Satellite Products and Services Review Board

**Manual**

**Standards and Guidelines**

***Compiled by the***

**SPSRB Common Standards Working Group**



**Version 1.0**

**September, 2012**

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**DOCUMENT HISTORY**

**DOCUMENT REVISION LOG**

The Document Revision Log identifies the series of revisions to this document since the baseline release. Please refer to the above page for version number information.

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**LIST OF CHANGES**

Significant alterations made to this document are annotated in the List of Changes table.

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# INTRODUCTION

The objective of this document is to provide standards and guidelines for the External and Internal Manuals, Algorithm Theoretical Basis Document and the System Maintenance Manual that are intended for operational use through the Satellite Products and Services Review Board (SPSRB) process.

Guidelines for these documents were developed several years ago. These guidelines, called version 1, will remain in effect for all systems that are currently operational.

The Common Standards Working Group (CSWG) after reviewing the guidelines and templates discovered overlapping information which could lead to confusion to the documentation writers. This document combines the standards and guidelines of all the SPSRB documents into a single document. This document supports the updated, called version 2, set of SPSRB documents and will be in effect for all systems that have become operational in 2011 or later.

The SPSRB Version 2 includes this set of documents, and will be referred to as SPSRB documents in these guidelines:

* External Users Manual
* Internal Users Manual
* System Maintenance Manual
* Algorithm Theoretical Basis Document

# PURPOSE AND USERS

* External Users Manual (EUM)

Purpose: The purpose of the EUM is to provide product users and product testers with information that will enable them to acquire the product, understand its features, and use the data.

Users: The intended users of the EUM are end users of the products and product verification and validation (V&V) teams.

* Internal Users Manual (IUM)

Purpose: The purpose of the IUM is to provide information on the product processing system (PPS) and its analysis tools that is necessary to ensure the effective and reliable analysis of the system’s data products.

Users: The intended users of the IUM are internal users (i.e. SAB analysts) of a system such as an interactive tool/GUI for analysis of the system’s output data products.

* System Maintenance Manual (SMM)

Purpose: The purpose of the SMM is to provide the information necessary to understand the software programs, the operating environment and the associated maintenance procedures. To achieve this purpose, the SMM shall describe all input, intermediate, and output datasets, including details on data format/type, production, frequency, range of values and special error values.

Users: The intended users of the SMM are maintenance programmers and Product Area Leads (PALs) who will be accepting a product processing system (PPS) from developers and maintaining the PPS throughout the operational lifecycle.

* Algorithm Theoretical Basis Document (ATBD)

Purpose: The purpose of the ATBD is to provide a theoretical description (scientific and mathematical) of the algorithm that is used to create a product that meets user requirements.

Users: The intended users of the ATBD are end users of the products, Product Area Leads (PALs), and product verification and validation (V&V) teams.

The guidelines do not anymore emphasize that the SPSRB documents be assembled from components. However, to keep continuity the document object (DO) numbers have been included in the templates for the documents in each section. There are 99 distinct DOs and although ideally this approach would have allowed a document to be written in parallel by more than one author, in practice this approach was found to be difficult to implement. Since the revised documents have very little overlap, following the document templates and applying the standards and guidelines will ensure consistency.

# DOCUMENT WRITERS

The templates include the recommended writers for the sections or subsections. The writers for the documents are selected from the following list of stakeholders:

* Development Lead
* Algorithm Scientist
* Development Programmer
* Development Tester
* Product Area Lead
* Integration Programmer

## Development Lead

The Development Lead is the person who leads the project during the Development stage of the Product Processing System (PPS) lifecycle. Commonly referred to as a “project lead” or “IPT lead”, the Development Lead may be a scientist with a research organization (e.g., a Cooperative Institute), but is usually a STAR scientist.

## Algorithm Scientist

An Algorithm Scientist is responsible for the development and science maintenance of the algorithm (e.g., the theoretical basis and ATBD) that is used by the PPS to produce the end products from the defined inputs. Also referred to as a “Development Scientist”, the Algorithm Scientist may be a scientist with a research organization (e.g., a Cooperative Institute), but is usually a STAR scientist who may also be the Development Lead.

## Development Programmer

A Development Programmer participates in the design, writing, and maintenance of the pre-operational code that is used in the PPS to implement the algorithm. Development Programmers may be STAR personnel, but are usually contractors.

