



GSE – PROMOTE 2

C6 Validation Report

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TITLE:

GMES SERVICE ELEMENT PROMOTE 2

C6 Validation Report

**INTRODUCTION AND SUMMARY
Version 2**



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C6 Validation Report

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DOCUMENT STATUS SHEET

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EXECUTIVE SUMMARY

Introduction

The C6 Validation Report documents the compliance of the PROMOTE 2 Phase 1 *Service Portfolio* and its products, delivered to end-users, with the applicable technical specifications and Service Level Agreements (SLA) [AD 2] as well as progress and service quality phase after phase. The validation of all services and products is done by every service provider in accordance with the Validation Protocol [AD 1].

Goals

The second version of the C6 Validation Report aims at demonstrating a user-defined quality level for seventy one products grouped in sixteen services, and at verifying the availability of tools and procedures necessary to guarantee this level of quality during service provision. Through detailed referencing and links to additional documents and resources, this report also guarantees the traceability of the PROMOTE 2 Service Portfolio validation as well as of the progress made phase 1.

Generation process

The contents of every individual validation report were obtained from service providers and service leaders. Coordination, review and final edition was done by the PROMOTE Validation Office. The iterative process carried out in order to generate this document was initiated by the update of template documents generated and completed in Phase 1. The definition of the structure of this document was driven by 1) The structure of the Validation Protocol [AD 1], 2) The structure of the S5 Product Specifications Document [AD 15], 3) The identification of elements relevant for all Users [RD4], [RD7], [RD8], 4) The identification of elements specifics to each User [AD 2].

During PROMOTE 2 Phase 2, twenty two new products were added to the PROMOTE Portfolio. Overcoming the variable maturity and validation status of the different components, a template of equal format containing Phase 1 validation information updated to allow including Phase 2 progress was delivered to each service providers. The contents required in this template were adapted by the Validation Office to the different Services and Products taking into account 1) Individual components and datasets specific to the Production process of every Service and/or Product [RD2], [RD2], 2) Product Specifications provided in the S5 Specifications Document [AD 15], 3) User Requirements defined in SLA Signed before May 2008 [AD 2].

Contents

The results were compiled in a series of sixteen individual Validation Reports where most relevant information is summarized, for every Product, in five standardized tables:

- Two information tables: *Product characterization* and *validation data* tables.
- Two product and service validation tables: *validation of individual components* including intermediate and final products and *validation against Specifications and User Requirements*.

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- One Service quality table: containing information regarding *quality assessment and control procedures and Service provision* quality monitoring.

This version of the C6 Validation Report (PROMOTE 2 v2) provides:

- An introductory chapter for the interpretation of the individual reports containing each:
 - A summary of the validation plan and status for every Service and Product.
 - A basic characterization of every Product including units, range of values and standards after which these Products are delivered to the User.
 - General information about datasets used for the validation of individual components as well as for final and intermediate Products.
 - A description of validation tools and validation parameters created and/or defined for every Service and Product.
 - Overview of the results obtained for the validation of the individual components (intermediate and final products). Overview of the information content of every individual component.
 - Verification of the compliance between actual Product features and Specifications provided in the S5 Product Specifications Document [AD 15].
 - Verification of the compliance between actual Product features and User Requirements defined through SLA's signed [AD 2].
 - Definition of available tools and procedures for the performance of quality assessment and control of Service provision.
- A chapter devoted to the assessment and analysis of product and service validation for the complete portfolio including Phase 2 vs. Phase 1 progress assessment.

Validation assessment of PROMOTE 2 Phase 2 Services and Products

Constraints

During Phase 1, a number of constraints were encountered by the Validation Office when attempting to apply the Validation Protocol to all components of the PROMOTE 2 Portfolio. As a consequence, only a partial assessment of the validation status, focused on compliance with S5 defined Product Specifications [AD 15] and with SLA defined User Requirements [AD 2] could be performed. Apart of the impact of different maturity of Phase 1 Products and Services, the following three elements were identified as main limitations for the validation against Specifications and against User Requirements:

- Essential documents as Utility Reports, Evaluation Forms and Anomaly Reports are not available for PROMOTE 2 at the moment of the generation of this Validation Report for Phase 1.
- S5 Product Specifications are given for Phase 1 or for Phase 1 to 3 without always indicating applicability period.

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- Measures mutually (verbally) agreed by Service Provider and User in order to adapt Specifications and Requirements to changes in User needs or in Service provision within Phase 1 are not documented.

In general, the impact of the constraints listed above has clearly diminished during Phase 2. As well is for phase 1, No anomaly reports exist for this phase; however, traceability of verbally agreed user requirements modification is still limited.

Assessment criteria

In this version of the Validation Report (v2), compliance was assessed applying the same criteria to both new and old services:

- **Partial compliance:** neither theoretical Product S5 Specifications [AD 15] nor SLA defined Requirements [AD 2] are completely fulfilled at the moment of the generation of the individual validation report.
- **Specifications compliance:** the Product satisfies all specifications but only some of the User Requirements [AD 2]. (Compliance level 0)
- **User-requirements compliance:** the Product fulfils all the SLA defined Requirements [AD 2]. (Compliance level 1)
- **Full compliance:** the Product fulfils both Phase 1 SLA Defined User Requirements for Phase 1[AD 2] and S5 defined Product Specifications [AD 15]. (Compliance level 2)

Results for Phase 2

The results of the service and product quality assessment for the Phase 2 of PROMOTE 2 can be summarized as follows:

1. **Compliance: As shown in** Figure 1.1-1, during Phase 2, 89% of the PROMOTE products grouped in sixteen PROMOTE Services attain a positive compliance assessment. Positive compliance means that the products and services reach an acceptable to excellent conformity with previously system and user defined features. Among these, 46% of the products present absolute compliance with all user requirements and specifications.

As well as in Phase 1, delivery mode and frequency is still the main cause of not compliance or partial compliance with both specifications and requirements closely followed, in this last case, by temporal coverage and resolution.

In the figure below, compliance assessment for new services and products indicates an acceptable level of compliance for the 56% of them.

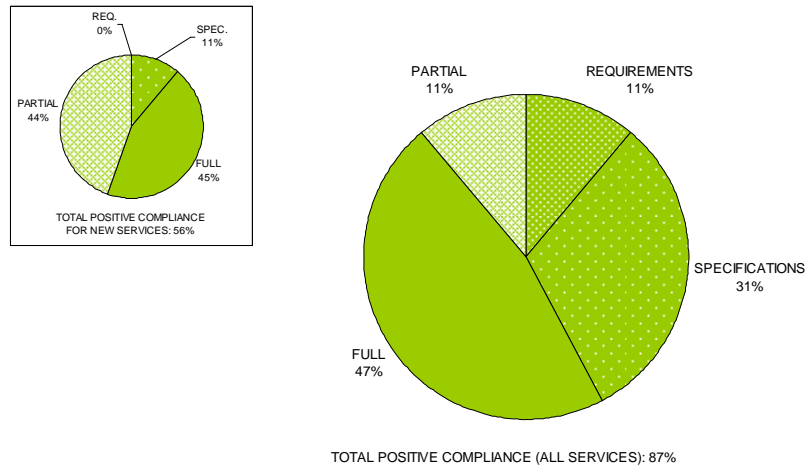


Figure 1.1-1 Assessment Results for Phase 2

2. Progress:

In order to assess progress for services existing in Phase 1 and Phase 2, a comparison between results for both Phases is performed.

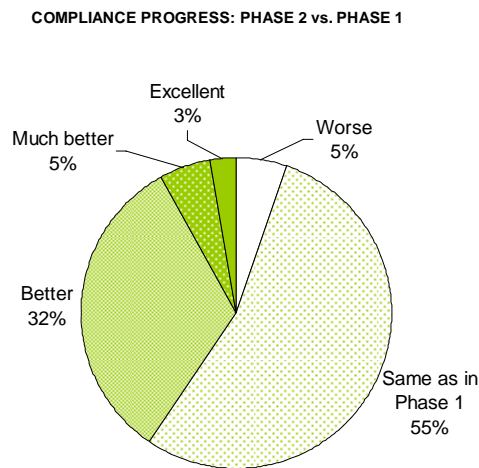


Figure 1.1-2 Phase 2 vs. Phase 1 progress observed after compliance assessment.

Results shown in Figure 1.1-2 indicate only 5% of the products presented a level of performance inferior to the level shown in Phase 1. In addition, a 40% of the products already existing in Phase 1 have significantly improved their level of compliance with user requirements and with specifications in Phase 2.



