



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687289



Coastal Waters Research Synergy Framework

Verification and Validation Plan

Tools

Document Code: CORESYF-DME-VVR-VVP02-E-R

Date of delivery: CDR-1 meeting (T0+10)
Deliverable identifier: D3.03
Version of document: 1.1 – last updated 17/12/2016
Dissemination level for document: PU

Table of Signatures			
	Name	Function	Signature
Prepared by	Nuno Grosso Miguel Terra-Homem	WP3 Leader Executive Board Chair	
Reviewed by	Nuno Grosso	WP3 Leader	
Approved by	Miguel Terra-Homem	Executive Board Chair	
Signatures and approvals appear on original			

Project start date:	01/01/2016
Project duration:	36 months

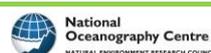


Revision Records			
Version	Date	Changes	Authors
1.0	11/11/2016	First issue of document	Nuno Grosso Miguel Terra- Homem
1.1	17/12/2016	Changed the text of TOOL-VTS-09 test.	Nuno Grosso



Table of Contents

- 1 Introduction 6
 - 1.1 Purpose and Scope 6
 - 1.2 Document Structure 7
- 2 SOFTWARE VERIFICATION PLAN..... 8
 - 2.1 Software Verification Process Overview 8
 - 2.1.1 Organization 8
 - 2.1.2 Master Schedule 8
 - 2.1.3 Techniques and Methods 8
 - 2.1.4 Standards, Practices and Conventions 8
 - 2.1.5 Resource Summary 8
 - 2.2 Verification Activities..... 9
 - 2.2.1 Software Validation Process Verification 9
 - 2.2.2 Software Delivery and Acceptance Process Verification 9
 - 2.3 Software Verification Reporting 9
- 3 SOFTWARE VALIDATION PLAN 9
 - 3.1 Software Validation Process Overview 9
 - 3.1.1 Organization 9
 - 3.1.2 Master Schedule 9
 - 3.1.3 Techniques and Methods 10
 - 3.1.4 Standards, Practices and Conventions 10
 - 3.1.5 Resource Summary 10
 - 3.2 Software Validation Test Facilities..... 10
 - 3.3 Software Validation Test Reporting..... 11
- 4 GENERAL V&V ADMINISTRATIVE PROCEDURES 11
 - 4.1 Anomaly Report and Resolution 11
 - 4.2 Task Iteration Policy..... 11
 - 4.3 Deviation Policy 11
 - 4.4 Control Procedures..... 11
- 5 ACCEPTANCE TESTS 11
 - 5.1 Acceptance Test Designs 11
 - 5.2 Acceptance Test Specifications..... 13





5.3 Acceptance Test Procedures 21

6 Verification Control Matrix 21

7 References 21

8 Annex I : Template for the Test Procedures 22

List of Tables

Table 5-1 : V1 Acceptance Tests Specifications 13

List of Figures

No table of figures entries found.





Acronyms and Abbreviations	
CMS	Corporate Management System
Co-ReSyF	Coastal Waters Research Synergy Framework
COTS	Commercial Off-the-shelf Software
EO	Earth Observation
FOSS	Free and Open-source Software
GUI	Graphical User Interface
OS	Operating System
SPR	Software Problem Report
VCM	Verification Control Matrix
VVP	Verification & Validation Plan
VTP	Validation Test Procedures
VTS	Validation Test Specifications



1 Introduction

The Co-ReSyF project will implement a dedicated data access and processing infrastructure, with automated tools, methods and standards to support research applications using Earth Observation (EO) data for monitoring of Coastal Waters, leveraging on the components deployed SenSyF (www.sensyf.eu). The main objective is to facilitate the access to Earth Observation data and pre-processing tools to the research community, towards the future provision of future Coastal Waters services based on EO data.

Through Co-ReSyF's collaborative front end, even inexperienced researchers in EO will be able to upload their applications to the system to compose and configure processing chains for easy deployment on the cloud infrastructure. They will be able to accelerate the development of high-performing applications taking full advantage of the scalability of resources available in the cloud framework. The system's facilities and tools, optimized for distributed processing, include EO data access catalogues, discovery and retrieval tools, as well as a number of pre-processing tools and toolboxes for manipulating EO data. Advanced users will also be able to go further and take full control of the processing chains and algorithms by having access to the cloud back-end, and to further optimize their applications for fast deployment for big data access and processing.

