

MANAGEMENT REQUIREMENTS FOR SPACE4RAIL DOWNSTREAM APPLICATIONS IN ARTES 4.0 FEASIBILITY STUDIES - APPENDIX 3 TO CONTRACT

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1. INTRODUCTION

Space4Rail Downstream Applications in ARTES 4.0 Feasibility Studies provide the preparatory framework to define and evaluate new, potentially commercially viable applications and services for railways within the ARTES 4.0 Programme.

They cover the preparation of customer/user-driven applications and services for railways that employ one or more space assets and are conceived to become viable in the short to medium term.

The objectives of a feasibility study are:

- to prepare the implementation of a sustainable service(s) on the targeted market, and to support the business development for such service(s),
- to evaluate and determine the technical feasibility and commercial viability of an integrated service(s)¹ and the associated system(s)¹ able to meet the needs and conditions of relevant user community(ies) and other stakeholders,
- to reduce the technical and commercial risks related to the implementation of such sustainable service(s),
- validate the critical assumptions regarding customer desirability, commercial viability, and technical feasibility in a Proof of Concept (PoC),
- to secure the buy-in and involvement of important customers/users and other stakeholders for the further implementation and market roll-out,
- to define the roadmap for implementation and market roll-out of commercial operations of the application/service, which may include a subsequent Demonstration Project,
- to prepare a potential follow-on demonstration project,
- to generate the relevant answers to the most critical questions which allow taking informed decisions by all involved parties (industries, customers/users/customers, stakeholders, ESA / National Delegations) on the necessary further investments.

The Contractor is invited to take note that terminology used in this document are defined in the [“Terminology used in ESA Business Applications”](#) document.

¹ In the remainder of the Management Requirements, the singular form of services and systems will be used, where this may still indicate more than one service or system.

2. SCOPE OF WORK AND STUDY LOGIC

2.1. Scope of Work

The Contractor shall be responsible for the fulfilment of all the activities required to set up and execute the feasibility study, in accordance with the requirements for tasks and deliverables detailed in this document.

Due to the customer/user-driven nature of the study and with respect to a potential follow-on demonstration project, the Contractor shall pursue strong partnerships with the targeted customer/user communities and, whenever relevant for the successful achievement of the study's objectives, with other relevant stakeholders. Such partnerships shall be actively maintained and reinforced by the Contractor during the whole study.

2.2. Study Logic

To achieve the objectives of the study, the work logic presented in Figure 1 shall be taken as baseline. Within this structure, the Contractor is free to implement a detailed study logic that serves the objectives of the Feasibility Study and supports the generation of the required deliverables. If already all information related to a specific task exists, this task does not have to be repeated, but this information must be provided to the Agency as part of the Full Proposal.

The Contractor can follow an alternative approach, providing it is properly described in the Full Proposal and agreed by ESA.

The duration of the study shall not exceed 9 months.

The work is organised in two technical phases:

- **Technical phase 1 (Business Case Assessment):** Customers Identification & Value Proposition Definition (Task 1), Technical Feasibility Assessment (Task 2), Commercial Viability Assessment (Task 3), Proof of Concept (Task 4)
- **Technical phase 2 (Implementation Plan):** Preparation for Service Implementation (Task 5)

