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Space project management

Risk management

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Foreword

This Standard is one of the series of ECSS Standards intended to be applied together for the management, engineering and product assurance in space projects and applications. ECSS is a cooperative effort of the European Space Agency, national space agencies and European industry associations for the purpose of developing and maintaining common standards.

Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

The formulation of this Standard takes into account the existing ISO 9000 family of documents.

This Standard has been prepared by the ECSS Risk Management Working Group, reviewed by the ECSS Technical Panel and approved by the ECSS Steering Board.

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Introduction

Risks are a threat to the project success because they have negative effects on the project cost, schedule and technical performance.

The objective of project risk management is to identify, assess, reduce, accept, and control space project risks in a systematic, proactive, comprehensive and cost effective manner, taking into account the project's technical and programmatic constraints. Risk is considered tradable against the conventional known project resources within the management, programmatic (e.g. cost, schedule) and technical (e.g. mass, power, dependability, safety) domains. The overall risk management in a project is an iterative process throughout the project life cycle, with iterations being determined by the project progress through the different project phases, and by changes to a given project baseline influencing project resources.

Risk management is implemented at each level of the customer-supplier network.

Known project practices for dealing with project risks and addressed in other ECSS Standards, such as: system and engineering analyses, analyses of safety, critical items, dependability, critical path, cost, are an integral part of project risk management. Ranking of risks according to their criticality for the project success allowing to direct management attention to the essential issues is a major objective of risk management.

The project actors agree on the extent of the risk management to be implemented into a given project depending on the project definition and characterization.

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Scope

1.1 General

This Standard defines, extending the requirements of ECSS-M-00, the principles and requirements for integrated risk management on a space project; it explains what is needed to implement a project integrated risk management policy by any project actor, at any level i.e. customer, first level supplier, or lower level suppliers.

This Standard contains a summary of the general risk management process, which is sub-divided into four (4) basic steps and nine (9) tasks. The implementation can be tailored to project specific conditions.

The risk management process requires information exchange between all project domains, and provides visibility over risks, with a ranking according to their criticality for the project; these risks have to be monitored and controlled according to the rules defined for the domain to which they belong.

The fields of application of this Standard are all the space project phases defined in ECSS-M-30.

1.2 Tailoring

When viewed from the perspective of a specific project context, the requirements defined in this Standard should be tailored to match the genuine requirements of a particular profile and circumstances of a project.

NOTE Tailoring is a process by which individual requirements of specifications, standards and related documents are evaluated, and made applicable to a specific project by selection, and in some exceptional cases, modification of existing or addition of new requirements.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For references, subsequent amendments to, or revisions of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references the latest edition of the publication referred to applies.

ECSS-M-00A	Space project management — Policy and principles
ECSS-M-10	Space project management — Project breakdown structure
ECSS-M-20	Space project management — Project organization
ECSS-M-30	Space project management — Project phasing and planning
ECSS-M-40	Space project management — Configuration management
ECSS-M-50	Space project management — Information/documentation management
ECSS-M-60	Space project management — Cost and schedule management
ECSS-M-70	Space project management — Integrated logistics support
ECSS-E-00	Space engineering — Policy and principles
ECSS-E-10	Space engineering — System engineering
ECSS-E-20	Space engineering — Electrical and electronic
ECSS-E-30	Space engineering — Mechanical
ECSS-E-40	Space engineering — Software
ECSS-E-50	Space engineering — Communications
ECSS-E-60	Space engineering — Control systems
ECSS-E-70	Space engineering — Ground systems and operations
ECSS-Q-00	Space product assurance — Policy and principles
ECSS-Q-20A	Space product assurance — Quality assurance
ECSS-Q-30	Space product assurance — Dependability
ECSS-Q-40	Space product assurance — Safety

ECSS-Q-60	Space product assurance — Electrical, electronic and electromechnical (EEE) components
ECSS-Q-70	Space product assurance — Material, mechanical parts and processes
ECSS-Q-80	Space product assurance — Software product assurance
ECSS-P-001	Glossary of terms

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Terms, definitions and abbreviated terms

3.1 Terms and definitions

The following terms and definitions are specific to this Standard in the sense that they are complementary or additional with respect to those contained in ECSS-P-001.

3.1.1
acceptance of (risk)
decision to cope with consequences, should a risk scenario materialize

NOTE 1 A risk may be accepted when its magnitude is less than a given threshold, defined in the risk management policy.

NOTE 2 In the context of risk management, acceptance may mean that even though a risk is not eliminated, its existence and magnitude are acknowledged and tolerated.

