

MWI 7120.6  
REVISION G

EFFECTIVE DATE: February 21, 2014  
EXPIRATION DATE: February 21, 2024

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# MARSHALL WORK INSTRUCTION

QD01

## PROGRAM, PROJECT, AND INSTITUTIONAL RISK MANAGEMENT

<b>Marshall Work Instruction QD01</b>		
<b>Program, Project and Institutional Risk Management</b>	<b>MWI 7120.6</b>	<b>Revision: G</b>
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### DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		7/10/00	
Revision	A	5/15/01	Added reference 4.9. Added definitions 5.1, 5.4 a 5.5 and 5.7. Added planning responsibilities clarification into 6.1. Added responsibilities for PMC and the Procurement Office into section 6.2 and reordered section to more logically follow process flow. Updated risk management tools application into section 6.3. Added procurement responsibilities into flow diagram.
Revision	B	12/16/2003	Removed reference from paragraph 6.3, Type III. Defined the PMC in section 5.12. Made appropriate changes to bring in accordance with NPG 8000.4 throughout the document. Added the word "Continuous" in front of Risk Management throughout the document. Added NPG 8000.4 to the Applicable Documents section. Corrected the number references for S&MA OI's in the reference section. Corrected the title to MPD 1150.1 in the reference section. Added the word "may" prior to the word cause and removed "or prior" to the word loss in section 5.6. Added the words "The PHA" prior to the word provides in section 5.7. Added the words "an undesired" prior to the word consequence in section 5.8. Removed the last two sentences in section 6.1 and added section 6.1.1 which discusses MPG 2810.1. Added the words "a CRM" prior to the word plan. Also, changed the word "Presents" to Present in section 6.2.3. Added the words, "Organizations supporting programs/projects will also support the respective team" in section 6.2.6. Eliminated section 6.2.8 and added to the end of section 6.2.6 the words, "Periodically assess the risk management process to ensure risks continue to be managed throughout the project life cycle." In section 6.3 identified the Table as Table 6.3. Added a new line item (4.1.1) to the reference section and it was, "Schedule Risk Assessment Guide" – MSFC Project Analysis Office (RS40). Added to section 5 a new line item (5.1.1) which was a definition of Schedule Risk Assessment (SRA). Added a new line item for section 6.2 (6.2.9) which says, "The Actionees are Project or Program Manager and Project Analysis Office". Added to section 6.3 SRA to all three Program/Project Types. Added to section 6.3 SRA to the list risk management tools. Corrected section 6.2.8 to say, "S&MA evaluates implementation of risk management requirements in MSFC Programs and Projects. Added cost numbers to section 6.3 with regards to Type I, II and III. In the reference section deleted the 40 after QS for 4.2, 4.3 and 4.4.
Revision	C	10/15/2004	Changed document Revision number "B" to "C". Changed document effective and expiration date to September 1, 2004 and September 1, 2009 respectively. Replaced all references to QS01 with QD01 throughout the document. Changed title of document from Program/Project Risk Management to Program/Project Continuous Risk Management. Changed NPG 7120.5 to NPR 7120.5 and NPG 8000.4 to NPR 8000.4 throughout the document as applicable. Added NPR 9501.5 and NPD 9501.3 to the References. Added Development Model Analysis (DMA) and description under the 5. Definitions and renumbered applicable paragraphs. Changed will be required to shall in section 6.1 as appropriate. Added the word "all" to section 6.2.2 and added the words "the program or project manager shall aggressively implement the risk management plan.", "the selected risk handling tool (risk management database or risk management spreadsheet", "and documented in the risk management database or spreadsheet" and changed worksheet to spreadsheet in section 6.2.3. Added the word "shall" and "all risk management" to section 6.2.6. Deleted Systems Management Office section and renumbered Project or