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DOCUMENT CHANGE RECORD

Issue	Date	Modified Items / Reason for Change
Version 1		
0.1	22.02.2007	Document created
0.5	30.05.2007	Edition and implementation of available results
0.8	08.06.2007	Edition and implementation of available results
0.85	11.06.2007	Edition and implementation of available results
0.87	11.06.2007	Draft document reviewed
0.88	12.06.2007	Document edited
1.0	27.06.2007	Document properties updated
Version 2		
1.1	27.05.2008	Document updated (1)
1.5	02.06.2008	Document updated (2)
1.3	18.07.2008	Draft document (introduction) reviewed
1.9	04.08.2008	Draft document updated and distributed

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1 INTRODUCTION

1.1 Purpose

The present PROMOTE 2 C6 Service Validation Report provides the information necessary to determine the compliance of all constituents of the Service portfolio of PROMOTE 2 Phase 2 with Service Specifications [AD 15] and User Requirements [AD 2] stipulated in the different Service Level Agreements signed before May 2008. In Phase 2, new elements concerning Service and Product quality as progress and quality control monitoring are also analysed.

In every report, the validation plan and status of all constituents of the Service Portfolio Specifications is summarized for every information Product. In addition, this document includes information on datasets used for product validation as well as on service quality monitoring parameters. Special attention has been paid to referencing of every report in order to guarantee traceability of validation results, quality assessment, quality assurance breakpoints, and documentation.

1.2 Scope

The goal of this document is verifying and documenting the implementation of the PROMOTE 2 Validation Protocol for all constituents of the Service portfolio. In the first Phase of PROMOTE 2 validation results will be analysed in terms of compliance with S5 Specifications [AD 15] and SLA defined User Requirements [AD 2].

In this second Phase, 2 new services and 22 new products will be assessed after same criteria applied in Phase 1. Services and products existing in Phase 1 are now assessed after a series of more demanding criteria. As new elements not present in Phase 1 C6 document, maturity, progress and service quality are also considered for the validation and quality assessment of the PROMOTE Portfolio.

1.3 References

1.3.1 Applicable Documents

- [AD 1] C5 Service Validation Protocol. Version 1, Issue 0.2. 30-11-2006.
- [AD 2] C7 Service Level Agreements (Multiple documents) 2006-2008.
- [AD 3] ESA's Statement Of Work entitled "Scaling-up Consolidated GMES Services for Humanitarian Aid and Atmospheric Monitoring", EOEP-GSE-EOAD-SW-05-0001, Issue 2.1, Nov 18, 2005.
- [AD 4] Minutes of the first progress meeting held on November 2-3, 2006, at UBA (Austria).
- [AD 5] Minutes of the kick-off meeting held on July 18, 2006, at DLR (Germany).

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- [AD 6] Minutes of the third progress meeting held on January 30-31, 2007, at KNMI (Netherlands).
- [AD 7] Minutes of the fourth progress meeting held on May 3-4, 2007, at WMO (Switzerland).
- [AD 8] Minutes of the Annual Meeting held on September 20-21, 2007, at DLR (Germany).
- [AD 9] Minutes of the sixth progress meeting held on February 26-27, at the University of Cologne (Germany).
- [AD 10] Minutes of the seventh progress meeting held on May 6-7, 2007, at Sofia-Antipolis (Nice, France)
- [AD 11] Progress Report 1. Issue 1.1. Kick-of-August 2006.
- [AD 12] Progress Report 2. Issue 2.0. September 2006.
- [AD 13] Progress Report 3. Issue 1.0. November-December 2006.
- [AD 14] Progress Report 4. Issue 1.0. February 2007.
- [AD 15] S5 Service Portfolio Specifications. Version 1, Issue 1.2. 17-04-2008.
- [AD 16] Statement of Work, Service Consolidation Actions of EARTHWATCH GMES Services Element, EOEP-GSE-EOAD-SW-02-0002, Issue 6.4, Sep-10, 2002.
- [AD 17] The Prime Contractor's proposal, ref. 3400720, dated March 8, 2006, as amended by Revision 1, ref. 3 400 720 Rev. 1, dated June 19, 2006.

1.3.2 Reference Documents

- [RD1] C6 Service Validation Report. PROMOTE 1. Version 2, Issue 2.2. 23-05-2006.
- [RD2] D2 Service Network Configuration Master Document. Version 2, Issue 0.2. 20-02-2008.
- [RD3] S3 Service Prospectus. Version 0.95, Issue 0.9. 13-06-07.
- [RD4] U1 Global User Needs Directory. PROMOTE 1. Version 2, Issue 1.1. 23-05-2006.
- [RD5] U2 Key User Segment Profile. PROMOTE 1. Version 2, Issue 2. 23-05-2006.
- [RD6] U4 Service Prospectus Appraisal. PROMOTE 1. Version 2. Issue 2.2. 23-05-2006.
- [RD7] U5 Core User Needs. PROMOTE 1. Version 2, Issue 2.1. 23-05-2006.
- [RD8] U7 Service Utility Reports. PROMOTE 1. Version 1, Issue 1. 19-09-2007.
- [RD9] U1 Core User Needs and User Standards Dossier 0709182, Issue 1. 18-09-2007.

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1.4 Document Overview

To facilitate the access to the most relevant validation information, this document has been structured as follows:

1. An introductory chapter containing this introduction, including the purpose of the Validation Report, a list of applicable and general reference documents and the organization and structure of this report and a comprehensive approach to the application of the Validation Protocol.
2. Fourteen (Sixteen-2: SACS and Integrated AQ Platform) individual validation reports for the different Services and Products structured after the S5 Specifications Document [AD 15]. Every report is related to an individual Service and provides specific validation information for every Product. In total 42 Products are validated.

The individual validation reports are grouped by Service as in the S5 document [AD 15]. To facilitate handling of the validation reports, an independent document has been created for each one of the Services listed below:

- Total ozone.
- Stratospheric ozone profile records.
- 3D Ozone.
- Long-term multi-sensorial UV records.
- UV information.
- UV for Greenland.
- Air quality records.
- *Integrated air quality platform for Europe (N/A)*
- Regional air quality forecasts.
- Local air quality forecasts.
- Urban/regional air quality assessment.
- Satellite-based particulate matter demonstration.
- Desert dust awareness.
- Pollen concentration observation and forecast.
- Greenhouse gas and aerosol records.
- *Support to aviation control (N/A)*

The individual reports are preceded by the following chapters:

3. A recapitulative chapter that providing an overview of validation status with respect to PROMOTE Project and User Requirements for Phase 1 [AD 2]. This chapter includes also an assessment on service quality and service progress since Phase 1.
4. In this part some conclusions are summarized after a brief discussing on the assessment results. At the end of chapter, some remarks and recommendations for the generation of further versions of this document are given.

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2 IMPLEMENTATION OF THE VALIDATION PROTOCOL

2.1 Introduction

Before examining the individual validation reports for every Service and Product it is necessary to define all the parameters and criteria implemented by the PROMOTE Validation Office for the application of the PROMOTE 2 Validation Protocol [AD 1].

Each individual Validation Report provides a complete appraisal of the validation status and results available for PROMOTE 2 Phase 2 for a particular Service. The most relevant information is compiled in five standardized tables.

Two information tables:

- Product characterization.
- Validation data.

Four validation tables:

- Validation of individual components.
- Validation against Service Specifications.
- Validation against User Requirements.
- Service quality monitoring: quality assessment and control procedures for Service provision.

This format makes possible a clear, concise and accurate examination of all elements object of validation, facilitates the comparison between different Products, and simplifies the understanding and interpretation of validation results.

This chapter describes in detail the configuration and contents of these tables and also the criteria steering the selection of reference information for every step of the validation process. In case certain information is not available (N/A), not specified (n.s.) or not applicable (n.a.), it will be indicated by the corresponding abbreviation.

The structure of this chapter is the same as the structure of every validation report and rigorously reflects the Validation Protocol [AD 1].

2.2 PROMOTE 2 Service summary and Product characterization

Every individual Service validation report is open with a brief introduction to the Service and all its Products. Before proceeding with the summary of the validation plan, some general information regarding Service and Product status is provided for Service.

First, the following information is given:

- Service is/will be operational since/after: date.
- Research partners: institution and country.
- Service Provider(s): institution and country.
- Validation contact: name, institution and e-mail.

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After that, a *Product Characterization Table* containing the following information for every Product is presented:

Product name	
Parameter	<i>Name of the physical quantity, measured property or parameter chosen to represent the Product named above.</i>
Typical range	<i>When applicable, the typical range of values presented for this Product will be given. This range corresponds to the range of the scales (axis, colorbars) used in graphic data display (timeseries, colormaps etc)</i>
Determination of the typical range (Method, criteria)	<i>Criterion or method for the definition of the typical range.</i>
Maximum range	<i>When applicable, the maximum range of values presented for this Product will be given. This range corresponds to the largest possible range of the scales (axis, colorbars) used in graphic data display (timeseries, colormaps etc)</i>
Units	<i>[units] if necessary, different units are indicated for different data displays.</i>
Standards	<i>Name of standards in use for this quantity or parameter. Includes a reference.</i>

Table 2.2-1 Description of the standard Product Characterization table

2.3 Validation Plan and Validation Data

As a general requirement, validation of all PROMOTE 2 Products and Services should be done before starting Service provision. In addition, and according to the Validation Protocol, it is the responsibility of Service Providers ensuring compliance of Products provided with Product Specifications [AD 15] and provide all means necessary for the maintenance of user required quality levels during Service provision.