## Development Tester

A Development Tester plans and performs verification and validation of the pre-operational system and its products. Testing involves a combination of science and programming skills. Though large projects may have distinct test personnel, it is common for testing to be performed by Algorithm Scientists and Development Programmers.

## Product Area Lead

The Product Area Lead (PAL) is the person who leads the project during the Operations and Maintenance (O&M) stage of the PPS lifecycle. The PAL is usually an OSPO scientist.

## Integration Programmer

An Integration Programmer performs installation and acceptance testing of the pre-operational code in the OSPO Test Environment, and subsequently transitions the code to the ESPC Operations Environment.

# SECTION GUIDELINES

The traditional manner of document creation has been found most suitable for scientific documents. The implementation of DOs requires a document-writing tool that will automatically insert DOs into the appropriate location of a document. A tool that is at par with traditional document writing software is not available at this time. Projects may choose to write their documents in a traditional manner until this tool has been acquired and validated which they may choose then to write DOs in accordance with the new SPSRB Document Object Guidelines included as Appendix A in this guidelines document.

The document templates state both the guidelines for section content and the appropriate DOs which may be used in the future. Projects that choose to write their documents in a traditional manner should ignore the references to Document Object. Projects that choose to write DOs can refer to Appendix A for guidelines on DO Content and Writers.

# TABLES AND FIGURES

Section content may include tables and figures.

Each table should include a Table Title, using the following format:

Table X – Table Title

Each figure should include a Figure Caption, using the following format:

Figure X – Figure Caption

The first figure for a given main section (e.g. Section 3) should be numbered Figure 3-1, etc.

The first table for a given main section (e.g. Section 4) should be numbered Table 4-1, etc.

If the SPSRB documents are constructed by the insertion of Document Objects (DOs, c.f. Section 1), the tables and figures will have to re-numbered. Because DOs will be inserted into different documents in different places, a DO writer cannot know how to number a table or figure for the EUM. Tables and figures will therefore be numbered in numerical order, i.e. the first table will be Table 1, the second table will be Table 2, etc. and the same for figures. After DOs are inserted into documents, they must be re-numbered to fit their locations in the document (Figure 3-1, Table 4-1, etc.).

# REFERENCES

Jensen, K. A. and McNamara, D., 2010a, External Users Manual Template, <http://projects.osd.noaa.gov/spsrb/standards_data_mtg.htm>

Jensen, K. A. and McNamara, D., 2010a, Internal Users Manual Template, <http://projects.osd.noaa.gov/spsrb/standards_data_mtg.htm>

Jensen, K. A. and McNamara, D., 2010a, System Maintenance Manual Template, <http://projects.osd.noaa.gov/spsrb/standards_data_mtg.htm>

Jensen, K. A. and McNamara, D., 2010a, Algorithm Theoretical Basis Document Template, <http://projects.osd.noaa.gov/spsrb/standards_data_mtg.htm>

Jensen, K. A. and McNamara, D., 2010b, SPSRB Document Object Guidelines, <http://projects.osd.noaa.gov/spsrb/standards_data_mtg.htm>

# 

# DOCUMENT OBJECT GUIDELINES

Guidelines for each of the 98 version 2 DOs follow, separated into sub-sections that apply for each type of document writer (c.f. Section 2 of the main document). Note that some DOs require collaboration between different document writers. Guidelines for these DOs appear in each relevant sub-section.

# Development Leads

Development Leads should contribute to the following DOs:

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 1** (Product Requirements)

**Contents:** State the requirements for each product, either explicitly or by reference to the project's requirements document, if available. Product requirements should include content, format, latency, quality.

**Writers:** Development Lead.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 2** (Product Team)

**Contents:** State the product team members (development, help desk and operations), roles, and contact information. Generic contacts - PAL, Development Lead, help desk.

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 3** (Product Development History)

**Contents:** State the major product development steps and milestones, with links to relevant project artifacts.

**Writers:** Development Lead.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 28** (Satellite Instrument Description)

**Contents:** Describe the attributes of the sensing system(s) used to supply data for the retrieval algorithm at a level of detail sufficient for reviewers to verify that the instrument is capable of supplying input data of sufficient quality.

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 29** (Satellite Instrument Overview)

**Contents:** High-level description of the satellite and instrument that provides the input data, including spectral (range, channels/bands), spatial (scan pattern, footprint), and other features (e.g., instrument noise).