The Co-ReSyF capabilities will be supported and initially demonstrated by a series of early adopters who will develop new research applications on the coastal domain, guide the definition of requirements and serve as system beta testers. A competitive call will be issued within the project to further demonstrate and promote the usage of the Co-ReSyF release. These pioneering researchers will be given access not only to the platform itself, but also to extensive training material on the system and on Coastal Waters research themes, as well as to the project's events, including the Summer School and Final Workshop.

1.1 Purpose and Scope

The main aim of this document is to define the verification and validation strategy for the first version of the System Tools Requirements, explaining how each requirement is going to be verified and what is the criteria for the verification of the same.

Within the Co-ReSyF platform two major components can be identified that support the operation of the research activities performed within the platform. One component is the Framework, which is composed of all the features that support the environment where the applications are defined and executed, and the other component are the Tools which are elements that can be used to build an application and to analyse/visualize the results of the application.

The Framework includes the Cloud back-end, which is the infrastructure that runs the applications in the cloud and is in charge of coordinating and creating the VMs for distributed processing and collection of input and output data. It also includes the Data Access API which is a set of tools that allows the query and retrieval of the data within the Co-ReSyF catalogue and



also any open data catalogue available online. The other part of the framework is related to the user interaction and it is the part that directly interfaces with the user, this includes the Front-end (GUI that provides the connection to all the platform functionalities) and the Expert Centre and Knowledge Base (wiki with relevant information for newcomers of the platform to start using it).

The Tools live within the Framework and are a set of executables or libraries that can be used by the researchers to build and manage their applications or handle the data. It includes the Automated Orchestration which is a set of tools designed to configure and monitor the execution of the sequence of tasks that compose one application. The Image Inter-calibration, Atmospheric corrections, Data Co-registration and Fusion and Other tools, which are tools used to process the data commonly used by several applications and provided in a default tool-kit available to all users of the platform. Finally there is also a set of Visualisation tools, which are provided as default by the platform that allow the users to visualise, manipulate and analyse the data (different from the main front-end data visualization provided with the platform).

This document focuses solely on the V1 requirements of the Tools component of the Co-ReSyF platform.

1.2 Document Structure

The structure of the document is as follows:

- Chapter 2: describes the Verification approach.
- Chapter 3: describes the Validation approach.
- Chapter 4: describes the procedures for anomaly and deviations handling.
- Chapter 5: describes the Acceptances tests to be executed.
- Chapter 6: includes the Verification Control Matrix.
- Chapter 7: details of the Reference Documents.



2 SOFTWARE VERIFICATION PLAN

2.1 Software Verification Process Overview

2.1.1 Organization

The project will follow a simplified software verification process to be carried out by the PA&QA responsible of the project, based on verifying only the acceptance testing activities defined in (Deimos, 2016a).

The verification process will be carried out solely by the PA&QA and the results reported to the Executive Board via the Verification Control Matrix (VCM) document (see Section 6). The VCM shall also be included in the Verification and Validation Report.

2.1.2 Master Schedule

The verification activities will be carried out according to the schedule below, where the milestone reviews in (Co-ReSyF, 2016c) are used as reference dates:

1. After PDR-1 the first version of the VCM is prepared with the requirements baseline for V1;
2. At the CDR-1 the VCM is reviewed;
3. After the implementation of all V1 functionality and the execution of the acceptance tests the VCM is updated reflecting the status of the requirements;
4. At the SAR-1 the VCM is reviewed;
5. After PDR-2 the VCM is updated to include the updates to the requirements baseline for V2 (addition of requirements);
6. At the CDR-2 the VCM is reviewed;
7. After the implementation of all V2 functionality and the execution of the acceptance tests the VCM is updated reflecting the status of the requirements;
8. At the SAR-2 the VCM is reviewed.

2.1.3 Techniques and Methods

The method to be used for the verification activities is to inspect the Verification and Validation Plan and the Verification and Validation Report documents and record the findings related to the requirements traceability to tests and test results in the VCM document.

2.1.4 Standards, Practices and Conventions

The verification activities follow the standard defined in the Deimos Corporate Management System (Deimos, 2016a), tailored for the simplified approach of this project that focus only on the verification of the Acceptance activities.

2.1.5 Resource Summary

The verification activities only require the QA&PA responsible.



