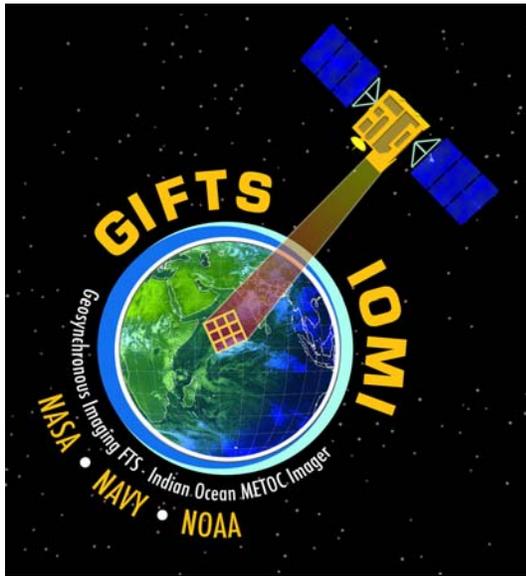


Title: Guide for Preparation and Review of GIFTS-IOMI Documentation	
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Geosynchronous Imaging Fourier Transform Spectrometer - Indian Ocean METOC Imager (GIFTS – IOMI) Mission

Guide for Preparation and Review of GIFTS- IOMI Documentation

October 10, 2003

NOTE: THIS DOCUMENT IS PROVIDED AS A SAMPLE GUIDE FOR PROJECT BASELINE DOCUMENT PREPARATION. IT WAS DEVELOPED AT LANGLEY RESEARCH CENTER FOR THE GIFTS PROJECT. IT IS BASED ON A SPECIFIC PROJECT ORGANIZATION STRUCTURE AND PROCESS AND USE OF THE DOORS REQUIREMENTS MANAGEMENT TOOL. ANY QUESTIONS OR COMMENTS SHOULD BE DIRECTED TO THE LANGLEY SYSTEMS MANAGEMENT OFFICE OR DOCUMENT CURRATOR, WHO MAY BE REACHED VIA EMAIL AT THOMAS.A.SHULL@NASA.GOV

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1 Introduction

1.1 Purpose and Scope

The purpose of this document is to establish a general guideline for authors and reviewers during development and review of GIFTS-IOMI documentation. All official GIFTS-IOMI documents (all documents with a GIFTS-IOMI document number) should conform to the general rules described herein, unless given approval by the Systems Manager (SM).

1.2 Document Control

The approved Guide for Preparation and Review of GIFTS-IOMI Documentation will be placed under configuration control. Any changes will require the SM's approval.

1.3 Definitions, Acronyms, and Abbreviations

The following definitions are included to aid the reader in understanding the acronyms and terminology used in this document.

DOORS	Telelogic DOORS®, the software tool used by the GIFTS-IOMI project to manage project requirements.
EDMS	Electronic Document Management System
GIFTS	Geosynchronous Imaging Fourier Transform Spectrometer
GIFTS-IOMI	GIFTS-IOMI Project
MIM	Mission Information Manager
ICDs	Interface Control Documents
IOMI	Indian Ocean METOC Imager
RID	Review Item Disposition
RMWG	Requirements Management Working Group
SM	Systems Manager
WBS	Work Breakdown Structure

1.4 References

Document Number	Document Title
GIFTS 01-014	GIFTS-IOMI Document List

2 Editorial Rules

2.1 Templates

Requirements documents, Interface Control Documents (ICDs), and Software Requirements Specifications should follow respective templates located on the Electronic Document Management System (EDMS) in the Document Library/Templates folder. All other documents should follow the "Other" template document. These templates establish the document title page, revision history page, signature page, header and footer, heading styles, and document organization. Using a template to generate a document from scratch will assure the author that

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all of the required formatting is in place. For requirement documents, it helps assure readability and completeness.

For authors starting with a previous version of a document, the easiest process may be to modify the content of that document, and then use cut-and-paste and global format changes to establish the required document organization and document format. Be sure to update the title page, revision history page, signature page, and headers and footers appropriately. Contact the MIM with problems or issues.