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			<p>Program Manager and Project Analysis Office to 6.2.8. Added S&amp;MA Continuous Risk Management Office 6.2.9 “Evaluates implementation of Continuous Risk Management requirements in MSFC programs and projects. Changed Table 6.3 Type II to include: FMEA, FTA, HA and SRA and Type III to Include: HA and SRA. Changed RM to CRM. Changed will to “shall” in sections 9.1 and 9.2. Changed Flow Diagram section 11 “arranges” to read “schedules” and inserted “the entire”, “identifies the risk and” and “S&amp;MA will facilitate this.” Added 3.4 NPD 8700.1B, “NASA Policy for Safety &amp; Mission Success” to the Applicable Document section. Changed S&amp;MA Office to S&amp;MA Directorate. Changed all references of Project/Program to Program/Project throughout document. Changed section 6 Instructions to CRM Process Requirements, Roles, Responsibilities and Tools. Deleted FMEA from Table 6.3, Type III. In the References section, paragraphs 4.2, 4.3 and 4.4, changed QS to QD. In section 5, put the definitions in alphabetical order. In paragraph 6.1, changed all the will’s to shall. In section 6.2, took out the word “will” throughout the section and replaced it with “shall”. In the second sentence of section 6.2.6, I added an “s” to the word “activity”. In the sixth sentence of the same section, added the word “risk” after the word “continuous.” In section 6.3 in Table 6.3, I added the words “FMEA or FTA” under the heading “Type 111.” In section 6.3, changed “will” to “shall.” In paragraph 9.1, added the word “shall” before the word “maintain.” Added “&amp; Team” to section heads 6.2.1, 6.2.3 and 6.2.7. In paragraph 3.5, changed the title of NPR 8000.4 to Risk Management Procedural Requirements. In paragraph 6.1 the third sentence in the note changed shall to may. In paragraph 5.1 changed the definition of Acceptable Risk. Appendix Z is added to include a risk identification worksheet to aid program/project personnel in identifying risks.</p>
Revision	D	8/4/2005	<p>Changed document Revision number “C” to “D”. Added – Section 1 Work Instruction. Added 4.16 NPR 8705.5, “Probabilistic Risk Assessment (PRA) Procedures for NASA Programs and Projects”, MPR 3410.1, “Training.” Added – 5.1 Referenced definitions and improved Definitions 5.1 Acceptable Risks and 5.2 Continuous Risk Management (CRM). Added – 5.10 Independent Assessment (IA). Added – 5.11 Metric. Added – 5.13 Probabilistic Risk Assessment (PRA), Added – 5.14 Program (or Project) Management Council (PMC). Added – 5.15 Risk. Added – 5.16 Risk Assessment. Added – 5.17 Risk Management, Added Risk Mitigation. Added – 5.18 Risk Mitigation: This may be accomplished through engineering changes to design, processes, or procedures; schedule realignment; budget adjustments; or alternate paths and approaches. Added – 5.20 Technical Warrant Holder (TWH). Revised Section 6.1 through 6.4. Added 6-1 through 6.6.4 and Figure 1-1, CRM paradigm and Figure 1-2, CRM Process Overview. Revised – 7. Notes. Revised 8. Safety Precautions and Warning Notes. Added – 9. Records. Changed Training Organization to reflect new organizational title: Learning &amp; Organization Development Office. Also, added to section 9.1 Program/Project Office. Added to section 9.2 by the Program/Project Office. Added – 10. Personnel Training and Certification. Added – 11. Cancellation. Revised and updated – Table 1-1, CRM Roles &amp; Responsibilities for Programs/Projects. Deleted – Responsibility Flow Table. Revised – Appendix Z – Continuous Risk Management Worksheet for Concern/Risk Identification.</p>
Revision	E	10/3/2008	<p>Revised 2. Applicability statement to address the applicability of this directive to the Michoud Assembly Facility. Removed reference 4.1, “Earned Value Performance Management” which has been cancelled. Replaced PMC with CMC and updated 4.13. Added 7120.5D, “NASA Space Flight Program and Project Management Requirements,” and NPR 7120.8, “NASA Research and Technology Program and Project Management Requirements.”</p>

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Revision	F	9/16/2010	Removed "Continuous" from Directive title and throughout document where necessary. Addressed the addition of RIDM in NPR 8000.4, Agency Risk Management Procedural Requirements, which now includes the compliment of RIDM and CRM. NPR 8000.4 also covers institutional Risk Management. Added NPR 7120.7 "NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements," and removed NPR 7120.5C and the revision letter D, "NASA Program and Project Management Processes and Requirements," and SSP 50431, "Space Station Requirements for Payloads."
Revision	G	2/21/2014	Total rewrite. Revised per 2011 management review. Reformatted per MWI 1410.1 revision. Deleted/reworded a majority of the requirements that were duplicate statements found in upper level Federal, State, Local and Agency docs and directed user to these docs. Rearranged some sections to improve clarity and remove Table 1. Removed references to cancelled MWI 1700.3, "NASA Safety Reporting System Corrective Action Process." Removed terminology and requirements from older versions that pertained to primary risks.
Revalidation	G	8/7/2019	Replaced all references to QD20 with QD03 throughout the document. Replaced S&MA with SMA. Deleted QD20: Mission Systems Assurance and Technical/Risk Support Department and replaced with QD03: SMA Business Office. Incorporated the following changes as required by NPR 1400.1: removed revision "C" from NPR 8715.3; removed quotation marks from around directive titles; removed titles of directives from citations within the body of this directive; and indented notes. Removed the last sentence of 5.7.2.7 "A sample risk information sheet is supplied in Appendix A." The sample risk information sheet was removed during the total rewrite 2/21/2014.

