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STATEMENT OF WORK

ECSS Requirements Management System - [E-RMS]

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1 INTRODUCTION

1.1 Scope of the Document

This document describes the activity to be executed, and the deliverables required by the European Space Agency, representing the European Cooperation for Space Standardization, in relation to the new generation of **ECSS Requirements Management System – [E-RMS]**.

It will be part of the Contract and shall serve as an applicable document throughout the execution of the work.

1.2 Understandings

Since its inception in 1996 the ECSS organisation has codified more than 120 standards, containing around 25.000 requirements for the development and operations of European Space Systems. These standards are currently available in the form of documents (MS Word and PDF). With the objective of moving from paper documents as a reference to a digital databased system, the requirements have been copied to a requirements management system using IBM Rational DOORS®, tailored for the purpose of the ECSS context.

With this activity, it is proposed to perform the next step towards the full digital management of the ECSS system, consisting of developing a new ECSS requirements management system called E-RMS. The user requirements that applies are specified in the E-RMS-URD applicable document.

For this activity, it is also required to apply the recommendations provided by ECSS in the ECSS-E-TM-10-23A Space System Data Repository and to use the Object Role Modelling information modelling techniques introduced in that technical memorandum, further described in clause 2.1 and defined in the ORM reference document.

1.3 Applicable and Reference Documents

1.3.1.1 Applicable Documents (ADs)

The following documents, listed in order of precedence, contain requirements applicable to the activity:

E-RMS-URD	<i>E-RMS – User Requirements Document</i>
E-RMS-CDM	<i>E-RMS – Conceptual Data Model including NORMA data repository</i>
ECSS-D-00	<i>ECSS – ECSS Organization and processes</i>

The version of the applicable documents to use for preparing the proposals can be found in:

<https://esabox.esa.int/owncloud/TBC>

password = TBC

The version of the applicable documents to use during the execution of this activity will be provided at kick-off.

1.3.2 Reference Documents (RDs)

BPMN	<i>Business Process Model and Notation</i> refer to https://www.omg.org/spec/BPMN/2.0/
DOORS	Rational dynamic object oriented requirements system refer to https://en.wikipedia.org/wiki/Rational_DOORS



ECSS-E-ST-00-01	<i>ECSS – Glossary of terms</i>
ECSS-E-ST-40	<i>ECSS – Space engineering - Software</i>
ECSS-E-TM-10-23A	<i>ECSS – Space engineering - Space System Data Repository</i>
ECSS-M-ST-10	<i>ECSS – Space project management – Project planning and implementation</i>
ECSS-Q-ST-80	<i>ECSS – Space product assurance – Software product assurance</i>
FBM	<i>Fact Based Modelling standardization Working Group</i> refer to www.factbasedmodelling.org
FAMOUS	<i>Fact based modelling unifying system, ESA TRP contract number 4000107725</i> refer to www.famous2.eu
ISO-29148:2011	<i>ISO – Systems and software engineering – Life cycle processes – Requirement engineering</i> refer to https://www.iso.org/standard/45171.html
OMG-ReqIF	<i>OMG requirements interchange format</i> refer to http://www.omg.org/spec/ReqIF
ORM	<i>Object Role Modelling</i> refer to www.orm.net <i>For an introduction to that methodology, refer e.g. to Object-Role Modeling Fundamentals, a practical guide to data modelling with ORM, Terry Halpin, ISBN 978-1-63462-074-1</i> <i>For the NORMA tool, refer to the resources page of the www.orm.net</i>

ECSS documents are available on the ECSS website, refer to www.ecss.nl

1.4 Terms and definitions

<i>baselined population</i>	<i>population of a model, at a point in time, which serves e.g. as exchange between two or more entities or as a basis for defining changes</i>
<i>conceptual data model</i>	<i>combination of a conceptual schema and its conceptual population</i>
<i>conceptual schema</i>	<i>ontology of the concepts as the users think of them and talk about them</i> NOTE 1 A conceptual schema specifies the semantics, i.e. the WHAT, including the meaning of every term that could be misunderstood by the intended audience and ignoring the aspects of data representation, physical data organisation and access, i.e. the HOW. NOTE 2 A conceptual schema declares the fact types, constraints, derivation rules, events and concepts relevant to the universe of discourse.
<i>data</i>	<i>representation of the information in compliance with a logical schema and a physical schema used for its preservation within a data repository</i>

NOTE Data alone is not information. To reproduce information from data, there is a need to interpret the structural organisation brought by the related physical and logical schemas and to use the semantics carried by the related conceptual schema and.

data repository

data storage entity or entities into which data has been partitioned

NOTE 1 A data repository is a generic term used to refer to the data storage:

- independently of the technology used, e.g. whether the data storage entity is an instance of a commercial or open source data storage product, such as Oracle, MS Excel or even simply a data file (ASCII, XML, etc.);
- independently of the number of physical stores used, e.g. the data can be centralised or distributed involving one or more technology. e.g. an instance of Oracle, together with a number of ASCII and XML files.

NOTE 2 A data repository brings together the discrete data items and operate on them as one, in compliance with the related physical, logical and conceptual definitions.

domain-specific model *model related to a given business*

NOTE 1 Examples of a domain-specific model are models used for requirement management, for capturing the functionality of spacecraft, the design of a spacecraft or the resources within an organisation

NOTE 2 A domain-specific model is specified in accordance with one of the following modelling abstractions:

- at conceptual level, i.e. using a conceptual modelling language resulting in a domain-specific conceptual data model,
- at logical level, i.e. using a logical modelling language resulting in a domain-specific logical model,
- at physical level, i.e. using a physical modelling language resulting in a domain-specific physical model.

external schema

organisation of the human machine interfaces used to create and maintain the information stored within the related data repository

NOTE An external schema provides the means to manage the conceptual population of interest to each community according to their responsibility (roles and privileges) in that overall population.

generic model

model related to a specific modelling methodology or notation

NOTE 1 A generic model is associated to a particular conceptual, logical or physical modelling abstraction.

NOTE 2 Examples:

- at conceptual level, examples are the fact based modelling methodology and related notations, e.g. ORM, CogNIAM, DOGMA, OWL;
- at logical level, examples are relational, object-oriented, network, tree-like structures modelling methodology and related notations;



- at physical level, examples are:
 - for relational modelling, Oracle SQL and related data definition language,
 - for object-oriented modelling: C++ and related class definition language,
 - for tree-like structure modelling: Altova XML and related XML schema definition language.

global model

conceptual data model that captures the universe of discourse

NOTE By nature, a global model is for a multi-domains' universe of discourse whereas interoperability between these multi-domains is key for the business.

local model

domain-specific consistent subset of a global model that represents the universe of discourse of a community

NOTE 1 A local model can be seen as the view of interest of a community.

NOTE 2 In a distributed environment, such local model can be used to express the conceptual data model used by that community to produce their own data repository. The fact that the local models are subsets of the global model enables the capability of interoperability at semantic level.

information

statement of fact or belief

NOTE 1 Information is formally captured by a conceptual data model, populating the related conceptual schema.