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 30** (Satellite Data Preprocessing Overview)

**Contents:** High-level description of the steps performed to produce input sensor data (e.g., L1, SDR).

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 35** (Product Overview)

**Contents:** State what the system produces. This should be a list of end products that are to be distributed to users.

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 66** (Science Maintenance)

**Contents:** Describe how and how often to monitor performance to determine whether science maintenance is needed to improve quality and/or recover degraded performance.

**Writers:** Development Lead

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 96** (Granule/collection level metadata)

**Contents:** Note the contents of any collection level and granule level metadata provided to the archives per the Submission Agreement (SA) by the algorithm. This information should adhere to the NESDIS Data Center's best practice for metadata, specifically the ISO 19115-2 standards for Geographic information. Metadata content is worked in coordination with SA and the Data Center representative. Refer to the SA and coordinating guidance from the SPSRB.

**Writers:** Development Lead and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 97** (Executive Summary)

**Contents:** High-level summary for senior management. This consists of 9 DOs, in the following recommended order:

* DO 35
* DO 86
* DO 1
* DO 2
* DO 5
* DO 7
* DO 8
* DO 27
* DO 36

**Writers:** Development Lead and PAL should collaborate on assembling the nine DOs in the recommended order and creating DO 97 for insertion in the SMM Executive Summary.

-------------------------------------------------------------------------------------------------------------------------

# Algorithm Scientists

Algorithm Scientists should contribute to the following DOs:

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 13** (Processing Outline)

**Contents:** Full description of the processing outline of the retrieval algorithm. All key elements and sub-elements needed to convey a comprehensive sense of the algorithm should be included. The level of detail should be consistent with the current maturity of the software architecture (which will improve with each revision). A data flow diagram consistent with the software architecture is preferred.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 14** (Algorithm Input)

**Contents:** Full description of the attributes of all input data used by the algorithm, including primary sensor data, ancillary data, forward models (e.g. radiative transfer models, optical models, or other model that relates sensor observables to geophysical phenomena) and look-up tables. Do not include file formats; these will be documented elsewhere.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 15** (Physical Description)

**Contents:** Comprehensively describe the sensor physics and the associated geophysical phenomenology key to the product retrieval.

**Writers:** Algorithm Scientists.

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**Document Object: 16** (Mathematical Description)

**Contents:** Comprehensively describe the mathematics used by the algorithm, including all assumptions, simplifications, approximations.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 17** (Algorithm Output)

**Contents:** Describe the output data products - not format - at a level of detail to determine if the product meets user requirements.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 18** (Sensor Effects)

**Contents:** Characterize sensor effects that may contribute to retrieval error. Include the following effects if relevant:

o Flowed-through effects of sensor noise (radiometric, thermal, or other) on the quality of products, using text and graphics (scatter plots, image displays, etc.).

o Flowed-through effects of calibration errors (radiometric, including structured scenes and response versus scan, or any sensor biases) on the quality of products, using text and graphics.

o Flowed-through spatial and spectral error effects (pointing and geolocation errors, apodization, modulation transfer function (MTF), point-spread function (PSF), out-of-band (OOB) response, near-field stray light, Earth shine, solar contamination, polarization, cross talk, etc.) on the quality of products, using text and graphics.

o Flowed-through effects of un-modeled or neglected geophysical phenomena on the quality of products, using text and graphics.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 19** (Error Budget)

**Contents:** Organize the various error estimates into an error budget, presented as a table. Error budget limitations should be explained. Describe prospects for overcoming error budget limitations with future maturation of the algorithm, test data, and error analysis methodology.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 20** (Algorithm Performance Assumptions)

**Contents:** Describe all assumptions that have been made concerning the algorithm performance estimates. Note any limitations that apply to the algorithms (e.g., conditions where retrievals cannot be made or where performance may be significantly degraded. To the extent possible, the potential for degraded performance should be explored, along with mitigating strategies.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 23** (Quality Assessment and Diagnostics)

**Contents:** Describe how the quality of the output products and the retrieval itself is assessed, documented, and any anomalies diagnosed.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 25** (Potential Improvements)

**Contents:** Describe potential future enhancements to the algorithm, the limitations they will mitigate, and provide all possible and useful related information and links.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 26** (Validation)

**Contents:** Describe how the algorithm has been or should be validated at a level of detail appropriate for the current algorithm maturity.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 27** (Algorithm Overview)