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## **1. PURPOSE**

The purpose of this MWI is to provide instructions for the implementation of an effective Risk Management (RM) process at MSFC for the management of institutional and program/project risks, as required by NPR 8000.4. RM includes two complementary processes: Risk-Informed Decision Making (RIDM) and Continuous Risk Management (CRM), and both form an essential process for managing MSFC's assets and programs.

## **2. APPLICABILITY**

2.1 This MWI applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. ("Contractors," for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

2.2 This MWI applies to the Michoud Assembly Facility.

2.3 This MWI applies as follows: all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms: "may" or "can" denotes discretionary privilege or permission; "should" denotes a good practice and is recommended, but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.

2.4 This MWI applies the following: all document citations are assumed to be the latest version unless otherwise noted.

2.5 This MWI applies to institutional, infrastructure and mission support activities at the Center.

## **3. AUTHORITY**

NPR 8000.4, Agency Risk Management Procedural Requirements

## **4. APPLICABLE DOCUMENTS AND FORMS**

4.1 NPR 2810.1, Security of Information Technology

4.2 NPR 7120.5, NASA Space Flight Program and Project Management Requirements

4.3 NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements

4.4 NPR 7120.8, NASA Research and Technology Program and Project Management Requirements

4.5 NPR 8715.3, NASA General Safety Program Requirements

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4.6 NRRS 1441.1, NASA Records Retention Schedules (NRRS)

4.7 MPR 3410.1, Training

4.8 MWI 8715.15, Ground Operational Safety Assessment Program

4.9 MWI 8715.17, Hazardous Operations Readiness Review Program

## 5. INSTRUCTIONS

5.1 The Program, Project, or Institutional Manager shall develop and implement a Risk Management process that includes RIDM and CRM to form an integrated risk management plan for all risks associated with program, project, and institutional safety, cost, schedule, and technical performance and document it in a Program, Project or Institutional Risk Management Plan as specified in NPR 7120.5, NPR 7120.7, NPR 7120.8, NPR 8000.4, NPR 8715.3, MWI 8715.15, and MWI 8715.17.

5.2 The NASA Risk Management process is outlined in Figure 1. Both RIDM and CRM are applied within a graded approach. The resources and depth of analysis need to be commensurate with the stakes and the complexity of the decision situations being addressed.

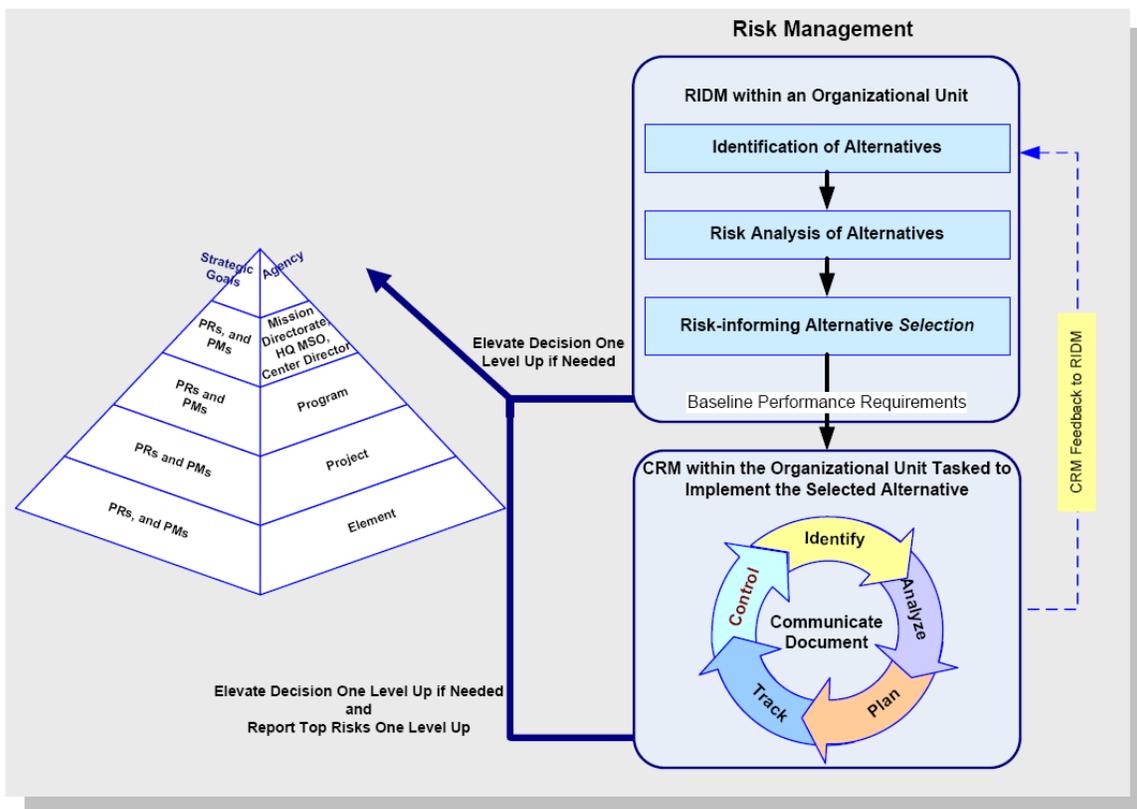


Figure 1. The Coordination of RIDM and CRM within the NASA Hierarchy (Illustrative).