2.2 Verification Activities

2.2.1 Software Validation Process Verification

The verification of the Software Validation Process uses as input the Acceptance Test Specifications (contained in this document) and checks that all the requirements applicable to the respective software version (V1 or V2) have a test case specification (with defined acceptance criteria). The traceability between requirements and test cases is recorded in the VCM, which is the output of the verification process. All the requirements applicable to the respective software version need to be traced to a test case and the acceptance criteria defined in order to consider the verification successful.

2.2.2 Software Delivery and Acceptance Process Verification

The verification of the Software Delivery and Acceptance Process uses as input the Verification and Validation Report document which contains the results of the execution of the acceptance tests performed for the respective software version. The verification consists in checking the result of the test steps that check each requirement and record if the requirement is passed or failed in the VCM document. All the requirements applicable to the software version need to have been tested with clear indication of their status in order to consider the verification successful.

2.3 Software Verification Reporting

The results of the software verification activities will be recorded in the VCM document, which will be delivered, attached to the Verification and Validation Plan and Report documents.

3 SOFTWARE VALIDATION PLAN

3.1 Software Validation Process Overview

3.1.1 Organization

The project will follow a simplified software validation process, based on carrying out only the acceptance testing activities defined in (Deimos, 2016a).

The validation activities will be carried out by the WP3 leader with assistance of the Deimos development team. The WP3 leader is responsible for defining, preparing and executing the acceptance tests to be carried out during the Acceptance campaign. The results of the Acceptance Campaign will be reported to the Executive Board in the Verification and Validation Report document.

3.1.2 Master Schedule

The Validation activities will be carried out according to the schedule below, where the milestone reviews in (Co-ReSyF, 2016c) are used as reference dates:

1. After PDR-1 the first version of the Acceptance Tests specification is prepared with the requirements baseline for V1;



2. At the CDR-1 the Acceptance Tests specification is reviewed;
3. During the implementation period of all V1 functionality the test procedures for the Acceptance Tests is defined;
4. One month before SAR-1 (SAR-1 – 1m), the Acceptance Tests are executed and the results are recorded in the Verification and Validation Report;
5. At the SAR-1 the Verification and Validation Report is reviewed;
6. After PDR-2 the Acceptance Tests specification is updated to include the updates to the requirements baseline for V2 (addition of requirements);
7. During the implementation period of all V2 functionality the test procedures for the new Acceptance Tests is defined;
8. One month before SAR-2 (SAR-2 – 1m), the new Acceptance Tests are executed and the results are recorded in the Verification and Validation Report;
9. At the SAR-2 the Verification and Validation Report is reviewed.

3.1.3 Techniques and Methods

The method to be used for the Validation activities is to execute a set of Acceptance tests on the operational platform in order to verify that the requirements defined in (Co-ReSyF, 2016b) are implemented, for the applicable software version. There is only one testing method foreseen, which is to execute a set of procedural steps on the running software that will verify the functionality of the requirement. The validation criteria and ID of the requirement will be defined at the applicable step of the procedure. The information will be recorded in the Verification and Validation Report document.

3.1.4 Standards, Practices and Conventions

The validation activities follow the standard defined in the Deimos Corporate Management System (Deimos, 2016a), tailored for the simplified approach of this project that focus only on the Acceptance activities.

3.1.5 Resource Summary

The validation activities will require the execution of the defined acceptance test procedures. These procedures will be executed by the WP3 Leader and will use a standard PC (or Laptop) to connect to the online platform. Additional open source tools may be used in the local PC/Laptop for analysis of the results, if needed, although an effort will be made when defining the test procedures to use only the functionalities provided by the online platform.

3.2 Software Validation Test Facilities

The validation will be done directly on the operational platform, and being it an online platform the needed test facilities are a simple PC/Laptop with a good network connection (e.g. it is advisable to have at least a 100 Mbps network). There is no restriction on the OS of the used PC/Laptop.



3.3 Software Validation Test Reporting

The results of the Acceptance tests to be carried out for the validation activities will be reported in the Verification and Validation Report document. For each acceptance test procedure the result of the step shall be recorded and the date of when the test procedure was executed also.

4 GENERAL V&V ADMINISTRATIVE PROCEDURES

4.1 Anomaly Report and Resolution

The procedure for *Light Process for Problem Management for small projects* as defined in (Deimos, 2016b) will be followed for anomaly reporting and resolution. The difference to the procedure as defined in (Deimos,2016b) is that the project manager is replaced by the WP3 Leader for the case of Validation of the Tools Requirements.

The SPRs will be raised and traced in the JIRA Deimos issues management tool.