**Contents:** Provide a high-level description of the algorithm, including a reference to the ATBD, if available.

**Writers:** Algorithm Scientists.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 32** (Ancillary Data Description)

**Contents:** List each input file that contains ancillary data. Describe the ancillary data content of each file, either explicitly or by reference to the developer's design documents. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 33** (Ancillary Data Overview)

**Contents:** List of ancillary data sets needed for processing, with access information. This is a subset of DO 32, without the detailed information.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 34** (Product Description)

**Contents:** Product description with sufficient detail so that the user understands how to use the product files.

**Writers:** Algorithm Scientists.

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**Document Object: 39** (Product Accuracy)

**Contents:** Accuracy of products, as measured by V&V testing, and compared to accuracy requirements. Refer to relevant test reports.

**Writers:** Algorithm Scientists and Development Testers should collaborate

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**Document Object: 41** (Data Flow)

**Contents:** Describe the system flow and program flow. A full data flow description may be in the developer's Software Architecture Document (SWA) and/or ATBD. If so, data flow diagrams may be copied from the SWA or ATBD. Refer to the SWA and ATBD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists and Development Programmers should collaborate.

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**Document Object: 55** (Look Up Tables)

**Contents:** List each input file that contains reference data (e.g. Look Up Tables, parameter files). Describe the content and format of each reference data file. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

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# Development Programmers

Development Programmers should contribute to the following DOs:

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**Document Object: 6** (Software Description)

**Contents:** List all software elements of the system. Provide a description of each element at a level of detail sufficient for design reviewers, system administrators and maintenance personnel to verify the function, capabilities and limitations of each element.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 7** (Software Overview)

**Contents:** Provide a high-level description of the software, including the programming languages

**Writers:** Development Programmers.

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**Document Object: 9** (User’s Interaction)

**Contents:** GUI or tool description and how to use it.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 12** (Internal Tool Limitations)

**Contents:** Any known modes of operation that the internal (e.g. SAB or QA) tool does not support.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 21** (Numerical Computation Considerations)

**Contents:** Describe how the algorithm is numerically implemented, including possible issues with computationally intensive operations (e.g., large matrix inversions, truncation and rounding).

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 22** (Programming and Procedural Considerations)

**Contents:** Describe any important programming and procedural aspects related to implementing the numerical model into operating code.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 24** (Exception Handling)

**Contents:** List the complete set of expected exceptions, and describes how they are identified, trapped, and handled.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 32** (Ancillary Data Description)

**Contents:** List each input file that contains ancillary data. Describe the ancillary data content of each file, either explicitly or by reference to the developer's design documents. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 33** (Ancillary Data Overview)

**Contents:** List of ancillary data sets needed for processing, with access information. This is a subset of DO 32, without the detailed information.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 38** (Quality Control Output)

**Contents:** Describe the quality flags that are included in the output product files.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 40** (Data Preparation)

**Contents:** Any formatting performed on data to allow it to be used by an internal tool or used by a GUI for an internal tool.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 41** (Data Flow)

**Contents:** Describe the system flow and program flow. A full data flow description may be in the developer's Software Architecture Document (SWA) and/or ATBD. If so, data flow diagrams may be copied from the SWA or ATBD. Refer to the SWA and ATBD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists and Development Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 49** (Input Data Set Description)

**Contents:** List each input file that contains satellite data. State the purpose of the file. Include contact information for the supplier of the file. Provide details on data format/type, range of values and special error values at a level of detail that is sufficient for the operator to verify that the required input data files are available for a run. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 50** (Intermediate Data Set Description)

**Contents:** List each file that is created internally during a processing run. State the purpose of the file. Provide details on data format/type, range of values and special error values at a level of detail that is sufficient for the operator or user to verify that the expected intermediate files are created during a run. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 51** (Output Data Set Description)

**Contents:** List each output file that is produced during a processing run. For each output data file, provide details on data format/type, range of values and special error values at a level of detail that is sufficient for the operator or user to verify that the required output data files are produced correctly. Include data volume and file size. Include all information needed to verify that the required output data is created by a run; i.e. to verify that all expected datasets are produced in the expected format. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 52** (Internal Product Tools)

**Contents:** Describe each program and/or application that is supplied to internal users for display and analysis of the product output files, including the purpose and function of the tool and how to operate them.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 53** (External Product Tools)

**Contents:** Provide a description of each program and/or application that is supplied to external users for display and analysis of the product output files, including the purpose and function of the tool and how to operate them. This could also include readers for product files. You many also describe any files that may be supplied to an external user (e.g. BUFR tables, coefficient files, etc).

