GSICS Procedure for Product Acceptance (GPPA)

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GSICS Procedure for Product Acceptance (GPPA) is the …

- GSICS product developers pathway to obtain a "Stamp of Approval" for a potential product
- GSICS data users window to GSICS product quality and "fitness for purpose"
- GSICS governing body reference for judging GSICS product fitness

Fundamental Capabilities of GPPA

For a potential GSICS product, the GPPA defines and documents:

- Scope of product within the GSICS product portfolio
- Theoretical basis, and implementation and distribution strategy, of product
- Product Quality (uncertainty, quality indicators, etc)

GPPA Leads to Three Product Distribution Modes:

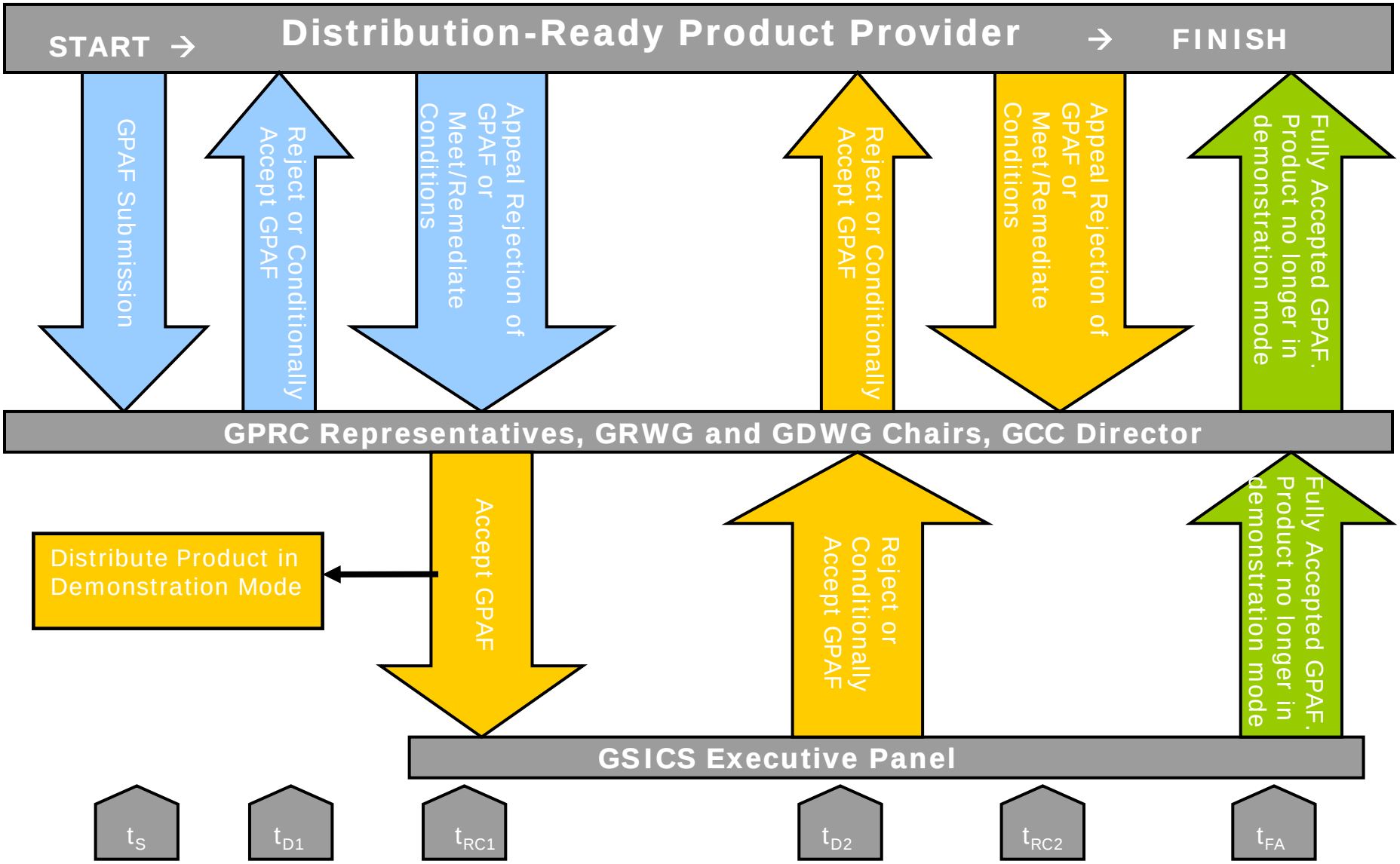
1) **Rejection Mode** - Not distributed as a GSICS product

