

# S3108: Project Milestone Review Support

Version: Basic

Effective Date: November 3, 2023

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- Purpose
- Scope
- Importance
- Milestone Review Support Process Flow
- Milestone Review Support
  - Preparation
    - Stakeholder Expectations
    - Project or Mission-specific Objectives
    - Entry and Exit Criteria (see Appendix A)
    - RFAs, RIDs, and Actions from prior Milestone(s)
    - Waivers
    - IV&V Schedule
    - Changes in IVV's Scope and/or Focus since the Previous Milestone
    - Technical Issue Memorandum (S3105)
    - Assurance Conclusions
    - Risks
    - Residual Risk
    - Other Considerations
  - Presentation
    - Format
    - Content
  - Internal Review and Feedback
  - Attendance
  - Post Review Follow-up
- IV&V Milestone Presentation Repositories
- References
- Version History
- Appendix A

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## Purpose

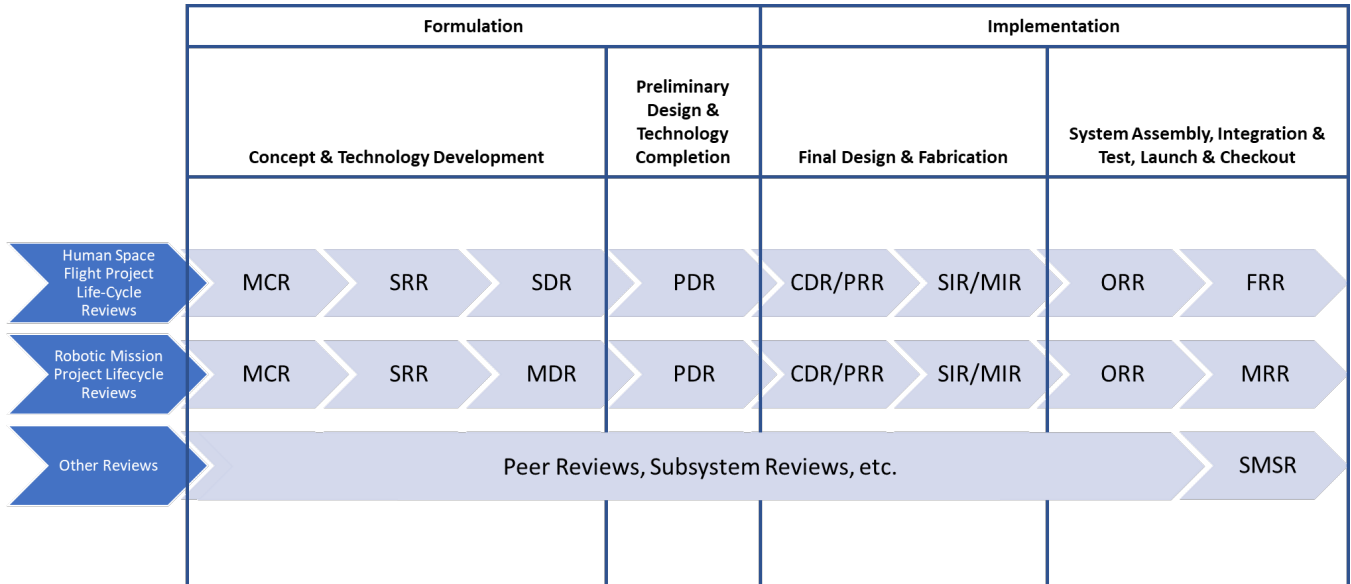
The purpose of this document is to provide guidelines for NASA IV&V participation and communication at project lifecycle milestone reviews ([NPR 7120.5](#)). This document describes steps and actions that should be taken before, during, and after a review. The desired result is that IV&V projects effectively and clearly communicate their assurance position, identify and address requests for action (RFAs) and review item discrepancies (RIDs), and capture and clearly communicate all remaining residual risk.