In order to document these two tasks, every Service Provider sends the Validation Office a summary of the validation plan explaining the general approach to the validation of every intermediate and final Product and the steps and tools used for validation, with references to the validation data. If available, main validation results are included in the summary. This plan includes, for Products and Services already existing in the previous Phase, progress made in both Phase 1 and 2 allowing for progress assessment.

The contents of the validation plan are defined in regard of the two general validation principles defined in the Validation Protocol:

- Verification of data consistency, which guarantees the accuracy, quality and geophysical meaningfulness of all Products.
- Verification of data usability, which contributes to the optimal *fitness for purpose* of every Product and Service in function of the User needs.

Fundamental information concerning datasets obtained from different sources and used for the validation of every Product are summarized for every Service in a standard *Validation Data Table* containing the information described in Table 2.3-1. This table can be given as a reference along the document and when providing validation results.

VALIDATION DATA		
Type of data acquisition or generation system (Ground-based, <i>In-situ</i> , Model output, EO System)		
Instrument or model name/type/Project	Data availability and access:	<i>A time frame for data availability and accessibility is given including access paths for those existing data sets that are ready to be used (free or restricted use).</i>
	Spatial coverage and resolution:	<i>Geographical areas for which data are available and spatial frequency at which data are available.</i>
	Temporal coverage and resolution:	<i>Time period within which data are available and frequency at which data is available.</i>
	Location(s) (coordinates)/orbit/computational domain:	<i>Location name and coordinates for ground-based data; trajectory description for in-situ data; orbits for EO data; computational domain for model outputs.</i>
	Accuracy:	<i>Results of validation of the reference data if available.</i>

Table 2.3-1 Standard table providing a description of data used for validation.

Validation datasets displayed in the *Validation Data Table* belong to one of the four groups below:

- Ground-based observations.
- In-situ observations, *i.e.* measurements from aircraft, sonde, balloon, etc.
- Equivalent Products already validated or produced by independent methods.
- Output of operational models.
- Other EO data obtained inside or outside the PROMOTE framework.

References mentioned in this section are, generally, publications and reports related to the processing and validation of the different Products and are generally included in the validation data table above. Eventually, electronic references for the access to data or to relevant information are also provided. All these references are listed together at the end of every individual report.

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2.4 Validation of Individual Service Components

In this part of the Validation Protocol, individual components leading to the generation of intermediate and final Products are analysed in order to determine their **quality** and their **consistency**. For this purpose, a detailed description of the parameters or estimators used to perform the validation is also included when available. In addition, the information content of every individual component is summarized in order to provide a first approach to data **usability**.

Information related to the validation of individual components is presented, for every Product, in a table which configuration and contents are shown in Table 2.4-1.

The first section of the *Validation of Individual Components Table* is devoted to the description of data quality and uncertainty assessment parameters, methods, and criteria. Special attention is paid in this section to parameters and methods used for data screening. The aim is to verify the use of adequate procedures for minimizing the contribution of the following elements to final Products:

- Bad retrievals, unrealistic measurements or computational results that would introduce errors in the final Product.
- Presence of outliers.
- Uncertainty.

In addition, specific quality assessment parameters relative to outputs of particular retrievals, algorithms and models are given for every final and intermediate Product. Criteria for data acceptance or rejection are indicated as well when applicable.

The different data quality parameters and criteria used for every Product are presented as given by Service Providers. This information is essential for a complete and correct understanding of the validation results.

In order to guarantee consistency of final data Products, consistency of individual components is evaluated. The validation of consistency of individual components against the validation data is also summarized in a table of the form of Table 2.3-1. The validation of consistency is done predominantly by means of the analysis of the statistics of Observation minus Forecast and derived or other statistic parameters. In the lower part of the *Validation of Individual Components Table*, every Service Provider indicates and defines the particular reference parameters used for this part of the validation. The mathematical expressions for uncertainty estimators are included for every Product as given by the Service Provider.

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VALIDATION OF INDIVIDUAL COMPONENTS	
Uncertainty assessment	
<i>Best estimator</i>	<i>Parameter=Result; Procedure/method/threshold (ref)</i>
<i>Other estimator(s)</i>	<i>Parameter=Result; Procedure/method/threshold (ref)</i>
Quality Assessment	
<i>Goal 1 (e.g. identification of outliers, bad retrievals, quality check...)</i>	<i>Parameter =Result; Procedure/method/threshold (ref)</i>
<i>Goal 2 (...)</i>	<i>Parameter=Result; Procedure/method/threshold (ref)</i>
<i>Error</i>	<i>Parameter=Result; Procedure/method/threshold (ref)</i>
<i>Other</i>	<i>Parameter=Result; Procedure/method/threshold (ref)</i>
RETRIEVALS /ALGORITHMS/MODELS/ASSIMILATION	
<i>Name 1/version</i>	<i>A priori constraints/initial conditions/boundary conditions/sensitivity</i>
	<i>Parameter=Result; Procedure/method – ref data (ref)</i>
<i>Name 2/version</i>	<i>A priori constraints/initial conditions/boundary conditions/sensitivity</i>
	<i>Parameter=Result; Procedure/method – ref data (ref)</i>
...	
CONSISTENCY/(intermediate and/or final) PRODUCT VALIDATION	
<i>Name source output 1/ reference dataset</i>	<i>Parameter=Result; Procedure/method – ref data (ref)</i>
<i>Name source output 2/name reference dataset</i>	<i>Parameter=Result; Procedure/method – ref data (ref)</i>

Table 2.4-1 Configuration and contents of the table devoted to the Validation of Individual Components

As a third element for the validation of individual components, an overview of their information content is also included in a table like Table 2.2-1. In this framework, the Validation Office requested the following information:

- Description of a priori constraints of geophysical quantities retrieved.
- Deviation of the Product retrieved from a priori constraints.
- Sensitivity analysis of retrieval algorithms or models.

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- Effects of model initialisation data (e.g. climatology, other models output) and first guess.
- Constraints due to boundary conditions.

The main reference document used for the generation of the template table for each Service and Product was the last version of the S5 Service Specifications Document [AD 15].

References complementing contents of Table 2.2-1 are also included in the references list at the end of every individual report when available.

2.5 Validation against Product and Service Specifications

This part of the Validation Protocol is devoted to the assessment of the compliance of actual Service features with theoretical Service Specifications given in the S5 Document [AD 15].

Specifications of a particular Service include main technical properties and practical information about data properties, generation, processing, post-processing and delivery. In observance of Requirements for the validation of the PROMOTE 2 Service Portfolio, this section focuses on the validation of Specifications having clear links with User Requirements. In particular, the following types of Specifications are assessed:

- Spatial and temporal coverage and resolution.
- Accuracy/precision.
- Validation results.
- Data formats, access and delivery (or result from best estimator)..
- Service documentation.

The Validation Office performs a first verification of adherence to S5 theoretical Product properties by means of the examination of every dedicated Service Web Sites. The final verification is done through a comparison between Specifications foreseen by the Service Provider at the beginning of the pre-operational phase and the properties actually available at the end of this phase.

The validation against Service Specifications is presented in every individual report together with the validation against User Requirements. Therefore, applicable parameters, reference information and criteria will be defined in next section.

2.6 Validation against User Requirements

This part of the Validation Protocol [AD 1] consists in the verification of the provision of particular Service Specifications in observance of specific and general User Requirements. In order to do this verifications, ac comparison between actual Product features and specific User Requirements are agreed between provider and User and defined in a Service Level Agreement (SLA) are analysed is performed.

To simplify readability and avoid overlap between contents of this section and contents of the precedent one, devoted to the validation against User Requirements, all

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information related to these two fundamental steps of the validation process is presented together in a four columns table providing the following information:

- SPECIFICATION (Column 1): Indicates the Product property to be evaluated.
- S5 (Column 2): Indicates the Specifications given for the corresponding property as indicated in the last version of the S5 Service Specifications Document [AD 15].
- REQUIRED (Column 3): Indicates the particular Specifications that the User expects to obtain for the property under evaluation (User requirement). In this field, contents in *italics* refer to *general Specifications* and *recommendations*, while contents in regular font correspond to SLA defined User Requirements.
- ACTUAL (Column 4): Indicates the actual Specification of the property under evaluation at the end of the Service pre-operational phase. In other words, the Specification that is actually delivered to Users during Service provision is indicated here. In general, the reference date is Mai the 31st 2007. This applies equally to demo and test Services.

Compliance between the three fields for all the Specifications, namely, *S5*, *required* and *actual*, leads to the positive validation of the Product against Service Specifications and Service Requirements.