2) **Demonstration Mode** - Favorable potential GSICS product implemented on an experimental basis without Executive Panel approval

3) **Full Acceptance Mode** - Final product acceptance given by the GSICS Executive Panel

Global Space-based Inter-Calibration System (GSICS)

GPPA Flowchart



GPPA Elements

- Mature GSICS Product
- GSICS Product Acceptance Form
- Supporting Documentation
  - Product physical basis documents
  - Product implementation documents
  - Product operations/distribution documents

GSICS Product Application Form (GPAF)

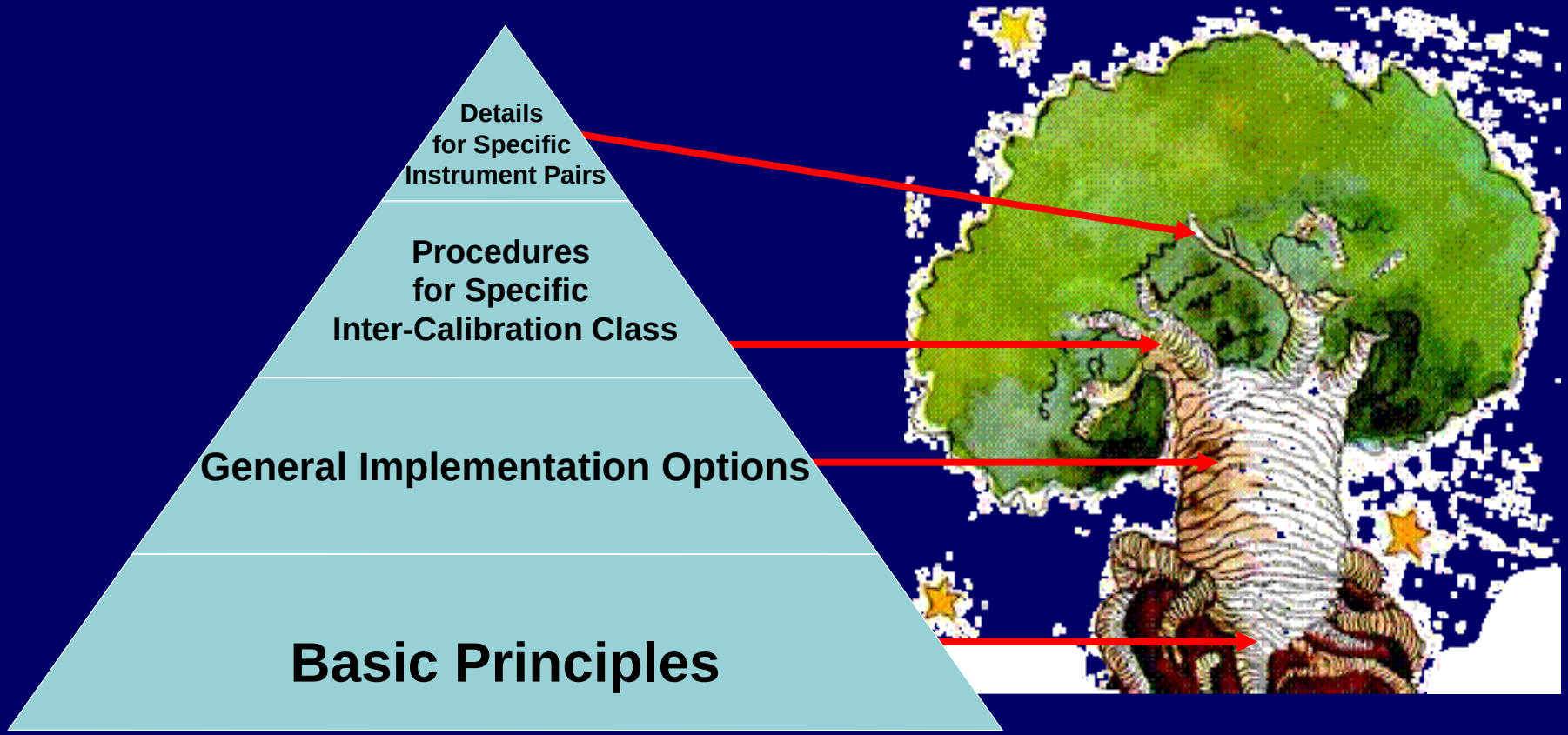
The GPAF includes:

