



GSICS Procedure for Product Acceptance, Version 2.1

GSICS Coordination Center

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Change History

11/2009 - Version 1.0: Accepted by GSICS Executive Panel.

03/2010 - Version 2.0: Updates made to change product distribution phases based on input from the GSICS Data and Research Working Groups at the Joint GRWG-V and GDWG-IV Meeting held in Toulouse, France between 9-11 February 2010.

05/2010 – Version 2.1: Updates were made based on the 30 April 2010 GSICS Executive Panel Meeting. These updates include the need for a preliminary Algorithm Theoretical Basis Document during Submission Phase. It also accommodates extra time needed by GSICS Members to review this document.

Table of Contents

1. Scope and Philosophy of Document **1**
2. Overview of GSICS Procedure for Product Acceptance..... **1**
Appendix 1. GSICS Product Application Form (GPAF) supporting documentation and materials..... **5**

1. Scope and Philosophy of Document

The formal acceptance procedure of distribution-ready products into the GSICS product portfolio answers the following five questions:

- What is the product?
- What is its scope and purpose within the GSICS product portfolio (does it fill a need within GSICS)?
- What is the product theoretical basis?
- What is the product quality (uncertainty, quality indicators, traceability to reference standards, etc)?
- How is the product implemented operationally?

This proposed "acceptance" procedure of distribution-ready products is not designed to be limiting to GSICS, and is put into place mainly as a system of documentation and product quality assurance. The procedure is not developed to judge products as "good" and/or "bad", or even to discriminate them based on the type of method. The acceptance procedure is put into place only to determine whether the product is within the scope of GSICS, and whether its methods, uncertainties, traceability, and implementation have been properly documented. This way, the GSICS data user can decide whether or not a given product will suit their needs.

2. Overview of GSICS Procedure for Product Acceptance

The success of GSICS is intimately linked to the quality and usefulness of GSICS products and to the availability of these products to the GSICS community. Therefore, careful consideration must be given to distribution-ready products before they achieve final acceptance into the GSICS product portfolio. The GSICS Procedure for Product Acceptance (GPPA) is designed to establish a method by which distribution-ready products from data providers around the world can be first inspected, and then accepted, as a GSICS product. The acceptance procedure process includes a Product Submission Phase, and the following three possible GSICS product distribution states:

- 1) **Demonstration Phase (DP)** – The Product is determined to be within GSICS scope, its fundamental founding concepts are understood, and it meets GSICS data format/content guidelines. In this phase, the Product is released solely for the purpose of evaluation within GSICS and by potential product users;
- 2) **Pre-operational Phase (PP)** – The Product has been determined to be a valuable part of the GSICS product portfolio, and has developed and understood methodology, software, supporting models and measurements, uncertainty, quality indicator, and traceability to a community or SI standard;
- 3) **Operational Phase (OP)** – In addition to its PP attributes, the Product has developed and understood generation, distribution, version control and archive strategies. It also has an available User's Guide. At this point, Product is fully accepted and maintained within GSICS.

An overview of this process is given by the illustration in Figure 1.

Before the GPPA can begin, the product provider must have a distribution-ready product. The acceptance procedure commences when the provider fills out the required sections of the GSICS Product Acceptance Form (GPAF), detailed in the GPPA Workflow (found on the GSICS Wiki at <https://cs.star.nesdis.noaa.gov/GSICS/GppaWorkflow>), and submits this form to the GSICS Coordination Center (GCC). At this point, the product enters the Product Submission Phase.

The full GPAF includes information about the product provider and the nature of the distribution-ready product. It also includes a checklist of required supporting documentation and materials that will be needed during the process. A high-level list of these supporting documents and materials can be found in Appendix 1. Note that the product provider does not need to write documentation for third party tools used in the process of product generation, if the tools are already accompanied by documentation. For example, radiative transfer models are available from many sources, and they usually are accompanied by well established User's Guides that the product provider does not need to reproduce. On the other hand, it is important that links to documentation and materials from the third party be available for inspection.