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 54** (System Control Files)

**Contents:** Describe the process control file

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 55** (Look Up Tables)

**Contents:** List each input file that contains reference data (e.g. Look Up Tables, parameter files). Describe the content and format of each reference data file. This information may be in the developer’s Detailed Design Document (DDD). Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** Algorithm Scientists andDevelopment Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 59** (Storage Requirements - Data)

**Contents:** State the volume required to store data during processing, including all input, intermediate, output, and ancillary data

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 60** (Storage Requirements - Code)

**Contents:** State the volume required to store code and other non-data files (e.g., LUTs).

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 61** (Computer Resource Requirements)

**Contents:** Describe the computer hardware and software resources needed for the operations environment, including - storage capacity, timeliness requirements. Refer to IT Planning slides "IT\_Planning\_Slides\_SPSRB\_Project\_Plan\_V14-2 lpc 9-11-09.ppt" for guidelines.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 62** (Communication Needs)

**Contents:** Describe bandwidth or special communications issues.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 63** (Performance Statistics)

**Contents:** Describe the software and hardware (e.g., image displays) that should be used to produce and display statistics for monitoring product performance. Explain how and how often to perform performance statistics monitoring.

**Writers:** Development Programmers and PAL should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 74** (Directory Description)

**Contents:** Provide the complete directory tree for the application. Include a brief description of the purpose and contents of each directory.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 75** (Installation Items )

**Contents:** List all items that are required for installation, including source files, make files, configuration files, data files, scripts and libraries. The directory location of each listed item should be given.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 76** (Compilation Procedures)

**Contents:** Explain how the software is compiled in test and operations environments.

**Writers:** Development and Integration Programmers

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 77** (Installation Procedures)

**Contents:** Describe the specific steps that are customarily taken to install the application in the operating environment. These steps should be listed in the order in which they are customarily done.

**Writers:** Development Programmers and Integration Programmers should collaborate.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 79** (Processing Controls)

**Contents:** Describe the processing options contained in control files.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 80** (Source Code Description)

**Contents:** Describe each piece of source code including associated subroutines, functions, and parameters. Refer to the developer's design documents, if available. Headers in program files should conform to the SPSRB standards. However, if they follow another format (as in the case of legacy code), please include a sample of the header block.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 82** (Problem Diagnosis and Recovery Procedures)

**Contents:** Explain the meaning of all automatically generated error messages along with verified recovery procedures. State recommended actions for cases when there are no verified recovery procedures. If there are known potential problems that will not generate an automatic error message, these should be noted, along with verified recovery procedures or recommended actions. Procedures to deal with extended system down time should be listed. Known potential problems should be itemized. For each known potential problem, the following should be explained:

1) Error message

2) Diagnosis of the problem

3) Recovery procedure (or recommended actions, if no recovery procedure exists)

**Writers:** Development Programmers and Integration Programmers should collaborate

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 89** (Data Recovery Procedures)

**Contents:** Describe any procedures for recovering data and removing bad data. Include methods regarding switchovers to backup processors (if available) and data recovery. Include flushing bad data from multi-day datasets for example.

**Writers:** Development Programmers and Integration Programmers should collaborate

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 91** (GUI Procedures)

**Contents:** Instructions to use any GUIs designed for internal users including shutdown and restart procedures.

**Writers:** Development Programmers.

-------------------------------------------------------------------------------------------------------------------------

# Development Testers

Development Testers should contribute to the following DOs:

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 31** (Test Data Description)

**Contents:** Description of data sets used for V&V, including unit tests and system test, either explicitly or by reference to the developer's test plans, if available. This will be updated during operations to describe test data for maintenance.

**Writers:** Development Testers

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 39** (Product Accuracy)

**Contents:** Accuracy of products, as measured by V&V testing, and compared to accuracy requirements. Refer to relevant test reports.

**Writers:** Algorithm Scientists and Development Testers should collaborate

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 47** (Test Results)

**Contents:** Description of testing and test results performed during development, either explicitly or by references to test reports. If test reports are not available to external users, provide a summary of the test results in sufficient detail to give external users a good sense of how the test results indicate that the products meet requirements.

**Writers:** Development Testers

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 48** (Unit Test Plans)

**Contents:** Describe all test plans that were produced during development, including links or references to the artifacts.

