



SMC Tailoring SMC-T-005
19 May 2017

Supersedes:
SMC-T-005 (2015)

Air Force Space Command

**SPACE AND MISSILE SYSTEMS CENTER
TAILORING**

**RISK MANAGEMENT
SUPPLEMENT TO
IEEE-15288.1**

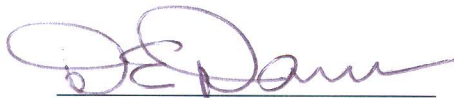
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FOREWORD

1. This tailoring document defines the Government's requirements and expectations for contractor performance in defense system acquisitions and technology developments.
2. This SMC tailoring was developed by the SMC/EN Risk Management Advisor and comprises tailoring to the risk management requirements of IEEE-5288.1, *Standard for Application of Systems Engineering on Defense Programs*.
3. The significant changes from the 2015 version includes:
 - Minor typographical corrections in document citations
 - Changed section title from "Background" to "Applicable Documents"
 - Changed medium risk to moderate risk to be consistent with Air Force risk management terminology.
 - Added requirement for supplier risk management planning per ISO 17666
 - Added DOD Data Item Description number DI-MGMT-81808, with SMC tailoring.
4. Beneficial comments (recommendations, changes, additions, deletions, etc.) and any pertinent data that may be of use in improving this document should be forwarded to the following addressee using the Standardization Document Improvement Proposal appearing at the end of this document or by letter:

Division Chief, SMC/ENE
SPACE AND MISSILE SYSTEMS CENTER
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5. This tailoring document has been approved for use on all Space and Missile Systems Center/Air Force Program Executive Office - Space development, acquisition, and sustainment contracts.



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Space and Missile Systems Center Risk Management Supplement to IEEE-15288.1.

1. Intent of this Tailoring Document

This tailoring document is an organizationally-unique supplement to the industry-consensus systems engineering standard, adding risk management requirements that have been deemed valuable by USAF and the Space and Missile Systems Center (SMC) for mission assurance/success of high-reliability space systems. This tailoring document supplements IEEE 15288.1-2015 Clause 6.3.4, Risk Management Process.

2. Context

- ISO-IEC-IEEE-15288: 2015, Systems and Software Engineering — System life cycle processes. The DOD adopted systems engineering process standard.
- IEEE 15288.1: 2014, Standard for Application of Systems Engineering on Defense Programs. The DOD adopted addendum to 15288 that elaborates on process outputs.
- ISO 17666, Space Systems – Risk Management. Second Edition. 2016.
- DI-MGMT-81808, Contractor’s Risk Management Plan. The DOD data item description for documentation of a contractor’s risk management plan.

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3. SMC Tailoring of IEEE 15288.1

3.1. General Risk Management Tailoring Instructions

The requirements in this document shall be used in conjunction with ISO/IEC/IEEE 15288 and IEEE 15288.1 on contract.

The requirements of this document shall prevail in the event of conflict between this document and ISO/IEC/IEEE 15288 or IEEE 15288.1.

This document, SMC-T-005 (2017), *Risk Management Supplement to IEEE 15288.1*, provides additional requirements to IEEE 15288.1-2014 and shall be:

1. Normative (requirements rather than informative guidance),
2. Tailored appropriately for specific acquisition/contract considerations, and
3. Implemented as part of the performance of IEEE 15288.1 Task 6.3.4, Risk Management Process.

3.2. Specific Risk Management Tailoring Language

3.2.1 Risk Management Program

The contractor shall establish and implement a risk management program that includes and integrates the required systems engineering considerations specified in this document.

3.2.2 Required Products

- a) Risk Management Plan
- b) Risk List

3.2.3 Required Product Attributes

- a. The Risk Management Plan:
 - (1) Specifies a process that plans and documents the risk management process, identifies and adjudicates candidate risks, analyzes approved risks, develops and implements risk handling plans for all moderate and high risks (and selected low risks), monitors progress associated with the implemented risk handling plans and feeds this information back to prior process steps, and documents risk information.
 - (2) Includes a risk management planning process step that incorporates items necessary to develop, implement, and document the risk management program via a Risk Management Plan (RMP) or equivalent. Relevant items may include a description of the risk management process steps (with inputs,

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methodologies or approaches, and outputs per step), candidate risk categories, ground rules and assumptions, roles and responsibilities for implementing risk management, risk working groups and/or board(s) and membership(s) as appropriate, metrics for monitoring and evaluating risk management results, provisions for risk management training, a description of risk management software used and/or templates for risk reports and reviews, and references.