3.1.2
(risk) communication
all information and data necessary for risk management addressed to a decision-maker

3.1.3
(risk) index
a score used to measure the magnitude of the risk; It is the product of the likelihood of occurrence and the severity of consequence, where scores are used to measure likelihood and severity

3.1.4
individual (risk)
risk identified, assessed and mitigated as distinct risk items in a project

3.1.5
(risk) management
the systematic and iterative optimization of the project resources, performed according to the established project risk management policy

3.1.6
(risk) management policy
describes what is the organization's attitude towards risks; how it is enabled to conduct risk management; what risks it is prepared to accept; and defines the main requirements for the risk management plan

3.1.7
(risk) management process
consists of all the project activities related to the identification, assessment, reduction and acceptance of risks

3.1.8
overall (risk)
risk resulting from the assessment of the combination of individual risks and their impact on each other, in the context of the whole project

NOTE Overall risk may be expressed as a combination of qualitative and quantitative assessment.

3.1.9
(risk) reduction
implementation of measures that leads to reduction of the likelihood or severity of risk

NOTE Preventive measures aim at eliminating the cause of a problem situation and mitigation measures aim to prevent the propagation of the cause to the consequence, or reduce the severity of the consequence or the likelihood of the occurrence.

3.1.10
residual (risk)
the risk remaining after implementation of risk reduction measures

3.1.11
resolved (risk)
a risk which has been rendered acceptable

3.1.12
risk
an undesirable situation or circumstance that has both a likelihood of occurring and a potential negative consequence on a project

NOTE Risks arise from uncertainty due to a lack of predictability or control of events, and are inherent to any project, and can arise at any time during the project life cycle; reducing these uncertainties reduces the risk.

3.1.13
(risk) scenario
the sequence or combination of events leading from the initial cause to the unwanted consequence

NOTE The cause can be a single event, or something activating a dormant problem.

3.1.14
(risk) trend
the evolution of risks throughout the life cycle of a project

3.1.15
unresolved (risk)
a risk for which risk reduction attempts are not feasible, or which cannot be verified, or have proven unsuccessful: a risk remaining unacceptable

3.2 Abbreviated terms

The following abbreviated terms are defined and used within this Standard.

Abbreviation	Meaning
IEC	International Electrotechnical Commission

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Principles of risk management

4.1 Risk management concept

Risk management is a systematic and iterative process for optimizing resources in accordance with the project's risk management policy. It is integrated through defined roles and responsibilities into the day-to-day activities in all project domains. Risk management assists managers and engineers when including risk aspects into management and engineering practices and judgement throughout the project life cycle. It is performed in an integrated, holistic way, maximizing the overall benefits, in areas such as:

- design, construction, testing, operation, maintenance, and disposal, together with their interfaces;
- control over risk consequences;
- management, cost, schedule.

This process adds value to the data that is routinely developed, maintained, and reported.

4.2 Risk management process

The entire spectrum of risks is assessed. Trade-offs are made among different, and often competing, goals. Undesired events are assessed for their severity and likelihood of occurrence. The assessment of the alternatives for mitigating the risks are iterated and the resulting measurements of performance and risk trend are used to optimize the tradable resources.

Within the risk management process available risk information is produced and structured, facilitating risk communication and management decision making. The results of risk assessment and reduction and the residual risks are communicated to the project team for information and follow-up.

4.3 Risk management implementation into a project

Risk management requires corporate commitment in each actor's organization, and the establishment of clear lines of responsibility and accountability from corporate level downwards. Project management has the overall responsibility for the implementation of risk management, ensuring an integrated, coherent approach for all project domains.

Risk management is a continuous iterative process. It constitutes an integral part of normal project activity and is embedded within the existing management processes. It utilizes the existing elements of the project management processes to the maximum extent possible.

4.4 Risk management documentation

The risk management process is documented to ensure that the risk management policies are established, understood, implemented and maintained, and are traceable to the origin and rationale of all risk related decisions made during the life of the project.

5

The risk management process

5.1 Overview of the risk management process

The iterative 4-step risk management process of a project is illustrated in Figure 1. The tasks to be performed within each of these steps are shown in Figure 2.

Step 1 comprises the establishment of the risk management policy (Task 1) and risk management plan (Task 2), and is performed at the beginning of a project. The implementation of the risk management process consists of a number of "risk management cycles" over the project duration comprising the Steps 2 to 4, subdivided into the 7 Tasks 3 to 9.

The period designated in the illustration with "Risk management process" comprises all the project phases of the project concerned, as defined in ECSS-M-30. The frequency and project events at which cycles are required in a project (only 3 are shown in Figure 1 for illustration purposes) depend on the needs and complexity of the project, and need to be defined during Step 1. Unforeseen cycles are required when changes to, for example, the schedule, technologies, techniques, performance of the project baseline occur.