It is the role of the GSICS Product Acceptance Team (GPAT) – i.e., GSICS Processing and Research Center (GPRC) Representatives, GSICS Research Working Group (GRWG) and GSICS Data Working Group (GDWG) Chairs, and GCC Director - to review each GPAF submitted to them from product providers. Collectively, they make sure that each GPAF is filled out properly, and that the required supporting documents and materials received with each step of the product acceptance process meets specifications. In addition, the candidate product is to be evaluated against scope and fitness-of-purpose criteria that are designed to determine if the new product eliminates GSICS product portfolio limitations, gaps or weaknesses.

According to Figure 1, a product enters the Product Submission Phase when the product provider submits a GPAF to the GPAT. In particular, the GCC will be the intake point for each GPAF, and for this first phase of the acceptance procedure, the GCC requires the GPAF be accompanied by the following information and files:

- producer point of contact information;
- product description;
- product scope and requirements;
- preliminary product algorithm theoretical basis document; and
- a single product data sample file that satisfies GSICS data format, and file and parameter naming conventions.

If these conditions are met, then the product can be moved by the GPAT into Demonstration Phase (DP). If the conditions are not met, the GPAT can ask for the GPAF to be revised accordingly by the product provider. The time between GPAF submission and DP of a given product is to be less than 90 days. Thus, if the product provider fails to revise their GPAF according to GPAT recommendations before the end of the 90 day period, the product provider will have to resubmit the form or request an extension. Likewise, if the GPAT does not act on the GPAF submission, the product will enter DP after 90 days. Once in DP, the product can be released to the GSICS community with a clear disclaimer that the product has not been fully accepted.

Once the product has achieved DP, there are several deliverables that need to be delivered from the product provider to the GPAT before the product can be distributed in Pre-operational Phase (PP). These deliverables include:

- a full suite of data product files or links to them; and
- documents and materials describing product
 - methodology,
 - software, supporting models and measurements, and

- uncertainty analysis, quality indicator(s) and traceable to community or SI reference standards.

In addition, a review by potential product users will be performed to determine usefulness of the product to the GSICS data user community. If these conditions are met, then the product can be moved by the GPAT into Pre-operational Phase (PP). If the conditions are not met, the GPAT can ask for the material to be revised by the product provider. The time between DP and PP of a given product is set to be less than 365 days. If the product provider does not address requests from the GPAT for revision or recommendations regarding the product or its documentation before the end of the 365 day period, the product may be removed from DP, and the product provider may have to resubmit the GPAF. Likewise, if the GPAT does not provide feedback to the product provider regarding their full suite of data and documents, the product will enter PP from DP after the 365 day period. Once in PP, the product can be released to data users, but still must have a clear disclaimer that the product has not been fully accepted within GSICS.

In order for a product to be promoted to Operational Phase (OP), the product provider must produce a product User's Guide, and develop product distribution, version control and archive strategies that are compatible with GSICS. Once the GPAT acknowledges that these items have been satisfactorily completed by the product provider, then the GPAT makes a recommendation (in a brief one or two page report) to the GSICS Executive Panel to promote the product to OP. It is fully the discretion of the Executive Panel, with recommendation from the GPAT, to determine if a product is to be placed into OP. The GSICS Executive Panel vote on the product yields an acceptance, or revision recommendations, of the product application. The GSICS Executive Panel communicates this to the product provider through the GCC Director. The time between PP and OP of a given product is set to be less than 180 days. If the product provider does not address revision requests from the GPAT or the GSICS Executive Panel regarding the product or its documentation before the end of the 180 day period, the product may be removed from PP and product provider might have to resubmit the GPAF. Likewise, if the GPAT or Executive Panel does not provide feedback to the product provider regarding their data and documents, the product will remain in PP until feedback from the Executive Panel can be acquired. Once in OP, the product disclaimer can be removed.

If a GPAF is completely rejected at any point in the process, the provider of the distribution-ready product may appeal the decision, but only after enough evidence is produced to show that the decision to reject is unwarranted or unreasonable. The product provider also has the opportunity to reapply, if a given GPAF is rejected.

