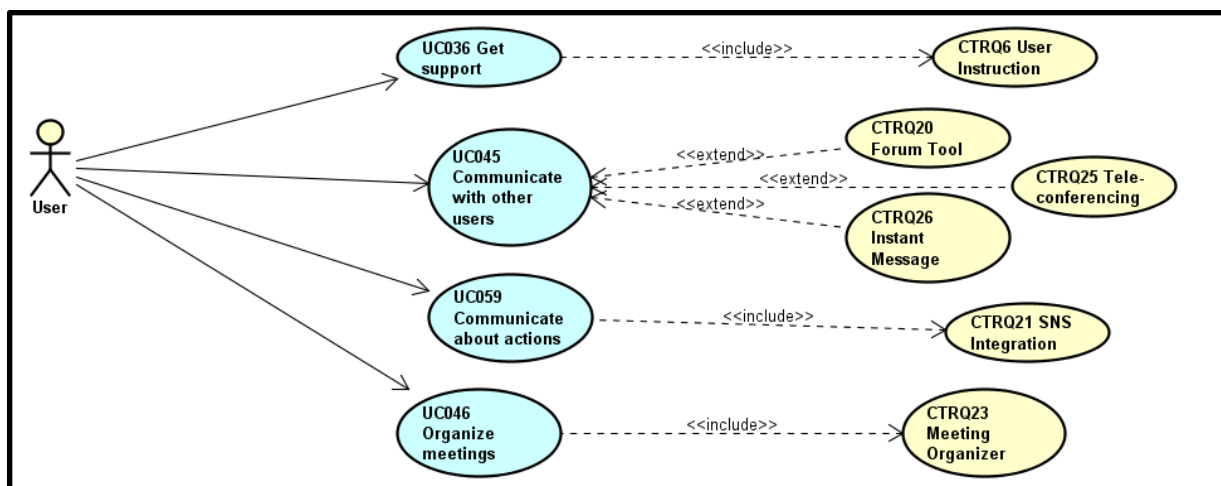
1. As a <VRE user>, I want to find researchers =**UC044**
2. I want to set up research teams with the researchers I found =**CTRQ17**

## UC044 - Find researchers

1. As a <VRE user>, I want to locate previous collaborators and potential collaborators =**CTRQ18**
  - a. Extension Point: I want a mechanism to find researchers with specific expertise =**CTRQ19**

## UC026 - Manage profile

1. As a <VRE user>, I want to manage my expertise in my profile =**ARQ023**



## UC036 - Get support

1. As a <User>, I want to have a support service and training facilities to help me use the system =**CTRQ6**.

## UC045 - Communicate with other users

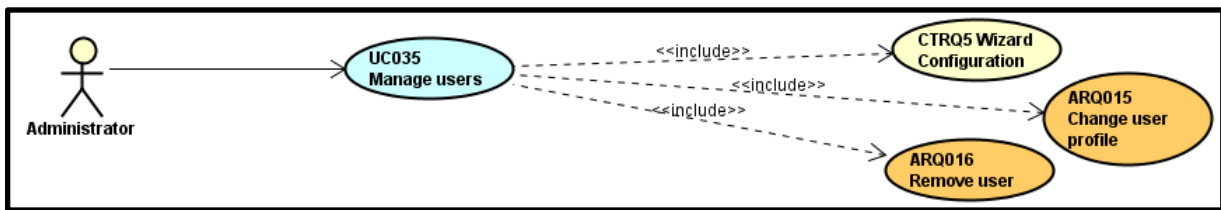
1. As a <User>, I want to communicate with other users
  - a. Extension Point: I want to access a forum to discuss with other researchers =**CTRQ20**
  - b. Extension Point: I want to use tele-conferencing tools =**CTRQ25**
  - c. Extension Point: I want to contact other users using an instant messaging tool =**CTRQ26**

## UC059 - Communicate about actions

2. As a <User>, I want to share actions and/or information on public social media network =**CTRQ21**

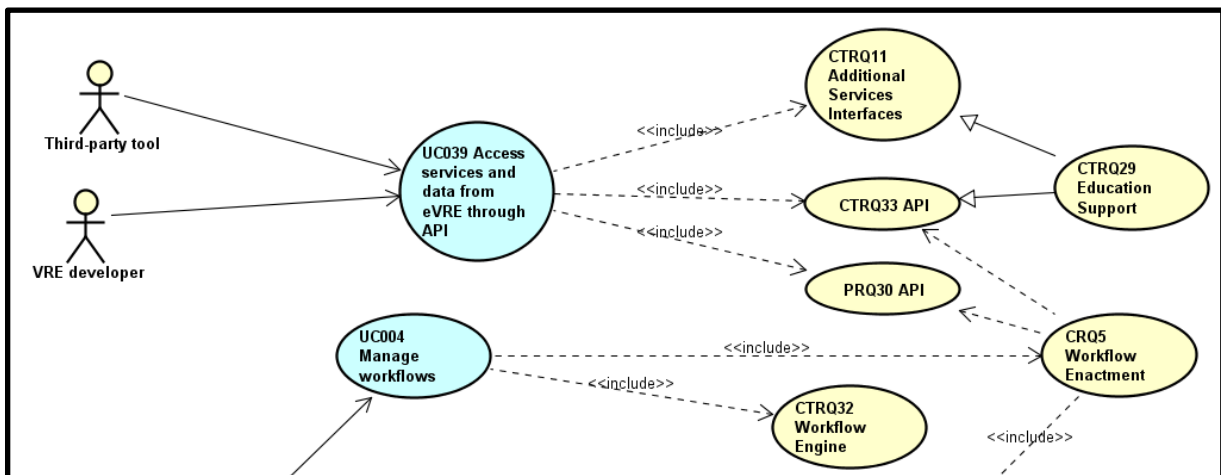
## UC046 - Organize meetings

1. As a <User>, I want to access tools to arrange team meeting, book rooms, catering booking, etc. = **CTRQ23**



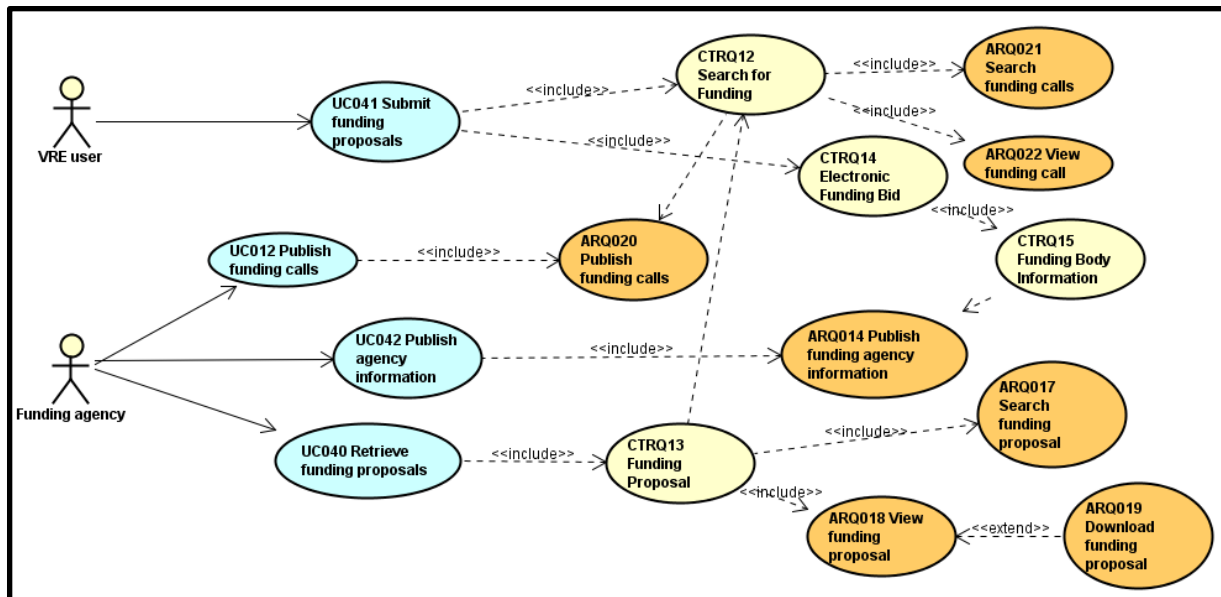
## UC035 - Manage users

1. As an <Administrator>, I want to be able to create users and define the default settings for users I create = **CTRQ5**.
2. If a user I created has a problem with her/his account, I want to be able to change her/his profile = **ARQ015**.
3. I also may need to remove a user that does not need to use the system anymore = **ARQ016**.



## UC039 - Access services and data from e-VRE

1. As a <Developer>, I want <Third-party tool> to access services from the eVRE through API = **CTRQ11, CTRQ33 & PRQ30**.
  - a. Can be refined by: ability to make services and data available for educational purpose = **CTRQ29**.