**Writers:** Development Testers

-------------------------------------------------------------------------------------------------------------------------

# Product Area Leads

Product Area Leads should contribute to the following DOs:

-------------------------------------------------------------------------------------------------------------------------

**Document Object: 2** (Product Team)

**Contents:** State the product team members (development, help desk and operations), roles, and contact information. Generic contacts - PAL, Development Lead, help desk.

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 8** (Interfaces Overview)

**Contents:** List of external interfaces (data suppliers, consumers) to the system for management.

**Writers:** PAL.

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**Document Object: 10** (Procedures for Normal Operations)

**Contents:** Describe the standard procedures for producing the operational products (including those for internal SAB tools)

**Writers:** PAL and Integration Programmers should collaborate

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**Document Object: 11** (Required SAB Training)

**Contents:** Training needs for SAB analysts - references to the COMMIT module, examples using QA tools complete with reportable incidents, bad data examples in QA tools, etc.

**Writers:** PAL, in consultation with SAB team lead

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**Document Object: 28** (Satellite Instrument Description)

**Contents:** Describe the attributes of the sensing system(s) used to supply data for the retrieval algorithm at a level of detail sufficient for reviewers to verify that the instrument is capable of supplying input data of sufficient quality.

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 29** (Satellite Instrument Overview)

**Contents:** High-level description of the satellite and instrument that provides the input data, including spectral (range, channels/bands), spatial (scan pattern, footprint), and other features (e.g., instrument noise).

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 30** (Satellite Data Preprocessing Overview)

**Contents:** High-level description of the steps performed to produce input sensor data (e.g., L1, SDR).

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 35** (Product Overview)

**Contents:** State what the system produces. This should be a list of end products that are to be distributed to users.

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 36** (Archives)

**Contents:** Provide the Information that each user needs to obtain the data products intended for them. This includes the location of the data products, procedures for obtaining them, and an identification of stakeholders who ensure maintenance and access.

**Writers:** PAL

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**Document Object: 37** (Archive Format Description)

**Contents:** List each output file that will be sent to the archive. Provide details on data format/type at a level of detail that is sufficient for the operator to verify that the archive files are produced correctly. This information will be in the Submission Agreement (SA) and may be in the developer’s Detailed Design Document (DDD). Refer to the SA. Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** PALs and Development Programmers should collaborate.

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**Document Object: 46** (Product Access Procedures)

**Contents:** State the procedures that should be followed for obtaining near real time (NRT) and archived product data files. This information may be in the developer’s Operations Concept Document (OCD). Refer to the OCD in the developer’s project artifact repository, if available.

**Writers:** PAL

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**Document Object: 57** (Operations Documentation)

**Contents:** Excerpts and/or references to operations documentation deemed of value to product users (e.g., relevant sections of operations event logs, System Maintenance Manual, and/or the Algorithm Theoretical Basis Document).

**Writers:** PAL

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**Document Object: 58** (Maintenance History)

**Contents:** Excerpts and/or references to maintenance documentation deemed of value to product users (e.g., relevant sections of maintenance reports).

**Writers:** PAL

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**Document Object: 67** (Data Signal Monitoring)

**Contents:** Describe how and how often to monitor the quality of the input data streams.

**Writers:** PAL

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**Document Object: 68** (Job Monitoring)

**Contents:** Describe how and how often to monitor the status of a job.

**Writers:** PAL

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**Document Object: 69** (Product Monitoring)

**Contents:** Describe how and how often to monitor the condition of the products produced. Include image display if appropriate.

**Writers:** PAL

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**Document Object: 70** (Image Display)

**Contents:** Describe how often to monitor the condition of image display software and hardware.

**Writers:** PAL

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**Document Object: 85** (Distribution Restrictions)

**Contents:** Describe any special restrictions regarding the distribution or release of data/products or software.

**Writers:** PAL

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**Document Object: 86** (Product Criticality)

**Contents:** State the maintenance level (24x7, 8x5), return to service times, etc.

**Writers:** PAL

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**Document Object: 87** (Product Retention Requirements)

**Contents:** State the retention requirement for each product (how long we keep the various products on the operations servers or SAN).

**Writers:** PAL

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**Document Object: 88** (Program Backup Procedures)

**Contents:** Describe project specific procedures for backing up programs outside the norm of the data center. These procedures should include information on the frequency of backups.