Note that once a GSICS product enters OP, regular maintenance and updates of the product and its documentation need to be clearly communicated with the GPAF. A product provider can lose approval of their product if their product documentation becomes outdated compared to their distributed data, or if product dissemination rules outlined by GSICS are not clearly followed.

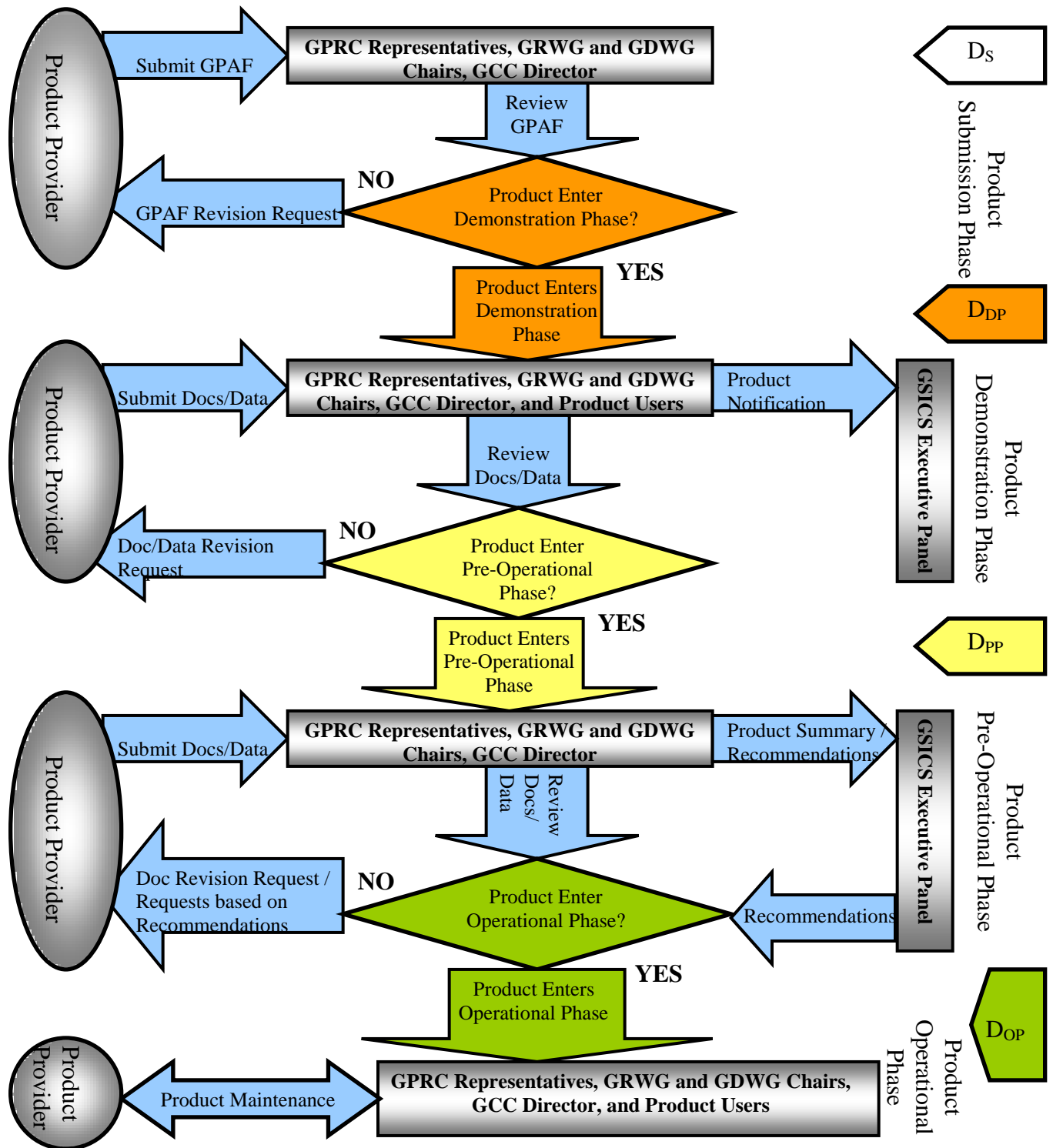


Figure 1: From top to bottom, the GSICS Procedure for Product Acceptance is described by four phases - Product Submission Phase, Demonstration Phase (DP), Pre-operational Phase (PP), and Operational Phase (OP) – and their review and revision cycles. The time markers at the far right, and their defined limits, are: date of submission (D_S); and the number of days from D_S to fulfill requirements to enter DP ($D_{DP} \leq D_S + 90 \text{ days}$), PP ($D_{PP} \leq D_{DP} + 365 \text{ days}$), and OP ($D_{OP} \leq D_{PP} + 180 \text{ days}$).

Appendix 1. GSICS Product Application Form (GPAF) supporting documentation and materials

This appendix outlines the GPAF supporting documentation and materials, which are based on the three identifiable phases of product development

- 1) Establishing algorithm physical basis;
- 2) Implementing technique(s) to generate product; and
- 3) Product operations/distribution.

To ensure long-term understanding of the product, documenting the processes and uncertainties related to each stage of product development is necessary. This information, given by the provider of the distribution-ready product, could be encompassed by one document, or several volumes, but each GPAF must be accompanied by the following supporting documentation and materials related to the three product development phases. Note, that it is the role of the GPRC Representatives, GRWG and GDWG Chairs, and GCC Director to ensure that product providers have access to the GSICS policies and guidelines governing preparation of products for distribution, and creating supporting documentation and materials.

A1.1) Establishing Algorithm Physical Basis

A1.1.1) *Algorithm Theoretical Basis Documentation* – Discussion of physical principles supporting the product. This could be in the form of references to journal article(s), or stand-alone technical information. Includes an algorithm flowchart, including data I/O and logic, and software module descriptions.