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5.3 RIDM process within each organizational unit involves:

5.3.1 Identification of decision alternatives, recognizing opportunities where they arise, and considering a sufficient number and diversity of performance measures to constitute a comprehensive set for decision-making purposes.

5.3.2 Risk analysis of decision alternatives to support ranking.

5.3.3 Selection of a decision alternative *informed by* (not solely based on) risk analysis results.

*Note: For detail information on the Risk-Informed Decision Making Process, refer to NASA/SP-2010-576 Version 1.0 April 2010.*

5.4 The Continuous Risk Management (CRM) process uses the following steps to reflect the process required by NPR 8000.4, which are basic to either programs/projects or institutional risk management. This is a continuous process of identifying risks, and following through to either complete mitigation and closure, or transfer to being worked as a problem if they occur.

5.4.1 **Identify**. Identify contributors to risk (shortfalls in performance relative to the baseline performance requirements).

5.4.2 **Analyze**. Estimate the probability and consequence components of the risk through analysis, including uncertainty in the probabilities and consequences and, as appropriate, estimate aggregate risks.

5.4.3 **Plan**. Decide on risk disposition and handling, develop and execute mitigation plans, and decide what to track.

5.4.4 **Track**. Track observables relating to performance measures (e.g., technical, safety, performance data, and schedule variances). Electronic Project Online Risk Tool (ePORT) is the tool used for documenting and tracking Institutional Risks.

5.4.5 **Control**. Control risk by evaluating tracking data to verify effectiveness of mitigation plans, making adjustment to the plans as necessary and executing control measures.

5.4.6 **Communicate and Document**. Communicate and document the above activities throughout the process.

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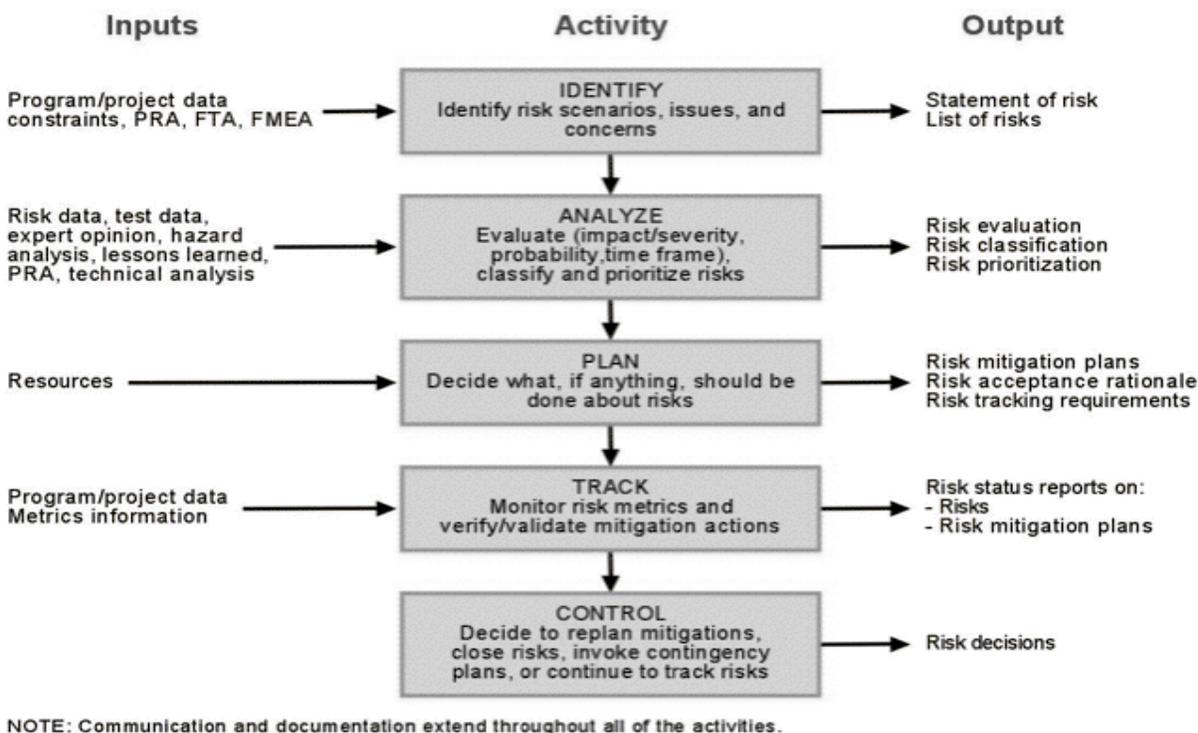


Figure 2. The CRM Process Steps.