In addition to SLA specified User Requirements, general User Requirements are given, when available, for those aspects of the Products that are neither defined in S5 nor in SLA. These general Requirements are only given as orientation or recommendation for coming phases and are written in *italics* in order to distinguish them from specific Requirements. For most of the Services, especially those already existing during PROMOTE 1, general User Requirements are obtained from the U5 Core User Needs document [RD7].

The results of this part of the validation will be summarized for each Product in a new standardized table was designed for the validation against Specifications and against User Requirements of the PROMOTE 2 Services. Table 2.6-1 provides a list of all Specifications assessed in this table (column 1) together with a brief definition of each of them (Column 2). The same Specifications will be assessed for all Services and Products. Only in seldom cases additional Specifications not listed below was added to the table by the Service Provider.

The reference documents for the selection of Product Specifications and for SLA [AD 2] and general Requirements [RD7] and recommendations are listed in the fourth column of Table 2.6-1. In the last column of this table, the criteria for determining reference parameters in case of concurrence of different options for the same Specification and Product is defined, *e.g.* different Requirements between different SLA Specifications for the same Product. Depending of the type of property under evaluation, only one Specification among all will be taken as a reference in some cases and, in other cases, all the Requirements will be considered. The general principle is to minimize error targets and to maximize time and space coverage, resolution, data availability and accessibility options. Accordingly, if only one Requirement is given as a reference, it will be always the one demanding the least errors, the highest resolution, the longest historical archive

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and this one including all other required etc. Several Requirements are given together in the same fields when those are related to data formats, delivery modes, data displaying, etc.

VALIDATION AGAINST SPECIFICATIONS and USER REQUIREMENTS				
Specification	<i>Definition</i>	Reference for Specifications	Reference for User Requirements	Reference Requirement for validation
Accuracy	<i>Theoretical accuracy level</i>	S5, Web	-	S5
Accuracy minimum	<i>Lowest limit for data usability</i>	S5, Web	SLA, U5	The highest accuracy minimum specified
Accuracy target	<i>Optimal accuracy level needed by the User</i>	S5, Web	SLA, U5	The highest accuracy target specified available
Spatial coverage	<i>Geographical areas for which data is available</i>	S5, Web	SLA, U5	The broadest spatial coverage available
Temporal coverage	<i>Frequency at which data is available</i>	S5, Web	SLA, U5	The highest frequency available
Spatial resolution	<i>Spatial frequency for data availability/ area covered by a single pixel</i>	S5, Web	SLA, U5	The highest frequency available
Temporal resolution	<i>Temporal frequency for data availability</i>	S5, Web	SLA, U5	The highest resolution available
Grid/Projection	<i>Method used for the representation of the earth surface</i>	S5, Web	SLA, U5	As after all Users required options available
User Interfaces				
PROMOTE Web Site	<i>Evaluation of operation, completeness and updates</i>	S5, Web	SLA, U5	Complete, operational and up to date (yes or not)
ftp	<i>Data delivery via ftp</i>	S5, Web	SLA, U5	As after all Users required options
On demand	<i>Data delivery on request</i>	S5, Web	SLA, U5	As after all Users required options

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Data formats and data delivery				
Data availability	<i>Datasets ready for delivery (time period)</i>	S5, Web	SLA, U5	As after all Users required options
Data accessibility	<i>Data is accessible to Users</i>	S5, Web	SLA, U5	As after all Users required options
Delivery Mode	<i>Data is obtained online, by ftp, on demand etc</i>	S5, Web	SLA, U5	As after all Users required options
Delivery frequency	<i>Frequency of availability of new data</i>	S5, Web	SLA, U5	As after all Users required options
Data Format	<i>Specific formats</i>	S5, Web	SLA, U5	As after all Users required options
Historical archive	<i>Duration-contents-access</i>	S5, Web	SLA, U5	As after all Users required options
Visualization	<i>Formats</i>	S5, Web	SLA, U5	As after all Users required options
REMARKS				

Table 2.6-1 Configuration and contents of the table devoted to the validation against Specifications and against User Requirements

Additional information that cannot be included in any of the fields of the standard table above will be given as text in the section “Remarks” at the bottom of Table 2.6-1. Information regarding additional Products and/or metadata that is relevant for the validation and not fully contained in the table above can be also included as text in this section.

2.7 Quality Assessment and Control Procedures for Services in Operations: Service Quality Monitoring

Once User Requirements are satisfactorily fulfilled, maintenance of validation and quality standards must be guaranteed by the implementation of a series of operational quality assessment and quality control procedures.

Quality control of Service provision will rely on a continuous monitoring of each Service component within the entire process chain including monitoring of the operational workflow and a permanent quality check of the resulting Products. The PROMOTE 2 Services quality control must be initiated by Service Providers together with end-User organizations as soon as the Service is fully operational. Once the existence and

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implementation of quality assessment and control procedures for Service provision is demonstrated, the Validation Office will act as a mere observer regarding Service provision quality. In this Phase, service providers were asked to provide information on the implementation of assessment and control measures and, when applicable, on service performance.

In this version of the validation report Service provision quality assessment and control will be introduced by six elements:

- **Quality checks of the resulting Products:** the methodology is introduced in the general validation plan included at the beginning of each individual Service validation report when available. In this version of the Validation Report only availability of quality check measures will be indicated unless quality checks are a SLA Specified Requirement [AD 2]. In this case, quality checks under the User-required procedure and frequency will be also verified in the previous section as a User Requirement.
In the table devoted to Service Quality, Specifications and User Requirements will be also given when existing. Again, User Requirements are indicated in regular font when compulsory (SLA Defined) and in *italics* when only recommended for coming phases. Frequency and/or number of checks performed during Phase 2 Service Provision is also provided when applicable.
- **Product confidence interval:** the statistical confidence interval for the final data is provided when available. Specified and User required confidence interval are indicated if defined. Frequency and/or number of tests performed during service provision is provided when applicable.
- **Error bar definition and representation:** provides the description of the error bar accompanying data provided by a certain Service. The description of the parameter used for the calculation of this error should be found in Table 2.6-1. Specifications and User Requirements related to this essential aspect of Service provision are indicated when available.
- Incidence monitoring protocols: are represented by two main elements:
 - **The representation of missing data.**
 - **The documentation of process failure.**

In both cases rules are defined in order to identify and document missing data and process failure. Specifications and User Requirements related to this part of the Service provision will be given when available.

Number/frequency of incidences involving missing data and/or process failure during Phase 2 Service Provision are also given in this table when applicable.

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Service Quality					
Specification	<i>Definition</i>	Reference for Specifications	Reference for User Requirements	Reference Requirement for validation	Frequency/number of checks
Quality checks	Parameter and rejection criteria (see also Table 2.4-1)	S5, provider	SLA, U5	Existing process. Compliance with User Requirements when available	Frequency or Number of checks during Phase 2 delivery period.
Product confidence interval	Probability that data provided is truly representative of the variable of interest	S5, Web, provider	SLA, U5	Compliance with User Requirements when available.	Frequency or Number of checks during Phase 2 delivery period.
Error bar definition and representation	Mathematical and graphical error parameterization	S5, Web, provider	SLA, U5	Error parameters completely defined. Compliance with User Requirements when available.	Frequency or Number of checks during Phase 2 delivery period.
Representation of missing data	<i>Convention</i>	S5, Web, provider	SLA, U5	Rules set and documented. Compliance with User Requirements when existing.	Frequency or Number of checks during Phase 2 delivery period.
Documentation of process failure	<i>Convention</i>	S5, Web, provider	SLA, U5	Rules set and documented. Compliance with User Requirements when existing.	Frequency or Number of checks during Phase 2 delivery period.
Version control mechanisms and representation	<i>Convention</i>	S5, Web, Val Contact	SLA, U5	Rules set. Compliance with User Requirements when existing.	Frequency or Number of checks during Phase 2 delivery period.

Table 2.7-1 Quality assessment and control procedures applied to Services in operations

- Version control mechanism and representation:** models, documents, algorithms are object of continuous update, often done by different persons at different locations. In addition, data obtained from different version of the same sources might be object of variations affecting usability. For these reasons, it is advisable to implement a methodology for controlling and document changes and

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updates in tools, Products and documents. Specifications and Requirements are indicated when existing. Service Providers briefly introduce the methodology used for this purpose when existing. When applicable, number of version upgrades during Phase 2 Service Provision is also given in this table.

General data quality assessment elements related to Product accuracy, resolution, visualization etc are, therefore, introduced in Table 2.7-1. Protocols for monitoring of process failures and data losses are also given in this table when available.

At this stage of the project, the verification of the availability of quality assessment and control procedures relies fully on the information provided by the Service and the subsequent confirmation obtained via Service-specific website.

In further versions of these document, information provided by end-users and results of specific actions carried out at the PROMOTE Validation Office will be included in this section.