A1.1.2) *Measurement Traceability to International Standards Statement* - Describes the traceability chain to international measurement standard. If the measurement is not traceable to international standards, it clearly needs to be stated.

A1.2) Implementing Technique(s) to Generate Product

A1.2.1) *Procedure "Best Practices"* – Procedures that meet current "best practices" in regards to establishing analysis software, harnessing radiative transfer models, and making calibration/validation measurements (TBD) that are fundamental to implementing theory to create products.

A1.2.1.1) Establishing Analysis Software

A1.2.1.1.1) Software that meets GSICS coding, I/O, filename, and documentation standards (TBD).

A1.2.1.1.2) Software verification results

A1.2.1.2) Harnessing Radiative Transfer Models

A1.2.1.2.1) Detailed model description

A1.2.1.2.2) User's Guide

A1.2.1.2.3) Description of data or input atmospheric soundings and boundary conditions used by the model

A1.2.1.2.3) Model verification results – Could be references to other test studies.

A1.2.1.3) *Making Measurements to Support Cal/Val* - e.g., measurements made to characterize a calibration target, such as monitoring platinum resistance thermometer temperatures of an external blackbody in thermal vacuum or making sea surface temperature measurements for SST validation.

A1.2.1.3.1) Measurement Procedure Outline – Gives a description of the instruments involved, as well as information needed to know how the measurement(s) was taken and under what conditions.

A1.2.2) *Data Quality Assessment Documentation* - Quantifies, as much as possible, the one-sigma uncertainties related to each product error source, as well as the product root-sum-square uncertainty. This document also gives results of product validation studies, and a clear description of the quality indicator to be assigned to the product.

A1.2.3) *Version Control Plan* - Describes process of performing software/model/measurement updates and archive.

A1.3) Product Operations/Distribution

A1.3.1) *Operations/Distributions Plan* - Outlines how the data or results are to be stored and shared through GSICS network computers. Statements about the level of access need to be included here.

A1.3.2) *Data User's Guide* – Documents detailed data format, quality flag and parameter descriptions. It must identify how data format meets GSICS standards, and the limitations of product use.