#### UC041 - Submit funding proposals

1. As a <VRE User>, I want to search and retrieve calls for research funding =**CTRQ12**
  - a. I want to search for calls corresponding to some keywords =**ARQ021**
  - b. I want to view a call from the research results =**ARQ022**
2. I also want to fill an structured electronic funding bid template that will be electronically distributed and signed-off by funding body =**CTRQ14**
  - a. The funding body information should be automatically included in the proposal =**CTRQ15**

#### UC012 - Publish funding calls

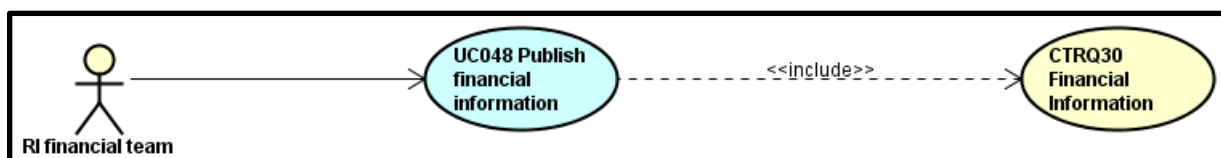
1. As a <Funding agency>, I want to publish funding calls in the platform =**ARQ020**

#### UC042 - Publish agency information

1. As a <Funding agency>, I want to publish information about my agency in the platform =**ARQ014**

#### UC040 - Retrieve funding proposals

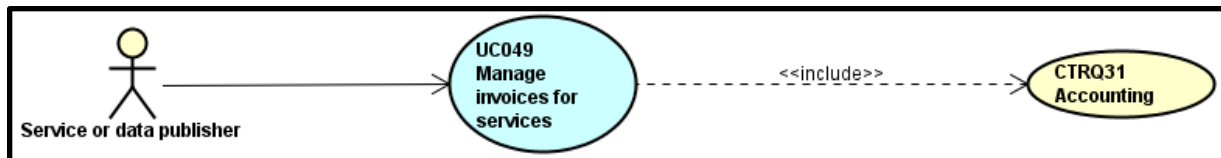
1. As a <Funding agency>, I want to retrieve proposals done for a funding call =**CTRQ13**
  - a. I search for funding proposals within a list =**ARQ017**
  - b. I access a funding proposal from the search results =**ARQ018**
    - i. Extension Point: I can download the funding proposal =**ARQ019**



#### UC048 - Publish financial information

1. As a <RI financial team>, I want to publish financial information on Research Infrastructure, cost, subscription fee, operation and maintenance costs, etc. =**CTRQ30**



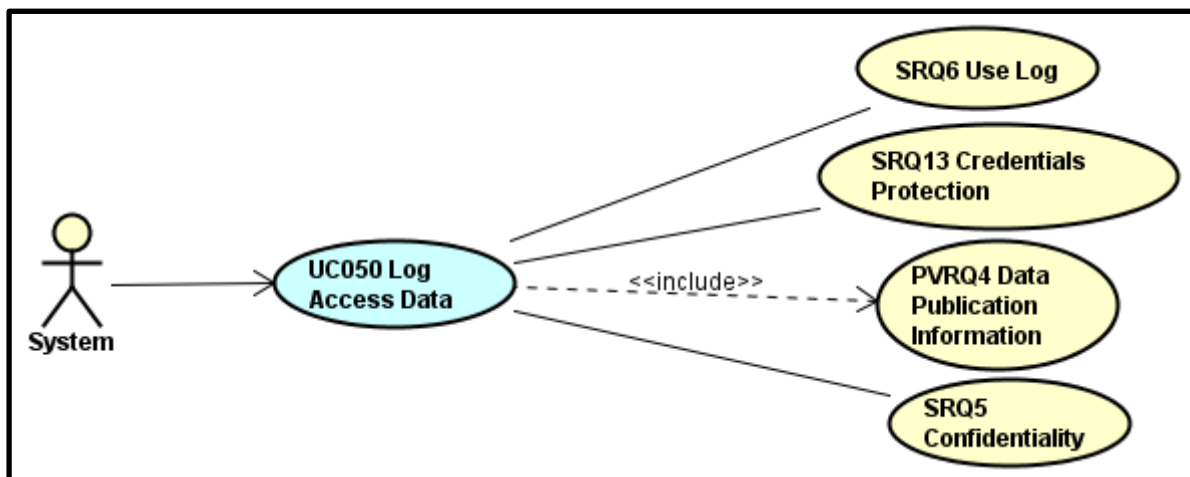


UC049 - Manage invoices for services

1. As a <Service or data publisher>, I want to use accounting services in the platform = **CTRQ31**

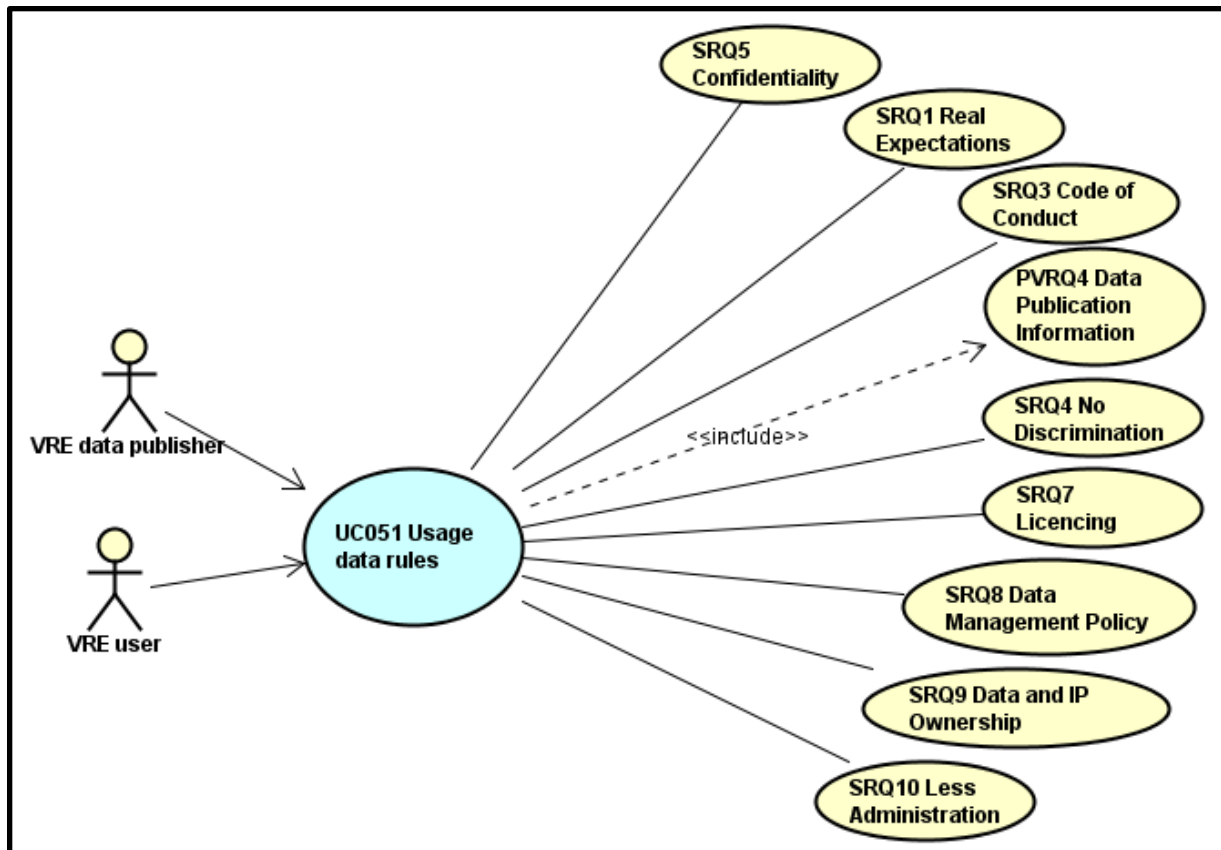
## 5.2.8 Privacy, security, trust and legal requirements

By orchestrating the requirements under the category named “Privacy, security, trust and legal requirements”, the following use-cases diagrams have been defined. After each diagram short description of shown use case is provided. A set of non-functional requirements which are not mapped to any specific use case are shown at the end of this section.



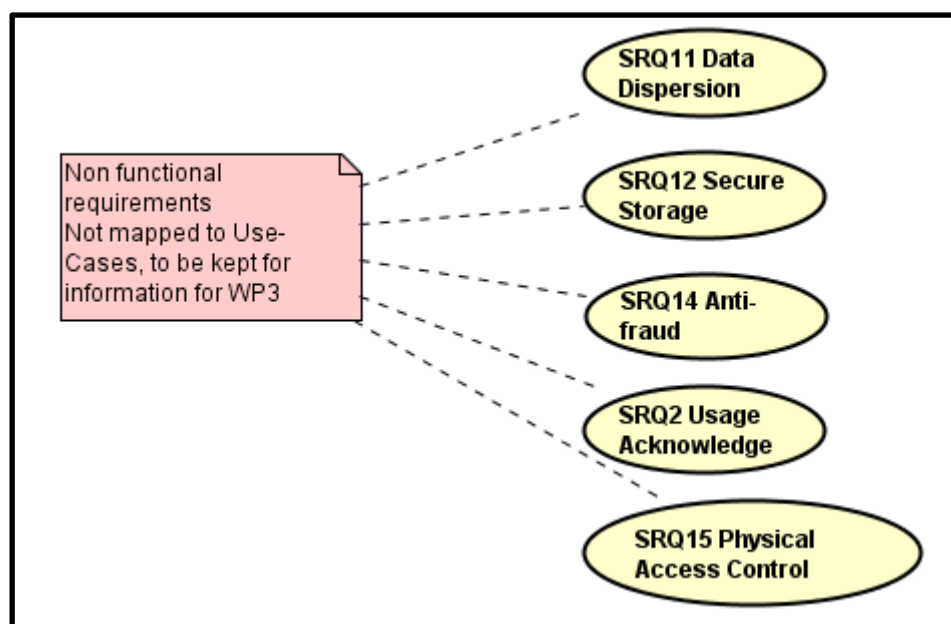
UC050 - Log access data

1. The user <System> logs information about access data including which data was accessed, which query was carried out and when = **PVRQ4**
2. Implementation of this use case should be in accordance with non-functional requirements **SRQ5, SRQ6, SRQ13**