[Back to top](#)

## Scope

The guidelines in this document apply to a subset of NASA Program/Project Milestone (or Life-Cycle) Reviews. To ensure IV&V detects issues as early as possible in the software development lifecycle, there is the potential for IV&V involvement as early as the Mission Concept Review (MCR), with the goal of being involved 6 months prior to the System Requirements Review (SRR). From there, support is expected to continue at a number of (if not all) milestone reviews through and including the Safety and Mission Success Review (SMSR). In addition to the formal agency reviews, this guidance should be considered for any other reviews. Figure 1 below is a high-level overview of milestones typically supported by an IV&V project. Depending on the mission directorate for the project, additional reviews may exist beyond those noted below, including Design Certification Reviews and Pre-Ship Reviews.

[Back to top](#)



**Figure 1 - Standard IVV supported Milestones**

## Importance

One of the primary venues for IV&V to communicate its independent assessment of the project's software is at milestone reviews. These reviews are both a requirement and an opportunity to provide the project and various stakeholders within the Agency with insight into the evidence compiled as a result of the activities performed by IV&V. Evidence is typically provided in the form of assurance, highlighting positive aspects of assurance (confidence) as well as technical issues (TIMs), risks, areas of concern, challenges, forward work and residual risk. It is important IV&V leads in with a "no surprises" approach, coordinating with both the Mission POCs and SMA counterparts to ensure the message from IV&V is clear, concise and doesn't contradict any communications from these other entities. For project planning, IV&V should plan to present at any of the Milestone Reviews where SMA is planning to present, ensuring we have a voice at these critical decision points in the mission timeline. The Project Manager should consult with IV&V Leadership if there are non-standard reviews planned that present IV&V the opportunity to communicate their assurance position and value to mission success.

[Back to top](#)

## Milestone Review Support Process Flow

The following process flow dictates the nominal path for the generation of IV&V content for presenting at Milestone Reviews. It is important that IV&V's message is clear, concise, and correct for stakeholders of the review to make the overall decisions that are best for mission success. Through this process, IV&V standardizes the format, structure and content of the presentation such that stakeholders see consistent approaches for IV&V across varying reviews and missions.