NOTE 2 Conceptual modelling implies specifying the constraints that apply to the universe of discourse. Those constraints are used to assess the quality of the information populated in the related internal repositories.

logical schema

technology-dependent description of the data structures used to represent the information

NOTE A logical schema is preferably the result of the transformation of a conceptual schema by injection of technology-dependent constructs.

model

combination of a schema and its population

physical schema

tool-dependent organisation of the data structures used to store the information within the related, tool-dependent, data repository

NOTE A physical schema is usually a tool-dependent representation of a logical schema and complies with the technology-dependent regulations of that logical modelling techniques.

population

data captured according to a schema organisation during the overall life-cycle of the related data repository

process model

[OMG] defined set of business activities that represent the steps required to achieve a business objective

NOTE A business process includes the flow and use of information and resources.



schema *structure that determines the regulations for a universe of discourse*

NOTE The regulations for a universe of discourse consist of the possible and permitted states and the possible and permitted transitions within that universe of discourse.

universe of discourse *aspects of the world that the related community wishes to talk about, is concerned about*

NOTE Depending of the involved community, a universe of discourse can be domain-specific or multi-domains related.

1.5 Acronyms and Abbreviations

BPMN	business process model and notation
CDM	conceptual data model
DB	database
DBMS	database management system
ECSS	European cooperation for space standardization
E-RMS	ECSS requirements management system
FAMOUS	fact based modelling unifying system
FBM	fact based modelling
ICD	interface control document
KOM	kick-off meeting
LDAP	lightweight directory access protocol
MS	Microsoft
OMG	object management group
ORM	object role modelling
RDBMS	relational database management system
SQL	structured query language
URD	user requirements document
SoW	statement of work

2 BACKGROUND AND OBJECTIVES

2.1 Background

2.1.1 Information modelling

To ease the understanding of the modelling concepts used in this Statement of Work and defined in clause 1.4 - Terms and definitions, the following is introduced.

Figure 2-1 provides an overview of what a model is, i.e. the combination of a schema and a population. This figure includes the concepts of:

- a domain-specific model that corresponds to the “Business”. The E-RMS model specified in this Statement of Work is an example of such domain-specific model;
- a generic model that corresponds to one of the many languages that can be used to specify the domain-specific model whereas the population of the generic model corresponds to the schema of the domain-specific model expressed in the chosen generic language.

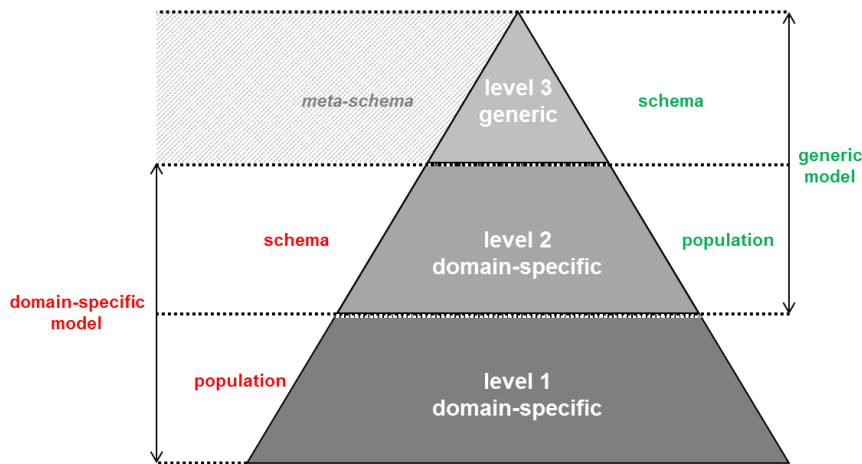


Figure 2-1 Modelling – Generic versus Domain-Specific

Illustrated by Figure 2-2, applying information modelling to the software engineering principles defined by ECSS in ECSS-E-ST-40:

- a conceptual modelling language is used during the requirements engineering process to express the semantics and to specify what information the information system manages,
- a logical modelling language is used during the architecture engineering process to represent how the required information is to be structured from a functional and technological viewpoint to satisfy the information system’s performance requirements,
- a physical modelling language is used during the design engineering process to translate the logical models in the data definition languages exposed by the tools used by the information system (e.g. for the production of the internal data repository, for the interfaces).

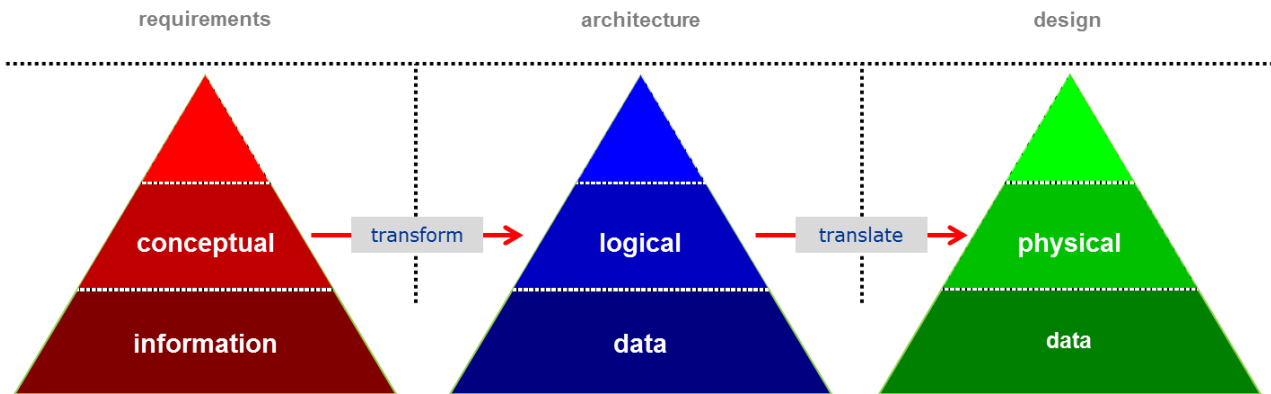


Figure 2-2 Information Modelling Engineering Processes

Reflected by the nature of the ECSS work, in fact, by the ECSS existence itself, developing and operating large systems such as Space Systems imply constant exchanges of information, of knowledge, through multi-levels sets of customer/supplier relationships. In such global environment, interoperability cannot just be limited to assessing how to exchange data contained within data files, how to understand, to interpret an interface control document.

Semantics is expressed using conceptual modelling. Any partner involved, independently of the customer or supplier role(s) played, needs freedom to scope and define his/her universe of discourse to the responsibility he/she plays in the overall Space System. This implies the freedom, for any partner, to define locally the information systems needed, as long as the overall Space System needs are satisfied.

Semantic interoperability ensures that the information exchanged between all partners satisfies the overall Space System needs. Illustrated by Figure 2-3, the concepts of global model versus local models concepts are introduced:

- a global model is a conceptual data model whose purpose is to capture and put in relations the universes of discourse of partners involved, i.e. producing the semantics links between the vocabulary used by each community, deriving how the same semantics modelled by some in a given conceptual way maps the conceptual representation of the others;
- a local model is a conceptual data model that represents the view (a local view) that a given partner has of the global model, meaning the subset of the global model of relevance to that partner.