4.2 Task Iteration Policy

An acceptance test procedure should be repeated whenever a failed step in the procedure prevents the validation of a requirement and as a result of that a software modification is needed. For those cases the full test procedure shall be repeated in order to ensure that all the requirements in that same test procedure are validated after the change in the software.

4.3 Deviation Policy

All the requirements that are not implemented and are proposed to not be verified for a respective applicable version (or not verified at all), will need to be flagged in the VCM document. The VCM will be reviewed by the Executive Board and the deviation will need to be approved at the Executive Board meeting. The authorization for the deviation shall be recorded at the meeting minutes and the same referenced in the VCM document.

4.4 Control Procedures

As described in Section 5 of the PMP (Co-ReSyF, 2016c), the developed software shall be stored in a Git repository (configuration control system). The results of the software verification and validation shall be recorded and stored in the VCM and Verification and Validation Report documents and shall be stored and versioned in the Deimos document management system (as also described in the same Section 5 of the PMP).

5 ACCEPTANCE TESTS

5.1 Acceptance Test Designs

The Acceptance tests are designed to test a specific functionality that can cover only one requirement or several requirements. The approach for grouping or not requirements in one test case is decided on a case by case basis and best practice is to ensure that the Pass/Fail



Criteria can be written in a simple way. If the Pass/Fail Criteria becomes complex to describe this is an indicator that the test case is covering too many requirements.

Several test cases can be further grouped into one test procedure, when defining the test procedures, if they share common steps, in order to reduce the execution time of the tests. Clear candidates to grouping are test cases that have the same scenario and inputs.

A test case is specified using the following fields:

- A unique identifier for each VTS.
- A brief description of the functionality that the test aims to validate.
- The set of requirements that specify the functionality being tested. Note that the test cases often entail the execution of other functionalities besides the one that is the subject of the test, but the requirements associated with those other functionalities are not listed (i.e. they are not part of the aims of that particular test case). This is done deliberately to make it easier to define the pass/fail criteria for each test.
- A brief description of the overall scenario for the test (including the state that the software and the test environment have to be in before the test begins), i.e. explains how the functionality will be tested.
- The inputs to the test, described in more detail than in the test scenario. Note that the table does not give the complete, detailed description of all the inputs, because that is done instead in the test procedure.
- The test pass criteria, e.g. in terms of the expected values of certain outputs.



5.2 Acceptance Test Specifications

Table 5-1 : V1 Acceptance Tests Specifications

VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-01	Monitoring status and history of executions	<ul style="list-style-type: none"> • CORESYF-TOOL-ORCH-1 • CORESYF-TOOL-ORCH-2 	Co-ReSyF online platform available, with a valid user.	No special input needed.	<ol style="list-style-type: none"> 1. The Co-ReSyF web interface allows seeing the history of the executions and their status. 2. For the applications which are running, a diagram with the processing steps is available showing the current processing step.
TOOL-VTS-02	Configuration of the applications	<ul style="list-style-type: none"> • CORESYF-TOOL-ORCH-6 	Co-ReSyF online platform available, with a valid user.	No special input needed.	<ol style="list-style-type: none"> 1. The Co-ReSyF web interface allows selecting an application and setting the configuration parameters for it. 2. The results of running an application with different configuration parameters are different.
TOOL-VTS-03	Atmospheric correction modules	<ul style="list-style-type: none"> • CORESYF-TOOL-ATTCORR-1 • CORESYF-TOOL-ATTCORR-2 	Co-ReSyF online platform available, with a valid user.	Sentinel 2 and Landsat products with clouds and glint in the images.	<ol style="list-style-type: none"> 1. The user can build an application to perform the atmospheric correction and execute it on the selected images. 2. The output images have the pixels with clouds and glint flagged as invalid, and for each flagged pixel a confidence index is present.