Risks at any stage of the project are controlled as part of the project management activities.

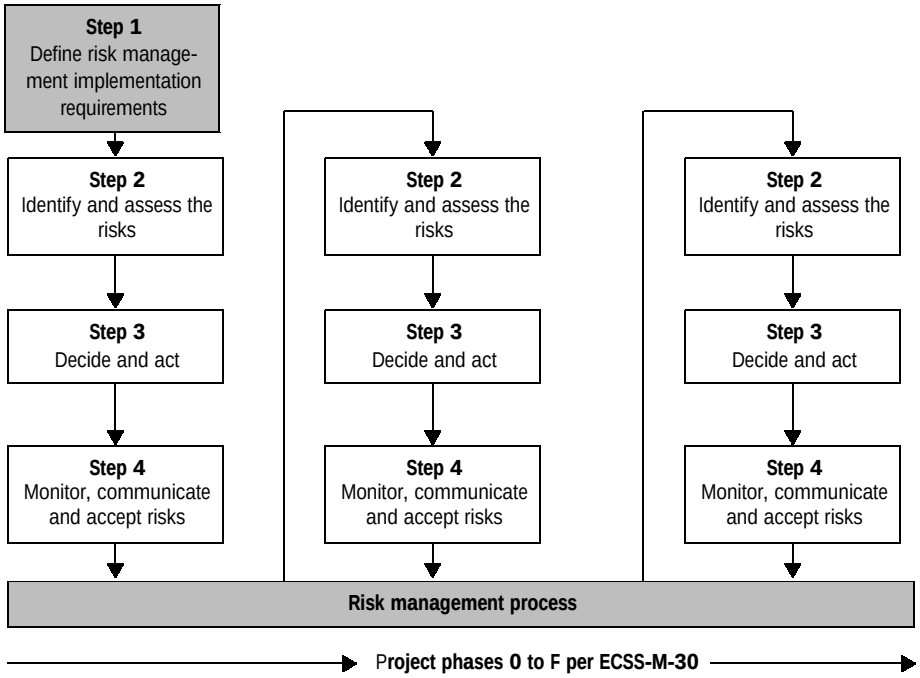

Figure 1: The steps and cycles in the risk management process

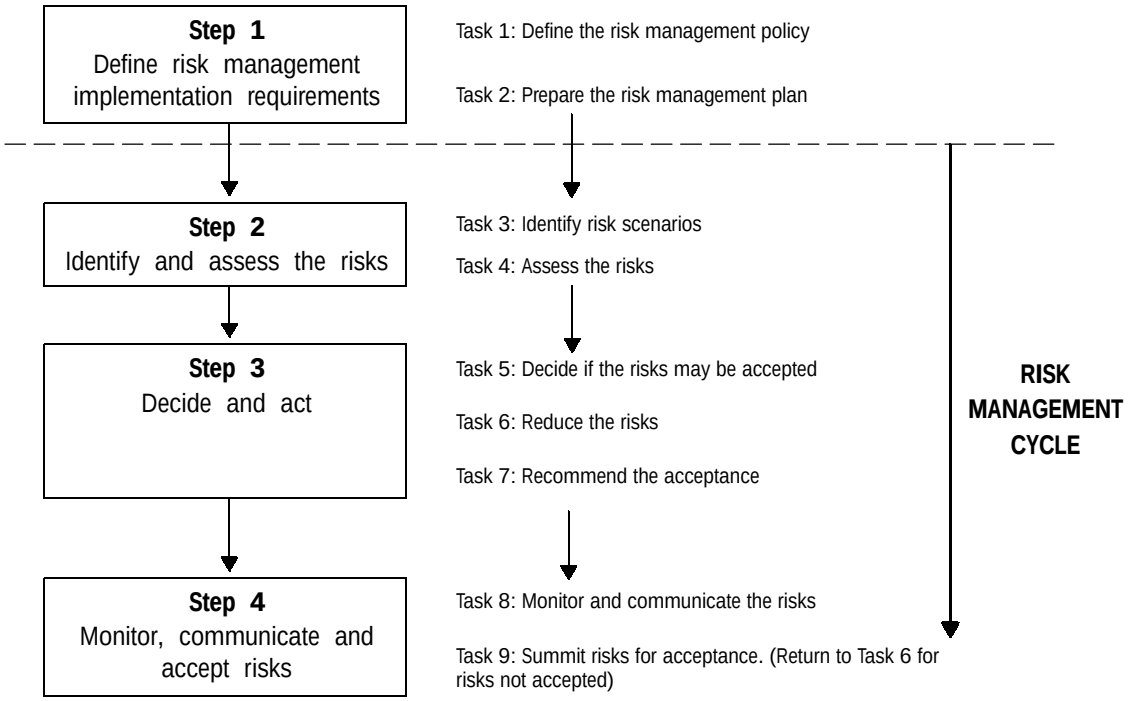

Figure 2: The tasks associated with the steps of the risk management process within the risk management cycle

5.2 Risk management steps and tasks

5.2.1 Step 1: Define risk management implementation requirements

5.2.1.1 Purpose

To initiate the risk management process by defining the project risk management policy and preparing the project risk management plan.