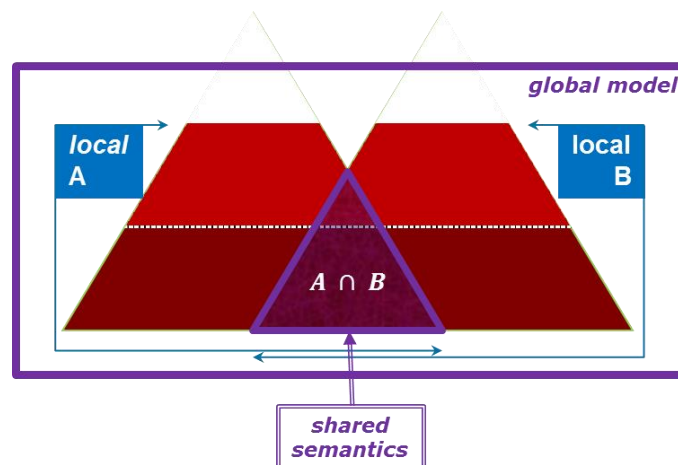


Figure 2-3 Semantic Interoperability in a customer/supplier relationship



2.1.2 ECSS and its Space System Model concept

The “Space System Data Repository” concept introduced in the ECSS-E-TM-10-23A has as objective to capture all knowledge related to a Space System, from its early mission analysis and needs identification phase (Phase 0) to its disposal phase (phase F), refer to ECSS-M-ST-10.

Assuming that one can develop a single, centralised information system (database) that satisfies the needs of all partners involved is an ineptitude. The “Space System Data Repository” is, by nature, a distributed system, made of many data repositories, each one residing in one of the involved partners, some of them being possibly subject to availability limited in time in line with related partner involvement during the lifecycle of the related project.

To ensure a successful interoperability between all data repositories with as objective to ensure the overall quality and efficiency of the Space System, ECSS-E-TM-10-23A requires conceptual modelling the Space System information at “global” level, producing the so-called “Space System Model”.

The Space System Model is a “global” conceptual data model, i.e. a Space System Ontology, made of a conceptual schema and a conceptual population. By conceptual, ECSS means “the knowledge”, independently of how that knowledge is organised, is structured, in the overall Space System Data Repository.

ECSS-E-TM-10-23A requires the global conceptual schema to be specified using a formal, i.e. logic-based, conceptual language that provides the capability:

- to capture the needs of each community (each actor, each stakeholder) involved in the Space System life-cycle,
- to integrate all needs, resulting in a fully consistent global conceptual schema,
- to identify from that global conceptual model, the so-called “local” conceptual views that represent the subsets of the global conceptual model, of relevance to each community.

Since its creation, ECSS has played a leading role in the development of the Space System Model required by the European Space Business. Standardizing the ECSS System and its vocabulary, covering management, product assurance and engineering and addressing the customer-supplier relationships, the information maintained by ECSS represents a source of knowledge for all involved. ECSS-E-TM-10-23A requires now that ECSS information to be formally specified taking into account the information modelling techniques promoted in this Statement of Work.

The conceptual data model addressed by this Statement of Work and related activity can be considered the first building block of the overall Space System Model, since covering the ECSS requirements that represents the first source of requirements of interest to possibly any actor in the European Space Business. Producing a conceptual data model for the ECSS requirements implies, beyond others, specifying the fundamentals that any requirement management data model should cover, e.g. what is a requirement? how to maintain requirements.

It is noted that this Statement of Work focuses on the requirement management aspects of the E-RMS. How to write good requirements, how to verify the quality of a requirement, are requirement engineering issues that are not covered by this activity.

It is also noted that although the E-RMS addresses requirement management, not all conceptual definitions required by ECSS are of interest to any requirement management system. The reverse is also true, not all requirement management system needs are covered by the E-RMS.



Assuming compliance to the Space System Data Repository and Space System Model ECSS-E-TM-10-23A principles, as illustrated by Figure 2-3, a Space Project could:

- use the E-RMS to access the ECSS requirements, e.g. Figure 2-3 local A conceptual view,
- procure a compliant project-specific requirement management system for handling project-specific requirements, e.g. Figure 2-3 local B conceptual view,
- safely exchange, between the two requirement management systems, the shared semantics of interest, for example, those ECSS requirements that apply to the project (exchange from the E-RMS to the project-specific requirement management system), or the project-specific feedback related to how the ECSS requirements have been tailored and used by that project (exchange from the project-specific requirement management system to E-RMS).

2.2 Objectives of the Activity

The main objectives of this activity are:

- 1) to develop a first version of the E-RMS that provides means to support the management of all ECSS standards, including:
 - a) specifying the conceptual, logical and physical schemas required for its internal data repository,
 - b) specifying the external schemas required for its human machine interfaces,
 - c) specifying the conceptual, logical and physical schemas required for the external interfaces,
 - d) specifying the process model required by each ECSS community,
 - e) assessing and specifying the deployment constraints (e.g. security, local and remote access, long term preservation, mirroring, performance scalability availability and network latency) that apply,
 - f) assessing and specifying the needs for prototyping the human machine interfaces and organizing the verification of their adequacy for use by the ECSS community,
 - g) specifying the software requirements,
 - h) creating the architecture of the overall E-RMS,
 - i) designing, producing and testing each functional component in isolation,
 - j) integrating and testing the overall software, using realistic ECSS-based use cases,
 - k) supporting the validation of the E-RMS in conformance with the user requirements,
- 2) to populate the E-RMS with¹:
 - a) a first baseline with all existing C versions of the ECSS standards²,

¹ The main objective of this population exercise is to fully verify the functioning of the E-RMS software and its readiness for operational use by all related communities in line with the related processes.

² The existing C versions of the ECSS standards have a reference number that ends by the “C” character. They can either be found:

- in the Active Standards page of the ECSS website, i.e. <http://ecss.nl/standards/ecss-standards-on-line/active-standards/> or
- in the Superseded ECSS Standards page, i.e. <http://ecss.nl/standards/ecss-standards-on-line/superseded-standards/>

It is noted that some active standards are still in A version. These standards are out of scope for this activity.



- b) for those ECSS standards that have been revised (e.g. ECSS-M-ST-10C Project planning and implementation) and for which some revisions have been published (e.g. ECSS-M-ST-10C Rev.1), to make use of all E-RMS developed capabilities, each related revision,
 - c) a second baseline with all C related versions including all C related revision versions up to the latest available publications³, and including also all related change requests,
- 3) to organize the delivery of the E-RMS, its distributed installation and preliminary acceptance,
 - 4) to participate to the E-RMS delivery, installation and preliminary acceptance,
 - 5) to perform all maintenance activities during the warranty period,
 - 6) to organize and participate to the final delivery, installation and acceptance of the E-RMS software.

³ The latest available C-related publications are either the C version of the standards or a revision version e.g. Rev.1, Rev.2. They can be found in the Active Standards page of the ECSS website, i.e. <http://ecss.nl/standards/ecss-standards-on-line/active-standards/>



3 WORK TO BE PERFORMED

3.1 Work logic

The work to be performed is organized in 2 phases as follows:

- Phase 1: E-RMS Specification
- Phase 2: E-RMS Design and Production

Phase 1 covers all analysis and specification activities of the E-RMS. Phase 1 includes the verification and validation by ESA and ECSS of:

- the adequacy of the proposed specifications,
- the adequacy of the proposed architecture(s),
- the adequacy of the trade-off assessment regarding re-using, with modification, off-the-shelves products versus performing a new development.