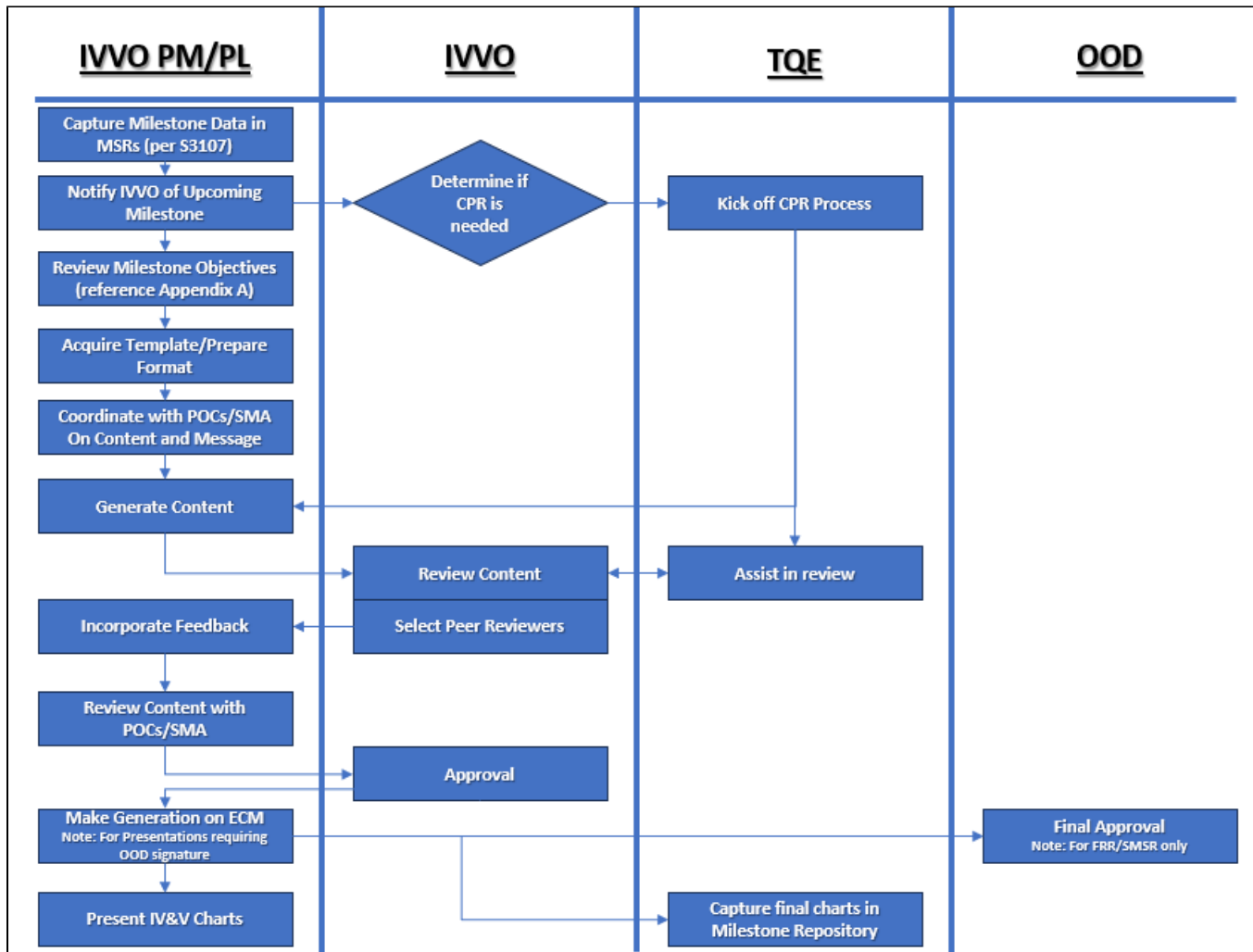


Figure 2 - Milestone Review Chart Generation Process Flow

## Milestone Review Support

### Preparation

Given the importance of the milestone reviews in the overall success of the mission and the wide breadth of stakeholders in attendance to absorb IV&V's message, the following things should be considered when preparing for an upcoming Milestone Review:

#### Stakeholder Expectations

- What are stakeholder's expectations?
  - Is IV&V getting what they need?
  - What is IV&V doing to claim success?
  - What is project doing to claim success?
  - What is SMA doing to claim success?

#### Project or Mission-specific Objectives

- Gather project/mission-specific Milestone Objectives from the meeting organizers/POC
  - Pay particular attention to objectives where IV&V activities, insight, and conclusions relate

- Determine what objectives, if any, are directly levied on IV&V

### Entry and Exit Criteria (see [Appendix A](#))

- Gather standard Entry/Exit Criteria for Milestones from the following sources paying particular attention to those that pertain to IV&V activities, insight, and conclusions
  - NPR 7123.1, Appendix G: [NPR 7123.1D - Appendix G \(nasa.gov\)](#)
  - SW Engineering Handbook, Section 7.9: [7.9 - Entrance and Exit Criteria - SW Engineering Handbook Ver C - Global Site \(nasa.gov\)](#)
  - NPR 7150.2 [NPR 7150.2D](#)
  - GSFC-STD-1001A [GSFC-STD-1001A](#)
- Compare the standard and project/mission-specific Milestone Objectives and Entry/Exit Criteria to identify both gaps and additional content
  - Work with S&MA counterparts to understand the gaps for awareness and support

### RFAs, RIDs, and Actions from prior Milestone(s)

- Determine the status of RFAs/RIDs/Action Items from the previous milestone(s)
  - Determine if any affect the completion of the current milestone criteria/objectives
  - Determine if IV&V activities, insight, or conclusions are applicable

### Waivers

- Has the development project or IV&V received any waivers that impact the work completed? How do those waivers impact what is presented at the milestone review?