2.8 Service Endorsement by Users

Service endorsement by Users takes effect when User-defined quality level of all Products of the Service is proved and the maintenance of User-defined quality standards demonstrated.

2.9 Validation of Service Updates

This part of the Validation Protocol [AD 1] involves the verification of the entire process chain with focus on Product changes. Validation of individual components, validation against Service Specifications and validation against User Requirements must be again completed after every Service update.

2.10 Validation Standards

The definition of validation standards will begin after the first issue of the validation report is available. For this purpose, the validation office will analyse the information provided in this report with focus on different aspects related mainly to error analysis and quality assessment tools. A second target for this analysis will be the identification of validation gaps. Results will be provided at the end of Phase 3.

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3 VALIDATION STATUS OF PROMOTE 2 SERVICES AND PRODUCTS IN PHASE 2

3.1 Summary

In this chapter, an attempt to provide a general overview of the validation status of every Service and Product of the PROMOTE 2 Service Portfolio is given. This analysis focuses on the compliance between Product Specifications and User Requirements; in particular, the fulfilment of Requirements necessary for the completion of Phase 2 will be assessed.

The Validation Protocol [AD 1] must be entirely and equally applied to all Services and Products, however, due to the different maturity levels of the Products constituting the PROMOTE 2 Portfolio and, more importantly, to a series of noteworthy limitations related to the information flow within the PROMOTE 2 information system. In this report, results of the implementation of the parts of the Validation Protocol [AD 1] concerning Phase 2 Service Specifications, User Requirements and a basic service quality assessment and update are presented. Aspects directly related to the validation of individual components, including geophysical validation, will be provided in Phase 3 after the realization of a certain number of audits.

Results described above are summarized in a number of tables and plots that will be briefly discussed. The outcome of an assessment of progress made between Phase 1 and Phase 2 will be also presented in this report. Information about the limitations encountered by the Validation Office for the application of the Validation Protocol [AD 1] to the PROMOTE 2 Phase 2 Service Portfolio will be also summarized here in order to define general and specific information needs for Phase 3. In addition, a series of recommendations for the generation of the individual C6 Validation reports in Phase 3 will be given to all partners at the end of this chapter.

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3.2 PROMOTE 2 Phase 2 validation assessment criteria

3.2.1 Phase 2 assessment criteria

The correct application of all steps of the Validation Protocol [AD 1] relies on the definition of objective criteria universally and equally applicable to all Services and Products. As a basis for the definition of these criteria, all the relevant information is presented for each Product under a standardized structure which contents provide the same type of information. Thanks to this structure, it is possible to group the different Product Specifications and Requirements in the eight assessment categories listed below:

- Accuracy.
- Spatial coverage, resolution, grids and projections.
- Time coverage and resolution.
- User interfaces.
- Data availability and access.
- Delivery mode and frequency.
- Data format and visualization.
- Historical archives.

These are the elements that will be object of evaluation and on which compliance levels defined further on in this chapter will be based.

3.2.2 Phase 1 vs. Phase 2 constraints

In principle, all Products are expected to fulfil Specifications and Requirements for these eight categories. During Phase 1 a number of constraints were encountered by the Validation Office when attempting to apply the Validation Protocol [AD 1] to all components of the PROMOTE 2 Phase 1 Service Portfolio. As a consequence, only a partial assessment of the validation status, with main focus on compliance with SLA defined User Requirements and, secondly, on S5 Specifications, could be performed. Apart of the impact of different Product maturity stages within the Service Portfolio on the universal application of the Protocol, the following elements had been identified as main limitations for a full validation against Specifications and against User Requirements:

- a) Essential documents as Utility Reports and User Evaluation Forms were not available for PROMOTE 2 at the moment of the generation of this Validation Report for Phase 1.
- b) S5 Product Specifications were given for Phase 1 or for Phase 1 to 3 without always indicating applicability period.
- c) Specifications for some Services were given in terms of individual Products and for others in terms of sub-Services or groups of Products so that detailed Specifications for each Product are not always available. As a consequence, not

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all individual Products have the same weight in the general validation plot. This fact must be taken into account when reading the validation summary given in the next sections.


- d) Measures mutually (verbally) agreed by Service Provider and User in order to adapt Specifications and Requirements to changes in User needs or in Service provision within Phase 1 were not documented.


During Phase 2, constraints type (a) were solved and did not apply. Constraints type (b) were minimized by adding to the S5 Specifications some fields containing information related to the applicability of the specifications given. However, the weight of the information provided for the different components of the portfolio (c) is still heterogeneous because specifications are detailed, depending on the service, by product, by set of products or by sub-service as done in Phase 1. This is an issue when comparing different services but has the advantage that results for Phase 1 and Phase 2 can be compared in a more consistent manner.


During Phase 2, an improvement in the traceability of agreements between providers and users (d) incurring in differences with Service Level Agreement requirements has been observed.

3.2.3 Phase 2 Compliance levels

Service and product maturity have progressed since Phase 1, however, in Phase 2 new services and products have been added to the portfolio. These new products will have to achieve full development in Phase 3. This is the reason why assessment criteria for Phase 2 will be equally defined and applied to all old and new services in Phase 2. Moreover, the specific criteria defined in Phase 1 assessment allowing for conditional compliance depending on user evaluation will not be used in this Phase. This means that results will be based on absolute criteria that will allow products and services to be classified in three compliance levels:

 *Full compliance:* both Product Specifications and Phase 1 SLA User Requirements have been fulfilled.

 *User-Requirement compliance:* there is full compliance with Phase 1 and Phase 2 SLA User Requirements defined in Article 3 and Annexes of every SLA but not with all Product Specifications (as given in the last version of the S5 Specifications document).

 *Specifications compliance:* The Product does not fulfil all the User Requirements. However, products and services are compliant with all specifications. Therefore, this level of compliance is conditioned to the following:

- No incidence reports for the product/service concerned have been issued during Phase 2.
- Phase 1 requirements are fulfilled.
- Phase 1 evaluation was positive.

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Partial compliance : Neither all specifications nor the user requirements have been completely fulfilled.



N/A

These compliance levels are also consistent with the levels defined for Phase 1 and therefore, allow for a direct comparison which results will be shown in the section 3.6 devoted to Phase 2 vs. Phase 1 compliance progress assessment.

3.2.4 Phase 2 Service quality assessment criteria

Service quality assessment is in principle based on the implementation of five measures to guarantee Service quality (S.Q.) during Service provision. The five measures under assessment are those included in the table for Quality Assessment and Control procedures (Service Quality) given for each Product in the individual reports:

- Quality checks.
- Error bar definition and representation/confidence interval (depending on Service) (Y: this measure is available; N: this measure is not available. See next point)
- Representation of missing data.
- Documentation of process failure.
- Version control mechanism and representation.

In Phase 1 validation summary, an indicator of how many of these five measures were available was given in the field called **S.Q.**. In some cases, one or more of these measures were not applicable to a particular Product and, therefore, the total number of measures under assessment becomes smaller than five. In Phase 2 only improvement “+” or no changes “=” with respect to Phase 1 will be indicated. In Phase 3 a detailed analysis of the implementation, operability and efficiency of these measures, including incidences counting will be provided.

❖ **Quality checks and error bars (or of a confidence interval) for final Products:** These two elements are considered as critical to guarantee product and service quality. The performance of quality checks on regular bases and the provision of an error bar together with the data products will be represented by a “1” in case one of both exists or “2” when both are available. In Phase 3, a detailed assessment of the correct implementation of these measures will be performed.

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3.3 PROMOTE 2 Phase 2 assessment results

Results of the compliance and quality assessment are summarized in a series of tables grouped by theme. Besides the indicators of compliance levels described in the previous chapter, in these tables fields named **SPEC.** and **REQ.**, an “Ok” will be included when there is full compliance with Specifications and with SLA defined User Requirements, respectively. If compliance is not achieved for one or for both of the fields, an asterisk * followed by one or more numbers from one (1) to eight (8) will be given between parentheses in order to provide some information on the aspects that are not fulfilled. Every number refers to one particular assessment category in such a way that all fields given in the standard table for validation against Specifications and User Requirements are represented (see Table 2.6-1). The equivalence between numbers and categories is given below:

1. Accuracy.
2. Spatial coverage, resolution, grids and projections.
3. Time coverage and resolution.
4. User interfaces.
5. Data availability and access.
6. Delivery mode and frequency.
7. Data format and visualization.
8. Historical archives.

Eventually, other causes of not compliance will be represented by an asterisk * followed by one or more low case letters given between parentheses (a, b, c...). The meaning, in this case, will be specifically defined for every Service at the bottom of the corresponding table.

In the summary given next, elements preventing from absolute compliance are specified in the field named **SPEC.** when the disagreement is due to a S5 Specification and in the field named **REQ.** when the disagreement refers to SLA User Requirements.