Phase 2 covers all design and production activities of the E-RMS. Phase 2 includes the necessary verifications and at the end of the development the validation by ESA and ECSS of the adequacy of the resulting product as well as the deployment, support to users and maintenance during the contracted warranty period.

Within this Statement of Work, the following tasks are introduced:

- Task 1 - E-RMS conceptual data model specification
- Task 2 - E-RMS human machine interfaces related conceptual schema specification
- Task 3 - E-RMS exchange interfaces related conceptual schemas specification
- Task 4 - E-RMS process models specification
- Task 5 - E-RMS human machine interfaces specification
- Task 6 – E-RMS software requirements specification
- Task 7 – E-RMS internal data repository related logical schema specification
- Task 8 – E-RMS architecture
- Task 9 – E-RMS design and production
- Task 10 –E-RMS population baselines
- Task 11 – Preliminary – E-RMS delivery, installation, preliminary acceptance and presentation
- Task 12 – Final – E-RMS delivery, installation, acceptance and presentation

3.2 Understandings [TO MOVE IN CONTRACT CONDITIONS]

Bidders are invited to organise the work to be done taking into account:

- the need to widely interact with the Agency including the time required by the Agency to interact with its ECSS partners, to provide inputs, and
- the wish to minimise the overall duration of this activity.

Bidders shall ensure that all requirements specifications activities that need to be verified and validated by the Agency and ECSS prior to the development of the E-RMS are performed in Phase 1.

For each task proposed, the Bidders should identify:

- the required inputs including selecting from the overall list of applicable and reference documents, those documents or part of the documents of relevance to that task;
- the verification and validation activities required and organize the related reviews.



It is noted that ESA and ECSS attached a large importance to the acceptance by the end-users of the E-RMS product. For that purpose, ESA and ECSS are in charge to produce the so-called E-RMS end-users operation plan. This plan has the purpose to ensure, during the development of this contracted activity, that all necessary material, procedures and verifications are produced and executed in line with the required end-users acceptance. In their proposal, the bidders should include the additional tasks and related deliverables to support ESA and ECSS in this end-users operation objective.

The E-RMS software is classified of "Category D" criticality as defined in annex D.1 of ECSS-Q-ST-80C. Consequently, for this activity, Annex R.1 Table R-1 column D of the ECSS-E-ST-40C and annex D.2 Table D-2 column D of ECSS-Q-ST-80C are applicable. The bidder shall identify those additional documentation required by these standards and add them to the list of deliverables identified in the Statement of Work. The Bidder may propose additional tailoring with explicit justification in order to make the activity more efficient and effective.

The bidder shall propose a fixed firm price (FFP) for the full activity as well as for Phase 1. Phase 2 shall be understood as limit of liability (LoL). At the end of Phase 1, the Contractor shall produce an updated proposal for the work to perform in Phase 2 taking into account the outputs of Phase 1 and the Phase 2 available budget. The Phase 2 authorisation to proceed is subject to an agreed way forward for Phase 2. Should no agreement be reached, the Contract may be closed at the end of Phase 1.

It is noted that the E-RMS solution plays a key role in the future ECSS operations. It is expected that the E-RMS will support the generation, use and maintenance of at least one future major evolution of the ECSS requirements set, leading to an expected lifetime of at least 15-20 years. For these reasons, it is necessary for the ECSS organisation to have a requirements management solution that, in addition to being used, operated and maintained, can evolve in a vendor independent way, with the ECSS guidance and support. This is usually achieved by providing to ECSS (as an entity) all E-RMS software (source and executable code) rights (e.g. copying, distributing, translating, modifying), or a perpetual, exclusive or non-exclusive, E-RMS software license including e.g. enhancement and maintenance, the right to sublicensing, no limitation on hardware or software deployment, on number of users, etc.

3.3 Task 1 - E-RMS conceptual data model specification

Task description

In line with the concepts introduced in ECSS-E-TM-10-23A, the E-RMS conceptual data model can itself be seen as a global model that purpose is to capture all information required to construct the E-RMS software application.

This global model includes all conceptual definitions required by:

- the E-RMS internal data repository,
- the E-RMS human machine interfaces, refer to clause 3.4,
- the E-RMS external interfaces, refer to clause 3.5.

The drafting of the E-RMS conceptual schema has been initiated. Its state is reflected in the E-RMS-CDM applicable document and associated NORMA data repository.

This task consists in fully specifying the conceptual data model required by the E-RMS taking into account the conceptual need of all E-RMS software functions. The resulting conceptual data model is for use to produce the E-RMS internal data repository.

It is noted that the E-RMS human machine interfaces and E-RMS external interfaces requires parts of this conceptual model. The identification of the conceptual definitions of interest to each of these interfaces and the production of the related local models are covered by Task 2 and Task 3.



- req. 001** The Contractor shall develop the E-RMS conceptual data model required for the management of the information required by:
- a. the E-RMS-URD clause 5.2 – E-RMS users,
 - b. the E-RMS-URD clause 5.3 – E-RMS communities, roles and privileges,
 - c. the E-RMS-URD clause 5.5 – E-RMS versioning,
 - d. the E-RMS-URD clause 5.6 – Software problem reporting,
 - e. the E-RMS-URD clause 5.7 – E-RMS human machine interfaces,
 - f. the E-RMS-URD clause 5.8 – Electronic data exchange interfaces,
 - g. the E-RMS-URD clause 5.10 – Collaborative and concurrent access

NOTE For that purpose, the analysis of the conceptual definitions that are already in place at ECSS level, as well as, those produced by other standardization organization, e.g. refer to OMG-ReqIF or ISO-29148:2011 is demanded.

- req. 002** In line with the priority specified in the E-RMS-URD, refer to clause 5.1.2 bullet a, the Contractor shall further develop the E-RMS conceptual data model to fully support the production and maintenance of the ECSS standards including covering the needs of:
- a. the ECSS drafting process, refer to E-RMS-URD requirement 5.9d,
 - b. the ECSS public review process, refer to E-RMS-URD requirement 5.9f,
 - c. the ECSS publication process refer to E-RMS-URD requirement 5.9g,
 - d. the ECSS working group control process, refer to E-RMS-URD requirement 5.9k,
 - e. the ECSS change request process, refer to E-RMS-URD requirement 5.9l,
 - f. the ECSS applicable requirement matrix process, refer to E-RMS-URD requirement 5.9m, and
 - g. the ECSS review board and lessons learned process, refer to E-RMS-URD requirement 5.9n.

NOTE ESA and ECSS foresee other versions of the E-RMS to cover the E-RMS-URD clause 5.1.2 bullets b and c priorities to be part of future activities.

- req. 003** The Contractor shall organise the review of all Task 1 deliveries.

Output

- D01 E-RMS – Conceptual Data Model specification (seen by ECSS, for this E-RMS activity, as a global model)

3.4 Task 2 - E-RMS human machine interfaces related conceptual schema specification

Task description

The E-RMS human machine interfaces provides means to interact with the information, the data managed by the E-RMS. That interaction is deduced from the functional analysis of the ECSS processes addressed in the E-RMS-URD.



The E-RMS human machine interfaces are composed of forms required to create, maintain and visualise (including reporting) the ECSS information stored within the E-RMS internal data repository. Each form “manipulates” a number of conceptual definitions.