### IV&V Schedule

- What IV&V work was planned/accomplished/completed/remaining/forward work as of the milestone review?
  - Is the planned/accomplished work in alignment with the technical framework ([IVV 09-1](#)) and the stated objectives of the review?
    - Was the work based on IPEP ([T2103](#)) assurance objectives and targets, derived from IV&V Planning and Scoping, Risk assessments and budget considerations?
    - If planned work has not been completed (either driven by internal or external factors), have discussions with Project POCs been held to discuss when IVV analysis will be completed and the impact/risk to further development?

### Changes in IVV's Scope and/or Focus since the Previous Milestone

- Have there been any changes in the scope and/or focus, as a result of the risk assessment ([S3106](#)) since the previous milestone?

### Technical Issue Memorandum ([S3105](#))

- What is the current state of the technical issues (TIMs) identified by IV&V?
  - Are all IV&V identified technical issues resolved or on a path to resolution (TBV) relating to the entrance/exit criteria?
  - Have any unresolved TIMs (submitted, in-dispute) been discussed with POCs? Have risks to next stage of development been captured, assessed, and agreed upon?
  - Are there any unresolved high severity technical issues, i.e., Sev 1 or 2 TIMs?
  - Have PAR TIMs been assessed for residual risk and gone through appropriate project channels for agreement /concurrence?

### Assurance Conclusions

- What statements of assurance can be made by IV&V?
  - Are positive statements of assurance reinforced by the presence of evidence and high confidence?
  - Are negative statements of assurance reinforced by the presence of technical issues (TIMs) and/or risks?

### Risks

- What is the current state of the external risks identified by IV&V?
  - Have all IV&V identified external risks either been mitigated to an appropriate level for the milestone criteria? Or are mitigation plans in place to achieve risk reduction after the milestone review?
  - Are there any significant challenges or concerns that need to be communicated?
  - Has the Mission Project appropriately reviewed and decided to accept any risks as-is? If so, what entity (individual, discipline, etc.) within the program or project has been identified to accept the risk?

### Residual Risk

- What is the required level of residual risk communication for the review? Is it the main focus (FRR and SMSR), or part of the overall package?
- Has the review panel or milestone objectives set a threshold for residual risk to be communicated?
- Is all residual risk communicated in a risk assessment, PAR TIM, or accepted external risk?
- Does the residual risk statement follow both the guidelines listed in [S3001](#) for residual risk and the criteria utilized for the milestone review?
- Does the residual risk combine/build upon any other residual risks statements being provided by the developer or SA?

### Other Considerations

- How to support Milestone reviews where the project uses 'non-traditional' lifecycle approaches (agile, spiral, incremental, etc.) - does it really matter if NASA still expects compliance with reviews like SRR-PDR-CDR-TRR-etc.?
- How to support Milestone reviews for different types of procurements
  - If NASA procures something in a 'different' way, we need to accommodate, not dictate what else a contractor should do, or if they should do something differently
- Who is on the Standing Review Board (SRB)?
  - Has there been communications with SRB members?

[Back to top](#)

## Presentation

It is important that IV&V follows the guidelines set forth for the milestone review, while also maintaining a consistent message across IV&V projects such that stakeholders have some level of expectations for IV&V's content at these reviews. The following guidelines provide IV&V with standardization in the format and messaging.

### Format

- Dependent upon level of review (Program, Project, Subsystem, etc.)
- Dependent upon time allotment (traditionally 10-15 mins)
- Dependent upon the allotment of slides (traditionally 1-2 or 3-5 range)
- Gravitating towards utilization of the format and/or content for the Monthly Status Report (MSR) to move towards continuity of monthly presentations of 'status' in alignment with key milestone reviews

[Back to top](#)

### Content

The content that is of focus for the IV&V presentation will evolve as the project progresses through the NASA SDLC. The below figure shows a distribution of that focus. Notice that in earlier reviews the focus is on what is being planned and scoped for IV&V analysis, and by the end of the mission that focus shifts to the closeout, documentation, and communication of residual risk.

