

 Independent Verification & Validation Program	MOA Template	T2101 Version: B Effective Date: April 20, 2012
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Verify that this is the correct version before use.

APPROVAL SIGNATURES		DATE
Natalie Alvaro (original signature on file)	IMS Manager	04/20/2012

VERSION HISTORY			
Version	Description of Change	Author	Effective Date
Basic	Initial Release	Paige Eckard	09/18/2007
A	Canceled	Jerry Sims	12/03/2010
B	Re-issued	Jarrod Petersavage	04/20/2012

REFERENCE DOCUMENTS	
Document	Title
IVV QM	NASA IV&V Quality Manual
IVV 09-1	Independent Verification and Validation Technical Framework

If any process in this document conflicts with any document in NODIS, this document shall be superseded by the NODIS document. Any reference document external to NODIS shall be monitored by the Process Owner for current versioning.

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Purpose of the Template/Supporting Document Template

This template is designed to provide a standard outline and format for templates and supporting documents. This template is also designed to provide standard sections that are used in all templates/supporting documents, and direction to provide tailoring and section content guidance for those who generate or update templates/supporting documents.

Template/Supporting Document Template Conventions

Three different styles of text are used in this template:

1. [Text included in square brackets]

This text represents document-specific information to be provided. Examples are [document name] for the name of the template/supporting document, and [purpose] for the purpose of the template/supporting document. Where this text appears, insert the document-specific information between the brackets, and then delete the brackets.

2. *{Italic text in braces}*

This text is guiding or explanatory in nature. It will include tailoring guidance and descriptions of the kinds of information to be included in each section. Therefore, this text should be deleted from the template/supporting document.

3. Normal text

This is standard text that should be copied verbatim into the template/supporting document as necessary. It represents any text that does not fit into either of the above categories.

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Template begins on the following page.}

**Memorandum of Agreement Between the
National Aeronautics and Space Administration
Software Independent Verification and Validation Program at GSFC
and the [Organization Name]**

1 Purpose

The purpose of this MOA is first, to communicate Independent Verification and Validation (IV&V) interactions, interfaces, roles and responsibilities, technical products, and reporting methods with the [Project Name]. Second, the MOA serves as the operational document for the IV&V efforts. The MOA is prepared and maintained by the IV&V Project Manager (PM). The IV&V PM coordinates the creation and maintenance of this document with affected individuals and organizations (within the NASA IV&V Program as well as with the [Project Name]).

In signing the document, Project personnel understand that their concurrence signature reflects the agreements identified within the body of the document. Signatures of NASA IV&V personnel reflect their understanding of the entire document.

2 Duration of the MOA

The period of performance for this MOA shall begin [DATE] and be effective through [DATE].

3 IV&V Overview

3.1 IV&V Goals and Objectives

The IV&V Team will conduct independent, goal-based validation and verification analysis to ascertain goodness of product for the Project's system software. Validation-related analysis will allow the IV&V Team to evaluate Project development artifacts to ensure that the right behaviors have been defined in the artifacts. The right behaviors are those that adequately describe what the system is supposed to do, what the system is not supposed to do, and what the system is supposed to do under adverse conditions. The validation-related analysis being performed will strive to ensure that the system software performs to the user's needs under operational conditions. Verification-related analysis will allow the IV&V Team to determine whether the products of each development activity fulfill the requirements or conditions imposed by a previous development activity.

3.2 IV&V Scope/Coverage

The IV&V team may utilize the Portfolio Based Risk Assessment (PBRA) process and other lower-level risk based assessment efforts as the means to prioritize/optimize IV&V resources. The PBRA process assesses the top-level capabilities of the system, to which software contributes, in terms of impact of a

limitation (defect) and likelihood of a limitation. The result of this assessment is an overall rating for each capability that is mapped against a 5X5 risk matrix that is used to prioritize the IV&V efforts within the Project. The IV&V Team will share PBRA results/assessment ratings with the Project and Agency stakeholders. Input/feedback on this data from the Project is encouraged. The IV&V Team will revisit the PBRA results/assessment ratings for the project every six months (or earlier, if warranted) and any changes to this data will be communicated to the Project.

To define where IV&V is being performed on the Project, the IV&V Team will also provide and communicate IV&V coverage data to the Project and Agency stakeholders. The IV&V coverage data will communicate where IV&V is being performed as well as indicators of where the safety and mission critical software is present for the Project.

3.3 IV&V Approach

The IV&V approach will consist of validation- and verification-related analysis. Validation and verification are described further below, including the artifacts generally required for specific analysis objectives. For additional information regarding validation- and verification-related analysis, see [IVV 09-1, Independent Verification and Validation Technical Framework](#).