5.5. All programs, projects, and institutions shall designate a Risk Manager for their units and prepare a Risk Management Plan in accordance with NPR 8000.4. The risk management methods, tools, and level of effort dedicated to Risk Management may be tailored for each program, project, institution or mission support activity. The Risk Management Plan may be a supplement to the program plan, as applicable. The Center Institutional Risk Management Plan is the document that outlines Institutional Risk Management activities.

5.5.1 The Program, Project, or Institutional Risk Management Plan shall include:

5.5.1.1 Risk List Generation. This list identifies the risks that impact your program, project, or institutional activity.

5.5.1.2 Periodic Risk Reviews. This review is conducted on a periodic basis to review all risks, risk mitigation, and discuss new risks.

5.5.1.3 Risk Management Review Boards. A major review conducted by the Program, Project or Institutional Manager to discuss risks, risk mitigation, risk elevation/escalation, and residual risk issues.

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5.5.1.4 Quantitative/Qualitative Risk Assessments. Risk assessment refers to the processes used to measure risks. Risks can be measured in a relative, qualitative manner using the Standard 5 x 5 risk matrix. In some instances, risks can be quantified with numerical probabilities of occurrence, and quantitative measures of the resource being impacted (budget, flight system mass, etc.). Numerous tools and techniques exist to perform quantitative risk assessment on program, project or institutional risks; examples include, but are not limited to: probabilistic risk assessment, reliability assessment, cost estimating, safety hazard analysis, and nearly every technical analysis used for margin estimation. Risk assessment techniques feed data to the risk management system for risk-informed decision-making.

5.5.1.5 Operations Risk Management. Used to address operational and interface risks.

5.5.1.6 Institutional Risks. Risks to infrastructure, information technology, resources, personnel, assets, processes, occupational safety, environmental management, or security that affect capabilities and resources necessary for mission success, including institutional flexibility to respond to changing mission needs and compliance with external requirements (e.g., Environmental Protection Agency or Occupational Safety and Health Administration regulations).

5.5.1.7 Risk-Based Acquisition Management Process. Per NPR 8000.4, procurement risks should be considered during acquisition formulation and implementation activities that include strategy development, development of requirements and solicitation instructions, evaluation of proposals, source selections, surveillance planning, and post-award contract monitoring. The Federal Acquisition Regulation (FAR), Parts 7 and 15, and NASA Federal Acquisition Regulation Supplement (NFS), Parts 1807 and 1815, provide requirements for acquisition/contract risk management and further details are provided in NPR 8000.4. The organizational unit manager ensures that the project or procurement technical team prepares a preliminary surveillance plan (referred to as a Quality Assurance Surveillance Plan (QASP)) for tracking risks. The preliminary QASP, which the project office prepares in conjunction with the statement of work, reflects the Government's surveillance approach relative to the perceived risks.

5.5.1.8 Information Management System for Problem Reporting. This is accomplished through the NASA Problem Reporting and Corrective Action System process (PRACAS) or by the program/project corrective action systems.

5.5.1.9 Risk Acceptance. This is the formal process of justifying and documenting a decision determined by an appropriate level of management not to mitigate (or continue to mitigate) a given risk associated with achieving given objectives or given performance requirements.

5.5.1.10 Risk Closure. This is a risk that has been fully mitigated using the available resources and is no longer a threat to the program, project or institutional activity.

5.5.1.11 Risk Surveillance Reporting. Risk review process established by the program/project risk implementation plan.

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5.5.1.12 Risk Supportability Data. Data used in the mitigation of program, project or institutional risks.

5.5.1.13 Risk Trend Analyses. Analysis used by program, project or institutional risk management to provide early warning of risk escalation and the action necessary for risk mitigation.

5.5.2 All program, project and institutional risks shall be documented and communicated within their respective risk databases and organizational unit.

5.5.2.1 The results of the risk management process shall be incorporated into the final technical products.

5.5.3 NPR 2810.1, defines the NASA Information Security Policy for Risk Management planning and risk assessment processes and activities.

5.6 Implement a comprehensive risk-management decision-making process.

5.6.1 The Program, Project, and Institutional Manager shall develop a Risk Management Plan that meets the requirements for Risk Management processes as described in NPR 8000.4, paragraph 3.1.2c.

5.6.2 Risk identification shall involve the entire organizational unit to assess all identifiable risks and risk constraints up front.

5.6.2.1 If an Independent Assessment (IA) has been performed, the program, project or institution shall include the risks identified during the assessment as input to the process.