5.2.1.2 Task 1: Define the risk management policy

The following activities are included in this task:

a. Identification of the set of resources with impact on risks.

b. Identification of the project goals and resource constraints.

c. Description of the project strategy for dealing with risks, such as the definition of margins and the apportionment of risk between customer and supplier.

d. Definition of ranking scheme for ranking the risk goals according to the requirements of the project.

e. Establishment of scoring schemes for the severity of consequences and likelihood of occurrence for the relevant tradable resources as shown in, the examples given in Figures 3 and 4[1)].

f. Establishment of a risk index scheme to denote the magnitudes of the risks of the various risk scenarios as shown, for example in Figure 5[2)].

Score	Severity	Severity of consequence: impact on (for example) cost
5	Catastrophic	Leads to termination of the project
4	Critical	Project cost increase > tbd %
3	Major	Project cost increase > tbd %
2	Significant	Project cost increase < tbd %
1	Negligible	Minimal or no impact

Figure 3: Example of a severity of consequence-scoring scheme

Score	Likelihood	Likelihood of occurrence
5	Maximum	Certain to occur, will occur one or more times per project
4	High	Will occur **frequently**, about 1 in 10 projects
3	Medium	Will occur **sometimes**, about 1 in 100 projects
2	Low	Will **seldom** occur, about 1 in 1000 projects
1	Minimum	Will **almost never** occur, 1 of 10 000 or more projects

Figure 4: Example of a likelihood-scoring scheme

1) In the examples five categories are used for illustration only; more, or less categories or designations are also possible.

2) In the example risk magnitude categorization (red, yellow, green) is used for illustration only. Different designations are also possible.

g. Establishment of criteria to determine the actions to be taken on risks of various risk magnitudes and the associated risk decision levels in the project structure (as in the example in Figure 6)[3)].

h. Definition of risk acceptance criteria for individual risks.

i. Establishment of a method for the ranking and comparison of risks.

j. Establishment of a method to measure the overall risk.

k. Establishment of acceptance criteria for the overall risk.

l. Definition of the strategy, and the formats to be used for communicating risk data to the decision-makers, and for monitoring the risks.

m. Description of the review, decision and implementation flow within the project concerning all risk management matters.

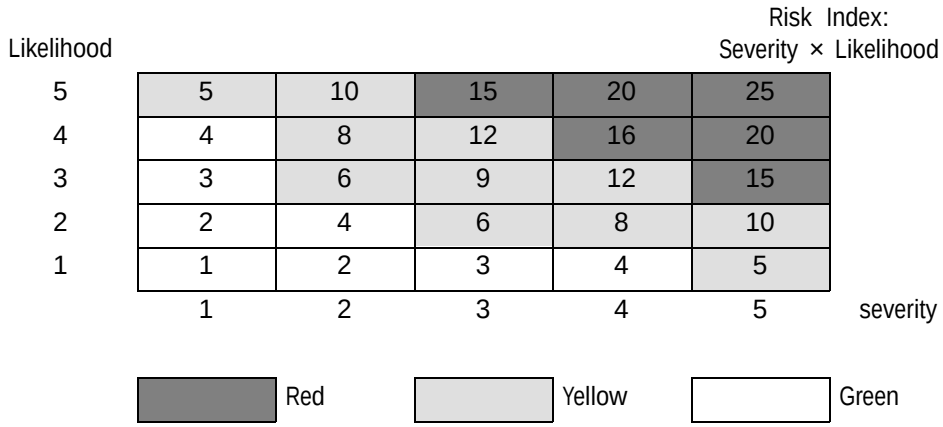

Figure 5: Example of risk index scheme

Risk index	Risk magnitude	Proposed actions
R ≥ 20	Maximum risk	Unacceptable risk: implement new team process or change baseline – seek project management attention at appropriate high management level as defined in the risk management plan.
15 ≤ R < 20	High risk	Unacceptable risk: see above.
10 ≤ R < 15	Medium risk	Unacceptable risk: aggressively manage, consider alternative team process or baseline – seek attention at appropriate management level as defined in the risk management plan.
4 < R < 10	Low risk	Acceptable risk: control, monitor – seek responsible work package management attention.
R ≤ 4	Minimum risk	Acceptable risk: see above.