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-04	COTS and FOSS SW availability	<ul style="list-style-type: none"> • CORESYF-TOOL-PREPROC-20 • CORESYF-TOOL-PREPROC-22 • CORESYF-TOOL-PREPROC-28 • CORESYF-TOOL-PREPROC-21 • CORESYF-TOOL-PREPROC-24 	Co-ReSyF online platform available, with a valid user with access to a sandbox.	No special input needed.	<ol style="list-style-type: none"> 1. The user can access via command line (without the need to install anything) to the following software: <ol style="list-style-type: none"> a. Python 2.7 b. Python 3.4 c. ESA S1 Toolbox d. R e. SNAP f. QGIS
TOOL-VTS-05	Point measurements to gridded maps module	<ul style="list-style-type: none"> • CORESYF-TOOL-PREPROC-19 • CORESYF-TOOL-VISUAL-3 	Co-ReSyF online platform available, with a valid user.	Products from altimetry missions (e.g. Sentinel3, Cryosat-2 and Jason-3).	<ol style="list-style-type: none"> 1. The user can build an application to generate a map of SSH from altimetry processed data. 2. The user can define the resolution of the output grid. 3. The user can choose from a set of interpolation methods for the map generation. 4. The output data is a map over the AOI selected with all pixels containing a value for SSH.



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-06	Cropping of images to a AOI with radiometric correction	<ul style="list-style-type: none"> • CORESYF-TOOL-PREPROC-1 • CORESYF-TOOL-PREPROC-6 	Co-ReSyF online platform available, with a valid user.	Products from Sentinel-2 and Sentinel-1 mission.	<ol style="list-style-type: none"> 1. The user can build an application that crops images and applies radiometric correction for Sentinel-1 data. 2. The user can build an application that crops images and applies radiometric correction for Sentinel-2 data. 3. The Co-ReSyF web interface allows selection of an AOI and definition of a respective dataset. 4. The user can run the two defined applications on the defined datasets. 5. The outputs of both applications are images which cover only the AOI defined.
TOOL-VTS-07	Application of masks to images and SAR speckle filtering	<ul style="list-style-type: none"> • CORESYF-TOOL-PREPROC-2 • CORESYF-TOOL-PREPROC-4 	Co-ReSyF online platform available, with a valid user.	Product from Sentinel-1 mission and respective mask file for the test (covering different regions of the image).	<ol style="list-style-type: none"> 1. The user can build an application that applies a mask to the image and then performs speckle filtering. 2. The user can run the application using the mask file. 3. The output image shows the un-masked sections of the image with more definition than the masked regions.



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-08	Image statistics and intercalibration	<ul style="list-style-type: none"> • CORESYF-TOOL-PREPROC-5 • CORESYF-TOOL-INTCAL-1 	Co-ReSyF online platform available, with a valid user. Independent desktop GIS application with image statistics calculation capabilities (e.g. GRASS, QGIS)	Multiband optical imagery georeferenced image time series from the same sensor (e.g. Sentinel 2) and covering the exact same spatial area (one absolutely calibrated reference image and two uncalibrated images)	<ol style="list-style-type: none"> 1. The user will calculate the entire image histogram and respective statistics (mean, percentiles, standard deviation), using the image statistics tool in the Co-ReSyF platform for the RGB bands in each image; 2. The same procedure will be applied, using the desktop GIS application 3. The user will compare the results given by both tools to verify that the image histogram and calculated statistics are equal 4. The user will apply the image intercalibration tool to each uncalibrated multiband image from the defined time series, choosing the appropriate reference image 5. Calculate the image histogram and statistics of the output multiband images and compare them with the histogram of the respective image before the calibration and with the histogram of the input reference image. After calibration output images should have a value distribution similar to the reference image) 6. Compare visually the RBG of the input an ouput images to see if no unwanted image features were added



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-09	Reprojection and Coordinate System Definition tool	<ul style="list-style-type: none"> CORESUF-TOOL-PREPROC-3 	Co-ReSyF online platform available, with a valid user. Independent desktop GIS application with image geo-referencing capabilities (e.g. GRASS, QGIS)	One multiband raster image and one vector file	<ol style="list-style-type: none"> The user will be able to define the output coordinate system If no input coordinate system is attributed the tool will check if the geo-referenced data file has coordinate system information and, if not, assign the output coordinate system. In the case where the input and output coordinate systems are different the tool will reproject the geo-referenced data file into the last Replicate the process in the desktop GIS application Overlay both outputs to see if they are coincident and, in the case of the raster format, double check by subtracting one from the other to see if you get an all zero image.