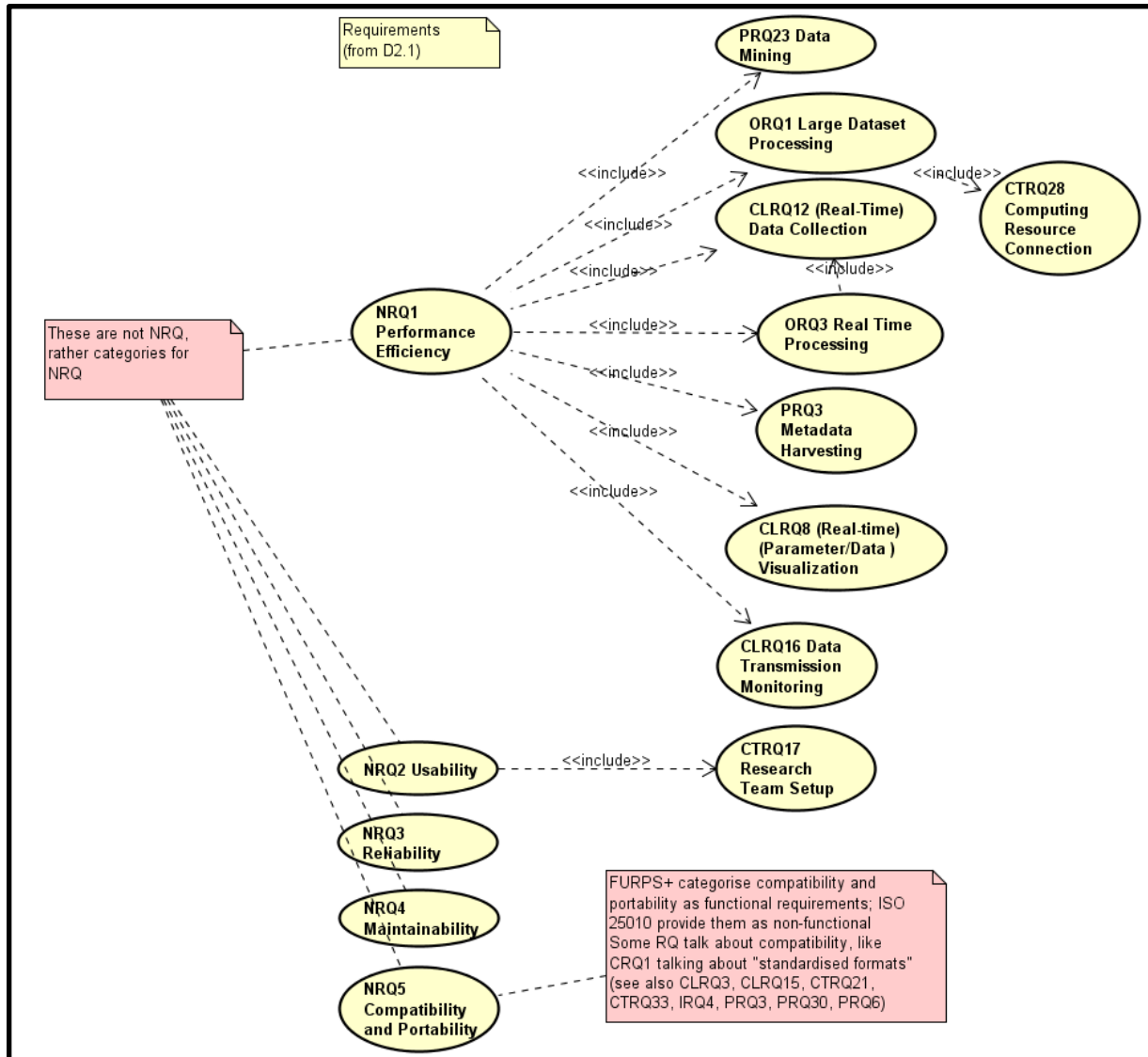
#### UC051 - Usage data rules

1. A user (<VRE data publisher> or <VRE user>) can define (<VRE data publisher>) or view (<VRE user>) rules for data usage of selected data object.
2. The user also can define/view rules for subset of data - which data are accessible and which are not = **PVRQ4**
3. The user <System> can check whether some data are available for other VRE users
4. Implementation of this use case should be in accordance with non-functional requirements **SRQ5, SRQ1, SRQ3, SRQ4, SRQ7, SRQ8, SRQ9, SRQ10**



### 5.2.9 FURPS+ and ISO 25010:2011

Non-functional requirements (NRQ) cannot be aggregated into use-cases. Some are related to other requirements that are included into use-cases.



### 5.3 Summary of “additional requirements” identified

Additional Requirements

☐

ARQ001 Define things to be notified about

☐

ARQ002 Access from email link

☐

ARQ003 Merge 2 datasets

☐

ARQ004 Select data across several sources

☐

ARQ005 Transform data

☐

ARQ006 view workflows

☐

ARQ007 view workflow instantiations

☐

ARQ008 manage curation rules

☐

ARQ009 Standardised formats

☐

ARQ010 Datasets comparison

☐

ARQ011 Metadata conversion

☐

ARQ012 Register projects

☐

ARQ013 Assign project to team

☐

ARQ014 Publish funding agency information

☐

ARQ015 Change user profile

☐

ARQ016 Remove user

☐

ARQ017 Search funding proposal

☐

ARQ018 View funding proposal

☐

ARQ019 Download funding proposal

☐

ARQ020 Publish funding calls

☐

ARQ021 Search funding calls

☐

ARQ022 View funding call

☐

ARQ023 manage my expertise

☐

ARQ024 Create a dataset

☐

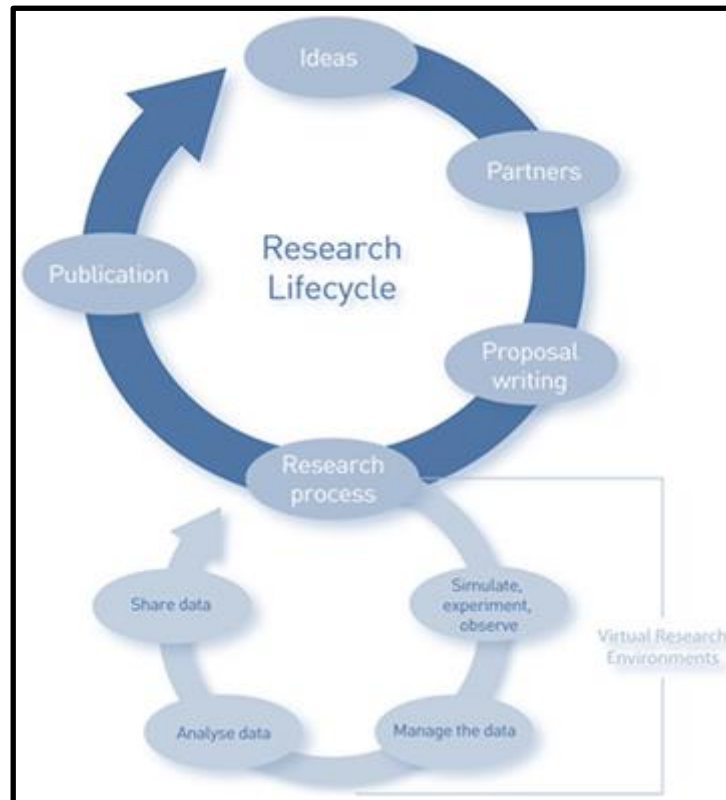
ARQ025 Select data from a dataset

☐

ARQ026 Metadata comparison

## 6 High-Level Use-cases

### 6.1 Introduction



In D2.1: Figure 2 Stages of the research and data lifecycle (Tenopir et al., 2011)

High-level Use-Cases have been designed by orchestrating the previously discovered Use-Cases.

All functional requirements are included in at least one Use-Case, and in the same way, all Use-Cases are included in at least one High-level Use-Case.

The High-level Use-Cases address the research and data lifecycle depicted above.

	(System) administration	Proposal writing	Simulate, experiment, observe	Manage the data	Analyse data	Share data & Publication
HUC001 Access services and data from eVRE				x	x	x
HUC002 Annotate data					x	
HUC003 Compare datasets					x	
HUC004 Create dataset			X			
HUC005 Create dataset from instrument			X			
HUC006 Manage data				x		
HUC007 Manage funding calls		x				
HUC008 Manage instrument			x			
HUC009 Manage research infrastructure	x					
HUC010 Manage research projects	x			x		
HUC011 Process data					X	
HUC012 Publish dataset						X
HUC013 Transform data				X		
HUC014 Manage personal profile	x					
HUC015 Manage services offered in eVRE	x					
HUC016 Manage users	x					
HUC017 Query data				x		
HUC018 Communicate			x		x	x
HUC019 Get support	x					

## 6.2 High-level Use-Cases description

### HUC001 Access services and data from eVRE

A <User> or <Third-party tool> wants to access services and data from eVRE.

Actors	<User>, <Third-party tool>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>None</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>None</li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC013 Transmit data</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC033 Access the eVRE</li> <li>UC039 Access services and data from eVRE through API</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>I want to access services and data from the eVRE:             <ol style="list-style-type: none"> <li>as a &lt;User&gt;, from anywhere with Internet access</li> <li>as a &lt;Third-party tool&gt;, with the use of an API (Application Programming Interface)</li> </ol> </li> <li>Once identified, I should be provided:             <ol style="list-style-type: none"> <li>as a &lt;User&gt;, with a menu to navigate through the different services and access the data</li> <li>as a &lt;Third-part tool&gt;, with accessible methods or functions to query data or access the services</li> </ol> </li> </ol>
Activity diagram	None
User interface	The <User> must have an interface to view and navigate through services and data of the eVRE. He must be identified so that these services and data are personalised, depending on its rights and preferences.
Scenarios	<ul style="list-style-type: none"> <li>The &lt;User&gt; wants to access services and data from eVRE.</li> <li>The &lt;Third-party tool&gt; want to access services and data from eVRE</li> </ul>
Sequence diagrams	None
Subordinate use-cases	None

Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC002 Annotate data**

A <VRE data publisher> or <System> can annotate a data object.