- Information about the provider and nature of the distribution-ready product
  - Organization
  - Point of Contact
  - Name of Product
  - Description of Product
  - Purpose and Scope of Product within the GSICS Framework
- A checklist of required supporting documentation and materials

GPPA Supporting Documents: Hierarchical ATBD

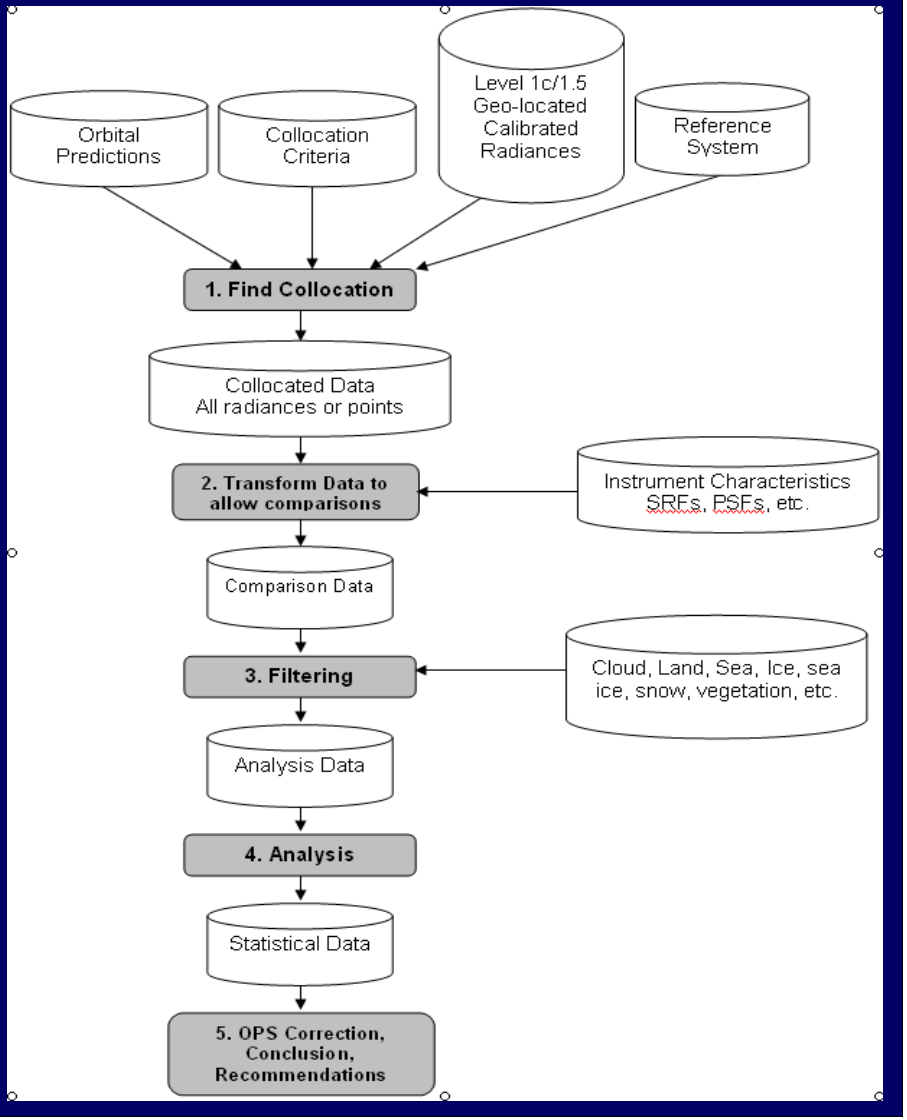
- **Establishing Product Physical Basis**
  - *Product Theoretical Basis Documentation* – Discussion of physical principles supporting the product. This could be in the form of references to journal article(s), or stand alone technical information.