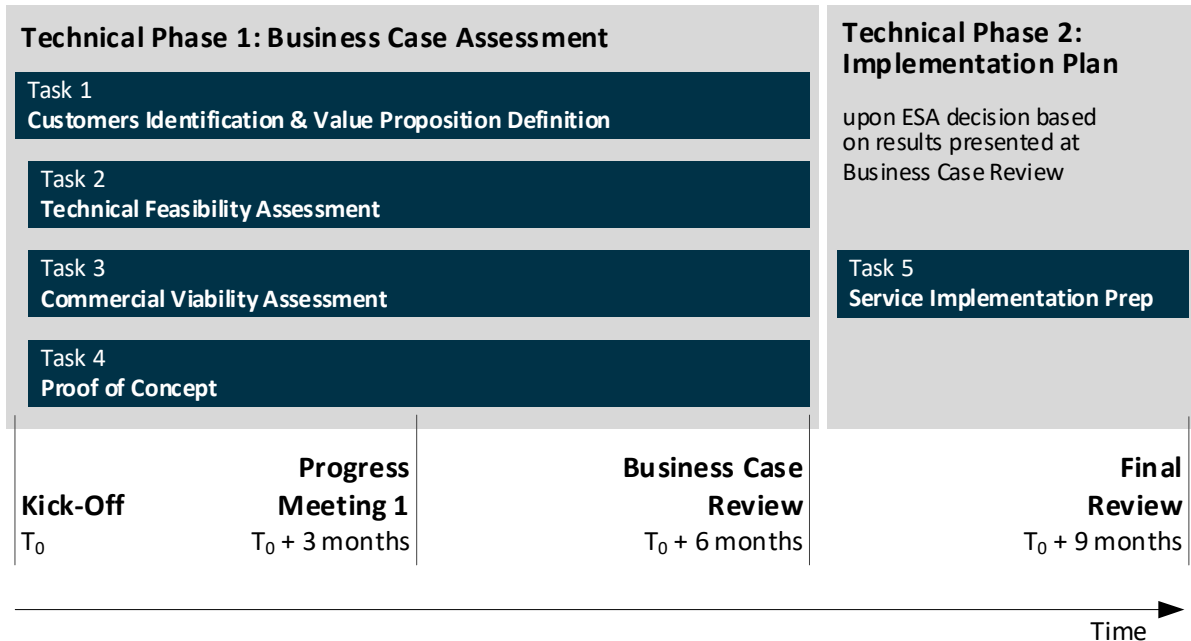


Figure 1: Study Logic

Tasks 1 to 4 are closely interlinked and require an iterative work approach (see also Figure 2). Key deliverables of Technical Phase 1 include:

- Business Case:** Deliverable D1 (Business Case), capturing the Tasks 1-3 results, shall present all aspects of a desirable, technically feasible, and commercially viable operational business. All critical assumptions that must be true for the business model to work shall be identified and recorded. The document shall be updated iteratively as new insights emerge, e.g. during the proof of concept and other work, and remain coherent and consistent.
- Proof of Concept:** Deliverable D2 (Proof of Concept) shall explain, how the critical assumptions about the customer desirability, technical feasibility, and commercial viability of the operational business were tested, and present the results and gained insights. These learnings shall be iteratively incorporated into the Business Case deliverables D1-D3.

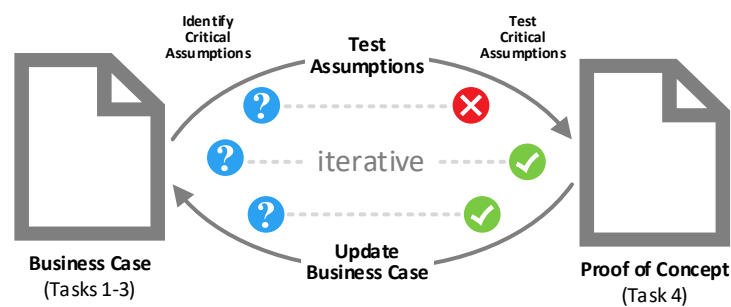


Figure 2. Iterative testing of critical assumptions and refinement of businesses case

The continuation with technical phase 2 (Implementation Plan) is subject to ESA decision at the end of technical phase 1 (Business Case Review), which will be based on the presented Business Case including evidenced desirability by potential customers, commercial viability, and technical feasibility, for example, during the **Proof of Concept**.

3. MILESTONE REVIEW MEETINGS

The following paragraphs describe the sequence of Milestone Review Meetings through which ESA will monitor the progress of the contractual activities, assess the quality and completeness of the deliverables and, when relevant, will authorise the relevant milestone payments.

For each of the review meetings indicated below, the Management Requirements do also provide guidelines on:

- Their main purpose
- The applicable deliverables

Each of these meetings will be attended by ESA's Technical Officer and representatives of the project team (i.e. prime and sub-contractors). Participation of representatives of customers/users is encouraged.

The documentation supporting each milestone review meeting shall be delivered to ESA no later than five (5) working days before the meeting takes place. The templates to be used for the deliverable documents of the different review meetings, as well as the related draft agendas can be found at <https://space4rail.esa.int/opportunities/ba-s4r/documents>

The following reviews and meetings represent the sequence of events to be taken into account in establishing the logical organisation of the work:

3.1. Negotiation Meeting (NM) / Kick-off (KO)

The purpose of the Negotiation Meeting (NM) is to confirm that all points of clarification and negotiation raised by ESA have been successfully addressed, to discuss and agree on the project planning via the Project Bar Chart (PBC), to finalise the contract and to review the activities to be carried out until the Progress Meeting (PM).