This task consists in identifying and specifying, for each form, the set of conceptual definitions used by that form. The resulting specification represents the local view of the E-RMS conceptual data model used by that human machine interface, i.e. the form.

It is noted that the E-RMS provides many different types of human machine interfaces, including editors, viewers, but also different types according to their users (refer to the E-RMS-URD communities and users). The human machine interfaces implements also different behaviours taking into account the ECSS communities and users related roles and privileges.

req. 004 For each E-RMS human machine interface identified in Task 5, the Contractor shall specify the local view of the E-RMS conceptual data model used by that interface.

req. 005 The Contractor shall assess and specify the set of E-RMS human machine interfaces required to ECSS communities, each user’s role and privilege, specified in the E-RMS-URD and in consistency with Task 1 output.

req. 006 The Contractor shall organise the review of all Task 2 deliveries.

Output

D02 E-RMS – HMI related external schema specifications

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.5 Task 3 - E-RMS exchange interfaces related conceptual schemas specification

Task description

req. 007 For each E-RMS exchange interface required in E-RMS-URD clause 5.8, the Contractor shall specify the local view of the E-RMS conceptual data model used by that interface.

NOTE 1 This requirement implies the production of:

- the first version of the E-RMS native interface control document that can be used to import and export all Task 1 related configuration items and structural elements representations, refer to E-RMS-URD requirements 5.8.2a and 5.8.2c,
- the E-RMS to DOORS mapping specification to enable generating the DOORS modules from the content of the E-RMS, refer to E-RMS-URD requirement 5.8.3a,
- the E-RMS to OMG ReqIF mapping specification to enable generating the ReqIF interface files from the content of the E-RMS, refer to E-RMS-URD requirement 5.8.3b,
- the E-RMS to MS Excel spreadsheet mapping specification to enable generating the MS Excel files from the content of the E-RMS, refer to E-RMS-URD requirement 5.8.3c,



- the E-RMS to MS Word document mapping specification to enable generating any structural element content under the form of a Microsoft Word document, refer to E-RMS-URD requirement 5.8.3d,
- the MS Word document to E-RMS mapping specification to enable the capability to populate the E-RMS with the content of the MS Word documents, refer to E-RMS-URD requirement 5.8.4a,
- the MS Excel spreadsheet to E-RMS mapping specification to enable the capability to populate the E-RMS with the content of the MS Excel spreadsheets, refer to E-RMS-URD requirement 5.8.4b,
- the DOORS to E-RMS mapping specification to enable the capability to populate the E-RMS with the DOORS modules used by ECSS to distribute the ECSS standards, refer to E-RMS-URD requirement 5.8.4c,
- the OMG ReqIF to E-RMS mapping specification to enable importing the ReqIF interface files into the E-RMS, refer to E-RMS-URD requirement 5.8.4d,

NOTE 2 The E-RMS also includes the generation of reports, some of them implying the need for an interface specification. As such, this requirement also covers:

- The change record report interface control document, refer to E-RMS-URD requirement 5.5p.

NOTE 2 The E-RMS exchange interface local views includes the conceptual definitions required for the management of the templates used by those interfaces, refer to E-RMS-URD requirement 5.8.3e and 5.8.3f.

NOTE 3 The E-RMS exchange interface local view includes the conceptual definitions required for storing the imported and exported files, refer to E-RMS-URD clause 5.8.1. It also includes the administrative data associated to these imports/exports, e.g. the author of the transactions with related date, purpose, etc.

req. 008 For each type of structural elements, the Contractor shall design and develop a Microsoft Office document template that can be used by the related E-RMS to Microsoft Office document generator functions to produce the related structural element document.

NOTE This Microsoft Office document templates can be used by the E-RMS users to produce candidate templates.

req. 009 The Contractor shall organise the review of all Task 3 deliveries.

Output

- D03 E-RMS Native ICD
- D04 E-RMS from/to DOORS mapping specification
- D05 E-RMS from/to MS Word mapping specification
- D06 E-RMS from/to OMG reqIF mapping specification
- D07 E-RMS from/to MS Excel mapping specification
- D08 E-RMS Change Record Reporting ICD
- D09 E-RMS to MS Office document templates
- other
 - if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C



- as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.6 Task 4 - E-RMS process models specification

Task description

The E-RMS-URD clause 5.9 specifies a number of ECSS processes to be implemented by the E-RMS.

In addition, the E-RMS-URD requirement 5.7m demands for the possibility to create and maintain any number of workflows. One of the objectives of ECSS, with the introduction of new workflows, is to be able to change their way to function in the future, resulting in the change of related ECSS processes.

This task consists in:

- formalising the modelling of the current ECSS processes using the OMG business process modelling and notation formalism,
- but also injecting in the E-RMS conceptual data model, the conceptual definitions required to maintain these processes and create new ones.

For e.g. Task 6, this implies that the E-RMS-URD clause 5.9 processes are not to be hardcoded in the E-RMS software.

req. 010 In line with the priority specified in the E-RMS-URD, refer to clause 5.1.2 bullet a, the Contractor shall produce a BPMN representation of each required process.

NOTE For that purpose, the use of a BPMN tool that provides the capability to visualise and report graphically the BPMN diagrams is needed.

req. 011 The Contractor shall produce a technical note that documents each process specified in req. 010.

NOTE The technical note includes the BPMN diagrams.

req. 012 The Contractor shall add to the E-RMS conceptual data model, the conceptual definitions required for enabling the production of BPMN models in the E-RMS and the utilisation of these models by the E-RMS software.

NOTE 1 The conceptual definitions addressed by this requirement provide means to satisfy the workflow management requirements specified in the E-RMS-URD clause 5.7 “E-RMS human machine interface”.

NOTE 2 The E-RMS workflows allows capturing the BPMN representation of any process such as the ECSS-D-00 ones.

req. 013 The Contractor shall populate the E-RMS with the workflows related to the req. 010 processes.

req. 014 The Contractor shall organise the review of all Task 4 deliveries.

Output

D10 TN – ECSS-D-00 processes using BPMN

The version of this document contains the processes required by this task.

D11 E-RMS from/to BPMN mapping specification

D12 ECSS-D-00 workflows related E-RMS population

This E-RMS population is provided as a data file that complies with the E-RMS native ICD.

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.7 Task 5 - E-RMS human machine interfaces specification

Task description

The E-RMS human machine interfaces provides means to the users, taking into account the roles and privileges, to interact with the E-RMS, e.g. for creating ECSS information and maintaining that information.

The E-RMS human machine interfaces are the key elements (building blocks) to for implementing the required E-RMS processes.

See also Task 2.

- req. 015** The Contractor shall specify the E-RMS human machine interfaces required to satisfy the E-RMS-URD clause 5.1.2 bullet a related requirements.
- req. 016** The Contractor shall specify the principles (e.g. ergonomics, kinematics, test, verification, validation) to apply for the development of the human machine interfaces.
- req. 017** Taking into account the wide number and the different types of E-RMS users, the Contractor shall ensure that the principles to apply for the development of the human machine interfaces, covers the need for a self-standing utilisation of the E-RMS product by the E-RMS users.