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOLS-VTS-10	Error metrics calculation tool	<ul style="list-style-type: none"> CORESIF-TOOL-PREPROC-7 	Co-ReSyF online platform available, with a valid user. Independent desktop GIS application with raster calculator and feature extraction and calculation capabilities (e.g. GRASS, QGIS)	<p>A collection of output products for one of the research applications for which observational data exists (e.g bathymetry or altimetry map)</p> <p>Shapefile with point ground measurements values</p> <p>Ground truth raster map (netCDF or Geotiff format)</p>	<ol style="list-style-type: none"> The user will choose a collection of output products of one of the output research applications (e.g. bathymetry or altimetry maps) The user shall use the error metrics tool in the Co-ReSyF platform to calculate the necessary error metrics (at least absolute error, bias, root mean square error and normalised root mean square error) for that collection of products, using as ground truth input a point shapefile with the ground measurements The user shall perform the necessary procedure to calculate the same metrics using the desktop GIS application The user shall compare the error metrics outputs using the two applications to check if the results are equal Repeat steps 1 to 6 but using a raster map instead of point shapefile as ground truth



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-11	Vector creation and edition tool	<ul style="list-style-type: none"> CORESUF-TOOL-PREPROC-13 	Co-ReSyF online platform available, with a valid user. Independent desktop GIS application (e.g. GRASS, QGIS)	-	<ol style="list-style-type: none"> The user shall use the vector creation tool to create a point shapefile. Save and export to check in external GIS application Create two attributes defining their names and data types. Save and export to check in external GIS application Insert values into the created fields. Save and export to check in external GIS application Modify the added values. Save and export to check in external GIS application Delete values one of the attributes. Save and export to check in external GIS application Delete column attribute. Save and export to check in external GIS application Repeat all previous steps with polygon shapefile



VTS No.	Functionality Tested	Identifiers of requirements tested	Test Scenario	Required Inputs	Pass/Fail Criteria
TOOL-VTS-12	Layer stack creation tool	<ul style="list-style-type: none"> CORESUF-TOOL-PREPROC-16 	Co-ReSyF online platform available, with a valid user. Independent desktop GIS application (e.g. GRASS, QGIS)	Different one band Geotiff products covering the same area and with the same spatial resolution	<ol style="list-style-type: none"> The user will use the layer stack creation tool to stack the input one layer Geotiff files into a single multi-layer file After defining the input layers the tool should look into the associated metadata to sort the layer stack according to date/time (default option). Create multilayer stack Geotiff product and export to check output in desktop GIS application The user shall use another metadata field to sort layers Create multilayer stack Geotiff product and export to check output in desktop GIS application The user shall define manually the layer order for the multi-layer file Create multilayer stack Geotiff product and export to check output in desktop GIS application

5.3 Acceptance Test Procedures

The procedures for the Acceptance tests will be defined in the Verification and Validation Report document according to the template presented in Annex I (Section 8).

Each acceptance test procedure will cover one or more test cases and their respective requirements, and will have a unique ID.

Each step of the procedure will be numbered (so that it can be referenced in the VCM using the test procedure ID with the step number). The possible results for a test step are either **PASS** or **FAIL**, no other value is allowed. In the case that the step is verifying a requirement the Pass/Fail criteria will need to be specified (this is mandatory) and will be used to assess the result of the step. On cases where no P/F criteria is specified the result of the step is assessed by the ability to execute the step.

6 Verification Control Matrix

The results of the verification and validation activities shall be recorded in a Verification Control Matrix, which the first version (including only the requirements and the traceability to the test case ID where it is verified) is included below.



[CORESYF-DME-WR-STR02-E-R]_[Verifical

7 References

- Co-ReSyF. (2016a). *GRANT AGREEMENT-687289*. European Commission, Research Executive Agency.
- Co-ReSyF (2016b). *System Requirements Document – Tools, issue 1.0*. European Commission, Research Executive Agency.
- Deimos (2016a). *VERIFICATION AND VALIDATION PROCEDURE, EDG-CMS-PRO16-E, Issue 2.0*. ELEC NOR DEIMOS CORPORATE MANAGEMENT SYSTEM.
- Co-ReSyF (2016c). *Project Management Plan, issue 1.0*. European Commission, Research Executive Agency.
- Deimos (2016b). *NON-CONFORMANCE MANAGEMENT PROCEDURE, EDG-CMS-PRO12-E, Issue 3.0*. ELEC NOR DEIMOS CORPORATE MANAGEMENT SYSTEM.



8 Annex I : Template for the Test Procedures

TEST PROCEDURE					
VTP Id.:		Id of Associated VTS:			
Functionality to be Tested:					
Required Test Environment:					
Overview of the test procedure:					
Detailed description of the test procedure, including how to observe and verify the results:					
Step Nb.	Description	Result	Requirement(s) Verified	P/F Criteria	Comments
Date of execution:					



END OF DOCUMENT