The NM is also the opportunity for the team to meet the ESA Technical Officer and create the basis for an effective working cooperation during the rest of the project.

During the Negotiation Meeting the envisaged Kick-off (KO) date, that is the date to start the study, will be agreed. In case a Kick-off meeting is considered needed and agreed during the negotiation meeting (e.g. to close possible open actions defined at the negotiation meeting), such a meeting can be held via teleconference.

3.2. Progress Meeting (PM)

The purpose of the Progress Meeting (PM) is for the Contractor to deliver and present the **Intermediate Results** of the tasks carried out up to this meeting, i.e. the engagement with the potential customers/users and the value proposition of the targeted application/service (task 1), the first results on service definition, system specification, and identification of critical technical and operational elements (task 2), the first results of the viability analysis with respect to market analysis, business model, and critical commercial and non-economic aspects (task 3), and the outline of the proof of concept (task 4) together with the identification of the critical aspects to be validated.

The format to deliver and present the Intermediate Results will be a **PowerPoint Presentation**. The content of this presentation (chapter/headlines) shall be aligned with the content of the document deliverables as presented below under section 4. The focus of the interaction between the ESA Technical Officer and the study team will be on achievements reached so far, resolution and handling of critical aspects and risks. The Progress Meeting will be concluded with a review and discussion of the activities to be carried out until the Business Case Review (BCR).

As part of the PM data package, the Contractor shall deliver to ESA the first version of the **Project Web Page (PWP)**.

In preparation of the Progress Meeting (PM), the Contractor may organise a **Customer/User Workshop** inviting the involved customers and users with the objective to consolidate and validate the Value Proposition and the Key Performance Indicators of the targeted application/service.

The Progress Meeting (PM) is foreseen to be held at the premises of the consortium or involved customer(s). In budgetary limited Feasibility Studies (ESA contribution up to 100 kEUR), the Progress Meeting can be held via teleconference or videoconference (e.g. Microsoft Teams).

3.3. Business Case Review (BCR)

The purpose of the Business Case Review (BCR) is for the Contractor to deliver and present the final results of the **Tasks 1, 2, 3, and 4**, and the resulting business case together with evidence on the technical feasibility, commercial viability, and desirability of the targeted application/service by potential paying customers. This concludes the Technical Phase 1 (Business Case Assessment).

Key deliverables for the Business Case Review are:

- **D1 (Business Case)**, and
- **D2 (Proof of Concept)**

Based on the results and discussions of the BCR, the achievements of the study will be assessed making use of the 'Feasibility Study Checklist' as provided in Annex A hereto. ESA will take a decision on the continuation of the study with Technical Phase 2, i.e. preparation of the roadmap towards further implementation, including preparatory activities for the continuation with a potential Demonstration Project. The decision will be taken upon assessment of the task results and project team performance with view to a promising perspective for a viable, sustainable service.

In case of decision to stop the feasibility study at BCR, the execution of task 5 is not foreseen and the study will be closed out at this stage. In case of decision to continue with task 5, a discussion of the activities to be carried out until the Final Review (FR) will take place.

As part of the BCR data package, the Contractor shall deliver to ESA an update of the **Project Web Page (PWP)** (especially on the status).

The Business Case Review (BCR) is foreseen to be held at ESA premises (ECSAT/UK or ESTEC/NL).

3.4. Final Review (FR)

The purpose of the Final Review (FR) is for the Contractor to deliver and present the results of **Task 5** (Preparation for Service Implementation), i.e. the roadmap for further implementation, the outline proposal for a demonstration project, the agreements achieved with consortium partners, the agreements achieved for the involvement of representative customers.

Key deliverables for the Final Review are:

- **D3 (Preparation for Service Implementation)**,
- the **Final Report (FREP)**,
- the final **Project Web Page (PWP)**,
- the collection of **Digital Media (DM)** (if applicable),
- the **Final Data Package (FDP)**,
- the **Contract Closure Document (CCD)**, and

- the **Financial Statements** as stipulated by Clause 27 of the Contract (if applicable).