Figure 6: Example of risk magnitude designations and proposed actions for individual risks

3) In the example risk magnitude designation, acceptability and proposed actions are used for illustration only. Project specific policy definitions may be different.

5.2.1.3 Task 2: Prepare the risk management plan

The risk management plan contains the following typical data:

a. Description of the project risk management organization.

b. Summary of the risk management policy.

c. The risk management related documentation and follow-up concept.

d. The scope of risk management over the project duration.

5.2.2 Step 2: Identify and assess the risks

5.2.2.1 Purpose

To identify each of the risk scenarios, to determine then, based on the outputs from Step 1, the magnitude of the individual risks and, finally, to rank them. Data from all project domains are used (managerial, programmatic, technical).

5.2.2.2 Task 3: Identify risk scenarios

The following activities are included in this task:

a. Identification of the risk scenarios, including causes and consequences, according to the risk management policy.

b. Identification of the means of early warning (detection) for the occurrence of an undesirable event, to prevent propagation of consequences.

c. Identification of the project objectives at risk.

5.2.2.3 Task 4: Assess the risks

The following activities are included in this task:

a. Determination of the severity of consequences of each risk scenario.

b. Determination of the likelihood of each risk scenario.

c. Determination of the magnitude of risk of each risk scenario.

d. Utilisation of available information sources and application of suitable methods to support the assessment process.

e. Ranking of each risk scenario according to its risk index and identification of the scenarios with the highest risk indices.

f. Determination of the overall project risk through an evaluation of identified individual risks, their magnitudes and interactions and resultant impact on the project.

5.2.3 Step 3: Decide and act

5.2.3.1 Purpose

To analyze the acceptability of risks and risk reduction options according to the risk management policy, and to determine the appropriate risk reduction strategy.

5.2.3.2 Task 5: Decide if the risks may be accepted

The following activities are included in this task:

a. Application of the risk acceptance criteria to the risks.

b. Identification of acceptable risks, the ones which will be subjected to risk reduction, and determination of the management decision level.

c. For accepted risks proceed directly to Step 4; for unacceptable risks proceed to Task 6.

5.2.3.3 Task 6: Reduce the risks

The following activities are included in this task:

a. Determination of preventative and mitigation measures options for each unacceptable risk.

b. Determination of risk reduction success, failure and verification criteria.

c. Determination of the risk reduction potential of each measure in conjunction with the optimization of tradable resources.

d. Selection of the best risk reduction measures, and decision on priorities for implementation, at the appropriate decision making level in the project according to the risk management plan.

e. Verification of risk reduction.

f. Identification of the risks that cannot be reduced to an acceptable level and presentation to the appropriate management level for disposition.

g. Identification of the reduced risks for which risk reduction cannot be verified.

h. Identification of the risk reduction potential of all risk reduction efforts with respect to the overall risk.

i. Record the successfully reduced risks in a resolved risks list, and the unsuccessfully reduced risks in an unresolved risks list: present the latter to the appropriate management level for disposition.

5.2.3.4 Task 7: Recommend acceptance

The following activities are included in this task:

a. Decision options for acceptance of risks.

b. Approval of acceptable and resolved risks.

c. Presentation of unresolved risks for further action.

5.2.4 Step 4: Monitor, communicate and accept risks

5.2.4.1 Purpose

To track, monitor, update, iterate and communicate risks, and finally to accept the risks.

5.2.4.2 Task 8: Monitor and communicate the risks

The following activities are included in this task:

a. Periodical assessment and review of all identified risks and updating of the results after each iteration of the risk management process.

b. Identification of changes to existing risks and initiation of new risk analysis needed in order to decrease uncertainties.

c. Verification of the performance and effect of corresponding risk reduction.

d. Illustration of the risk trend over the project evolution by identifying how the magnitudes of risk have changed over project time.

   An example for a risk trend of technical risks, which are main risk contributors at the first project milestone is provided in Figure 7.[4)] S1, S2 and S3 are three risk scenarios.

e. Communication of the risks and the risk trend to the appropriate level of management.

f. Implementation of an alert system for new risks.

[4)] In the example the evolution of 'S1' shows that in spite of risk reduction efforts, risk trend can worsen before improvement.