GPPA Supporting Documents: Hierarchical ATBD



GPPA Supporting Documents: Hierarchical ATBD

- Hierarchy of GSICS inter-calibration algorithm: from basic theoretical principles to specific recommendations for each instrument pair.
- At each step in the data flow:
- Identify each process in this step
  For each process:
  - i. Describe the basic principles of each process in this generic data flow.
  - ii. Provide different options for how these may be implemented in general.
  - iii. Identify specific recommended procedures for GEO-LEO inter-calibrations.
  - iv. Provide specific details for each instrument pair (e.g. GOES-AIRS).
- Details such as threshold values are defined in part iii).
- May be further refined by the GSICS partners investigating specific instrument pairs in part iv).
- Version numbers issued for each process



GPPA Supporting Documents: Hierarchical ATBD

- Hierarchical
  - Can build all inter-calibration on common principles and minimise differences between instrument pairs for maximum consistency
- Modular
  - Different GSICS partners can work on different instrument pairs
- Provides traceability
  - Include version number for each process, option, dataset
  - Integration after review cycle
- Simplifies documentation
  - Based on common principle, with specific details for each instrument pair

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GPPA Supporting Documents: Hierarchical ATBD

- **Documentation linked to table**
  - Basically, a table of hyperlinks to paragraphs describing each component of the ATBD
- **Incorporates Version Control**
  - Cells show version numbers of algorithms and hyperlink to their documentation.
  - Colour coding indicates the status of documentation review and approval
  - Old versions of each algorithm to be maintained
  - Must be obvious from the version number and colour coding that they are not the current version.
- **Tag GSICS datasets & products with pedigree**
  - Indicating version number of all algorithms.
  - Ensures reproducibility of the results.

Step #	Process id	Process description	i) Basic Principles	ii) General Options	GEO-LEO iii) GEO-LEO Specific	GEO-LEO iv) GOES-AIRS specific	GEO-LEO iv) SEVIRI-IASI specific	LEO-LEO by SNO iii) LEO-LEO SNO	LEO-LEO by SNO iv) AIRS-IASI	LEO-LEO Same Sat. iii) LEO-LEO Same	LEO-LEO Same Sat. iv) HIRS-IASI	GEO-GEO iii) GEO-GEO	GEO-GEO iv) GOES-SEVIRI
1	1a 1b	Select Orbit Collocate Pixels											
2	2a 2b 2c 2d	Calculate Radiances Spectral Matching Spatial Matching Temporal Matching	v0.1 v0.1 v0.1	v0.1	v0.1	v0.1							
3	3a 3b 3c	Uniformity Test Outlier Rejection Auxiliary Datasets	v0.1										
4	4a 4b 4c 4d 4e 4f	Regression Define reference radiances Calculate biases Test non-linearity Recalculate calibration coefficients Report Results	v0.1 v0.1 v0.1 v0.1 v0.1 v0.1	v0.1 v0.1 v0.1 v0.1 v0.1 v0.1	v0.1 v0.1 v0.1								
5	5a	Operational Corrections											

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

- *Establishing Analysis Software*
  - Algorithm flowchart, including data I/O and logic, and software module descriptions
  - Software that meets GSICS coding, I/O, filename, and documentation standards
  - Software verification results

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

Example: *GSICS data policy as outlined on the GSICS Wiki*

TWiki > GSICS Web > WebHome (20 May 2009, AleksandarJelenak) Edit Attach

Welcome to the GSICS Wiki

This wiki contains information pertaining to the Global Space-based Inter-Calibration System (GSICS). GSICS is a W.M.O.-sponsored international collaboration to examine and harmonize the data from operational weather satellites and their processing in order to improve weather forecasting and climate monitoring.