3.3.1 Ozone Services assessment

OZONE							
TOTAL OZONE SERVICE	3 SLA	PHASE 1	PHASE 2	PHASE 3	SPEC.	REQ.	S. Q.
NRT total O3 column	1		-		2	ok	2
Total O3 Forecast	1		+		ok	ok	2
Total O3 records	1		+		ok	ok	1

*(2) Horizontal resolution smaller in Specifications than actual.

Table 3.3-1 Validation assessment for PROMOTE 2 Total Ozone

3D OZONE RECORD SERVICE	1 SLA	PHASE 1	PHASE 2	PHASE 3	SPEC.	REQ.	S. Q.
ROSE 3D record	1		N/A				2
BASCOE 3D record	1		✓		*(3)	ok	2
SACADA record	1		+		ok	ok	2

*(3) Temporal coverage. This is a one time delivery Product so that User approval at the end of Phase 1 or at the moment of data delivery is needed.

Table 3.3-2 Validation assessment for PROMOTE 2 3D Ozone Records

3.3.2 UV Services assessment

UV INFORMATION SERVICE							
UV-Check	1 SLA	Phase 1	Phase 2	Phase 3	SPEC	REQ.	S. Q.
Sunburn Time; UV-Index; SPF	1		+		ok	ok	+2
MEDSUN	4 SLA						
Sunburn Time	4		+		ok	ok	+1
UV-Index	4		+		ok	ok	+1
SPF	4		+		ok	ok	+1
Phototype	4		+		ok	ok	+1
UV Eye Index	1		+		ok	ok	+1

Table 0-1 Validation assessment for PROMOTE 2 UV Services

LONG-TERM MULTISENSORAL UV RECORDS SERVICE							
	1 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
UV Records	1		+		ok	ok	+

Table 0-2 Validation assessment for PROMOTE 2 UV Services

UV SERVICE FOR GREENLAND							
	1 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
UV-Index	1	N/A	+		ok	ok	N/A

Table 0-3 Validation assessment for PROMOTE 2 UV Services for Greenland

3.3.3 Air quality Services assessment

INTEGRATED AQ SERVICE							
	2 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Integrated AQ analysis for Europe	1		N/A		N/A	N/A	N/A
Integrated AQ forecast for Europe	1		N/A		N/A	N/A	N/A

Table 0-4 Validation assessment for PROMOTE 2 Integrated AQ

REGIONAL AQ FORECAST (PREVIOUSLY TOGETHER WITH LOCAL AQ SERVICE)							
	28 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Finnish sub-Service	1		+		ok	ok	1
Regional Forecast for Mecklenburg-Western Pomerania and Bavaria	4		+		ok	ok	1
Eastern Mediterranean AQ Forecast (Greece)	2				*(6)	*(6)	=
AQ Forecast South East France, Corsica and East Italy	2		+		ok	ok	+1
Netherlands Regional Forecast	1		+		ok	ok	+1
<i>Denmark Regional Forecast</i>	-	N/A	N/A		N/A	N/A	N/A
<i>Canada Regional Forecast</i>	2	N/A	+		ok	ok	N/A

*(6) data access and delivery mode.

Table 0-5 Validation assessment for PROMOTE 2 Regional Local AQ Forecasting



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LOCAL AIR QUALITY FORECAST							
Local pollution Forecast for London, Budapest and Other Cities	18				1	1	=
AQ Forecast for Belgium and Belgian Cities	1		-		ok	2	+1
<i>AQ Forecast for Zeeland</i>	1		+		ok	3	2
<i>AQ Forecast for Lisbon</i>	1		+				2

DESERT DUST AWARENESS							
	4 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
NRT Aerosol Detection-Iberian sub Service	2				3, 6, 7	3, 6, 7	=
NRT Desert Dust indicator over Italy and Mediterranean Areas	2		✓		6	ok	+1

*(3) Actual time resolution is smaller than S5 specified resolution for Phase 2.

*(6) Data access and delivery mode.

*(7) Actual visualisation formats differ from S5 Specified format (Idl custom tool).

Table 0-6 Validation assessment for PROMOTE 2 Desert Dust Awareness

AQ RECORD SERVICE							
	3 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Global tropospheric NO ₂	3		+		ok	ok	+2
Global Tropospheric Formaldehyde Column	3		✓		1	ok	+2
European tropospheric assimilation based datasets (Former Regional Assimilated Near Surface Pollutants Dataset)	3		✓		1	ok	+2

*(1) Accuracy.

Table 0-7 Validation assessment for PROMOTE 2 AQ Records

SATELLITE BASED PM DEMONSTRATION SERVICE							
	3 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Multiannual European PM Records	1		+		Ok	Ok	=
Regional NRT Product for Northern Italy	2		+		Ok	Ok	+2

Table 0-8 Validation assessment for PROMOTE 2 Satellite Based PM Demo

POLLEN							
	3 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Pollen Forecast And Analysis for Europe							
Pollen Observation and Forecast for South Europe	1				*(2,8)	*(6)	+
Pollen Forecast for Central and North Europe	2		✓		*(2, 6, 8)	ok	+1

*(2) Actual spatial resolution larger than S5 Specifications resolution.
*(6) Data access and delivery mode.
*(7) Data format and visualization.
*(8) Historical archives.

Table 0-9 Validation assessment for PROMOTE 2 Pollen Observation and Forecast

URBAN/REGIONAL AQ ASSESSMENT SERVICE							
	1 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Model based AQ urban indicators	3				*(7)	*(1)	N/A
Scenario tool for regional AQ policy support (Former Regional scenario tool)	3				*(2)	*(2)	N/A
<i>Zeeland U/R AQ</i>	1	N/A	+		Ok	ok	2

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<i>Portugal U/RAQ</i>	1	N/A	+		Ok	ok	2
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*(1) Accuracy.

*(2) Spatial coverage and/or resolution and/or grid and/or projection differ from required.

*(7) Data format and visualization.

Table 0-10 Validation assessment for PROMOTE 2 Urban Regional AQ Assessment

3.3.4 Greenhouse gases and Aerosols Services validation assessment

GHG AND AEROSOL SERVICE							
GHG AND AEROSOLS RECORD SERVICE							
	2 SLA	Phase 1	Phase 2	Phase 3	SPEC.	REQ.	S. Q.
Global Column Averaged CH4 Global Volume Mixing Ratio (XCH4)	1		+		Ok	Ok	+2
Global Column Averaged CO2 Volume Mixing Ratio			+		Ok	Ok	+2
Regional Column Averaged CO2 Volume Mixing Ratio			+		Ok	Ok	+2
Multicontinental aerosol Optical Depth Records and speciation	1				7	7	+2
STRATOSPHERIC AEROSOLS AND GAS							
Stratospheric gases	2	N/A	+		ok	ok	N/A

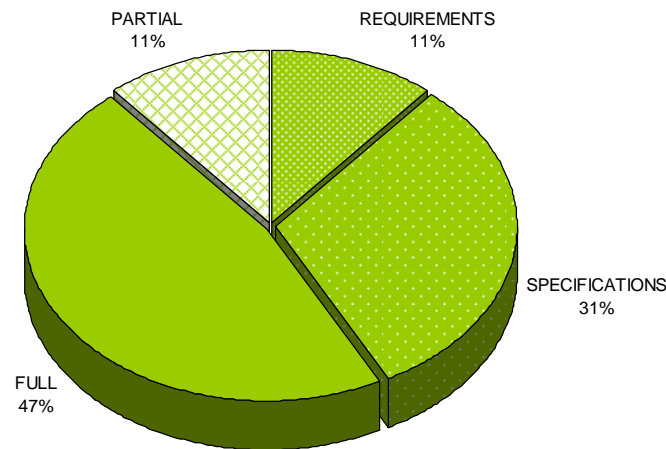
*(7) Data format and visualization.

Table 0-11 Validation assessment for PROMOTE 2 AQ Greenhouse Gases and Aerosols

3.4 Phase 2 compliance analysis

3.4.1 Validation per Product

In Phase 2, an 89% of all products assessed within the 16 Services have achieved one of the three levels of compliance defined for Phase 1. However, there are an 11% that neither fulfils all the SLA defined User Requirements [AD 2] nor the specifications as can be seeing in the figure below.



TOTAL POSITIVE COMPLIANCE (ALL SERVICES): 89%

Figure 3.4-1 Assessment of validation compliance for all Phase 2 products.

In this figure, a 47% of the products analysed present full compliance. This represents a 20% more than in the previous phase. It is important to underline that no distinction between new and old services has been made for these assessment or for the the criteria defined in order to determine compliance levels. This achievement is due not only to a better product quality but also to the completeness and clarity of the information provided in the S5 Specifications and in the information included in the C6 document delivered by Service Providers to the Validation Office.

REgrding new products only, 56% of the new services present positive levels of compliance, as shown in Figure 3.4-2. Among the new products, 45% achieve full compliance, nearly the same rate as old products. However, only partial compliance is found for 44% of the products, four times more than for the old services. It is important to underline that all of the new products fulfilling specifications do fulfil also all user requirements.