NOTE This requirement demands an easy to use set of human machine interfaces. This implies the need for example of:

- online helps brought to support the user in understanding the semantics carried by each field or group of fields provided by the human machine interface,
 - online training material when needed,
 - in case of problems encountered with the E-RMS software product, means to report, e.g. by email, these problems, implying for example the identification of each screen to ease the communication about the location in which the problem occurred,
 - means to reports problems with the information managed by the E-RMS,
 - availability of frequently asked questions data repository.
- req. 018** For each E-RMS human machine interface, the Contractor shall specify all characteristics of that interface, including for example:
- for what ECSS community(ies) that interface is produced,
 - In which process(es), that interface is called,
 - what functionality that interface provides to its users, taking into account their roles and privileges,
 - what amount and type of information that interface handles, e.g. qualifying the related types of transactions and related complexity.
- req. 019** For each human machine interface which external schema has been specified during the execution of Task 2, the Contractor shall produce a mock-up or a prototype of that human machine interface for the purpose to support its assessment by ESA and ECSS prior to its development,

req. 020 The Contractor shall organise the review of all Task 5 deliveries.

Output

D13 E-RMS – HMI principles guideline

D14 E-RMS – HMI specifications

D15 E-RMS – HMI related mock-up & prototypes

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.8 Task 6 – E-RMS software requirements specification

Task description

Within the E-RMS-URD, most user requirements are generic requirements that need to be instantiated for specific conceptual definitions specified in the E-RMS conceptual data model, e.g. for each type of structural elements, for each type of structural element specific property. This user requirements production approach has permitted to avoid creating tens of instantiated, i.e. type-specific, requirements that only difference is the type addressed.

This generic approach is also recommended for the production of the E-RMS software requirements. To ensure the adequacy of the E-RMS development for each conceptual definition specified in the E-RMS conceptual data model, a matrix of applicability is required that identifies for each generic requirement, the conceptual definitions addressed by that requirement, together with the applicable parameter values when needed.

This generic approach is of particular interest since it ensures the overall consistency of the specifications and related developments. Furthermore, it also ease the future developments where new types of conceptual definitions will be introduced, e.g. to cover the other priorities specified in E-RMS-URD clause 5.1.2 bullets b and c.

It is noted that this generic approach with related applicability is to be consistent used through the overall E-RMS development, e.g. to apply when producing the human machine interfaces principle guidelines, producing test plan, test procedures, etc.

req. 021 The Contractor shall specify all software requirements, including the applicability matrices to satisfy the priority specified in the E-RMS-URD clause 5.1.2 bullet a.

req. 022 The Contractor shall specify the E-RMS deployment strategy taking into account:

- a. the need for local and remote access, for (horizontal) scalability, availability and performance,
- b. the need for E-RMS symmetric replication,
- c. the security aspects of such E-RMS tool including misuse aspects,
- d. the security requirements that applies to:
 1. the ESA infrastructure (intranet, extranet, internet, etc.),
 2. the main ECSS partners related infrastructure i.e. National Agencies and Industries.



- e. the need for disaster recovery.

NOTE 1 It is expected that the E-RMS used by ECSS evolves in Organization-specific or Project-specific requirement management systems. Taking into account that possible evolution, the data to replicate is subject to filtering.

NOTE 2 The main ECSS partners are ESA, CNES, DLR, AIRBUS, OHB and THALES.

req. 023 The Contractor shall specify the E-RMS long term storage and retrieval software requirements and related performances taking into account:

- a. the E-RMS-URD clause 5.4 – long term storage and retrieval.

req. 024 The Contractor shall organise the review of all Task 6 deliveries.

Output

D16 E-RMS Software Requirements specification

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.9 Task 7 – E-RMS internal data repository related logical schema specification

Task description

This task consists in producing as part of the architectural design development phase of the E-RMS software, the logical schema of the E-RMS internal data repository.

req. 025 The Contractor shall transform the conceptual data model required by the E-RMS internal data repository in the logical model(s) required taking into account the software requirements and related performances.

req. 026 The Contractor shall ensure that the specified logical model(s) fully comply with the design rules of the technology used.

NOTE An example of technology design rules are the normalisation rules that apply to the relational modelling technology.

req. 027 The Contractor shall organise the review of all Task 7 deliveries.

Output

D17 E-RMS internal data repository related logical schema specification

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.10 Task 8 – E-RMS architecture

Task description



This task consists in developing the architectural design of the E-RMS product.

req. 028 The Contractor shall develop the architectural design of the E-RMS product.

NOTE This includes both the software and hardware architectures. It also includes the justifications needed.

req. 029 The Contractor shall perform a trade-off analysis in order to assess the feasibility of re-using existing off-the-shelves tool(s) to produce the E-RMS instead of developing from scratch.

NOTE This requirement implies the verification and validation of the adequacy of any off-the-shelves tools proposed by the Contractor (e.g. at bid time).

req. 030 During the trade-off analysis, the Contractor shall evaluate:

- a. the level of compliance of the off-the-shelves tools:
 1. to the user requirements,
 2. to the software requirements,
- b. the ability and cost impact of adding new functionality at later stage,
- c. the licensing constraints and cost impact (e.g. taking into account the cost per user)

req. 031 The Contractor shall organise the review of all Task 8 deliveries.

Output

D18 E-RMS Architectural Design Document

D19 Trade-off reporting TN

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.11 Task 9 – E-RMS design and production

Task description

This task consists in developing the detailed design of the E-RMS and producing the overall E-RMS product.

req. 032 The Contractor shall develop the detailed design of the E-RMS product.

req. 033 The Contractor shall establish the coding rules that apply to the E-RMS code production.

req. 034 The Contractor shall develop and execute the set of unit/subsystem/system tests required to verify the conformity and well-functioning of related product elements.

req. 035 Whenever possible, the Contractor shall automate the execution of the tests e.g. for later use during the maintenance and evolution activities.

req. 036 The Contractor shall organise the review of all Task 9 deliveries.

Output

D20 E-RMS Detail Design Document



- D21 E-RMS Software Coding Rules and Guideline
- D22 E-RMS Test plan, procedures and reports
- D23 E-RMS internal data repository related physical schema
- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.12 Task 10 –E-RMS population baselines

Task description

This task consists in populating the E-RMS with the C version related ECSS Standards.

- req. 037** The Contractor shall produce a first E-RMS population baseline by importing within the E-RMS, all first published C versions of the existing ECSS Standards.
- req. 038** For each ECSS Standard that is part of the first E-RMS population baseline and that ECSS has published one or more revisions, simulating the work performed by the ECSS communities involved and the related ECSS process, the Contractor shall:
- a. populate the change requests and the document review reports raised,
 - b. populate the associated working group dispositions,
 - c. produce the changes on the Standard,
 - d. release the related standard revision,
 - e. publish the related standard revision.
- NOTE** At each stage in this process, the production of the related E-RMS native ICD data files is needed in order to enable the instantiation, at ESA premises, of the related populations.
- req. 039** For each intermediate and last publication performed during this task, the Contractor shall:
- generate the MS word version of that publication,
 - compare the generated MS Word publication with the ECSS official MS Word publication,
 - report any difference or type of differences, including the related justification.
- req. 040** For each last publication of each Standard performed during this task, the Contractor shall:
- generate the DOORS version of that publication,
 - compare the generated DOORS publication with the ECSS official DOORS publication,
 - report any difference or type of differences, including the related justification.
- req. 041** The Contractor shall populate all change requests and document review reports that apply to the current published ECSS Standards.
- req. 042** The Contractor shall produce the second E-RMS population baseline that corresponds to the status of the ECSS standards and related change requests and document review reports at the time of the E-RMS delivery required in Task 11.
- NOTE** In case of failed preliminary acceptance during the Task 11 execution, a new E-RMS population baseline is required to cover the ECSS work meanwhile.
- req. 043** The Contractor shall organise the review of all Task 10 deliveries.