5.6.3 The Program, Project, and Institutional Manager shall use the risk management process as a basis for decisions to mitigate cost, schedule, technical, environmental, security, or safety risk. Examples include, but are not limited to, mission success criteria; development schedule; budget limits; launch window and vehicle availability; international partner participation; critical single-source suppliers; security or environmental concerns; human space flight safety issues; “fail ops/fail safe” requirements; facilities and infrastructure limitations; technology readiness; surveillance requirements; regulatory changes; and amount and type of testing.

## **5.7 Risk Management (RM) Roles and Responsibilities for Programs, Projects and Institutions**

The Risk Management program management responsibilities are outlined stating the appropriate, roles, and responsibilities of Risk Management actions to be taken when implementing Risk Management into programs, projects or institutions.

5.7.1 Program, Project, and Institutional Manager ensures that RM training is provided to all program, project, and institutional personnel.

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5.7.1.1 Program, Project, and Institutional Manager ensures that the designated Risk Manager has experience in Risk, Decision Analysis and the RM process.

5.7.2. Program, Project, and Institutional Manager and Team presents the RM process and plan to the IMSC/CMC during the approval phase as outlined in NPR 7120.5, NPR 7120.7, NPR 7120.8, and NPR 8000.4.

5.7.2.1 Program, Project, and Institutional Manager and Team elevates through the chain of command and presents to the IMSC/CMC if deemed appropriate by the cognizant director or manager.

5.7.2.2 After the RM process and planning are approved, the Program, Project, and Institutional Manager aggressively implements the Risk Management Plan.

5.7.2.3 Program, Project, and Institutional Manager and Team ensures all prior risk processes and risk statements are promptly transitioned to the selected risk-handling tool (i.e., risk management database or risk management spreadsheet) to be handled in accordance with the approved plan.

5.7.2.4 Program, Project, and Institutional Manager and Team ensures Lessons learned data, expert opinion, and technical analyses are used as an input to evaluate, classify, and prioritize risk.

a. Applicable Program/Project/Institutional risks should be entered into the lessons learned database as appropriate.

5.7.2.5 Program, Project, and Institutional Manager and Team ensures that tools such as HA, FMEA, PRA, FTA, or business environment analysis, as applicable, are used to identify and analyze risk.

5.7.2.6 Program, Project, and Institutional Manager and Team ensures that risk mitigation plans, risk acceptance rationale, and tracking requirements are identified and documented in the risk management database or spreadsheet.

5.7.2.7 Program, Project, and Institutional Manager and Team ensures that the results of this process are documented on a risk information sheet or an equivalent spreadsheet or database.

5.7.2.8 Program, Project, and Institutional Manager and Team ensures that the reporting requirements and frequency are specified in the RM plan.

5.7.2.9 Program, Project, and Institutional Manager and Team routinely monitors risk metrics to verify the effectiveness of the mitigating actions.

5.7.2.10 Program, Project, and Institutional Manager and Team routinely monitors risk metrics to decide whether to close the risk area or to modify the mitigation plan.

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5.7.2.11 Program, Project, and Institutional Manager and Team ensures that status of risk areas are reported as required by the RM plan.

5.7.2.12 Program, Project, and Institutional Manager and Team ensures that program, project and institutional personnel are trained and equipped in the use of Schedule Risk Assessments (SRA) tools and techniques as applicable, and support the program/project as requested in performing periodic SRA.

5.7.3 The Risk Management Review Board or Working Group meets on a periodic basis as determined by the Program, Project, or Institutional Risk Manager.

The Risk Management Review Board or Working Group ensures:

- a. Review risk status and mitigation plans.
- b. Identify and discuss new risks.
- c. Approve risk mitigation and status.
- d. Publish risk review findings.
- e. Determine whether the risk should be elevated/escalated.

5.7.3.1 The Risk Management Review Board or Working Group should conduct periodic reviews to discuss primary risks, risk mitigation, risk priority and residual risk issues.

5.7.4 The IMSC/CMC evaluates/concurs with program/project/institutional RM process and planning including the defined level of acceptable risk, the identification of the program/project type, and the scope of analysis for PRA, FMEA, FTA, and HA, internal or external business environment analysis, as appropriate.

5.7.5 The Office of Procurement shall ensure that RM is included in acquisition planning.

5.7.6 Safety and Mission Assurance (SMA) (QD03) shall provide risk management support upon request from the Program, Project, and Institutional Manager.

5.7.6.1 SMA shall provide RM training to the program, project and institutional organizations.

5.7.6.2 SMA shall act as the RM facilitator of the program, project and institutional risk activities.

5.7.6.3 SMA shall provide input and guidance into the development of the RM plan.

5.7.6.4 SMA shall provide input in the development of the risk statements, risk analysis, and the risk mitigation plans.

5.7.6.5 SMA shall periodically assess the RM process to ensure that risks continue to be managed throughout the program, project, and institutional life cycle.