**Writers:** PAL

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**Document Object: 96** (Granule/collection level metadata)

**Contents:** Note the contents of any collection level and granule level metadata provided to the archives per the Submission Agreement (SA) by the algorithm. This information should adhere to the NESDIS Data Center's best practice for metadata, specifically the ISO 19115-2 standards for Geographic information. Metadata content is worked in coordination with SA and the Data Center representative. Refer to the SA and coordinating guidance from the SPSRB**.**

**Writers:** Development Lead and PAL should collaborate.

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**Document Object: 97** (Executive Summary)

**Contents:** High-level summary for senior management. This consists of 9 DOs, in the following recommended order:

* DO 35
* DO 86
* DO 1
* DO 2
* DO 5
* DO 7
* DO 8
* DO 27
* DO 36

**Writers:** Development Lead and PAL should collaborate on assembling the nine DOs in the recommended order and creating DO 97 for insertion in the SMM Executive Summary.

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**Document Object: 98** (Appendix)

**Contents:** Detailed information for system maintenance as needed. This consists of 7 DOs, in the following recommended order:

* DO 41
* DO 49
* DO 32
* DO 55
* DO 50
* DO 51
* DO 37

**Writers:** PAL should assemble the seven DOs in the recommended order and creating DO 98 for insertion in the SMM Appendix.

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**Document Object: 100** (Input Satellite Data Description)

**Contents:** Provide a high-level description of the input satellite data. Provide information on the various types of input data such as the source, instrument name, format, level of processing (e.g. L1B).

**Writers:** Development Lead and PAL should collaborate.

# Integration Programmers

Integration Programmers should contribute to the following DOs:

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**Document Object: 4** (Hardware Description)

**Contents:** List all hardware elements of the system. Provide a description of each element at a level of detail sufficient for design reviewers, system administrators and maintenance personnel to verify the function, capabilities and limitations of each element.

**Writers:** Integration Programmers

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**Document Object: 5** (Hardware Overview)

**Contents:** Provide a high-level description of the hardware environment

**Writers:** Integration Programmers

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**Document Object: 10** (Procedures for Normal Operations)

**Contents:** Describe the standard procedures for producing the operational products (including those for internal SAB tools)

**Writers:** PAL and Integration Programmers should collaborate

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**Document Object: 37** (Archive Format Description)

**Contents:** List each output file that will be sent to the archive. Provide details on data format/type at a level of detail that is sufficient for the operator to verify that the archive files are produced correctly. This information will be in the Submission Agreement (SA) and may be in the developer’s Detailed Design Document (DDD). Refer to the SA. Refer to the DDD in the developer’s project artifact repository, if available.

**Writers:** PAL and Integration Programmers should collaborate.

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**Document Object: 43** (Error Correction – Warnings and Messages)

**Contents:** List and describe warnings that operators of the tool could encounter. Include criteria for when operators should call maintenance personnel.

**Writers:** Integration Programmers

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**Document Object: 44** (Error Correction - Error Codes)

**Contents:** List and describe error codes that the operators could encounter and procedures for fixing the problems. Include criteria for when operators should call maintenance personnel.

**Writers:** Integration Programmers

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**Document Object: 45** (Menus and Navigation)

**Contents:** Criteria for interactive operation and a description of all interactive menus and steps.

**Writers:** Integration Programmers

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**Document Object: 56** (Operational Scenario)

**Contents:** Frequency of job runs (i.e. orbital basis, daily, hourly). How runs are initiated (e.g. cron job, OPUS). Production rules. Detailed operational sequences.

**Writers:** Integration Programmers

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**Document Object: 64** (Operating System)

**Contents:** Describe the operating system for the operational environment.

**Writers:** Integration Programmers

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**Document Object: 65** (Monitoring)

**Contents:** Describe normal and special maintenance procedures for the operational environment.

**Writers:** Integration Programmers

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**Document Object: 71** (Library Maintenance)

**Contents:** Describe the procedures required to maintain the system software libraries.

**Writers:** Integration Programmers

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**Document Object: 72** (Special Maintenance Procedures)

**Contents:** Describe all non-routine maintenance procedures, including how to decide when to implement them. These may include procedures for new satellite implementation, adding a new job, data recovery and modification of the system hardware and/or software.