Output

D24 E-RMS population baselines

It is noted that Task 11 requires an installation of the E-RMS software, at ESA premises, from the source files, implying compilation, deployment, etc.

For the purpose of populating the E-RMS, the first E-RMS population baseline can be performed by importing from the ECSS reference documents, i.e. in MS Word or DOORS module.

For each other population, the related population are provided in data files that comply with the E-RMS native ICD.

D25 E-RMS population plan and execution report

- other
- if impacted by this task, the new versions of the other tasks outputs/deliverables
 - as proposed for compliance to Annex R.1 Table R-1 column D of the ECSS-E-ST-40C
 - as proposed for compliance to Annex D.2 Table D-2 column D of ECSS-Q-ST-80C

3.13 Task 11 – Preliminary – E-RMS delivery, installation, preliminary acceptance and presentation

Task description

This task consists in:

- the delivery of the E-RMS product (hardware as decided during phase 2 negotiations, software and documentation) to ESA premises and ECSS related partners,
- the delivery of the E-RMS population baselines,
- the support, including organisation, to the installation, deployment and preliminary acceptance of the E-RMS,
- the presentations and training to ESA premises and ECSS related partners.

req. 044 The Contractor shall produce the E-RMS data package including all E-RMS material required for the delivery, installation, training, preliminary acceptance and presentation event(s).

NOTE The training material can be made of small movies for online access to users of the E-RMS according to their role. It covers all E-RMS interfaces.

req. 045 The Contractor shall organise the E-RMS installation at ESA and ECSS related partners' premises.

req. 046 The Contractor shall be present and provide support during all installation, deployment and preliminary acceptance events on ESA and ECSS premises.

NOTE It is noted that the Agency and ECSS reserve the right to introduce new acceptance procedures during the preliminary acceptance events, without any need to inform the Contractor in advance.

req. 047 All critical or major issues known prior to the installation or discovered during this task shall be corrected by the Contractor prior to the successful preliminary acceptance of the E-RMS product.

req. 048 As part of the preliminary acceptance of the E-RMS, the Contractor shall organise and run the training sessions at each premise where the E-RMS has been deployed.



req. 049 As part of the verification and validation performed on ESA and ECSS premises, the Contractor shall demonstrate the ability of the installed E-RMS to fulfil the required performances.

req. 050 The Contractor shall organise the review of all Task 11 deliveries.

Output

D33 E-RMS Product “Successful Preliminary Acceptance” Release

D26 Summary Report consolidated draft

D27 Abstract consolidated draft

D28 Final Report consolidated draft

3.14 Task 12 – Final – E-RMS delivery, installation, acceptance and presentation

Task description

This task consists in:

- providing support to ESA and ECSS for the processing of new E-RMS product faults detected during the duration of this task,
- fixing all remaining E-RMS issues (faults, non-conformances...) and providing intermediate versions as required to ensure continuity in the E-RMS operations,
- producing and delivering the final release of the E-RMS product,
- providing support, including organisation, to the installation, deployment and final acceptance of the E-RMS.

req. 051 During the overall duration of this task, the Contractor shall provide support to the users of the E-RMS related to the detection, isolation and recovery of any problems encountered with the E-RMS product.

NOTE This implies production of intermediate patches and work around whenever required and in due time for their use.

req. 052 At the end of this task, for enabling the finalisation of this contracted activity and final acceptance of all deliverables, the Contractor shall:

- a. produce the E-RMS data package to use for the final delivery, installation and acceptance,
- b. provide support for the installation and verification of that final delivery on related ESA and ECSS premises.

NOTE The final acceptance of the E-RMS product is conditioned by the absence of any critical or major issues with the final delivery.

req. 053 The Contractor shall organise the review of all Task 12 deliveries.

Output

D34 E-RMS Product “Final Acceptance” Release

D30 Final Summary Report



D31 Final Abstract

D32 Final Report



4 REQUIREMENTS FOR MANAGEMENT, REPORTING, MEETINGS AND DELIVERABLES

<TO CLEAN AND FURTHER DEVELOP>

req. 054 The standard requirements for Management, Reporting, Meetings and Deliverables (Appendix 3 to the Contract) shall apply, taking account of the following specific requirements for the present activity, which prevail in case of conflict.

4.1 Management

4.1.1 Communications

req. 055 All communications to the Agency shall be addressed to the Agency's representatives nominated in the Contract.

4.2 Access

req. 056 During the course of the contract, the Agency shall be afforded free access to any plan, procedure, specification or other documentation relevant to the programme of work.

4.3 Reporting

4.3.1 Minutes of Meeting

req. 057 The Contractor is responsible for the preparation and distribution of minutes of meetings held in connection with the Contract.

req. 058 Electronic versions shall be issued and distributed to all participants, to the Agency's Technical Officer and to the ESA Contracts Officer, not later than 10 days after the meeting concerned.

req. 059 The minutes shall clearly identify all agreements made and actions accepted at the meeting.

4.3.2 Bar-chart Schedule

req. 060 The Contractor shall be responsible for maintaining the bar-chart for work carried out under the Contract, as agreed at the kick-off meeting.

req. 061 The Contractor shall present an up-to-date chart for review at all subsequent meetings, indicating the current status of the contract activity (WP's completed, documents delivered, etc.).

4.3.3 Progress Reports

req. 062 Every month, the Contractor shall provide a Progress Report in electronic format to the Agency's representatives, covering the activities carried out under the Contract.

req. 063 This report shall refer to the current activities shown on the latest issued bar-chart and give:

- a.** Action items completed during the reporting period;
- b.** Description of progress: actual versus schedule, milestones and events accomplished;



- c. Reasons for slippages and/or problem areas, if any, and corrective actions planned and/or taken, with revised completion date per activity;
- d. Events anticipated during the next reporting period (e.g. milestones reached);
- e. Milestone payment status.

4.3.4 Problem Notification

- req. 064** The Contractor shall notify the Agency's representatives (Technical Officer and Contracts Officer) of any problem likely to have a major effect on the time schedule of the work or to significantly impact the scope of the work to be performed.

4.3.5 Technical Documentation

- req. 065** As they become available and not later than the dates in the delivery plan, the Contractor shall submit for the Agency's approval Technical Notes, Task/WP Reports, etc.
- req. 066** Technical documentation to be discussed at a meeting with the Agency shall be submitted electronically two weeks prior to the meeting.
- req. 067** Technical documents from Subcontractors shall be submitted to the Agency only after review and acceptance by the Contractor and shall be passed to the Agency via the Contractor's formal interface to the Agency.