2.2 Requirement Documents

To assure quality requirements, the GIFTS-IOMI Project uses standard document preparation practices and DOORS as the requirements management tool. The DOORS tool imposes fairly strict formatting requirements to allow efficient importing of external documents and subsequent export for posting or distribution. Although the DOORS has the ability to import MS Word and Excel documents, as well as HTML files, the project has elected to support only MS Word or .doc files. In addition to using templates, standard document format, style, and attribute capture rules have been established. Following these rules helps ensure a clear, verifiable, and achievable set of requirements and effective use of the DOORS tool. For further details on requirements documentation rules, see Appendix A.

3 Document Preparation

3.1 Document Information

The document title, document number, and document scope should be available from the GIFTS-IOMI Document List (01-014). If any of this information is not found on the Document List, contact the SM for help. To prevent document duplication and overlap please DO NOT begin writing the document until all of this information is made available.

3.2 Document Development

There are two phases of document preparation. The first stage is the development stage, which is managed by the author. During this stage of preparation the author is responsible for coordinating inputs with the appropriate individuals and organizations. The author should circulate the document for informal review. The EDMS workspace area is available for posting draft documents for this purpose.

3.3 Informal Document Review

The second phase of document preparation is the informal review process. When the author has created a mature draft document ready for review (mature document content, spell checked, grammatically correct), the author should submit that draft to the MIM. The version number associated with this draft will be 0.x. The MIM reviews the document for editorial and format correctness.

3.3.1 Requirements Documents

Requirements documents are sent, by the MIM, to the Requirements Management Working Group (RMWG) for review of the quality of the requirements. The RMWG is not expected to review the entire document, but a subset of requirements from each section will be reviewed. If the RMWG is satisfied that the requirements are of sufficient quality, the RMWG will work with the author to complete the attributes. During this process, the document will be imported into DOORS. When the attributes are sufficiently populated in DOORS, the document will be exported and submit to the MIM for posting in the Draft Folder. If the requirements document lacks quality requirements, the RMWG will return the document to the author with comments and recommendations for improvement. For further details on requirements document format and attributes, see Appendix A. Once the requirements document has been approved by the RMWG and posted, it is ready to enter the formal document review process. The requirements document formal review process is the same as for other documents, and is detailed in Section 4.

3.3.2 Non Requirements Documents

All other types of documents bypass the RMWG review and DOORS entry process. The MIM verifies that the document has the appropriate format and is grammatically and editorially sound. Then the MIM will post the document to the EDMS Document Library/Draft folder and notifies the SM that document is ready for formal review.

4 Formal Document Review

- a. The author, SM (or designee), and appropriate WBS lead (or designee) establish the review panel, concurrence signatories, and approval authority for the document. The review panel is notified that the document is available for review. The review panel is given 1 week to review the document, and document comments, questions, and discrepancies on GIFTS Review Item Disposition (RID) form (located in the EDMS Document Library/Forms folder). At the conclusion of the review period all RIDs are returned to the author for disposition.
- b. The author numbers and dispositions (accepts, rejects, or accepts with modification) the RIDs, and updates the document accordingly. The author submits the new version of the document and the dispositioned RIDs to the MIM (**RIDs dispositioned as accepted with modifications must indicate the modification**).
- c. The MIM posts the document and RIDs to the EDMS Document Library/Draft folder, and notifies the SM when posting is complete.
- d. The SM notifies the review panel that the new version of document has been posted with the dispositioned RIDs. The review panel is given 1 week to review the new version of the document. Each author of an original RID accepts or rejects the author's disposition of the original RID. Each reviewer may also generate new RIDs to the document. New RIDs and rejected RID dispositions are provided to the SM at the conclusion of the review period.
- e. The SM then schedules a document review meeting for the review panel and author. The document review meeting is for online disposition of all new RIDs, and rejected dispositions of old RIDs. At the conclusion of the document review meeting, the author

updates the document with approved changes from the meeting and submits this version to the MIM for Signature.