Actors	<VRE data publisher>, <System>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The &lt;VRE data publisher&gt; has been registered in the eVRE and has permission to annotate selected data object</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC001 Manage the life-cycle of my data</li> <li>UC017 Manage resource references</li> <li>UC030 Automatically add metadata</li> <li>UC032 Explain data</li> <li>UC051 Usage data rules</li> <li>UC058 Rate data quality</li> <li>UC029 Peer review a dataset</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>A user (&lt;VRE data publisher&gt;) selects a data object and accesses the interface to annotate it</li> <li>The user provides data curation information (e.g. the exact description of measurements, metadata to assist with correct future interpretation and data replication) and data acquisition information (e.g. detailed information about scientific questions and investigation design, observation or measurement methods or measurement devices)</li> <li>The user can also rate the data quality or peer review the dataset</li> <li>The user requests system (the actor &lt;System&gt;) to assign IDs and references to each version of data object</li> <li>The user defines rules for data usage of selected data object, the user also can define rules for subset of data - which data are accessible and which are not</li> <li>The user saves the data object annotations</li> </ol>



	<p>Alternative flow:</p> <ol style="list-style-type: none"> <li>1. The system (the actor &lt;System&gt;) periodically harvests metadata for the data object from a given list of sources and creates entries for the object in a registry, and store the associated metadata</li> <li>2. Also, the system as a consequence of some other users actions automatically adds some metadata to data object such as quality level, access level, etc.</li> </ol>
Activity diagram	<i>None</i>
User interface	The option for annotation of data object should be enabled or disabled taking into the account logged user permissions.
Scenarios	<ul style="list-style-type: none"> <li>• The &lt;VRE data publisher&gt; wants to annotate some object or the &lt;System&gt; automatically annotates some data object based on some other sources or user actions.</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

### HUC003 Compare datasets

A <VRE user> or <VRE data publisher> can compare two datasets by data or by metadata.

Actors	<VRE user>, <VRE data publisher>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>• Identified</li> <li>• Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>• Two datasets have been selected</li> <li>• The user has been registered in the eVRE and has permission to view two selected datasets (data and metadata)</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>• UC018 Compare 2 datasets</li> <li>• UC019 Compare 2 datasets metadata</li> </ul>

"Used" use-cases	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>1. A user can choose to compare datasets by data</li> <li>2. Before comparison, data of datasets can be converted to the same format</li> <li>3. After comparison of data, the result is presented, the two datasets are presented next to each other (vertical split screen), the first difference is marked, the user can navigate to the next difference</li> <li>4. Also, the user can choose to compare datasets by metadata</li> <li>5. Before comparison, metadata of datasets can be converted to the same format and the system should enable semantic harmonization of metadata</li> <li>6. After comparison of datasets by metadata, the result is presented, the metadata of two datasets are presented next to each other (vertical split screen), the first difference is marked, the user can navigate to the next difference</li> </ol>
Activity diagram	<i>None</i>
User interface	After selection of two datasets, the option for comparing two datasets should be enabled or disabled taking into the account logged user permissions.
Scenarios	<ul style="list-style-type: none"> <li>• The user wants to compare two datasets by their data or metadata</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC004 Create dataset**

A <VRE user> or <VRE data publisher> can create a dataset.

Actors	<VRE user>, <VRE data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>• Identified</li> <li>• Described</li> </ul>

Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE and has permission to create a dataset</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC002 Replicate a dataset</li> <li>UC010 Upload dataset</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC024 Create a dataset             <ul style="list-style-type: none"> <li>UC021 Optimize data storage</li> </ul> </li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>A &lt;User&gt; can create a dataset object in the eVRE (UC024)</li> <li>Data included in this dataset can be             <ol style="list-style-type: none"> <li>Uploaded by the &lt;User&gt; (UC010)</li> <li>Defined as a replica of another dataset (UC002)</li> <li>The result of a query on one or several other datasets</li> </ol> </li> <li>The &lt;System&gt; should optimize data storage on newly created dataset (UC021)</li> </ol>
Activity diagram	<i>None</i>
User interface	If the <User> has been granted rights to create a dataset, a dataset creation option should be displayed when viewing or managing datasets.
Scenarios	<ul style="list-style-type: none"> <li>The user wants to import new data</li> <li>The user wants to create a new dataset as the result of a query</li> <li>The user wants to replicate a dataset</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC005 Create dataset from instrument**

A <VRE user> can create a dataset directly from an instrument.

Actors	<VRE user>
Priority	Medium

Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE and has permission to create a dataset</li> <li>The user also has permission to control an instrument</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC056 Search instrument</li> <li>UC007 Control an instrument</li> <li>UC008 Access data from an instrument</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>A &lt;User&gt; searches for an instrument (UC056)</li> <li>He takes control of the instrument to produce a set of data (UC007)</li> <li>He accesses data from the instrument (UC008)</li> <li>He creates the dataset with the data coming from the instrument</li> </ol>
Activity diagram	<i>None</i>
User interface	When displaying an instrument, or in the list of instrument, an option should be available to produce a set of data from the instrument and store them in a dataset.
Scenarios	<ul style="list-style-type: none"> <li>The user wants to make measurements with the help of a manageable instrument.</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC006 Manage data**

A <VRE user> or <VRE data publisher> can manage data.

Actors	<VRE user>, <VRE data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>

Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>HUC004 Create dataset</li> <li>HUC012 Publish dataset</li> <li>HUC011 Process data</li> <li>HUC017 Query dataset</li> <li>UC013 Transmit data</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>A user select option to manage data and the dialog for management of data</li> <li>There are options for <ol style="list-style-type: none"> <li>Creation of a new dataset (HUC004 - Extension point)</li> <li>Publishing of a dataset (HUC012- Extension point)</li> <li>Searching datasets (HUC017 - Extension point)</li> <li>Processing data (HUC011 - Extension point)</li> <li>Data transmission - the user can start, check and report the status of data transferring process against specified performance criteria</li> </ol> </li> </ol>
Activity diagram	<i>None</i>
User interface	After logging into the system, the user should have option in user interface for management of data.
Scenarios	<ul style="list-style-type: none"> <li>The user wants to create and publish a new dataset, or work with the existing one</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

### HUC007 Manage funding calls

A <Funding agency> can manage funding calls.

Actors	<Funding agency> (and <VRE user> for related use-case)
Priority	Low

Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE</li> <li>The user has been granted permissions to manage funding calls</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC042 Publish agency information</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC054 Publish funding calls</li> <li>UC040 Retrieve funding proposals</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>A &lt;Funding agency&gt; can publish information about itself (UC0042)</li> <li>The &lt;Funding agency&gt; can publish funding calls (UC0054) <ol style="list-style-type: none"> <li>Researchers can submit funding proposals (UC041) for a call</li> </ol> </li> <li>The &lt;Funding agency&gt; then retrieves submitted funding proposals (UC040)</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>After logging into the system, the user should have an interface to manage agency’s information.</p> <p>The funding agency should also have a complete interface to manage funding calls</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;Funding agency&gt; wants to publish funding calls and manage funding proposals.</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

### HUC008 Manage instrument

A <Service or data publisher> can manage instruments.

Actors	<Service or data publisher>
Priority	Medium

Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The &lt;Service or data publisher&gt; has been registered in the eVRE and has permission to manage instruments</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC053 Create instrument metadata</li> <li>UC055 Register instrument services</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC056 Search instrument</li> <li>UC007 Control an instrument</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;Service or data publisher&gt; search for an instrument in the list of managed instruments (UC056)</li> <li>Once he found the instrument, he updates the instrument settings (UC007)</li> <li>If the instrument does not exist in the list, he can create the instrument metadata (UC053)</li> <li>He can also register new services for an existing instrument (UC055)</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>The &lt;Service or data publisher&gt; have access to a list of managed instruments. He can create new instruments, and update existing instruments.</p> <p>For an instrument, he can manage the associated metadata and manage the registered services.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;Service or data publisher&gt; wants to add, update or delete an instrument metadata and services</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

### HUC009 Manage research infrastructure

A <RI financial team> can manage research infrastructure.

Actors	<RI financial team>
Priority	Low

Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The &lt;RI financial team&gt; has been registered in the eVRE and has permission to manage a research infrastructure</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>None</li> </ul>
Extension points	<ul style="list-style-type: none"> <li>None</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC048 Publish financial information</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;RI financial team&gt; access the interface to manage information about the research infrastructure             <ol style="list-style-type: none"> <li>This user can add/update/delete financial information</li> </ol> </li> </ol>
Activity diagram	None
User interface	<p>The &lt;RI financial team&gt; have access to a list of settings concerning the research infrastructure.</p> <p>A part of these settings concern financial information, which can be edited.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;RI financial team&gt; wants to provide financial information about the research infrastructure (cost, subscription fee, operation and maintenance costs, etc.)</li> </ul>
Sequence diagrams	None
Subordinate use-cases	None
Diagram of participating objects	None
Other artifacts	None

### HUC010 Manage research projects

A <VRE user> can manage research projects.