Risk magnitude		Risk trend during project phases A, B, C/D
R ≥ 20	**Maximum**	S1
15 ≤ R <20	**High**	S2
10 ≤ R **<** 15	**Medium**	
4 < R **<** 10	**Low**	S3
R ≤ 4	**Minimum**	
		Phase A Phase B Phase C/D

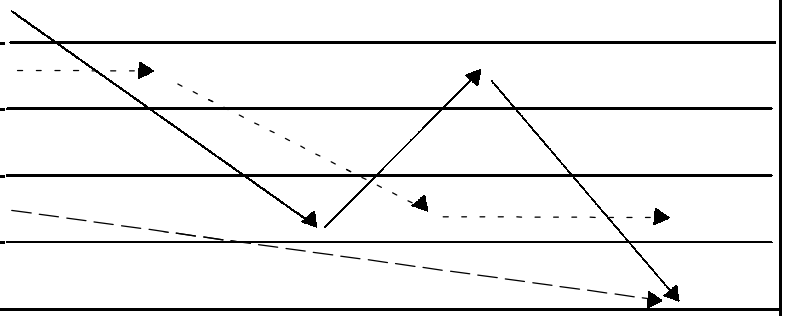

Figure 7: Example of a risk trend

5.2.4.3 Task 9: Submit risks for acceptance

The following activities are included in this task:

a. Submittal of the risks for formal risk acceptance by the appropriate level of management.

b. Return to Task 6 for risks not accepted.

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6

Risk management implementation

6.1 General considerations

a. Risk management is performed within the normal project management structure, ensuring a systematic risk identification, assessment and follow-up of risks.

b. Risk management is implemented as a team effort, with tasks and responsibilities being assigned to the functions and individuals within the project organization with the most relevant expertise in the areas concerned by a given risk.

c. The results of risk management are considered in the routine project management process and in the decisions relative to the baseline evolution.

d. Risk management draws on existing documentation as much as possible.

6.2 Responsibilities

The responsibilities for risk management matters within the project organization are described in the risk management plan. The following approach applies:

a. The project manager acts as the integrator of the risk management function across all concerned project domains. The project manager has the overall responsibility for the integrated risk management within a project and reports the results of the risk management task to the next higher level in the project hierarchy. The project manager defines who in the project is responsible for the control of the risks in their respective domains, and what their communication, information and reporting lines and responsibilities are for risk management matters.

b. Each project domain such as engineering, software, verification, schedule control, manages the risks emanating from their domains, or being assigned for treatment to their domain, under the supervision of the project manager.

c. Risks are formally accepted by next higher level responsibility within the project hierarchy.

6.3 Project life cycle considerations

Risk management activities take place during all project phases per ECSS-M-30. The following project activities are concerned with risk management:

a. Project feasibility studies, trades and analyses (such as design, production, safety, dependability, operations).

b. The allocation of tasks, manpower and resources according to the ranking of risks.

c. The evolution of the technical concept through iterative risk assessment.

d. Evaluation of changes for risk impact.

e. The development, qualification, acceptance and operation of the project by using risk assessment as a diagnostic tool and for finding corrective actions.

f. Assessment of the overall risk status of projects as part of all formal project reviews.

6.4 Risk visibility and decision making

a. Management processes and information flow within the project organization ensure a high visibility of the prevailing risk. Risk information is presented to support management decision-making, including an alert system for new risks.

b. Action plans are prepared covering all outstanding risk items whose magnitude are above the level specified in the project risk management policy to increase their visibility, to permit rapid decision making, and to ensure that their status is regularly reported to the relevant management level, and to all actors impacted by the risk consequences.

c. Information on all identified risks and their disposition are kept in a database.

6.5 Documentation of risk management

a. Risk management documents are maintained so that each step of the risk management process, and the key risk management results and decisions, are traceable and defensible.

b. The risk management process draws on the existing project data to the maximum extent possible, but documentation established specifically for risk management includes information on project specific risk management policy; objectives and scope; the risk management plan; the identified scenarios; likelihood of events; risk results; risk decisions; records of risk reduction and verification actions; risk trend data; risk acceptance data.

c. The data emanating from risk management activities are recorded in a risk management database containing all data necessary to manage risks and document the evolution of risks over the project duration. The database is a living document, and is maintained current. Extracts from the database are presented at project meetings, reviews and milestones as required by the risk management plan. Items to be candidates for “lessons learned” are identified. The database is accessible to actors as appropriate.

d. Example forms for the registration and ranking/logging of risk items are presented in annex A to this Standard.

7

Risk management requirements

7.1 General

The requirements in this section are numbered. Each numbered requirement is composed of the wording of the requirement proper, and accompanied by an explanatory text attached to the general requirement (aim), and the expected output.