- f. The MIM removes all draft document material from the EDMS, posts the new document and all dispositioned RIDs to the EDMS Document Library/Signature folder, and makes requests for electronic signatures from all document signatories.
- g. Upon reception of all electronic signatures, the MIM removes the document and all RIDs from the EDMS, updates the document signature page, changes the version number to 1.0, and reposts the document to the EDMS Document Library/Baseline folder. Should a signatory reject the document a new document review meeting will be held (if deemed necessary by the SM, author, and rejecting signatory) to disposition remaining issues.

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Appendix A: Attribute and Content Rules for Requirements Documents

A.1 Requirement Attributes

Each requirement (“shall” statement) in a requirements document must include the required minimum set of **attributes** in braces ({ }), immediately after the sentence. (**NOTE: Braces ({ }) should not be used anywhere else within the requirements document.**) These attributes are a traceability link to parent requirements (e.g., MR356); the requirement allocation to the next lower level (e.g., CM and SM for the GIFTS Instrument); the verification method(s), i.e. Inspection, Demonstration, Analysis, and/or Test (I, D, A, T); and rationale for the requirement, including assumptions and study/trade results. Verification method may include a comment, e.g., {Demo – at the board level} or {Analysis – of acceptance test results}. Note: Definition of I, D, A, and T can be found in the Mission Integration, Test and Verification Plan. Separate the attributes by a single space only, and always list the attributes in the same order: {traceability link}, {allocation}, {verification method (I, D, A, T)}, {rationale}. The following statement is an example of a requirements statement with the proper attributes format.

The GIFTS Instrument shall perform autonomous scanning of coverage areas selected by ground command. {MR153} {GIFTS} {Test} {Scanning is necessary to achieve coverage. Communication bandwidth cannot support real time scan control. Autonomous scanning is expectation of EO-3/NMP.}

Once the RMWG approves the quality of the requirements in the draft document, the members will strip out the attributes from the document, and create the Attributes Matrix for DOORS input.

A.2 Writing Good Requirements¹

A.2.1 Product vs Project Requirements

A product requirement is something the product must do or a quality that the product must have. A project requirement is the definition of a task to be done or what the provider will deliver.

Requirements documents should only contain product requirements. Project requirements are generally captured in a Statement of Work (SOW) or Project Plan. They may be found in the highest-level system level requirements document.

A.2.2 Requirements Format

-Use correct terms: **Shall** = requirement; **Will** = facts or declaration of purpose; and **Should** = goal.

¹ Reference: “Customer-Centered Products”, Ivy F. Hooks and Kristin A. Farry and Requirements Training.

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-A requirement must state, “The product (or provider) shall (do, perform, provide, have, weigh, or other verb followed by a description of what), in the active, not passive, voice, i.e., must be in “Who” shall “What” form.

- Example Product requirements:

- The system shall operate at a power level of...
- The software shall acquire data from the...
- The XYZ shall have mass of...
- The structure shall withstand loads of...

Example Project requirements:

- The provider shall perform a trade study to...
- The provider shall deliver the following documentation...
- The developer shall use the following tools...

A.2.3 Checklist for “Good” Requirements

The requirement is clear and understandable.

- Is there only one thought per requirement statement? Can it only be understood one way?
- Is it in the form “who shall what”; uses active rather than passive voice?
- Is grammatically correct?
- Is it simply and concisely stated? Break requirements into their simplest form (e.g., 'A and B and C' into 'A', 'B', and 'C').
- Is the terminology consistent?
- Is it positively stated?
- Is it free of ambiguous terms such as: “support”, “etc.”, “but not limited to”?

The requirement is necessary.

- Is it a needed function or characteristic? Distinguish between needs and wants. If it is not necessary it is not a requirement.
- Are the tolerances defensible and cost-effective? Ask, “What is the worst thing that could happen if the tolerance was doubled or tripled?”
- Is it over specified?
- Is it in alignment with scope?

The requirement is verifiable; compliance can be verified.

- Don’t use unverifiable words such as: flexible, easy, sufficient, safe, ad hoc, adequate, accommodate, user-friendly, useable, when required, if required, appropriate, fast, portable, light-weight, small, large, maximize, minimize, sufficient, robust, quickly, easily, clearly, other ”ly” words, other “ize” words.
- Does a means exist to measure its accomplishment?
- Can you state the criteria required for verification?