Actors	<VRE user>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>



Pre-conditions	<ul style="list-style-type: none"> <li>The &lt;VRE user&gt; has been registered in the eVRE and has permission to manage research projects</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC047 Manage research projects             <ul style="list-style-type: none"> <li>UC043 Manage research team</li> <li>Extension point: UC046 Organize meetings</li> <li>Extension point: UC041 Submit funding proposals</li> </ul> </li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;VRE user&gt; accesses the list of projects he manages/is member of</li> <li>He can register new projects, or update the settings of projects he managed (<i>ARQ012</i>)</li> <li>He can manage research teams and assign projects to team (UC043, <i>ARQ013</i>)</li> <li>On a project, he has the possibility to organize meetings by booking rooms, etc. (UC046)</li> <li>On a project, he also can search for funding calls and submit funding proposals (UC041)</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>The &lt;VRE user&gt; must have access to a list of projects. He should be able to add projects, and update projects he managed (=projects in which he is tagged as the project manager).</p> <p>For a project, he should be able to submit proposals to funding calls. He should also be able to register meetings and update meetings’ data for organisation.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;VRE user&gt; wants to manage projects             <ul style="list-style-type: none"> <li>He wants to manage the members of a project</li> <li>He wants to detail meetings organisation for a project</li> <li>He wants to submit funding proposals for a project</li> </ul> </li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC011 Process data**

A <VRE user> or <VRE data publisher> can process datasets

Actors	<VRE user>, <VRE data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>● Identified</li> <li>● Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>● The user has been registered in the eVRE and has permission to view and process selected datasets (data and metadata)</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>● <i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>● HUC002 Annotate data</li> <li>● HUC003 Compare datasets</li> <li>● HUC013 Transform data</li> <li>● UC004 Manage workflows <ul style="list-style-type: none"> <li>○ UC027 Manage data processing instance</li> <li>○ UC025 Generate and run a (mathematical) model</li> </ul> </li> <li>● UC009 Visualize data</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>● <i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>6. If a user selected two datasets, there are options in user interface for <ol style="list-style-type: none"> <li>a. comparing datasets (HUC003) and</li> <li>b. transforming data (HUC013) - there is option for merging data</li> </ol> </li> <li>7. If the user selected a dataset, there are options for <ol style="list-style-type: none"> <li>a. annotation of data (HUC002),</li> <li>b. transformation of data (HUC013) - there is no option for merging data,</li> <li>c. Visualization (UC009) - the user can graphically illustrate scientific data to enable other scientists to better understand data</li> <li>d. Management workflows (UC004) - the user can define a data processing chain and initiate the calculation and manage that outputs of one element in the chain are returned to the next element in the chain, also the user can monitor the whole data processing (UC027)</li> <li>e. model generation and running (UC025) - the user can generate abstract, conceptual, graphical or mathematical models, and can run an instance of the model</li> </ol> </li> </ol>

Activity diagram	<i>None</i>
User interface	After selection of one or two datasets, the options for processing data should be enabled or disabled taking into the account logged user permissions.
Scenarios	<ul style="list-style-type: none"> <li>The user wants to process selected datasets (data and metadata)</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

#### HUC012 Publish dataset

A <VRE user> or <VRE data publisher> can publish datasets.

Actors	<VRE user>, <VRE data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE and has permission to publish a dataset</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>UC014 Catalogue a dataset</li> <li>UC015 Publish a dataset</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;VRE user&gt; or &lt;VRE data publisher&gt; selected an unpublished dataset from its datasets.</li> <li>He catalogue the dataset by providing metadata concerning this dataset (UC014)</li> <li>He finally publish the dataset (UC015) according to the publication rules</li> </ol>
Activity diagram	<i>None</i>
User interface	When managing its datasets, a <VRE user> or <VRE data publisher> should be able to retrieve published or

	<p>unpublished datasets.</p> <p>For unpublished datasets, he should have an option to publish each one of them, which will bring him to a form to fill all needed information for dataset publication.</p>
Scenarios	<ul style="list-style-type: none"> <li>The user wants to publish a dataset</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

### HUC013 Transform data

A <VRE user> or <VRE data publisher> transform data of a selected dataset.

Actors	<VRE user>, <VRE data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The user has been registered in the eVRE and has permission to view and transform selected datasets</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC003 Process data</li> <li>UC011 Check quality</li> <li>UC023 Merge 2 datasets</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>After selection of dataset/datasets, a user can choose an option to transform data or subset of data of selected dataset(s)</li> <li>The user interface offers option for merging selected datasets or to process data of the selected dataset(s) (UC023) <ol style="list-style-type: none"> <li>If the user selects the first option, the user can select subset of data which should be merged.</li> <li>If the user selects the second option, the form for processing data is opened. The system should support filtering data by values of various parameters and applying complex</li> </ol> </li> </ol>

	<p>functions for selecting subset of data expressed by language which is easy to learn by the user. The selected set of data can be transformed to other values or the user can curate data, where the function for transforming data can be expressed using the similar language as one mentioned in the previous point. (UC003)</p> <ol style="list-style-type: none"> <li>3. The user describes changes of dataset</li> <li>4. The user can check quality of data (UC011)</li> <li>5. The new/changed data has been saved</li> </ol>
Activity diagram	<i>None</i>
User interface	After selection of a dataset/datasets, the option for transforming data should be enabled or disabled taking into the account logged user permissions.
Scenarios	<ul style="list-style-type: none"> <li>• The user wants to transform data of the selected dataset</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

#### HUC014 Manage personal profile

As a <User>, I want to manage my personal profile within the eVRE.

Actors	<User>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>• Identified</li> <li>• Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>• The &lt;User&gt; has been registered in the eVRE</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>
Extension points	<ul style="list-style-type: none"> <li>• UC026 Manage profile</li> <li>• UC034 Customise the eVRE interface</li> <li>• UC038 Receive a notification from the eVRE</li> </ul>

"Used" use-cases	<ul style="list-style-type: none"> <li>None</li> </ul>
Flow of events	<p>The &lt;User&gt; access the interface to change her/his profile</p> <p>The &lt;User&gt; changes the preferences</p> <p>The &lt;User&gt; saves the preferences</p>
Activity diagram	None
User interface	<p>The "profile management" interface should display preferences that can be changed by the &lt;User&gt; and that concern her/his profile.</p> <p>Preferences should be grouped by categories or functionalities.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;User&gt; wants to change some preferences.</li> </ul>
Sequence diagrams	None
Subordinate use-cases	None
Diagram of participating objects	None
Other artifacts	None

#### HUC015 Manage services offered in eVRE

As a <Service or data publisher>, I want to manage the services I offer in the eVRE.

Actors	<Service or data publisher>
Priority	High
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>&lt;User&gt; has been registered in the eVRE</li> <li>&lt;User&gt; has been identified as a service or data provider</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>None</li> </ul>
Extension points	<ul style="list-style-type: none"> <li>HUC004 Create dataset</li> <li>HUC002 Annotate data</li> <li>HUC012 Publish dataset</li> <li>HUC008 Manage instrument</li> <li>UC049 Manage invoices for services</li> </ul>

"Used" use-cases	<ul style="list-style-type: none"> <li>None</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;Service or data publisher&gt; access the interface to manage her/his services</li> <li>The &lt;Service or data publisher&gt; view, create, update or delete her/his services.</li> <li>If one or more services are paid services, the &lt;Service or data publisher&gt; can manage the invoices.</li> </ol>
Activity diagram	None
User interface	<p>The "services and data" interface should display services and data published by the &lt;Service or data publisher&gt;.</p> <p>Services and data should be grouped by type.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;Service or data publisher&gt; wants to create a new service.</li> <li>The &lt;Service or data publisher&gt; wants to update an existing service.</li> <li>The &lt;Service or data publisher&gt; wants to manage invoices for her/his services.</li> </ul>
Sequence diagrams	None
Subordinate use-cases	None
Diagram of participating objects	None
Other artifacts	None

### HUC016 Manage users

As an <Administrator>, I want to manage users.

Actors	<User>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>The &lt;Administrator&gt; has been registered in the eVRE</li> <li>The &lt;Administrator&gt; has been granted rights to manage users</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>None</li> </ul>
Extension points	<ul style="list-style-type: none"> <li>UC057 Search users</li> <li>UC035 Manage users</li> </ul>

"Used" use-cases	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>1. The &lt;Administrator&gt; has a list of existing users</li> <li>2. He can search for a user with several criteria (name, position, etc.) (UC057)</li> <li>3. He can manage users (UC035)               <ol style="list-style-type: none"> <li>a. Add a new user</li> <li>b. Update information for a user</li> <li>c. Remove access for a user</li> </ol> </li> </ol>
Activity diagram	<i>None</i>
User interface	<p>The &lt;Administrator&gt; needs an interface to list all users and search for a user.</p> <p>He also need an option to add a new user.</p> <p>When he selects a user in the list, he is presented with the user information and can update them. One of this information is the ability to access the eVRE.</p>
Scenarios	<ul style="list-style-type: none"> <li>• The &lt;Administrator&gt; wants to create a new user.</li> <li>• The &lt;Administrator&gt; wants to update information for a user</li> <li>• The &lt;Administrator&gt; wants to remove access for a user</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC017 Query data**

As a <User>, I want to query data in an eVRE.

Actors	<User>
Priority	High
Status	<ul style="list-style-type: none"> <li>• Identified</li> <li>• Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>• &lt;User&gt; has been registered in the eVRE</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>



Extension points	<ul style="list-style-type: none"> <li>● UC031 Provenance of data and data usage information</li> <li>● UC051 Usage data rules</li> <li>● UC022 Define a set of resources for an action (search, access)</li> <li>● UC052 Query data from a source</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>● UC020 Search and retrieve a dataset</li> <li>● UC050 Log Access Data</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>1. The &lt;User&gt; access the interface to search datasets</li> <li>2. The &lt;User&gt; can view metadata about datasets: provenance of data, usage data rules.</li> <li>3. The &lt;User&gt; can select several datasets for action.</li> <li>4. The &lt;User&gt; can select data within the datasets.</li> <li>5. The &lt;System&gt; log access to the data</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>The “datasets search” interface should display a search engine to look for datasets.</p> <p>Search results should display a list of datasets corresponding to the query, allowing the &lt;User&gt; to view/access metadata about the datasets, and to access the data within the datasets;</p>
Scenarios	<ul style="list-style-type: none"> <li>● The &lt;User&gt; wants to retrieve specific datasets to use them.</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC018 Communicate**

As a <User>, I want to communicate.

Actors	<User>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>● Identified</li> <li>● Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>● &lt;User&gt; has been registered in the eVRE</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li>● <i>None</i></li> </ul>

Extension points	<ul style="list-style-type: none"> <li>UC045 Communicate with other users</li> <li>UC059 Communicate about actions</li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>The &lt;User&gt; can communicate with other users with various tools (UC045).</li> <li>The &lt;User&gt; should also be able to share actions he performed or information he retrieves (UC059)</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>When managing teams the &lt;User&gt; is member of, he should be able to initiate a conference call directly.</p> <p>When looking for researchers, the &lt;User&gt; should be able to send any other &lt;User&gt; an instant message.</p> <p>The &lt;User&gt; should be able to access a forum to ask questions to communities.</p> <p>For each action he performed on the eVRE, he should be able to share the action on Social Networks, depending on the social networks he configured in his profile.</p>
Scenarios	<ul style="list-style-type: none"> <li>The &lt;User&gt; wants to communicate with other users</li> <li>The &lt;User&gt; wants to share information he accessed or actions he performed</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

**HUC019 Get support**

As a <User>, I want to get support.