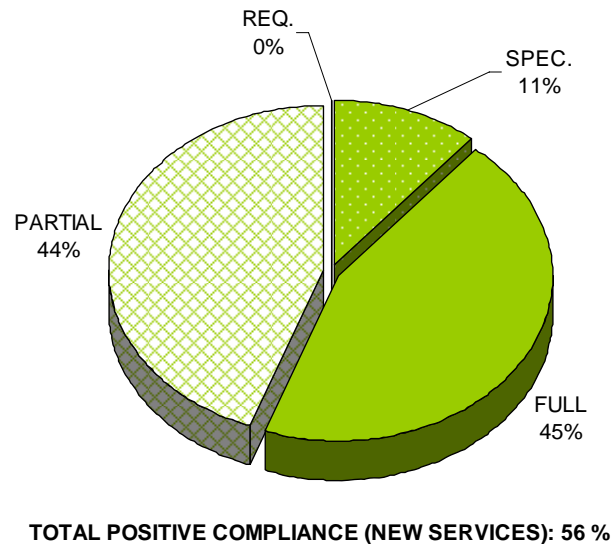


Figure 3.4-2 Assessment of validation compliance for new Phase 2 products

3.4.1.1 Compliance assessment per Service

Level of compliance with S5 Specifications and SLA defined User Requirements [AD 2] achieved by every Service are shown in Figure 3.4-3. To obtain this figure, compliance levels of all Products of a particular Service are put together and highest and lowest levels identified. For every Service, levels are displayed in the figure below and connected by a vertical line which indicates the compliance range. Within this range, between 0 for partial compliance and 2 for full compliance, maxima are represented by bold dots and minima by white dots. Ideally, all Services should be represented by a unique bold symbol located at Level 2 (full compliance, both S5 and SLA are fulfilled) maximum compliance level for Phase 2 and equivalent to Level 4 in Phase 1. Symbols located at level 0 represent products needing a significant improvement.

About 70% of the Services reach maximum compliance levels. Among them, more than 30% of the services present this level for all its products which is the best result possible. 46% reach full compliance with one of all of its Products. However, a 37% of the Services still have Products that reach only a partial compliance level requiring intensive improvement during the coming Phase.

These results indicate, on one hand the different maturity of PROMOTE 2 Products mentioned earlier in this document but also certain heterogeneities still present within different services. These are often related to the nature of the product itself and to data and validation data availability.

Progress with respect to Phase 1 will be discussed in Section 3.6.

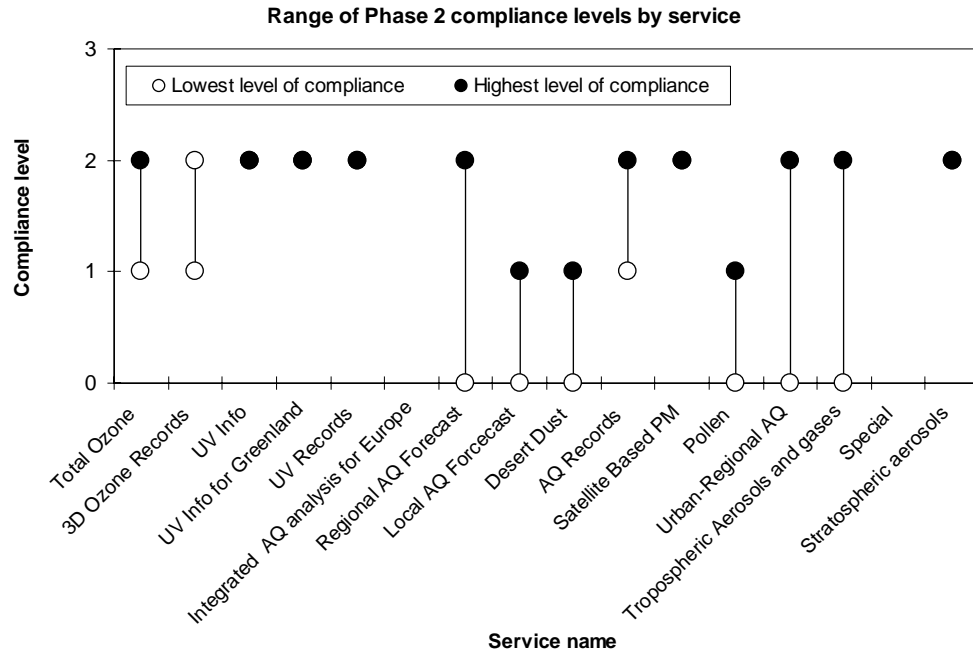


Figure 3.4-3 Overview of compliance levels and fulfilment of Specifications and Requirements for PROMOTE 2 Phase 2 per Service (13): compliance levels for all Products within a Service are taken into account. Maximum and minimum levels achieved per Service are shown. Level 0: partial compliance. Level 1: requirements or specifications only compliance. Level 2: full compliance.

3.5 Analysis of causes of no compliance in Phase 2

3.5.1 Compliance with S5 Specifications

In the figure below, causes of no compliance with Specifications for all Phase 2 products is shown. Issues with the delivery mode and or frequency are behind 25% of cases of no compliance, closely followed by a 21% of incidence of issues related to spatial coverage, resolution, grids and projections.

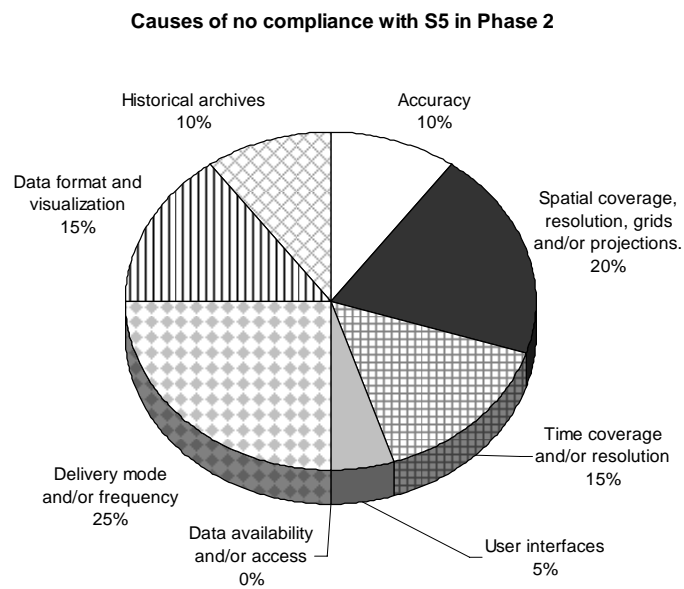


Figure 3.5-1 Incidence of the different causes of no compliance with S5 Product Specifications (Normalized, total=22%)

Figure 3.5-1 shows the different incidence on the assessment results of all possible causes of non compliance between actual product features and theoretical Specifications given in document S5 [AD 15]. Among the 22% of Products that do not fulfil all Specifications, 25% fail in providing the specified delivery mode and/or frequency. The second cause of not compliance with S5 is related to the spatial coverage and/or resolution with a 21% incidence. It is remarkable the fact that the incidence related to user interfaces, including the webpage, is of only 5% and there is no incidence related to data availability and access.

It is necessary to highlight the apparently low incidence of the accuracy as a cause of no compliance with S5 Specifications. This is due, in most of the cases, to the uncertainty related to the determination of product accuracy and leading to the omission of this information in both S5 Product Specifications and C6 Individual Report given by Service Provider.

3.5.2 Validation against SLA defined User Requirements

The element dominating the assessment results summarized in this chapter are SLA defined User Requirements [AD 2]. After evaluating the same eight categories discussed in section 3.5.1, results present some notable differences. Among the 42% of products that fail one or more SLA defined User Requirement, a 22% do not comply with required delivery mode and/or frequency. This result is not very different to what was obtained for S5 Specifications. However, in the case of validation against SLA defined User Requirements, the not compliance with spatial resolution and coverage Requirements is limited to a 14% incidence, same as data format and visualization.