Available Information

- GSICS user registration procedure for this wiki and the NOAA/NESDIS/STAR Collaboration Server
- Useful links
- Examples of including mathematical equations in this wiki
- **[DRAFT]** GSICS netCDF convention
- GSICS netCDF file naming convention
- Standard names for GSICS netCDF Variables
- GrwgMeetings
- GdwgMeetings
- WebMeetings

Edit | Attach | Print version | History: r28 < r27 < r26 < r25 < r24 | Backlinks | Raw View | Raw edit | More topic actions

- File format for data storage and exchange: **netCDF**
- File naming convention: **Follows the rules given in the *General File Naming Conventions* section of the *W.M.O. Manual on The Global Telecommunication System* (July 2007 edition; pages A.II-15/31 through A.II-15/36).**
- Convention for assigning netCDF standard_name attribute: **Adopted from the Climate and Forecast (CF) metadata convention** which maintains a list of official names. Any new names proposed by GSICS will follow the CF guidelines.

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

- *Harnessing Radiative Transfer Models*
  - Detailed model description
  - User's Guide
  - Description of data or input atmospheric soundings and boundary conditions used by the model
  - Model verification results – Could be references to other test studies.

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

- Making Cal/Val Measurements
  - 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. Also, describes the traceability of the measurement to international measurement standards.

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

Best Practice Guidelines for Pre-Launch Characterization and Calibration of Instruments for Optical Remote Sensing

- Recommendations
  - Plan and carry out instrument pre-launch characterization and calibration in conjunction with their design and development to meet the mission requirements
  - Onboard calibrators such as blackbodies and the sensors such as spectral radiometers should be characterized and calibrated using SI traceable standards
- Guidelines based on two decades of experience gained during NIST, NASA and NOAA programs
- Describes radiometric standards and calibration facilities at NIST available to serve the remote sensing community
- Includes examples of best practice calibrations and inter-comparisons to build SI traceable uncertainty budget in the instrumentation used for preflight satellite sensor calibration and validation

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

GOES-R Cal / Val Plan

EXECUTIVE SUMMARY

1. INTRODUCTION

2. INSTRUMENT PRE-LAUNCH CHARACTERIZATION AND CALIBRATION

3. GROUND PROCESSING SYSTEM AND OPERATIONAL CALIBRATION

4. POST-LAUNCH ACTIVATION AND CHECKOUT

5. ON-ORBIT VERIFICATION (OV)
5.1. Radiometric performance evaluation
5.2. Spectral calibration
5.3. Spatial calibration
5.4. Calibration using celestial targets
5.5. Radiance inter-comparison of GOES-R and other GEOSS space-borne sensors
5.6. Vicarious calibration at reference sites
5.7. Comparison between observed and CRTM-simulated GOES-R radiances
5.8. GOES-R OV using airborne radiometer under-flights

6. LONGTERM INSTRUMENT PERFORMANCE MONITORING

7. ANOMALY RESOLUTION

GPPA Supporting Documents: Implementation of Best Practice Techniques to Generate Product

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

Example used within GSICS:

- Submit software for archive control using “Subversion” software
- Document and tag software comments in a manner recognized by “Doxygen”
- Generate software documentation using “Doxygen”

GPPA Supporting Documents: Product Operations/ Distribution

- **Product Operations / Distribution**
  - *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.
  - *Data Quality Assessment Documentation* - Documents the estimated value and sources of uncertainty in the product as traced to a reference standard (preferable SI).
  - *Data User's Guide* – Documents detail data format and quality flag and parameter descriptions. It must identify how data format meets GSICS standards, and the limitations of product use.