Actors	<User>
Priority	Medium
Status	<ul style="list-style-type: none"> <li>Identified</li> <li>Described</li> </ul>
Pre-conditions	<ul style="list-style-type: none"> <li>&lt;User&gt; has been registered in the eVRE</li> </ul>
Post-conditions	<ul style="list-style-type: none"> <li><i>None</i></li> </ul>

Extension points	<ul style="list-style-type: none"> <li>• <i>None</i></li> </ul>
“Used” use-cases	<ul style="list-style-type: none"> <li>• UC036 Get support</li> </ul>
Flow of events	<ol style="list-style-type: none"> <li>1. The &lt;User&gt; uses a functionality of the eVRE and encounter some difficulties in the use of this functionality.</li> <li>2. He has direct access to online help concerning the functionality he is using.</li> <li>3. The &lt;User&gt; should also be able to access a dedicated space with training for the platform.</li> </ol>
Activity diagram	<i>None</i>
User interface	<p>The &lt;User&gt; should be able to find online help for each functionality.</p> <p>The &lt;User&gt; should also have access to online training (MOOC, etc.)</p>
Scenarios	<ul style="list-style-type: none"> <li>• The &lt;User&gt; wants to get support on a specific functionality</li> <li>• The &lt;User&gt; wants to get training on a specific functionality or globally for the platform</li> </ul>
Sequence diagrams	<i>None</i>
Subordinate use-cases	<i>None</i>
Diagram of participating objects	<i>None</i>
Other artifacts	<i>None</i>

## 7 Visionary Use-cases

Visionary use-cases are created independently of the gathered requirements. They are drawn from the experience of the partners in multi-domain research.

The aim of gathering such random high-level visionary use-cases is to validate the high-level use-cases and use-cases coverage: if these visionary use-cases cannot be covered executed with the high-level use-cases or use-cases identified so far, we'll be able to identify a weak sport in these and improve the coverage.

So far, the following Visionary use-cases have been described:

1. Investigating historical interest based on current events (Digital Humanities)
2. Investigating capacity of urban infrastructure in case of evacuation (Geological, mobility, sociological and housing)
3. Evolution of electric charging (Urban infrastructure, mobility, power grid topology)
4. Relation between age of first pregnancy and level of education followed (Healthcare, sociology, education)
5. Social consequences of increased debts of EU countries (Finance, economic and criminology)
6. A) Collect data, B) Test a model, C) Design a model, D) Retrieve data, in relation to Shipwreck archaeology (Environment, engineering and social science/history)
7. Prediction of transport delay (Environmental sciences, transportation)
8. Choosing travel destination for tourists with allergic diseases (Healthcare, environmental sciences)

In the second version of this Use-case report, more may be added and all will be mapped to High-level Use-Cases or Use-Cases to check the coverage.

## 8 Alignment with Architecture

High-level Use-Cases are part of the *Business Architecture* level

(Small) Use-Cases and Requirements are part of the *Functional Architecture* level

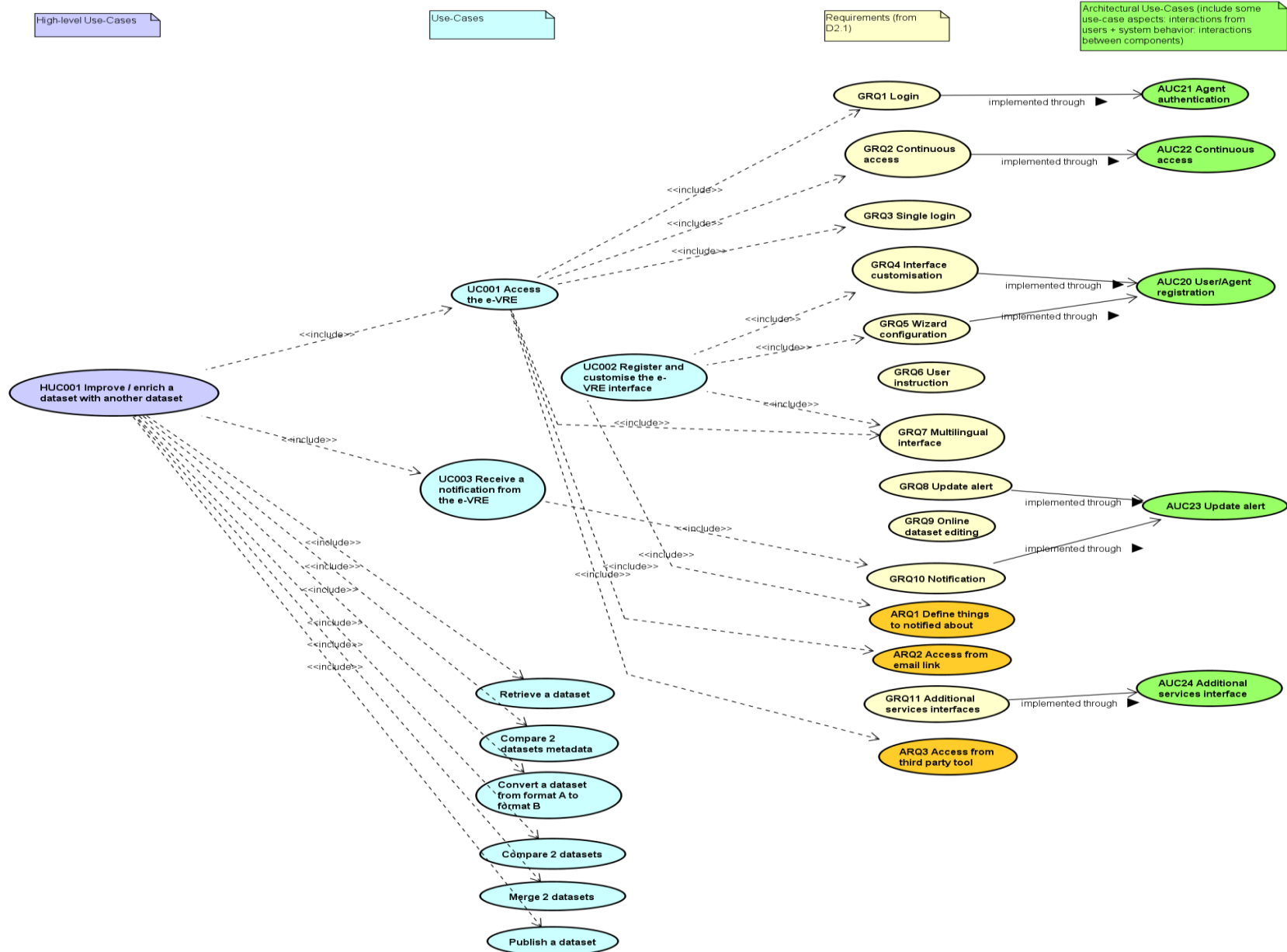
(Architectural Use-Cases) Functions describe interactions between components from the *Applicative Architecture* level

The implementation of the components (database, code, message queue,...) describes the *Technical Architecture* level

“use cases capture who (actors) does what (interactions) with the system, for what purpose (goal). A complete set of use cases specifies all the different ways to use the system, and thus defines all behavior required of the system--without dealing with the internal structure of the system.”

“Functional requirements capture the intended behavior of the system-or what the system will do. This behavior may be expressed as services, tasks or functions the system is required to perform.”

([http://www.bredemeyer.com/pdf\\_files/functreq.pdf](http://www.bredemeyer.com/pdf_files/functreq.pdf) p.9)



## 9 Conclusion and next steps

In this “first version”, 59 use-cases and 19 high-level use-cases have been identified and described. 26 “additional” requirements have also been identified in order to fill gaps in the use-cases flow.

The next steps are two-fold:

- Architecture: use-cases are used to validate the architecture design;
- Community: use-cases and additional requirements will be brought to the potential users to get their feedbacks; visionary use-cases will be mapped to high-level use-cases and use-cases; EPOS and ENVRplus use-cases will be compared to these ones.

## 10 References

Use Case Template, Coleman, 1998: [http://www.bredemeyer.com/pdf\\_files/use\\_case.pdf](http://www.bredemeyer.com/pdf_files/use_case.pdf)

Functional requirements and use cases, Bredemeyer, 2001:  
[http://www.bredemeyer.com/pdf\\_files/functreq.pdf](http://www.bredemeyer.com/pdf_files/functreq.pdf)

Alistair Cockburn: <http://alistair.cockburn.us/get/2465>



# 11 Appendix - Traceability matrices

Use case		Relation	Use case		Relation	Use case		Relation	Use case		Relation	Use case	
Code	Name		Code	Name		Code	Name		Code	Name		Code	Name
HUC001	Access services and data from eVRE	UC013 extends HUC001	UC013	Transmit data	UC013 includes CLRQ15	CLRQ15	Data Transmission						
					CLRQ16 extends UC013	CLRQ16	Data Transmission Monitoring						
					PRQ6 extends UC013	PRQ6	Data Conversion						
		HUC001 includes UC033	UC033	Access the eVRE	UC033 includes UC028	UC028	Be identified on the eVRE	UC028 includes CTRQ1	CTRQ1	Login			
								UC028 includes CTRQ3	CTRQ3	Single Login			
		HUC001 includes UC039	UC039	Access services and data from eVRE through API	UC039 includes CTRQ11	CTRQ11	Additional Services Interfaces						
					UC039 includes CTRQ33	CTRQ33	API						