7.2 Risk management process requirements

7.2.1

The basis for risk management shall be the 4-step process and 9 tasks illustrated in the Figures 1 and 2 of this document. The starting point for risk management shall be the formulation of the risk management policy at the beginning of the project.

AIM: Establish a risk management policy for the project concerned:

— meeting customer requirements;

— covering all project domains such as management, engineering, performance, schedule, cost;

— taking into account the project resources such as margins in schedule, cost, performance, power;

— establishing scoring and risk ranking criteria allowing to take actions and decisions on the treatment of individual and overall risks;

— defining requirements for risk management.

EXPECTED OUTPUT: *Risk management policy, methods and formats as part of the risk management plan.*

7.2.2

A risk management plan shall be established by each supplier.

AIM: Assemble in a single document all elements necessary to ensure implementation of a risk management commensurate with the project domains, organization and management, while meeting customer requirements.

EXPECTED OUTPUT: *Risk management plan.*

7.2.3

Risk scenarios shall be identified.

AIM: Identify risk scenarios in a structured way for all domains (such as, management, engineering, software, test, operations), using available information sources such as:

— previous analysis, lessons learned and historical data;

— expert interviews and experience data;

— data extrapolation;

— simulations, test data and models;

— detailed safety and dependability analysis (see ECSS-Q-30 and ECSS-Q-40);

— analysis of all work breakdown structures and levels;

— comparison of goals and plans;

— analysis of resources;

— analysis of suppliers;

— analysis of proposed changes;

— test results;

— non-conformance reports.

EXPECTED OUTPUT: *List of risk scenarios.*

7.2.4

The risk scenarios shall be assessed.

AIM: To facilitate understanding and comparison of the identified risk scenarios, by applying the scoring method and scheme defined in the risk management policy.

EXPECTED OUTPUT: *Criticality scoring for each risk scenario and overall risk overview.*

7.2.5

The risk scenarios shall be analysed for their acceptability.

NOTE In the context of risk management, acceptance may mean that even though a risk is not eliminated, its existence and magnitude are acknowledged and tolerated.

AIM: Identify acceptable risks, which are not subject to risk reduction, and unacceptable risks subject to risk reduction.

EXPECTED OUTPUT: *Lists identifying acceptable risks and unacceptable risks.*

7.2.6

Risks shall be reduced in accordance with the risk management policy.

AIM: Reduce unacceptable risks to an acceptable level applying methods aiming at reducing the probabilities or severity of risk scenarios, or reducing the uncertainties in risk data, applying measures such as:

— modification of requirements or contract;

— change of design, baseline or project structure;

— introduction of, for example, failure tolerance in accordance with ECSS-Q documents;

— acquisition of additional resources or redirection of resources;

— augmentation of test or analysis.

EXPECTED OUTPUT: *List of resolved risks; list of unresolved risks.*

7.2.7
The overall risk after consideration of the risk reduction shall be determined.

7.2.8
Options for acceptance of resolved, acceptable and overall risks shall be defined where appropriate and presented to the appropriate management level, as defined in the risk management plan, for disposition.

AIM: Determination and implementation of the appropriate risk resolution options.

7.2.9
Unresolved risks shall be presented to the appropriate management level, as defined in the risk management plan, for further disposition.

AIM: Arrive at a disposition of unresolved risks at the management level defined in the risk management plan.

EXPECTED OUTPUT: *Disposition records as appropriate.*

7.2.10
Risks shall be monitored, communicated and results be displayed.

AIM: Ensure a complete and systematic control of the implementation of risk management activities.

EXPECTED OUTPUT: *Risk trend charts, risk lists and records, risk management file, risk alert system.*

7.2.11
Residual risks at the end of a risk management cycle shall be submitted to the appropriate management level, as defined in the risk management plan, for acceptance.

AIM: Formal acceptance of residual risks at the appropriate management level.

7.3 Risk management implementation requirements

7.3.1
Risk management shall be implemented at each level of the customer-supplier network.

7.3.2
Risk management shall be implemented in a cost-effective manner, using the existing project organization to the maximum extent.

AIM: To establish a coherent risk management structure, integrated in the project organization, with a view to obtaining benefits that outweigh the cost of risk management implementation.

EXPECTED OUTPUT: *Risk management enabled project organization, risk management schemes and procedures.*

7.3.3
The risk management process shall be monitored.

7.3.4
Lessons learned exercise on the risk management process shall be performed.

7.3.5
Recognized improvements to the risk management process shall be implemented with the project progress.

AIM: To improve the risk management process.