- (3) Includes a methodology for risk identification that encompasses both top-level approaches such as products (e.g., Work Breakdown Structure (WBS), processes, requirements/critical parameters, risk categories) and lower-level approaches (e.g., affinity; brainstorming; checklists; critical/near-critical path; diagramming methods; expert opinion; failure and reliability information; lessons learned from analogous programs; scenario analysis; strengths, weakness, opportunities, threats; trigger questions). See the Air Force Space and Missile Systems Center Risk Management Process Guide, Section 3.2, Version 2, 5 September 2014 (or later version)¹ for additional information. While ad hoc risk identification may use one or more lower-level approaches, comprehensive risk identification should use one or more top-level approaches coupled with one or more lower-level approaches.
- (4) Includes an established process for continued identification of risks throughout the program life cycle.
- (5) Includes one or more methodologies for analyzing risks in terms of the likelihood (probability) of occurrence and the resulting consequence (impact) with regards to cost (including life-cycle costs), schedule, and technical. If qualitative methodologies are used (e.g., risk scales), the likelihood and consequence values are estimated and converted to risk levels (low, moderate, and high) using the maximum of the resulting likelihood value(s) and the maximum of the three consequence values (cost, schedule, and technical) with a risk mapping matrix (e.g., AFPAM 63-128, 2014², Figure 12.2). (Note: fractional likelihood and consequence values obtained through the use of ordinal scales may yield erroneous results.) The qualitative risk analysis includes cost, schedule, and technical (including but not limited to design, integration, manufacturing, support, technology, and threat) uncertainties and sensitivity to program, product, and process assumptions. The qualitative risk analysis also includes a methodology for prioritizing risks that have identical likelihood and/or consequence values.
- (6) Cost, performance, and schedule risks are analyzed using appropriate quantitative methods (e.g., Monte Carlo simulation), and include uncertainties and sensitivity to program, product, and process assumptions.
- (7) Includes the activities and criteria for identifying, analyzing, validating, and transitioning critical technologies from technology development and demonstration programs, including commercially developed technologies.

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- (8) Includes technology readiness level (TRL) in performance, affordability, and life-cycle processes in the criteria. (Note: TRL and other readiness level scores are not risk because they are unrelated to the consequence dimension. They are, however, indicators of portions of the probability dimension of risk.)
- (9) Includes a structured process for evaluating risk handling options and developing a risk handling strategy (option plus implementation approach). At a minimum, the assumption (acceptance), avoidance, mitigation (control), and transfer options should be examined, the “best” option selected, and a suitable implementation approach developed for that option (or hybrid of multiple options).
- (10) Includes an approach for developing risk handling plans for all moderate and high risks and selected low risks. Resources necessary to implement each activity contained in the risk handling plan should be identified and specified whether/not the resources are part of the baseline program. Risk handling activities (or at a minimum a subset of the handling activities) should be included in the program’s Integrated Master Schedule (IMS). A risk waterfall/burndown (graphical) chart (including a listing of handling activities) should be developed for each implemented risk handling plan that includes actual vs. planned progress associated with both risk level and schedule for the implemented risk handling plan and its activities. Low risks not requiring risk handling plans are documented in a program watch list and periodically re-evaluated to ensure that suitable progress is being made to either close the risk or reduce it to an acceptable level.
- (11) Includes secondary risk handling strategies for moderate and high risks as appropriate.
- (12) Includes a risk waterfall/burndown chart methodology for periodically monitoring (e.g., monthly, and at other times when needed) actual vs. planned progress for implemented risk handling plans and associated activities in terms of risk likelihood and consequence scores (and risk level), schedule (IMS) and appropriate metrics and technical performance measures (TPMs). This information is fed back to update the: 1) risk handling plans, 2) risk analysis results, 3) risk identification information, and 4) risk management planning as needed. The risk handling plan activities are included in the program Integrated Master Schedule to provide a basis for determining progress in completing risk handling activities as well as the potential for achieving modeled program milestones.
- (13) Includes consolidation of all elements of risk management at each level of the project hierarchy, including subcontractors and suppliers (See ISO 17666 clause 8.2.2)

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(14) Conforms to DI-MGMT-81808, if directed by the acquirer-supplier agreement and/or contract, with the following change: Risk Mitigation – 2.3 i, *Risk Mitigation Planning*, and j, *Risk Mitigation Implementation*, shall describe all types of risk handling methods, including accept, avoid, mitigate, transfer, and monitor.

b. The Risk List:

- (1) Includes suitable documentation for all low, moderate, and high risks, and all risk identification, risk analysis, risk handling, and risk monitoring information.
- (2) Includes a separate list of all watch list items. The resulting risk lists are maintained in a suitable database that will permit interrogation of and updates to information over the life of the program.

4. Applicable Documents

The following documents form a part of this document to the extent specified herein. Unless otherwise specified the issues of these documents are those cited in the solicitation or contract.

- ISO-IEC-IEEE-15288: 2015, Systems and Software Engineering — System life cycle processes.
- IEEE-15288.1: 2015, Standard for Application of Systems Engineering on Defense Programs.
- ISO 17666, Space Systems – Risk Management. Second Edition. 2016.
- DI-MGMT-81808, Contractor’s Risk Management Plan.