3.3.1 Validation

Specific analysis that the IV&V team performs includes requirements validation and test design validation. To perform this analysis, the IV&V Team typically needs to acquire the following Project artifacts: operational concept documentation, system and software requirement documents and interface requirements documents (IRDs) at various levels of the requirements hierarchy, interface control documents (ICDs), requirements traceability-related data, safety-related data (hazard analysis, critical items listing, Failure Modes and Effect Analysis [FMEA]/Failure Mode Effects and Criticality Analysis [FMECA] data, etc.), and test plans and test cases at various levels of the testing hierarchy. For the IV&V efforts, the IV&V Team anticipates that the artifacts such as those defined in Table 3-1 are necessary to support validation-related analysis. Typical outputs of validation-related analysis include requirements validation analysis reports, test design validation analysis reports, observations, issues, and risks. *{Please modify the data in this table to reflect the targeted artifacts for your Project/characteristics of your Project.}*

Table 3-1: Project Targeted Validation Artifacts

Artifact Name	Need/Applicable Analysis
Operations Concept Document/Data	System Reference Model (SRM) Development
Early concept/design review documentation/data	SRM Development
Level 1 requirements	SRM Development
Mission Requirements Document	Requirements Validation
Spacecraft Element Requirements Document	Requirements Validation
Software Requirements Document	Requirements Validation
Interface Requirements Documents	Requirements Validation
Traceability Related Data (L2 – L5)	Requirements Validation
Hazard Analyses (PHA, FTAs, etc.)	Requirements Validation

Artifact Name	Need/Applicable Analysis
System Test Plan	Test Design Validation
System Test Cases	Test Design Validation
Build Level Test Plan	Test Design Validation
Build Level Test Cases	Test Design Validation
Integration Test Plans	Test Design Validation
Integration Test Cases	Test Design Validation
Traceability related data (showing traceability from requirements to test cases)	Test Design Validation

3.3.2 Verification

Specific analyses that the IV&V Team performs include architecture, design, and implementation analyses. To perform these analyses, the IV&V Team typically needs to acquire the following Project artifacts: architecture description documentation/data, design documentation and associated models, design review materials, source code, test results (at various levels), and traceability-related data. For IV&V efforts, the IV&V Team anticipates that the artifacts defined in Table 3-2 are necessary to support verification analysis. Typical outputs of verification-related analysis include software architecture analysis reports, software design verification analysis reports, implementation analysis reports, observations, issues, and risks.

{Please modify the data in this table to reflect the targeted artifacts for your Project/characteristics of your Project.}

Table 3-2: Project Targeted Verification Artifacts

Artifact Name	Need/Applicable Analysis
Architecture Description Documentation/Architecture Diagrams/Data	Verify Software Architecture
Software Design Documentation	Verify Software Architecture, Verify Software Design
Software Design Models	Verify Software Design
Source Code	Verify Implementation
Software Build delivery/release packages/Version Description documentation/data	Verify Implementation
Test results (at varying levels including build level, integration level and system level)	Verify requirements implementation
Discrepancy reports from test activities	Verify requirements implementation
Traceability related data (showing traceability from requirements to design – to code to test)	Verify Software Design, Verify Requirements Implementation

3.4 IV&V Metrics Support

The NASA IV&V Program strives to ascertain the value and effectiveness of the IV&V efforts. Some of these efforts require the comparison of software issues (discrepancies) identified by IV&V and software issues identified by the Project, as well as ascertaining post-launch software anomalies. The IV&V PM may request data from the Project in support of these efforts. The Project, subject to the Project's IV&V

Point of Contact (POC) discretion, will attempt to provide access to the data, or the actual data necessary to support these efforts. The IV&V PM will work with the IV&V POC to identify the specific data of interest and availability of that data.

4 Schedules and Milestones

The IV&V activities associated with this MOA are tied to the development schedules of the [Project Name]. The IV&V team will respond to milestone activities within the organization through various reports and analyses to the [Project Name]. The detailed IV&V activities, reports, and analyses associated with [Project Name] milestones are described in Section 7 Tasks.