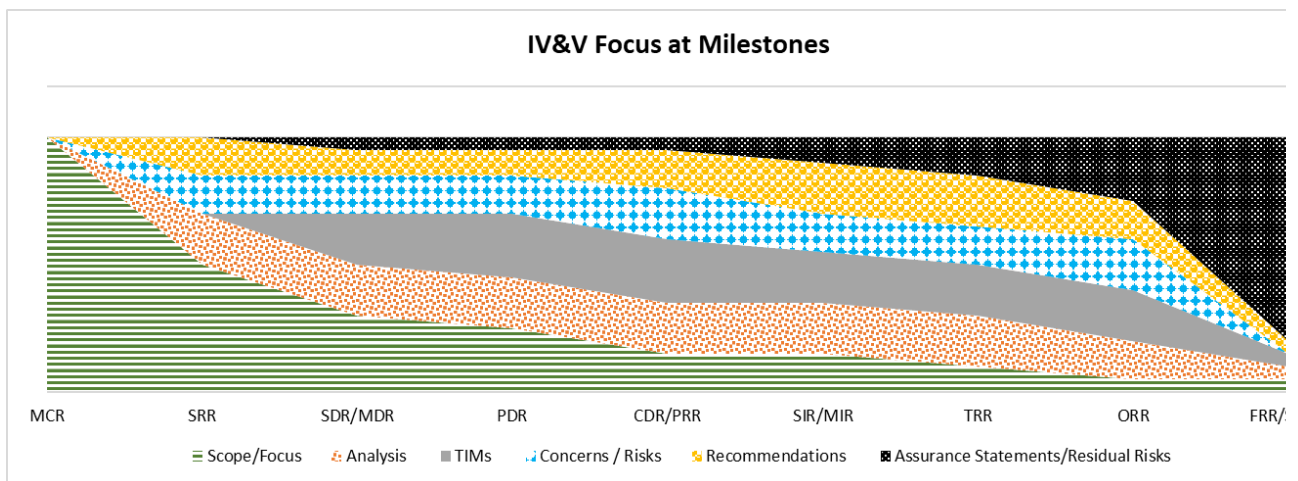


Figure 3 - IV&V Focus at Milestones

Dependent on time and slide allotment, decisions on inclusion of the following content will need to be made to ensure the most critical information is being provided to the SRB.

- Main Body (Content present to audience - combine or truncate as possible/necessary)
  - Context/Introduction – When IV&V started, how engaged we are, working relationship with project, last milestone presented at, etc.
    - What's expected by/from IV&V at the milestone?
  - Scope/Focus/Rigor – Highlights of risk assessment – what could be in scope and what is actually in focus
  - Assurance Design/Strategy; include discussion on technical rigor, if applicable
  - Analyses – Status of planned, completed, in-work, remaining, forward work
  - TIMs – Status of TIMs
  - Risks/Challenges/Concerns – Status of EXTERNAL risks (Challenges/Concerns can be INTERNAL as appropriate for the audience)
  - Assurance – Summary level statements of assurance
    - Tied to milestone objective language, if applicable
  - Path Forward/Next Steps
- Backup (Content to have available to reference as needed - too much detail for most reviews)
  - Technical Framework (TF)
  - Planning & Scoping
  - Risk Assessments
  - IV&V assessment of Milestone Objectives & Entrance/Exit Criteria
  - Residual Risk Details

[Back to top](#)

## Internal Review and Feedback

Prior to the milestone, it is important to receive feedback from the broader IV&V community on both the slides and what will be presented. For the majority of milestone reviews, IVVO review is required for the chart presentations. For milestones closer to the end of the lifecycle (FRR and SMSR), OOD review and sign off is required. If requested by the IVVO Lead or the PM, Checkpoint Reviews can be utilized to support the preparation, review and dry-runs of the presentation material.