Annex A (informative)

Risk register example and ranked risk log example

RISK REGISTER (Example)

Project:	Organisation:	Source:	Date:
WBS Ref.:		Controlled by:	Issue:
		Supported by:	

RISK SCENARIO and MAGNITUDE

No.	Risk scenario title:

Cause and consequence:

Severity (S)					Likelihood (L)					Risk Index	RED	YELLOW	GREEN	Risk Domain
Negligible 1	Significant 2	Major 3	Critical 4	Catastrophic 5	Minimum 1	Low 2	Medium 3	High 4	Maximum 5	(R=SxL)	(*)	(*)	(*)	(**)

RISK DECISION and ACTION

Accept Risk j	Reduce Risk j

Risk reduction measures:	Verification means:	Expected risk reduction (severity, likelihood, Risk index):
Action:		Status:

Agreed by Project Management:			Risk Rank:
Name:	Signature:	Date:	

Notes
(*) Mark box as appropriate for the value of "R" (risk index), according to the criteria defined in the risk management policy
(**) Indicate risk domain, e.g. technical, cost or schedule

RANKED RISK LOG (Example)

Project:	Organisation:	Date: Issue:

Rank	No.	Risk scenario title	Red	Yellow	Green	Risk Domain	Actions and status
			(*)	(*)	(*)	(**)	

Notes
(*) Mark box as appropriate for the value of "R" (Risk index) from the risk register, according to the criteria defined in the risk management policy
(**) Indicate risk domain, e.g. technical, cost or schedule

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Annex B (informative)

Contribution of ECSS Standards to the risk management process

B.1 General

Other ECSS Standards contain requirements relevant to the risk management process. The main domains covered in level 1 and 2 standards are listed below.

B.2 ECSS-M Standards

- ECSS-M-00: This document, ECSS-M-00-03, is considered an extension of the requirements on risk management of ECSS-M-00.
- ECSS-M-10, ECSS-M-20: Partitioning the project into technical and manageable elements ensures that items or tasks at risk can be unambiguously identified and allocated, and interfaces contributing to risk be identified.
- ECSS-M-30: Partitioning the project into phases with reviews at critical project stages provides significant events for reviewing the identified risks and eventually assessing new risk scenarios evolving with the project progress, applying the risk assessment policy adopted for the project.
- ECSS-M-40, ECSS-M-50: The configuration and information/documentation management ensures that all documentation and data of relevance for the risk management process are available and controlled in a systematic manner.
- ECSS-M-60: Controlling the schedule and cost of the project ensures that deviations with bearing on identified risks are detected and remedied, or that risks can be re-assessed in the light of these deviations.
- ECSS-M-70: The logistics support analysis contributes to risk management in providing the data underlying the assessment of risks influenced by operations, maintenance and disposal of the project hardware and software items.

B.3 ECSS-Q Standards

- ECSS-Q-00: The product assurance control processes contribute to the overall risk management process.
- ECSS-Q-20: The control of the product quality ensures that the products concerned by risk management are controlled to meeting their specifications.
- ECSS-Q-30, ECSS-Q-40: The dependability and safety related activities apply where risks are linked to dependability and safety.

- ECSS-Q-60, ECSS-Q-70: The choice of EEE components, material, mechanical parts and processes influence the function and dependability of the design and have therefore an impact on risks.
- ECSS-Q-80: The correct function of software has an influence on risks related to the function of the system.

B.4 ECSS-E Standards

- ECSS-E-00, ECSS-E-10: The engineering and system engineering processes provide a breakdown of engineering activities into manageable and controllable entities, and the demonstration of achievement of the customer's technical requirements. They are essential for identifying and assessing technical risks, and the verification of requirements with bearing on risk.
- ECSS-E-20 to ECSS-E-70: The design of electronic and electrical, mechanical, communications, control and ground support systems and their software as well as of the overall system software has an influence on risks related to the function of the system.

ECSS Document Improvement Proposal

1. Document I.D.	2. Document date	3. Document title
ECSS-M-00-03A	25 April 2000	Risk management

4. Recommended improvement (identify clauses, subclauses and include modified text or graphic, attach pages as necessary)

5. Reason for recommendation

6. Originator of recommendation

Name:	Organization:	
Address:	Phone: Fax: e-mail:	**7. Date of submission:**

8. Send to ECSS Secretariat

Name:	Address:	Phone: +31-71-565-3952
W. Kriedte ESA-TOS/QR	ESTEC, P.O. Box 299 2200 AG Noordwijk The Netherlands	Fax: +31-71-565-6839 e-mail: wkriedte@estec.esa.nl

Note: The originator of the submission should complete items 4, 5, 6 and 7.

This form is available as a Word and Wordperfect-Template on internet under
http://www.estec.esa.nl/ecss/improve/

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