**Writers:** Integration Programmers

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**Document Object: 73** (Data Transfer / Communications)

**Contents:** List all file distribution protocols (e.g., ftp) and software packages (e.g., ADDE) that are used for primary and backup transfer of input and output files. Describe product distribution methods (i.e. data distribution server, ftp, webpage).

**Writers:** Integration Programmers

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**Document Object: 76** (Compilation Procedures)

**Contents:** Explain how the software is compiled in test and operations environments.

**Writers:** Integration Programmers

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**Document Object: 77** (Installation Procedures)

**Contents:** Describe the specific steps that are customarily taken to install the application in the operating environment. These steps should be listed in the order in which they are customarily done.

**Writers:** Development Programmers and Integration Programmers should collaborate.

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**Document Object: 78** (Build Procedures)

**Contents:** Describe the specific steps that are customarily taken to build the application executable in the operating environment. These steps should be listed in the order in which they are customarily done.

**Writers:** Integration Programmers

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**Document Object: 81** (Data Preparation)

**Contents:** Describe any steps that may be needed to ensure that the required input data are available to run the system. Explain what has to be done to ensure that there are no read errors.

**Writers:** Integration Programmers

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**Document Object: 82** (Problem Diagnosis and Recovery Procedures)

**Contents:** Explain the meaning of all automatically generated error messages along with verified recovery procedures. State recommended actions for cases when there are no verified recovery procedures. If there are known potential problems that will not generate an automatic error message, these should be noted, along with verified recovery procedures or recommended actions. Procedures to deal with extended system down time should be listed. Known potential problems should be itemized. For each known potential problem, the following should be explained:

1) Error message

2) Diagnosis of the problem

3) Recovery procedure (or recommended actions, if no recovery procedure exists)

**Writers:** Development Programmers and Integration Programmers should collaborate

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**Document Object: 83** (System Reboot Procedures)

**Contents:** Itemize the steps required to reboot the system. This applies in situations where the verified recovery procedure is a system reboot. It is intended for system administrators; operators should be alerted here to contact the system administrator.

**Writers:** Integration Programmers

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**Document Object: 84** (Maintenance Utilities)

**Contents:** Provide a listing and description of any programs that are available to a system analyst or operator for looking at data. The use can be for observational, analytical, or troubleshooting purposes.

**Writers:** Integration Programmers

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**Document Object: 89** (Data Recovery Procedures)

**Contents:** Describe any procedures for recovering data and removing bad data. Include methods regarding switchovers to backup processors (if available) and data recovery. Include flushing bad data from multi-day datasets for example.

**Writers:** Development Programmers and Integration Programmers should collaborate

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**Document Object: 90** (Program Recovery Procedures)

**Contents:** Describe program recovery procedures. These procedures could include methods to switch over to backup processors and job resubmission if this is the responsibility of the operators.

**Writers:** Integration Programmers

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**Document Object: 92** (Application Restart Procedures)

**Contents:** Describe specific procedures needed to restart an application after a failure or a shutdown.

**Writers:** Integration Programmers

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**Document Object: 93** (System Restart Procedures)

**Contents:** Describe specific procedures needed to restart the system after a failure on either the primary or backup system.

**Writers:** Integration Programmers

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**Document Object: 94** (Application Shutdown Procedures)

**Contents:** Describe procedures operators should complete prior to a planned or required application shutdown.

**Writers:** Integration Programmers

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**Document Object: 95** (System Shutdown Procedures)

**Contents:** Describe procedures operators should complete prior to a planned or required system shutdown or reboot

**Writers:** Integration Programmers

**Document Object: 99** (Production Rules)

**Contents:** Describe the production rules and to configure the system to use these rules. Production rules describe what is required to trigger the various processing components of the system. These rules typically define the triggers, such as required input files, and the logic used to select those files (e.g. spatial or temporal criteria). This section should then describe how these production rules are entered into the system.

**Writers:** Development Programmers and Integration programmers

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# Table Titles and Figure Captions

A Document Object (DO) may include tables and figures.

Each table should include a Table Title, using the following format:

Table X – Table Title

Each figure should include a Figure Caption, using the following format:

Figure X – Figure Caption

Because DOs will be inserted into different documents in different places, a DO writer cannot know how to number a table or figure for that document. Tables and figures should therefore be numbered in numerical order, i.e. the first table should be Table 1, the second table should be Table 2, etc. and the same for figures. After DOs are inserted into documents, they will be re-numbered to fit their locations in the document.

**ACKNOWLEDGEMENTS**

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