4.4 Meetings

- req. 068** The kick-off meeting shall take place at the Agency.
- req. 069** Progress Meetings shall be held each month within one week after the submission of the Monthly progress report.
- req. 070** During the execution of tasks 1 and 2, a face-to-face meeting shall be organised on ESA premises at a minimum frequency of one every 3 weeks up to full satisfaction of the produced output.
- req. 071** During the execution of tasks 3 to 6, a face-to-face meeting shall be organised on ESA premises at a minimum frequency of one every 6 weeks up to full satisfaction of the produced output.
- req. 072** Additional WebEx teleconferences (1 to 2 hours) might be organised when required.
- req. 073** The delivery and preliminary acceptance of all deliverables shall be organised on ESA premises.
- req. 074** The final delivery and final acceptance of all deliverables shall be organised on ESA premises.
- req. 075** With due notice to the Contractor, the Agency reserves the right to invite Third Parties to meetings to facilitate information exchange.
- req. 076** For each meeting the Contractor shall propose an agenda in electronic form and shall compile and distribute hand-outs of any presentation given at the meeting.

4.5 Deliverable Items

In addition to the documents to be delivered according to section 3.3 here above, the following documentation and other deliverable items shall also be deliverable.



4.5.1 Documentation

req. 077 The copyright of all documents produced during this activity shall be given to the European Space Agency.

req. 078 The following copyright statement shall be included on the first page following the cover page of any document, for which ESA owns the Intellectual Property Rights:

“The copyright of this document is vested in the European Space Agency. This document may only be reproduced in whole or in part, stored in a retrieval system, transmitted in any form, or by any means electronically, mechanically, or by photocopying, or otherwise, with the prior written permission of the Agency.”

req. 079 The following copyright statement shall be included in the footer of each page (with the year sets as applicable), including the cover page, using a font size of 8:

“© Copyright European Space Agency, 20xx”

NOTE “xx” indicates each year, in which the document/software was created, modified and/or updated.

req. 080 All documents shall be produced using Microsoft Office 2013 or later.

req. 081 For each type of Microsoft Office 2013 document, e.g. Word, PowerPoint, the Contractor shall produce a Microsoft Office template to use for the production of each type related document.

req. 082 The Contractor shall document each Microsoft Office template with guidelines on how to use the template to ensure full compliance of the produced document to the template rules.

req. 083 The Contractor shall submit each Microsoft Office template to review by the Agency.

NOTE The Agency is in charge to approve the templates once they comply with the needs, e.g. all paragraph styles, font styles are defined, the content of the front pages, headers and footers are adequate.

req. 084 All documents produced during this activity shall comply with the agreed templates.

req. 085 Any documentation delivery shall include the Microsoft Office and PDF versions of the related documents.

req. 086 The following documents shall be delivered:

Document ID	Milestone	additional delivery information
D01. E-RMS – Conceptual Data Model specification	end of Task 1	including the associated NORMA data repository
D02. E-RMS – HMI related external schema specifications	end of Task 2	including the associated NORMA data repository
D03. E-RMS Native ICD	end of Task 3	
D04. E-RMS from/to DOORS mapping specification	end of Task 3	including the associated NORMA data repository
D05. E-RMS from/to MS Word mapping specification	end of Task 3	including the associated NORMA data repository

D06. E-RMS from/to OMG reqIF mapping specification	end of Task 3	including the associated NORMA data repository
D07. E-RMS from/to MS Excel mapping specification	end of Task 3	including the associated NORMA data repository
D08. E-RMS Change Record Reporting ICD	end of Task 3	including the associated NORMA data repository
D09. E-RMS to MS Office document templates	end of Task 3	
D10. TN – ECSS-D-00 processes using BPMN	end of Task 4	
D11. E-RMS from/to BPMN mapping specification	end of Task 4	including the associated NORMA data repository
D12. ECSS-D-00 workflows related E-RMS population	end of Task 4	This E-RMS population is provided as a data file that complies with the E-RMS native ICD.
D13. E-RMS – HMI principles guideline	end of Task 5	
D14. E-RMS – HMI specifications	end of Task 5	
D15. E-RMS – HMI related mock-up & prototypes	end of Task 5	
D16. E-RMS Software Requirements specification	end of Task 6	
D17. E-RMS internal data repository related logical schema specification	end of Task 7	
D18. E-RMS Architectural Design Document	end of Task 8	
D19. Trade-off reporting TN	end of Task 8	
D20. E-RMS Detail Design Document	end of Task 9	
D21. E-RMS Software Coding Rules and Guideline	end of Task 9	
D22. E-RMS Test plan, procedures and reports	end of Task 9	
D23. E-RMS internal data repository related physical schema	end of Task 9	
D24. E-RMS population baselines	end of Task 10	This E-RMS population baselines are provided as data files that comply with the E-RMS native ICD.
D25. E-RMS population plan and execution report	end of Task 10	



D26. Summary Report consolidated draft	end of Task 11	
D27. Abstract consolidated draft	end of Task 11	
D28. Final Report consolidated draft	end of Task 11	
D29. Final E-RMS training material	end of Task 12	
D30. Final Summary Report	end of Task 12	
D31. Final Abstract	end of Task 12	
D32. Final Report	end of Task 12	

- req. 087** The final report shall be delivered as follows:
- a.** 6 paper copies and 1 USB memory stick to be delivered to the ESA Technical Officer
 - b.** 1 paper copy and 1 USB memory stick to be delivered to the ESA Contract Officer
 - c.** 1 paper copy and 1 USB memory stick to be delivered to the ESA Information and Documentation Centre – ESTEC Library, Postbus 299, 2200AG Noordwijk, The Netherlands
 - d.** 1 electronic copy to be emailed to the ESA/ESTEC/TEC Data Management System, email address: dmscontracts@tec-prisma.estec.esa.int
- req. 088** The Final Report shall provide a complete description of all the work done during the study and shall be self-standing, not requiring to be read in conjunction with reports previously issued. It shall cover the whole scope of the study, i.e. a comprehensive introduction of the context, a description of the programme of work and report on the activities performed and the main results achieved.
- req. 089** At the end of the contract the Contractor shall deliver, to the ESA Technical Officer, 2 USB memory sticks including all documents produced during the term of this activity (including minutes of meetings, etc.)

4.5.2 Software

req. 090 The following copyright statement shall be included in all software files resulting from the Contractor's work as a comment in the header:

“© Copyright European Space Agency, 20 *xx*”

NOTE “*xx*” indicates each year, in which the document/software was created, modified and/or updated.

req. 091 The following software shall be delivered.

Software Item ID	Milestone	additional delivery information
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D33. E-RMS Product “Successful Preliminary Acceptance” Release	end of Task 11	including sources, executables and documentation
D34. E-RMS Product “Final Acceptance” Release	end of Task 12	including sources, executables and documentation

At the end of the contract:

- req. 092** the final version of all software developed under the terms of this contract shall be delivered in their source and executable representation to the ESA technical officer
- the contractor shall deliver to the ESA Technical Officer two sets of USB memory sticks, each set containing:
- a.** only the source, the installation and build procedure fully documented to allow an installation from scratch on ESA machines (MS windows 7 as a minimum)
 - b.** only the executable, the installation procedure fully documented and the software user manual and demonstration material



5 SCHEDULE AND MILESTONES

5.1 Duration

The overall duration of this activity should not exceed 24 months from kick-off to end of Contract.

The duration of phase 1 up to successful completion shall not exceed **12 months**.