					UC039 includes PRQ30	PRQ3 0	API						
HUC0 02	Annotate data	UC001 extends HUC002	UC00 1	Manage the life- cycle of my data	UC001 includes IRQ1	IRQ1	Data identification (assign ID)						
					UC001 includes IRQ2	IRQ2	(Store information about) Data provider						
					UC001 includes IRQ3	IRQ3	Raw data identification (assign ID)						
					UC001 includes IRQ4	IRQ4	Data Citation (assign reference)						
					UC001 includes IRQ5	IRQ5	Citation Tracking						
		UC017 extends HUC002	UC01 7	Manage resource references	UC017 includes PRQ3	PRQ3	Metadata Harvesting						
					UC017 includes PRQ4	PRQ4	Resource Registration	PRQ4 is generalizati on of PRQ5	PRQ5	(Metadata) Registration			
		UC029 extends HUC002	UC02 9	Peer review a dataset	UC029 includes PRQ33	PRQ3 3	Per review						

		UC030 extends HUC002	UC03 0	Automatica lly add metadata	UC030 includes PRQ34	PRQ3 4	Data tag						
		UC032 extends HUC002	UC03 2	Explain data	UC032 includes PVRQ2	PVRQ 2	Data Acquisition Information						
					UC032 includes PVRQ3	PVRQ 3	Data Curation Information						
		UC051 extends HUC002	UC05 1	Usage data rules	UC051 includes PVRQ4	PVRQ 4	Data Publication Information						
					UC051 should be in accordance with SRQ1	SRQ1	Real Expectations						
					UC051 should be in accordance with SRQ3	SRQ3	Code of Conduct						
					UC051 should be in accordanc e with SRQ4	SRQ4	No Discrimination						
					UC051 should be in	SRQ5	Confidentiality						

					accordanc e with SRQ5								
					UC051 should be in accordanc e with SRQ7	SRQ7	Licencing						
					UC051 should be in accordanc e with SRQ8	SRQ8	Data Management Policy						
					UC051 should be in accordanc e with SRQ9	SRQ9	Data and IP Ownership						
					UC051 should be in accordanc e with SRQ10	SRQ10	Less Administration						
		UC058 extends HUC002	UC058	Rate data quality	UC058 includes PRQ32	PRQ32	Quality Rating						

HUC003	Compare datasets	UC018 extends HUC003	UC018	Compare 2 datasets	UC018 includes ARQ010	ARQ010	Datasets comparison						
					UC018 includes PRQ6	PRQ6	Data Conversion						
		UC019 extends HUC003	UC019	Compare 2 datasets metadata	UC019 includes ARQ010	ARQ011	Metadata conversion	ARQ010 includes PRQ8	PRQ8	Semantic Harmonization			
					UC019 includes ARQ026	ARQ026	Metadata comparison						
HUC004	Create dataset	UC002 extends HUC004	UC002	Replicate a dataset	UC002 includes CRQ7	CRQ7	Data Replication						
					UC002 includes CRQ8	CRQ8	Replica Synchronization	CRQ8 includes ARQ003	ARQ003	Merge 2 datasets			
								CRQ8 includes CLRQ13	CLRQ13	Data Sampling			
								CRQ8 includes CLRQ15	CLRQ15	Data Transmission			
		UC010 extends HUC004	UC010	Upload dataset	UC010 includes CRQ6	CRQ6	Data Storage and Preservation	CRQ6 includes CRQ4	CRQ4	Data Versioning	CRQ4 includes CLRQ17	CLRQ17	Data Cataloguing

											CRQ4 includes PRQ5	PRQ5	(Metadata) Registration
								CRQ6 includes PRQ4	PRQ4	Resource Registration	PRQ4 is generalization of PRQ5	PRQ5	(Metadata) Registration
		HUC004 includes UC024	UC024	Create a dataset	UC024 includes ARQ024	ARQ024	Create a dataset						
					UC024 includes UC021	UC021	Optimize data storage	UC021 includes PRQ7	PRQ7	Data Compression			
		HUC004 is generalization of HUC005	HUC005	Create dataset from instrument	See description of HUC005 below								
HUC005	Create dataset from instrument	HUC005 is specialization of HUC004	HUC004	Create dataset	See description of HUC004 above								
		HUC005 includes UC007	UC007	Control an instrument	UC007 includes CLRQ1	CLRQ1	Instrument Integration						
					UC007 includes CLRQ2	CLRQ2	Instrument Configuration	CLRQ2 is generalization	CLRQ3	Instrument Calibration			

							tion of CLRQ3						
					CLRQ4 extends UC007	CLRQ 4	Instrument Access						
					UC007 includes CLRQ10	CLRQ 10	Process Control	CLRQ10 includes PRQ28	PRQ2 8	Data Processing Control			
								CLRQ10 includes PRQ29	PRQ2 9	Data Processing Monitoring			
					PRQ25 extends UC007	PRQ2 5	Scientific Modeling and Transformation						
					PRQ26 extends UC007	PRQ2 6	Scientific Workflow Enactment						
		HUC005 includes UC008	UC00 8	Access data from an instrumen t	UC008 includes CLRQ4	CLRQ 4	Instrument Access	CLRQ4 is generaliza tion of CLRQ5	CLRQ 5	Configuration Logging			
					CLRQ6 extends UC008	CLRQ 6	Instrument Monitoring						
					CLRQ9 extends UC008	CLRQ 9	Experiment						

					UC008 includes CLRQ11	CLRQ 11	Data Collection	CLRQ11 is generalization of CLRQ12	CLRQ 12	(Real-Time) Data Collection	CLRQ12 includes ORQ3	ORQ 3	Real Time Processing
								ORQ1 extends CLRQ11	ORQ 1	Large Dataset Processing			
								ORQ2 extends CLRQ11	ORQ 2	Processing Parallelisation			
								ORQ4 extends CLRQ11	ORQ 4	Data Compartmentalization	ORQ4 includes CLRQ13	CLRQ 13 (includes IRQ3)	Data Sampling (includes Raw data identification)
		HUC005 includes UC056	UC056	Search instrument									
HUC006	Manage data	HUC004 extends HUC006	HUC004	Create dataset	See description of HUC004 above								
		HUC011 extends HUC006	HUC011	Process data	See description of HUC011 below								
		HUC012 extends HUC006	HUC012	Publish dataset	See description of HUC012 below								



		HUC017 extends HUC006	HUC0 17	Query data	See description of HUC017 below								
		UC013 extends	UC01 3	Transmit data	UC013 includes CLRQ15	CLRQ 15	Data Transmission						
					CLRQ16 extends UC013	CLRQ 16	Data Transmission Monitoring						
					PRQ6 extends UC013	PRQ6	Data Conversion						
HUC0 07	Manage funding calls	HUC007 includes UC040	UC04 0	Retrieve funding proposals	UC040 includes UC041	UC04 1	Submit funding proposals	UC041 includes CTRQ12	CTRQ 12	Search for Funding	CTRQ12 includes ARQ021	ARQ0 21	Search funding calls
											CTRQ12 includes ARQ022	ARQ0 22	View funding call
								UC041 includes CTRQ14	CTRQ 14	Electronic Funding Bid	CTRQ14 includes CTRQ15	CTRQ 15	Funding Body Information
					UC040 includes CTRQ13	CTRQ 13	Funding Proposal	CTRQ13 includes ARQ017	ARQ0 17	Search funding proposal			
								CTRQ13 includes ARQ018	ARQ0 18	View funding proposal	ARQ019 extends ARQ018	ARQ0 19	Download funding proposal

		UC042 extends HUC007	UC042	Publish agency information	UC042 includes ARQ014	ARQ014	Publish funding agency information						
		HUC007 includes UC054	UC054	Publish funding calls	UC041 extends UC054	UC041	Submit funding proposals	UC041 includes CTRQ12	CTRQ12	Search for Funding	CTRQ12 includes ARQ021	ARQ021	Search funding calls
											CTRQ12 includes ARQ022	ARQ022	View funding call
								UC041 includes CTRQ14	CTRQ14	Electronic Funding Bid	CTRQ14 includes CTRQ15	CTRQ15	Funding Body Information
HUC008	Manage instrument	HUC008 includes UC007	UC007	Control an instrument	See description of UC007 above (HUC005)								
		UC053 extends HUC008	UC053	Create instrument metadata									
		UC055 extends HUC008	UC055	Register instrument services									
		HUC008 includes UC056	UC056	Search instrument									

HUC009	Manage research infrastructure	HUC009 includes UC048	UC048	Publish financial information	UC048 includes CTRQ30	CTRQ30	Financial Information						
HUC010	Manage research projects	HUC010 includes UC047	UC047	Manage research projects	UC047 includes ARQ012	ARQ012	Register projects						
					UC047 includes ARQ013	ARQ013	Assign project to team						
					UC047 includes CTRQ27	CTRQ27	Project Monitoring						
					UC041 extends UC047	UC041	Submit funding proposals						
					UC047 includes UC043	UC043	Manage research team	UC043 includes CTRQ17	CTRQ17	Research Team Setup			
								UC043 includes UC044	UC044	Find researchers	UC044 includes CTRQ18	CTRQ18	Finding Collaborators
											CTRQ19 extends UC044	CTRQ19	Expertise Finding

					UC046 extends UC047	UC04 6	Organize meetings	UC046 includes	CTRQ 23	Meeting Organizer			
HUC0 11	Process data	HUC002 extends HUC011	HUC0 02	Annotate data	See description of HUC002 above								
		HUC003 extends HUC011	HUC0 03	Compare datasets	See description of HUC003 above								
		HUC013 extends HUC011	HUC0 13	Transfor m data	See description of HUC013 below								
		UC004 extends HUC011	UC00 4	Manage workflow s	UC004 includes CRQ5	CRQ5	Workflow Enactment	CRQ5 includes ARQ006	ARQ0 06	view workflows			
								CRQ5 includes ARQ007	ARQ0 07	view workflow instanciations			
								CRQ5 is generaliza tion of PRQ26	PRQ2 6	Scientific Workflow Enactment			
					UC004 includes CTRQ32	CTRQ 32	Workflow Engine						