The requirement is attainable.

- Is it technically feasible?
- Is it feasible within budget and schedule?

The requirement is free from:

- Implementation (Requirements should state WHAT you need, NOT HOW to provide it (i.e. state the problem not the solution). Ask “Why do you need the requirement?” If the answer is already stated in a fundamental requirement, the statement is implementation and not a need/requirement.)
- Operations (Don’t mix operation with requirements, update the Operational Concept instead. To distinguish between operations and requirements ask the question: “Is this a need the product must meet or an activity involving the product?” Sentences like “The operator shall...” are almost always operational statements not requirements.)
- Non-validated assumptions. Assumptions must be confirmed before baselining.
- Negative requirements (i.e. “shall not”)
- Indefinite pronouns (this, these) and indefinite expressions (e.g. and/or, be able to, be capable of)

When compared to other requirements within the document, the requirement is free from:

- Redundancies
- Inconsistencies
- Contradictions

A.3 Format and Style

Rules for a Word (.doc) document for import into DOORS.

Use the Project templates and ensure that there are no breaks in the flow down of heading numbering (i.e., there must be a heading 3 between heading 2 and heading 4) or DOORS will insert one, and renumber. Do not alter the text “styles”. Only the following are preserved in DOORS: Normal, Headings 1-9, and Title.

Use the following **fonts**. They are preserved in DOORS.

- **Bold**
- *Italic*
- Underscore
- ~~Strikethrough~~
- Superscript (x¹)
- Subscript (x₁)
- Symbol character set (σ)

Note: Some specific fonts, e.g. Times, Arial, and Century, are preserved in DOORS for subsequent export to Word, but not used in DOORS. Thus, they will not appear in documents printed from DOORS. Unrecognized styles, e.g., Caption and Cover, are converted to Normal.

Do not skip lines between requirements. Blank lines will be imported as blank requirements. Use “6 point after” spacing for paragraphs (and text styles) instead. This is done in the project

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Template's style. Note: To do this in MS word, a) select Paragraph from the Format menu. Select the 'Indents and Spacing' tab, and click the up arrow in 'Spacing', 'After' to select '6 pt' or b) Format the Style for Normal and Headings to include the 6 pt after spacing.

Use Graphics (figures) in .bmp, .gif, .jpg, and .wmf formats. They will be imported, as will any OLE object. Note: Cropping and sizing are ignored.

Place figure and table labels above the item. While working in Word, recommend using Caption style or "Insert Caption", setting caption numbering to include "Chapter Number" as Header 1. Note: Caption style will be converted to Normal in DOORS.

Use appropriately sized and cropped original figures when possible. Borders, cropping, and sizing/scaling of figures may be used for appearance while developing the Word document, but these will be ignored when imported to DOORS.

When creating tabular data, use Word "Tables", as data will be imported as tables, although the column widths may be altered. Note: Each cell becomes a DOORS "object".

Use Word "Tables" (with or without borders) rather than "tabs" for all document, acronym, etc. lists. Table borders are preserved in DOORS. Bullets and numbering (chosen from the Word "tool bar") will be ignored when imported to DOORS. Note: For single column list, a method like the following may be used (TBR), with or without tabs:

- Item 1
- Item 2

Tabs may be used for emphasis while developing the Word document, but spacing is likely to be different in DOORS from the original document.

Indents, highlights, text colors, hidden text, or "Comments" may be used for while developing the Word document, but these will be ignored when imported to DOORS.

Use table of contents (ToC) or list of figures/tables in the Word document for ease of development. These will be removed prior to DOORS import. When exporting or printing, DOORS creates a new ToC.

When "tracking changes" in Word, accept all changes prior to submitting document for importing into DOORS.

A.4 Nomenclature

Use System International (SI) as primary units.

Spell out characters such as +/-, ≤, and ≥ in English (e.g., greater than, less than, etc.).

Completely spell out all units (e.g., kilograms, not kg; kilometers, not km; and microradians, not μradians).

Use 'radians' for measurement of angles, rather than the abbreviation 'rads'. Note: 'rads' is a measurement of radiation. Both of these terms are common in a space development program, and are not interchangeable.