Causes of no compliance with SLA in Phase 2

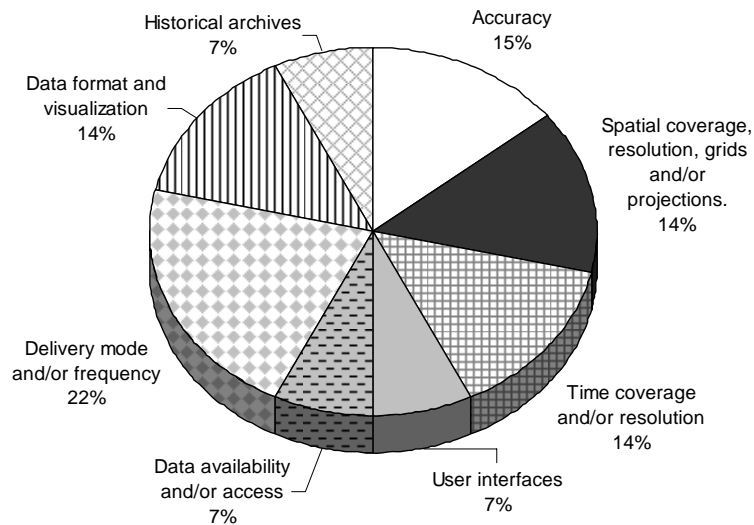


Figure 3.5-2 Incidence of the different causes of no compliance with SLA defined User Requirements (Normalized, total=42%)

These results indicate that SLA defined Requirements [AD 2] not fulfilled are often those more directly related to the quality of the provision of the Service than those defining Product quality itself. However, the low incidence of accuracy as cause of no compliance with SLA defined Requirements must again be treated with caution since, in most of the cases, this parameter is not explicitly given in the SLA and the availability of PROMOTE 2 documentation with this respect is still very limited.

3.6 Summary of Phase 1 vs. Phase 2 progress

In this section, different aspects of the validation compliance assessment will be considered. The goal is to assess progress made in Phase 2 with respect to Phase 1 and, in this way, being able to identify the points that will need more attention in Phase 3.

To assess **progress made on compliance** in Phase 2, Phase 1 assessment criteria were aligned to Phase 2 criteria in such a way that Phase 1 conditional compliance is equivalent to Phase 2 partial compliance. No compliance against specifications and against user requirements can be also compared without having to make any modification. The overall result of this comparison is summarized in Table 3.6-1.

<i>No compliance</i>	<i>PHASE 1</i>	<i>PHASE 2</i>
Specifications (S5)	75 %	22%
User requirements (SLA)	77%	42%

Table 3.6-1 Incidence of no compliance with specifications and requirements in Phase 1 and Phase 2.

Figures shown in the table above indicate a drastic reduction of no compliance levels in Phase 2 versus Phase 1 for both specifications and requirements.

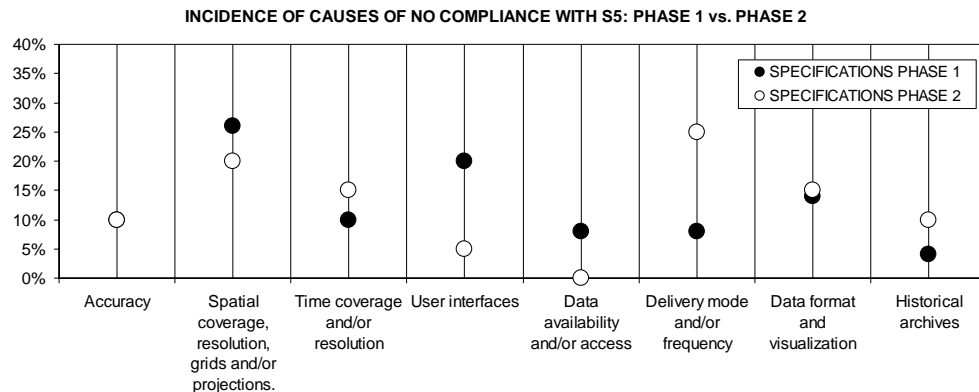


Figure 3.6-1 Comparisons of causes of not compliance with Specifications in Phase 1 and in Phase 2.

The incidences of different possible causes of not compliance with S5 Specifications for every Phase are summarised in Figure 3.6-1. Please, note that percentages indicated in these figures are relative to the total non compliance percentages given in Table 3.6-1.



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The figure above show how the incidence of no compliance with specifications due to data availability and access has been reduced to the minimum in Phase 2 whereas the incidence of aspects related to delivery mode and/or frequency related issues has increased from an 8% in Phase 1 to a 25% in Phase 2. Time coverage and resolution and historical archives related incidence show both an increase in not compliance of about 5% for Phase 2.

The elements for which incidence has been reduced in Phase 2 are spatial coverage and resolution, data availability and access, and users interfaces. This last element reflects the effort made in Phase 2 to complete and maintain dedicated Web Sites within the PROMOTE Portal.

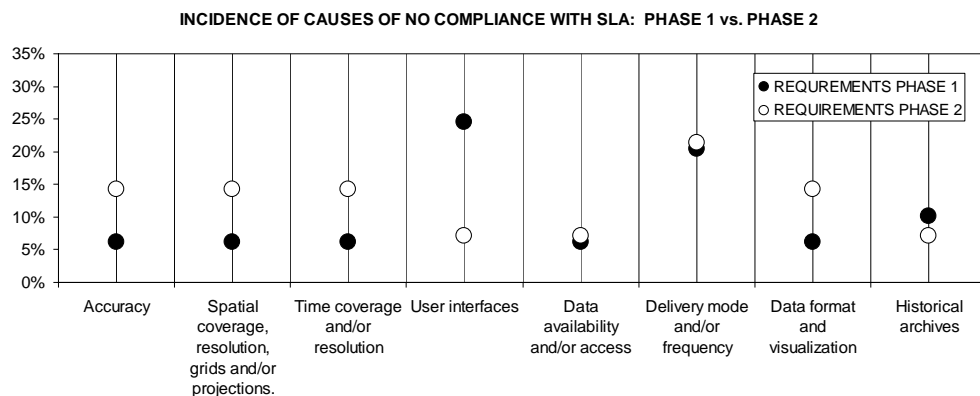


Figure 3.6-2 Comparisons of causes of not compliance with SLA Requirements in Phase 1 and in Phase 2.

Regarding User Requirements, results shown in Figure 3.6-2 indicate, in general, a clear reduction of the incidence of issues related to user interfaces in Phase 2 with respect to Phase 1 and a slight reduction of this incidence for historical archives. For the rest of the assessment parameters there is an increase of incidence of around a 5% for accuracy, spatial and time coverage and resolution, and up to 10% for data formats and visualization in Phase 2.

The figures above show different trends on incidence of causes of not compliance for Phase 1 and Phase 2. Some of these incidences rates have significantly grew in Phase 2 but the general progress in Phase 2 vs. Phase 1 compliance is very positive as shown in the Figure 3.6-3 below.

In Phase 2, 40% of the services have significantly improved their compliance levels whereas 55% have not presented changes in compliance levels. For many products, specifications and especially requirements are more demanding in Phase 2 than in Phase 1 and, for this reason, an invariable level of compliance in Phase 2 with respect to Phase 1 indicates in many cases, that products evolve according to

expectations. Products that are not in this line correspond to the 5% presenting a worse performance in Phase 2 than in Phase 1.

COMPLIANCE PROGRESS: PHASE 2 vs. PHASE 1

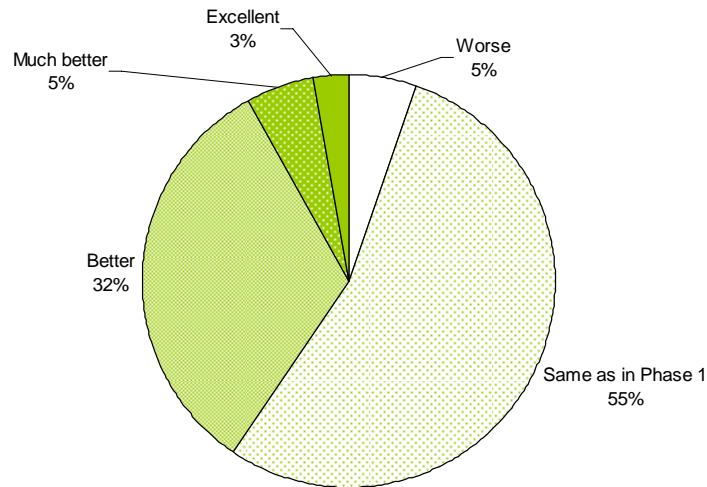


Figure 3.6-3 Phase 2 vs. Phase 1 progress in compliance levels

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3.7 Conclusions and recommendations for Phase 3

In this chapter, an assessment of the validation status of the PROMOTE Service Portfolio was performed for Phase 2 product and services including new products that did not form part of the portfolio during Phase 1.

The generation of this Validation Report allowed not only for an assessment of the quality and fitness-for-purpose of the PROMOTE 2 Service Portfolio but also for the evaluation of progress made with respect to Phase 1 status.

In Phase 1, a number of issues were identified as constraints for the full implementation of the Validation Protocol:

- The applicability of user requirements given in SLA.
- The applicability of S5 Specifications given in S5 Document.
- Validation timeframe including deadlines for SLA Signing, Web operationally and delivery of Validation Reports.
- Deliverables and documents flow.

In Phase 2 the impact of these constraints has been reduced but some fine tuning will be necessary in Phase 3 to avoid any type of ambiguity. This will be done, of course, taking into account the fact that SLA will not be modified or extended and thinking of Post-PROMOTE project needs.

Recommendations to deal with this and other issues will be included in the **Quality Plan (M2)** that will be released in October 2008.