[Back to top](#)

## Attendance

IV&V milestone presentations are typically presented by the IV&V PM or DPM. However, provided the IVVO Lead approves, the IV&V PM may request the IV&V PL to present. IV&V Project Team members may attend as well.

[Back to top](#)

## Post Review Follow-up

After the milestone is complete, the following actions should be followed to ensure the information and material covered in the review is disseminated appropriately within the IV&V Team, and any follow up activities are tracked to resolution.

- Document the participation in the milestone review with a summary highlighting the presentation provided by IV&V as well as summary of presentations, actions, follow-ups, etc. from the actual review
- Ensure all material from the review is properly referenced in the IV&V Project repositories
- Ensure all material from the review is properly linked to the IV&V Milestone Presentation repositories
- Ensure all material from the review is properly linked in the Monthly Status Report ([S3107](#))
- Collect, submit and address Requests for Action (RFAs)/Review Item Discrepancies (RIDs)
  - IV&V should coordinate with the POC and/or SMA for any RIDs or RFAs that are in direct correlation with IV&V analysis or responsibilities.
  - In most cases, the RFAs/RIDs should be captured as TIMs to ensure tracking and resolution of the items. If there is a RID/RFA documented that does not normally align with IV&V activities, coordinate with the IVVO Lead to determine next steps.

[Back to top](#)

[Back to top](#)

## IV&V Milestone Presentation Repositories

A repository of all IV&V supported milestone reviews can be found within TQ&E's ECM space (Enterprise/IV&V OFFICE/TQ&E/04 - Reference Documents /S3108\_Milestone Charts/).

- Mission Concept Review (MCR) - N/A
- System Requirements Review (SRR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28178288>
- Mission/System Definition Review (MDR/SDR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28179960>
- Preliminary Design Review (PDR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28178289>
- Critical Design Review (CDR) & Production Readiness Review (PRR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28178290>
- Mission/System Integration Review (MIR/SIR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28179961>
- Operational Readiness Review (ORR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28180352>
- Mission/Flight Readiness Review (MRR/FRR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28180353>
- Safety and Mission Success Review (SMSR) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28114720>
- Other Reviews (i.e. MOR, PER, PSR, etc.) - <https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28166258>

[Back to top](#)

## References

REFERENCES	
Document ID/Link	Title
<a href="#">IVV 09-1</a>	Independent Verification and Validation Technical Framework
<a href="#">T2103</a>	IV&V Project Execution Plan (IPEP) Template
<a href="#">S3001</a>	Guidelines for Risk Management
<a href="#">S3105</a>	Guidelines for Writing IV&V TIMs
<a href="#">S3106</a>	PBRA and RBA Process
<a href="#">S3107</a>	Monthly Status Report (MSR) Guidance
<a href="#">GSFC-STD-1001A</a>	GSFC Criteria for Lifecycle Reviews
<a href="#">NPR 7120.5F Chapter 2</a>	NASA Lifecycles for Spaceflight Programs and Projects
<a href="#">NPR 7123.1, Appendix G</a>	Life-Cycle and Technical Review Entrance and Success Criteria
<a href="#">NPR 7150.2</a>	SW Engineering Requirements
<a href="#">SWE HB, Section 7.9</a>	Software Engineering Handbook, version C, <i>Entry and Exit Criteria</i>
<a href="https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28114629">https://ecm.ivv.nasa.gov/OTCS/lisapi.dll/Open/28114629</a>	IV&V Milestone Presentation Repositories

[Back to top](#)

## Version History

VERSION HISTORY				
Version	Description of Change	Rationale for Change	Author	Effective Date
Basic	Initial Release		Mike Lemon	11/3/202

[Back to top](#)