5 Points of Contact

NASA IV&V Facility	Name	Email	Voice	Fax
NASA IV&V Program Director	Gregory Blaney	Gregory.D.Blaney@nasa.gov	304-367-8387	304-367-8203
NASA IV&V Office Lead	Steven Raquè	Steven.M.Raque@nasa.gov	304-367-8216	304-367-8203
NASA IV&V Office Business Manager	Lisa Downs	Sadie.E.Downs@nasa.gov	304-367-8252	304-367-8203
NASA IV&V New Business Lead	Jarrold Petersavage	Jarrod.M.Petersavage@nasa.gov	304-367-8388	304-367-8203
NASA IV&V Project Manager				
NASA IV&V Program Financial Manager	Kaci Reynolds	Kaci.A.Reynolds@nasa.gov	304-367-8335	304-367-8203

[Project Name]	Name	Email	Voice	Fax
[Title]				

6 Roles and Responsibilities

6.1 NASA IV&V Program

The NASA IV&V Program personnel will provide the technical direction and financial management for the IV&V contractors located at the IV&V facility, as well as IV&V contractor personnel that may be located at [any other location], to perform the tasks listed in this MOA. The IV&V Office will be responsible for the direction and activities performed by the IV&V contractors and for planning and approving the work to be performed, including utilization of IV&V tools available from the IV&V facility.

The IV&V Project Manager, PM, is responsible for assuring the transmittal of the IV&V deliverables identified in Section 8 to the [Project]. The IV&V PM may interface with the [developer] vendors, and the [Project] Office for issues related to the IV&V work being performed for the [Project].

6.2 Development Project

The [Project] Office will facilitate the tasks to be performed with the IV&V Project. The [Project] primary interface with IV&V shall be the [POC] manager or the appointed delegate. This may involve coordination between the [Project] personnel and the IV&V Program (as required) to:

- Provide necessary development and supporting documentation to the IV&V personnel to perform the IV&V tasks.
- Transfer the funding as cited herein to GSFC to fund this activity.

6.3 General Roles and Responsibilities

The following roles and interfaces are defined to ensure that the IV&V Team has adequate access to necessary deliverables and resources and that IV&V results are available to the [Project] Office.

1. [Project] Office and the IV&V Team will interface through the IV&V PM for items related to IV&V product issues, IV&V priorities and schedules, budgets, requirements for access to resources, and delivery of formal IV&V products.
2. The IV&V team members will interface through participation in [applicable project working groups]
3. The IV&V team will have access to developer deliverables and resources pertinent to the IV&V tasking:
4. The IV&V team members will participate in formal reviews including but not limited to reviews of [all applicable project reviews]
5. The IV&V team will make available copies of all technical, issue tracking, and status reports to the [Project] POC.
6. The IV&V team will protect all contractor proprietary data and materials.
7. The [Project Manager or POC] Manager is encouraged to contact the IV&V Program Director directly should issues need to be discussed that cannot be resolved with the IV&V PM or IV&V Office Lead.

7 Tasks

The NASA IV&V Program will perform *{detailed IV&V activities and analyses associated with [Project Name] milestones are described in the applicable sections below}*

7.1 Management and Planning

7.2 Verify and Validate Concept Documentation

7.3 Verify and Validate Requirements

7.4 Verify and Validate Test Documentation

7.5 Verify and Validate Design

7.6 Verify and Validate Implementation

7.7 Verify and Validate Operations and Maintenance Content

8 Deliverables

The IV&V Program will provide the results of the IV&V analyses and identified issues and risks. The IV&V Program will also deliver status reports via email to the [POC] manager on an as needed basis. Issues and observations are immediately communicated to the [POC] manager. The IV&V team does not wait for formal review and analysis reports to begin the issue resolution process. *{any additional deliverable information should be included in this section}*

9 Resources/Budget

9.1 Project Resources

The following project resources shall be made available to the IV&V team:

{list required accesses to databases, development environments, artifact repositories, tools, websites, etc}

9.2 Budget

The budget agreed upon for the IV&V effort described in this MOA shall not exceed \$ [estimate]. This estimate includes overhead, travel, tools, and all technical work. This included travel... *{insert any known travel information here}*. The included tool support and utilization... *{insert any known tool purchases, licensing expenses, etc}*.

10 Signatures

[Project Manager]

[Project Name]

Date

Gregory Blaney

Director, NASA Software IV&V Program

Date

Routing Sheet for: **Memorandum of Agreement between the National Aeronautics and Space Administration Software Independent Verification and Validation Program at GSFC and the [Organization Name]**

The following signatures are REQUIRED before this agreement is sent to the Project:

_____ TBD NASA IV&V Office Project Lead	_____ Date
_____ Jarrod Petersavage NASA IV&V Office New Business Lead	_____ Date
_____ Lisa Downs NASA IV&V Office Business Manager	_____ Date
_____ Steven Raquè NASA IV&V Office Lead	_____ Date
_____ Kaci Reynolds NASA IV&V Program Financial Manager	_____ Date
_____ Donna Ozburn NASA IV&V Program Support Office Lead	_____ Date
_____ Gregory Blaney Director, NASA Software IV&V Program	_____ Date