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5.7.6.6 SMA shall evaluate the implementation of RM requirements in MSFC programs, projects and institutional risk activities.

5.7.7 The Risk Manager shall facilitate the implementation of RIDM and CRM.

## **5.8 Risk Management Tools**

The documents referenced in section 4 provide detailed instructions on the preparation of PRA, FMEA, FTA, SRA, and HA, and they also provide information on other types of Risk Management tools. These analysis/decision tools shall be utilized when risks are being identified and analyzed. In the formulation and approval phases of a program/project, the system architecture is in a conceptual form so the detail of the risk assessment may not be as mature as when the program/project is in the implementation phase.

## **5.9 PERSONNEL RISK MANAGEMENT FACILITATION AND TRAINING**

Both Risk Management facilitation and training is available upon request to all civil service and contractor personnel that participate in NASA risk management activities.

5.9.1 SMA Directorate/QD03 shall provide risk management support upon request from the Program, Project, and Institutional Manager.

5.9.1.1 SMA Directorate/QD03 shall provide input and guidance upon request into the development of the RM plan.

5.9.1.2 SMA Directorate/QD03 shall provide RM training upon request to the program, project and institutional organizations.

5.9.1.3 SMA Directorate/QD20 shall act as the RM facilitator upon request of the program, project and institutional risk activities.

5.9.2 All civil service and contractor personnel that participate in NASA risk management activities shall be trained in the NASA Risk Management training or similar NASA-approved training provided by the contractor to the extent specified in their respective contracts or agreements.

Risk Management training for program/project teams or organizational units is available upon request through the SMA Directorate/QD03 or through SATERN.

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## **6. CANCELLATION**

MWI 7120.6F, Program, Project, and Institutional Risk Management dated September 16, 2010.

*Original signed by*

Patrick E. Scheuermann  
Director

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## **APPENDIX A: DEFINITIONS**

Acceptable Risk. The risk that is understood and agreed to by the program/project/institution, Center Management Council (CMC), Integrated Management System Council (IMSC), Mission Directorate (or Mission Support Office), the Technical Authority (TA), and other customer(s) sufficient to achieve the defined success criteria within the approved level of resources, no further specific mitigating action is required. (Some mitigating actions might have already occurred.)

Accepted Risk. A remaining (residual) risk that has not been completely mitigated and has been accepted by the organization management having primary responsibility for the facility/operation.

Center Management Council (CMC). One of the hierarchy of forums composed of senior management that assesses program or project planning and implementation and provides oversight and direction as appropriate. These forums are established at the Agency, Mission Directorate, Center, and lower levels. [See MPD 1150.1, Charter MC-08.]

Continuous Risk Management (CRM). The process that identifies risks; analyzes their impact and prioritizes them; develops and carries out plans for risk mitigation or acceptance; tracks risks and the implementation of plans; supports informed, timely, and effective decisions to control risks and mitigation plans; and ensures that risk information is communicated and documented.

Failure Mode and Effects Analysis (FMEA). An analysis that examines the conditions that can result in failures of components and the effects of the faults to the system in which they are contained.

Fault Tree Analysis (FTA). A graphical model of the various parallel and sequential combinations of faults that will result in the occurrence of a predefined undesired top-level event in a system.

Hazard Analysis (HA). A comprehensive and systematic method of identifying, examining, and evaluating existing and potential hazards and associated risks for a given facility/operation as a whole, or divided into parts and for providing the recommended corrective actions to eliminate, control, or mitigate these hazards and risks. This level safety assessment is normally conducted for facilities/operations identified with an overall risk level of high or medium.

Independent Assessment (IA). The general term referring to an evaluation of a program or program/project conducted by experts outside the advocacy chain. The evaluation results in an assessment of the program's or project's readiness (i.e., technical, schedule, cost, and risk) to proceed to the next phase in the lifecycle that is reported to a CMC.

Integrated Management System Council (ISMC). One of the hierarchy of forums composed of senior management that assesses institutional planning and implementation and provides

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oversight and direction as appropriate. These forums are established at the Agency, Mission Directorate, Center, and lower levels. [See MPD 1150.1, Charter MC-21.]

Metric. A measurement taken over a period of time that communicates vital information about a process or activity. A metric will drive the appropriate risk mitigation action.

Probabilistic Risk Assessment (PRA). A comprehensive, structured, and logical analysis method aimed at identifying and assessing risks in complex technological systems for the purpose of cost-effectively improving their safety and performance in the face of uncertainties. PRA assesses risk metrics and associated uncertainties relating to the likelihood and severity of events adverse to safety or the mission.

Risk-Informed Decision Making (RIDM). Risk-informed decision-making process uses a diverse set of performance measures (some of which are model-based risk metrics) along with other considerations within a deliberative process to inform decision making.