					UC004 includes UC027	UC027	Manage a data processing instance	UC027 includes PRQ28	PRQ28	Data Processing Control			
					UC027 includes PRQ28	PRQ29		Data Processing Monitoring					
					UC004 is generalization of UC025	UC025	Generate and run a (mathematical) model	UC025 includes PRQ25	PRQ25	Scientific Modeling and Transformation			
		UC009 extends HUC011	UC009	Visualize data	UC009 includes PRQ27	PRQ27	Visualization	PRQ27 is generalization of CLRQ7	CLRQ7	(Parameter) Visualization	CLRQ7 is generalization of CLRQ8	CLRQ8	(Real-time) (Parameter/ Data ) Visualization
HUC012	Publish dataset	HUC012 includes UC014	UC014	Catalogue a dataset	UC014 includes CLRQ17	CLRQ17	Data Cataloguing	CLRQ17 includes IRQ1	IRQ1	Data identification (assign ID)			
								CLRQ17 includes IRQ2	IRQ2	(Store information about) Data provider			
		HUC012 includes UC015	UC015	Publish a dataset	UC015 includes CLRQ18	CLRQ18	Data Publication	CLRQ18 includes IRQ4	IRQ4	Data Citation (assign reference)			
					CTRQ8 extends UC015	CTRQ8	Update Alert						

					CTRQ9 extends UC015	CTRQ 9	Online Dataset Editing						
					CTRQ10 extends UC015	CTRQ 10	Notification						
					PRQ7 extends UC015	PRQ7	Data Compression						
					UC015 includes PVRQ4	PVRQ 4	Data Publication Information						
HUC013	Transform data	UC003 extends HUC013	UC003	Process data	ARQ005 extends UC003	ARQ005	Transform data	ARQ005 is generalization of ARQ003	ARQ003	Merge 2 datasets			
					UC003 is generalization of CRQ1	CRQ1	Data Product Generation	CRQ1 includes ARQ009	ARQ009	Standardised formats			
								CRQ1 includes PRQ6	PRQ6	Data Conversion			
					ORQ1 extends UC003	ORQ1	Large Dataset Processing	ORQ1 includes CTRQ28	CTRQ28	Computing Resource Connection			

					ORQ2 extends UC003	ORQ 2	Processing Parallelisation						
					ORQ3 extends UC003	ORQ 3	Real Time Processing						
					ORQ4 extends UC003	ORQ 4	Data Compartmentali zation						
					UC003 is generaliza tion of PRQ22	PRQ2 2	Data Analysis						
					UC003 includes PRQ23	PRQ2 3	Data Mining						
					UC005 extends UC003	UC00 5	Curate data	UC005 includes CRQ2	CRQ2	Data Quality Checking	CRQ2 includes ARQ008	ARQ0 08	manage curation rules
											CRQ2 is generalizati on of CRQ3	CRQ3	Data Quality Verification
								CLRQ14 extends UC005	CLRQ 14	Noise Reduction			

					UC003 includes UC006	UC006	Register changes to a dataset	UC006 includes CRQ4	CRQ4	Data Versioning	CRQ4 includes CLRQ17	CLRQ17	Data Cataloguing
										CRQ4 includes PRQ5	PRQ5	(Metadata) Registration	
					UC003 is generalization of UC037	UC037	Co-edit dataset	UC037 includes CTRQ9	CTRQ9	Online Dataset Editing			
		UC011 extends HUC013	UC011	Check quality									
		UC023 extends HUC013	UC023	Merge 2 datasets	UC023 includes ARQ003	ARQ003	Merge 2 datasets	ARQ003 includes ARQ004	ARQ004	Select data across several sources	ARQ004 includes ARQ025	ARQ025	Select data from a dataset
								ARQ003 includes ARQ024	ARQ024	Create a dataset			
								ARQ003 is generalization of PRQ21	PRQ21	Data Assimilation			
HUC014	Manage personal profile	HUC014 includes UC026	UC026	Manage profile	UC026 includes ARQ023	ARQ023	manage my expertise						



		UC034 extends HUC014	UC03 4	Register and customise the e-VRE interface	UC034 includes ARQ001	ARQ0 01	Define things to notified about						
					UC034 includes CTRQ1	CTRQ 1	Login						
					UC034 includes CTRQ4	CTRQ 4	Interface Customization						
					UC034 includes CTRQ7	CTRQ 7	Multilingual Interface						
		UC038 extends HUC014	UC03 8	Receive a notificatio n from the e-VRE	UC038 includes CTRQ8	CTRQ 8	Update Alert						
					UC038 includes CTRQ10	CTRQ 10	Notification	ARQ001 extends CTRQ10	ARQ0 01	Define things to notified about			
								CTRQ10 is generaliza tion of CTRQ16	CTRQ 16	Funding Alert			
								CTRQ24 extends CTRQ10	CTRQ 24	Digest Email	CTRQ24 is generalizati on of CTRQ22	CTRQ 22	Group Newsletter

HUC015	Manage services offered in eVRE	HUC002 extends HUC015	HUC002	Annotate data	See description of HUC002 above								
		HUC004 extends HUC015	HUC004	Create dataset	See description of HUC004 above								
		HUC008 extends HUC015	HUC008	Manage instrument	See description of HUC008 above								
		HUC012 extends HUC015	HUC012	Publish dataset	See description of HUC012 above								
		UC049 extends HUC015	UC049	Manage invoices for services	UC049 includes CTRQ31	CTRQ31	Accounting						
HUC016	Manage users	HUC016 includes UC035	UC035	Manage users	UC035 includes ARQ015	ARQ015	Change user profile						
					UC035 includes ARQ016	ARQ016	Remove user						
					UC035 includes CTRQ5	CTRQ5	Wizard Configuration						

		HUC016 includes UC057	UC057	Search users									
HUC017	Query data	HUC017 includes UC020	UC020	Search and retrieve a dataset	UC020 includes PRQ9	PRQ9	Data Discovery and Access	PRQ9 is generalization of CLRQ13	CLRQ13	Data Sampling	CLRQ13 includes IRQ3	IRQ3	Raw data identification (assign ID)
					UC020 includes PRQ10	PRQ10	Simple Search	PRQ11 extends PRQ10	PRQ11	Multiple Format Support (in search)			
								PRQ12 extends PRQ10	PRQ12	Cross Searching			
								PRQ13 extends PRQ10	PRQ13	Advanced Search			
								PRQ10 includes PRQ14	PRQ14	Spelling Checking			
								PRQ10 includes PRQ15	PRQ15	Query Suggestion			
					UC020 includes PRQ16	PRQ16	Query (results) filter (facets)						

					UC020 includes PRQ20	PRQ20	Linking External Resources						
					UC020 includes PRQ31	PRQ31	Dataset Download						
					UC020 includes UC016	UC016	Access a curated list of resource references	UC016 includes PRQ1	PRQ1	Resources Annotation	PRQ1 is generalization of PRQ2	PRQ2	(Data) Annotation
								UC016 includes PRQ4	PRQ4	Resource Registration	PRQ4 is generalization of PRQ5	PRQ5	(Metadata) Registration
		UC022 extends HUC017	UC022	Define a set of resources for an action (search, access)	UC022 is generalization of PRQ17	PRQ17	Datasets Viewing (view all and select for search)	PRQ18 extends PRQ17	PRQ18	Datasets Pre-selection (for a user group)			
								PRQ19 extends PRQ17	PRQ19	Dataset Customization			
		UC031 extends HUC017	UC031	Provenance of data and data usage information	UC031 includes PVRQ1	PVRQ1	Data Provenance						
					PVRQ4 extends UC031	PVRQ4	Data Publication Information						
					UC031 should be in	SRQ2	Usage Acknowledge						

					accordanc e with SRQ2								
					UC031 should be in accordanc e with SRQ13	SRQ1 3	Credentials Protection						
		HUC017 includes UC050	UC05 0	Log Access Data	UC050 includes PVRQ4	PVRQ 4	Data Publication Information						
					UC050 should be in accordanc e with SRQ5	SRQ5	Confidentiality						
					UC050 should be in accordanc e with SRQ6	SRQ6	Use Log						
					UC050 should be in accordanc e with SRQ13	SRQ1 3	Credentials Protection						

		UC051 extends HUC017	UC05 1	Usage data rules	UC051 includes PVRQ4	PVRQ 4	Data Publication Information						
					UC051 should be in accordanc e with SRQ1	SRQ1	Real Expectations						
					UC051 should be in accordanc e with SRQ3	SRQ3	Code of Conduct						
					UC051 should be in accordanc e with SRQ4	SRQ4	No Discrimination						
					UC051 should be in accordanc e with SRQ5	SRQ5	Confidentiality						
					UC051 should be in accordanc	SRQ7	Licencing						

					e with SRQ7								
					UC051 should be in accordance with SRQ8	SRQ8	Data Management Policy						
					UC051 should be in accordance with SRQ9	SRQ9	Data and IP Ownership						
					UC051 should be in accordance with SRQ10	SRQ10	Less Administration						
		UC052 extends HUC017	UC052	Query data from a source	UC052 is generalization of ARQ025	ARQ025	Select data from a dataset						
					UC052 is generalization of PRQ24	PRQ24	Data Extraction						

HUC018	Communi- cate	UC045 extends HUC018	UC045	Communi- cate with other users	CTRQ20 extends UC045	CTRQ20	Forum Tool						
					CTRQ25 extends UC045	CTRQ25	Tele- conferencing						
					CTRQ26 extends UC045	CTRQ26	Instant Message						
					UC043 extends UC045	UC043	Manage research team	See description of UC043 above (HUC010)					
					UC057 extends UC045	UC057	Search users						
		UC059 extends HUC018	UC059	Communi- cate about actions	UC059 includes CTRQ21	CTRQ21	SNS Integration						
					UC026 extends UC059	UC026	Manage profile	See description of UC026 above (HUC014)					
HUC019	Get support	HUC019 includes UC036	UC036	Get support	UC036 includes CTRQ6	CTRQ6	User Instruction						