GPPA Supporting Documents: Product Operations/ Distribution

Collaborative GSICS Data Management Server documents cover

- Server Requirements and Design
- Operational Service Specification
- User Guide
- THREDDS Installation

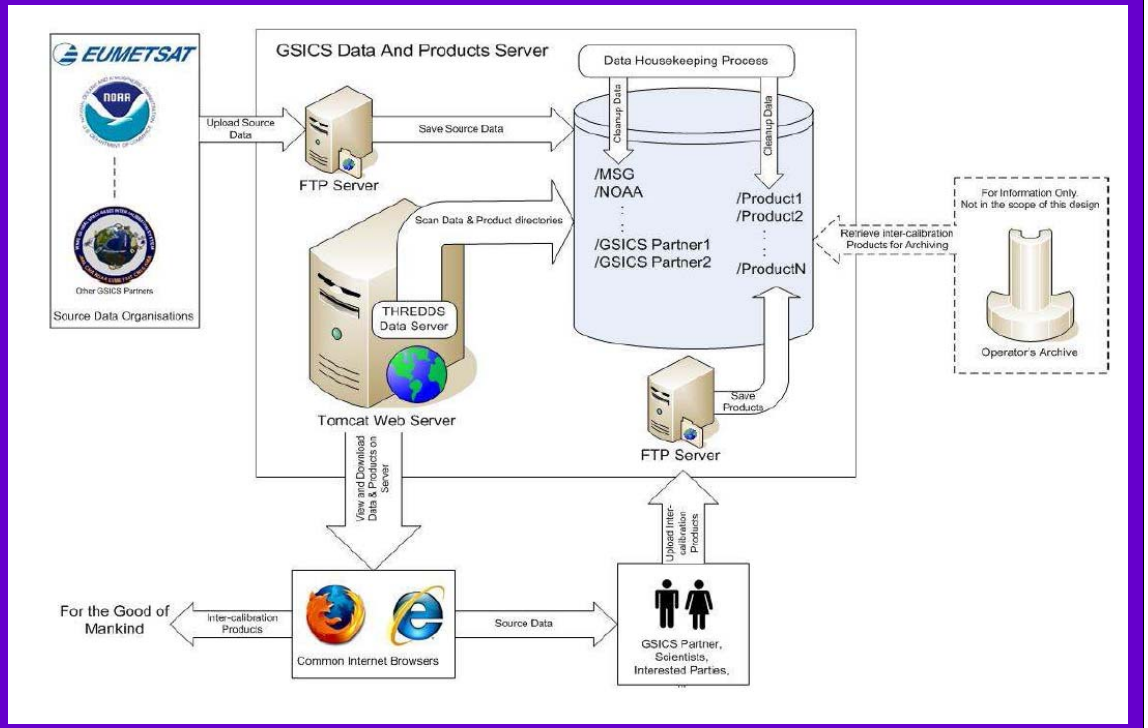

Illustration courtesy of Peter Miu, EUMETSAT

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Matrix mapping GPPA to QA4EO Key Guidelines

GPPA Component ↓ QA4EO →	OG	DQK-001	DQK-002	DQK-003	DQK-004	DQK-005	DQK-006	DQK-007	DPK-001	DPK-002	CEK-001
Overview Document	X	X	X					X			
Algorithm Theoretical Basis Docs		X	X			X					
Implementation Best Practice Docs Software		X	X			X					
Implementation Best Practice Docs Models		X	X			X					
Implementation Best Practice Docs Measurements		X	X	X	X						
Implementation Best Practice Docs Version Control Plan		X	X								X
Product Operations/Distribution Docs Operations/Distribution		X	X						X	X	
Product Operations/Distribution Docs Data Quality		X	X	X	X		X				
Product Operations/Distribution Docs User Guide		X	X						X	X	

Summary

GSICS is in the process of establishing product acceptance procedures based on the QA4EO.

Primary developments of this product acceptance procedure:

- Creation of high-level quality management system
- Collaborative algorithm development leading to inter-satellite instrument comparisons
- Collaborative Algorithm Theoretical Basis Document (ATBD)
- Adoption of file format, file naming, parameter naming conventions
- Development of international network of collaborative servers
- Formation of cal/val plans and pre-launch test best practice guidelines
- International communication and education through meetings and quarterly newsletter