Risk. The combination of the probability that a program, project, or institutional activity may experience an undesired event and the consequences, impact, or severity of the undesired event, were it to occur. Both the probability and consequences may have associated uncertainties. Some examples of undesired events include a cost overrun, schedule slippage, safety mishap, health problem, malicious activities, environmental impact, failure to achieve a needed scientific or technological breakthrough, or failure to meet mission success criteria.

Risk Assessment. An evaluation of a risk item that determines: (1) what can go wrong; (2) how likely is it to occur; and (3) what the consequences would be.

Risk Management. Includes RIDM and CRM in an organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program, project, or institutional goals.

Risk Mitigation. The process of applying methods, tools, and resources aimed at eliminating the risk or reducing the likelihood and/or consequence of a risk. This may be accomplished through engineering changes to design, processes, or procedures; schedule realignment; budget adjustments; or alternate paths and approaches.

Schedule Risk Assessment (SRA). A quantitative analysis of a project's scheduled task durations that provides a range of probable completion dates with the associated probabilities for each. If the schedule is resource loaded, a quantitative cost analysis may also be performed using the schedule data. This cost analysis would provide a range of probable project costs with probabilities for each cost. The SRA could provide the basis for project schedule margin and recommended budgetary reserves.

Technical Authority (TA). The individual who specifically maintains technical responsibility over establishment of, changes to, and waivers of requirements in a designated area.

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## **APPENDIX B: ACRONYMS**

CMC: Center Management Council  
CRM: Continuous Risk Management  
ePORT: Electronic Project Online Risk Tool  
EVM: Earned Value Management  
FAR: Federal Acquisition Regulation  
FMEA: Failure Mode and Effects Analysis  
FTA: Fault Tree Analysis  
HA: Hazard Analysis  
IA: Independent Assessment  
IMSC: Integrated Management System Council  
MC: Marshall Charter  
NFS: NASA Federal Acquisition Regulation Supplement  
NRRS: NASA Records Retention Schedules  
PHA: Preliminary Hazard Analysis  
PRA: Probabilistic Risk Assessment  
PRACAS: Problem Reporting and Corrective Action System  
QASP: Quality Assurance Surveillance Plan  
QD20: Mission Systems Assurance and Technical Support/Risk Management  
RIDM: Risk-Informed Decision Making  
RM: Risk Management  
S&MA: Safety and Mission Assurance  
SATERN: System for Administration, Training, and Educational Resources for NASA  
SP: Special Publication  
SRA: Schedule Risk Assessment  
TA: Technical Authority

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**APPENDIX C: VERIFICATION MATRIX (RESERVED)**

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## **APPENDIX D: RECORDS**

D.1 The Program/Project and Institutional Offices maintains the following risk management records as part of their program/project or Institutional files per MPR 1440.2:

D.1.1 Risk Management Plan. This plan is defined by the Program/Project and Institutional risk management implementation plan and process.

D.1.2 Risk Analysis/Risk Information Sheet (or equivalent). This report documents key risks context information to include: risk likelihood, consequence, mitigation plan, risk statement, risk owner, etc.

D.1.3 Risk Mitigation Plan. This document identifies the mitigation process to reduce or eliminate the risks.

D.1.4 Risk Area Action Closure. This documents the formal closure of a risk.

D.1.5 Top Risk Matrix Report. This report covers the top risks as defined by the program/project.

D.2 Retention periods for these records are determined per NRRS 1441.1.

D.2.1 Program/project risk management records are maintained per NRRS, schedule 8, items 101, 103, or 107; the specific item used depends on the program/project to which they apply.

D.2.2 Institutional risk management records are maintained per the NRRS schedule for the subject area (e.g., Information Technology risk records fall in NRRS, schedule 2, item 27) or, if not otherwise covered in the schedules, NRRS 1/120/E; retire when the risk assessment/analysis is complete/inactive; destroy when 15 years old.

D.3 Risk Management Training Records. The Training and Incentives Office maintains the NASA Risk Management training records per MPR 3410.1. These training records are kept to show that an individual has received training in the NASA Risk Management process.

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## **APPENDIX E: REFERENCES**

E.1 Federal Acquisition Regulation (FAR)

E.2 NASA Federal Acquisition Regulation Supplement (NFS)

E.3 NASA/SP-2010-576 *NASA Risk-Informed Decision Making Handbook* E.4 NPR 2810.1D,  
NASA Information Security Policy

E.4 NPR Technical Probabilistic Risk Assessment (PRA) Procedures for Safety and Mission  
Success for NASA Programs and Projects

E.5 MPD 1150.1, Charter MC-08, MSFC Center Management Council (CMC)

E.6 MPD 1150.1, Charter MC-21, MSFC Integrated Management System Council (IMSC)