

NASA Interim Directive (NID): NPR 7150.2A, NASA Software Engineering Requirements

Background

In 2012, the Aerospace Safety Advisory Panel recommended: "NASA should establish a standard identifying the level of criticality that requires software IV&V, i.e., at what risk level must IV&V be required and therefore either be resources, or if that is not possible, a formal waiver process be in place for an accountable individual to accept the associated risk and document it."

The Agency concurred and directed the Office of the Chief Engineer, with assistance with the Office of Safety and Mission Assurance and the NASA Independent Verification and Validation (IV&V) Program, to develop a NID that would replace the current multi-step process for determining which projects must have software IV&V with a standard identifying the level of criticality that requires software IV&V. This NID makes the following changes to NPR 7150.2:

1. Paragraph P.4:

Add NPR 8705.4, Risk Classification for NASA Payloads.

2. Requirement Change: Paragraph 2.2.1.3 is replaced in its entirety with the following:

2.2.1.3 Software Independent Verification and Validation (IV&V) shall be performed on the following categories of projects during at least the project life cycle Phases B & C: [SWE-141]

- a. Category 1 Projects as defined in NPR 7120.5, NASA Space Flight Program and Project Management Requirements (Human Space Flight, life cycle cost exceeding \$1B, or significant radioactive material).
- b. Category 2 Projects as defined in NPR 7120.5, NASA Space Flight Program and Project Management Requirements that have Class A or Class B payload risk classification per NPR 8705.4, Risk Classification for NASA Payloads.
- c. Projects specifically selected by the NASA Chief, Safety and Mission Assurance to have software IV&V.

Note: The NASA IV&V Board of Advisors supports the NASA Chief, Safety and Mission Assurance by recommending significant project needs for software IV&V beyond projects meeting the criteria in items a & b of SWE-141. Waivers to the above requirement will be adjudicated by the NASA IV&V Board of Advisors, with the final decision by the NASA Chief, Safety and Mission Assurance.

3. Requirement Change: Paragraph 2.2.1.4 is replaced in its entirety with the following:

2.2.1.4 If software Independent Verification and Validation (IV&V) is performed on a project, the IV&V provider shall develop an IV&V Project Execution Plan (IPEP). [SWE-131]

Note: The IV&V provider determines and documents the services to be performed in the IPEP. The IPEP is developed by the IV&V provider and serves as the operational document that will be shared with the project receiving IV&V support. The purpose of the IPEP is two-fold. First, it is to communicate IV&V interactions, interfaces, roles and responsibilities, technical products, and reporting methods with the Project. Second, the IPEP serves as the operational document for the IV&V efforts. The IV&V provider and the project will establish a mutual understanding of the IV&V provider's activities, IV&V project interfaces, and scope of the IV&V effort based upon risk. Per the responsibilities defined in NPD 7120.4, NASA Engineering and Program/Project Management Policy, paragraph 5.J.(5), projects ensure that software providers allow access to software and associated artifacts to enable implementation of IV&V. Additional information on the content of the IPEP is found in Chapter 5. A template and instructions for an IPEP may be found in the NASA IV&V Management System, located at: <http://www.nasa.gov/centers/ivv/ims/home/index.html>

4. Clarification Change: Paragraph 5.1.8 is replaced in its entirety with:

5.1.8 IV&V Project Execution Plan (IPEP).

The purpose of the IPEP is two-fold. First, it is to communicate IV&V interactions, interfaces, roles and responsibilities, technical products, and reporting methods with the Project. Second, the IPEP serves as the operational document for the IV&V efforts. The IPEP sections within the document focus generically on the "rules of engagement" that will be followed by the IV&V Team and the Project over the course of the Project lifecycle. Specifically, it includes the basic tenets for an agreement between the IV&V Team and the Project, including the roles and responsibilities, communications paths, and artifacts anticipated to be shared between the organizations. Additional information on the IV&V IPEP may be found in the NASA IV&V Management System, located at: <http://www.nasa.gov/centers/ivv/ims/home/index.html>.

5. Appendix D:

Update of SWE Item 131 (IV&V Plan) to reflect the new requirement.

Update of SWE Item 141 (Requirement for IV&V) to reflect the new requirement.



Michael G. Ryschkewitsch
Chief Engineer



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