The Final Review (FR) is foreseen to be held at ESA premises (ECSAT/UK or ESTEC/NL).

3.5. Final Presentation

In coordination with the related National Delegation(s), a **Final Presentation** can be foreseen in collocation with the Final Review. The purpose of the Final Presentation is to inform the related National Delegation(s) about the results of the Feasibility Study and to facilitate communication between the consortium and the related National Delegation(s) for a potentially planned Demonstration Project. The participants to the Final Presentation include members of the Contractor / Consortium, ESA, and related National Delegation(s).

3.6. Meeting Overview

The following table provides a summary of the meetings described in the previous sections:

Meeting	Date	Location
Negotiation Meeting (NM)		ECSAT(UK)/ESTEC(NL)
Kick Off (KO) – when needed	After successful NM	by teleconference
Progress Meeting (PM)	Halfway between KO and BCR	TBD
Business Case Review (BCR)	Conclusion of tasks 1-4	ECSAT(UK)/ESTEC(NL)
Final Review (FR) with Final Presentation	Conclusion of task 5	ECSAT(UK)/ESTEC(NL)

- a) Additional meetings may be requested either by the Agency or the Contractor.
- b) The Contractor shall give to the Agency prior notice of any meetings with Third Parties to be held in connection with the Contract. The Agency reserves the right of participation in such meetings.
- c) For all meetings with the Agency, the Contractor shall ensure that proper notice is given at least four (4) weeks in advance. For all other meetings, the Contractor shall inform the Agency, which reserves the right to participate. The Contractor is responsible for ensuring the participation of his personnel and those of the Subcontractor(s), as needed.
- d) With due notice to and in agreement with the Contractor the Agency reserves the right to invite Third Parties to meetings to facilitate information exchange.
- e) Draft versions of deliverables which are subject for review and discussion at the Review Meetings shall be submitted to the Agency at least five (5) working days before the meeting. The Agency reserves the right to cancel such a meeting in case that the documentation is not available in time or if it is of insufficient quality.
- f) For each meeting the Contractor shall propose an agenda in electronic form. Handouts of any presentation given at the meeting shall be prepared in electronic form and uploaded to the project collaboration tool (see Section 5.4 of this document). The Contractor shall also take the Minutes of Meeting (MoM).

4. KEY DOCUMENTS AND ITEMS TO BE DELIVERED

During the execution of the study, the Contractor shall produce the deliverable documents / items as described below. The documents shall be produced / updated at the meetings as detailed in Section 3 and the table in Section 5.11.

In principle, it is expected that all the tasks of the feasibility study are performed in close coordination with the involved customers/users (leveraging on their connections to other customers/users and important stakeholders, assisting in the definition of the customer/user needs and requirements as well as in the service and system definition, supporting the proof of concept (e.g. facilities, in situ support, participation), providing feedback on the usefulness of the targeted application/service, contributing to the viability analysis (e.g. price acceptability), assisting in the preparation of the roadmap and of a potential demonstration project, promoting the service in their respective communities, etc.). As such, it is expected that the content of the documents D1 to D5 mirrors adequately their involvement and contributions.

The content of the deliverables D1 to D5 shall be focused on the essential findings and conclusions. Except for the demo project outline proposal which shall make use of the template available on the ESA website <https://space4rail.esa.int/opportunities/ba-s4r/documents>, the size of each deliverable shall be limited to the necessary minimum but shall not exceed 75 pages for deliverable D1 and 30 pages for each other deliverable. Any additional information supporting the findings and conclusions may be annexed to the single deliverables.

4.1. Business Case Assessment (Technical Phase 1)

This section presents the outputs of the four tasks of technical phase 1 (Business Case Assessment). It is expected that the Contractor involves the customers, users, and other relevant stakeholders (where necessary) actively in the relevant tasks, achieving a clear understanding on their interest in the targeted application/service, their willingness to pay for such application/service, and their further involvement in a potential demonstration project.

4.1.1. Customer Identification & Value Proposition Definition (D1)

The deliverable D1 (Business Case) shall integrate the results of the task 1 activities and also include the following sub-elements:

D 1.1 Customer/User/Stakeholder Engagement:

- Overview of the engagement activities with the customers/users/stakeholders.
- Depending on the subject and when considered necessary or helpful, the organisation of a customer/user workshop might be considered. If such a workshop is carried out, the related workshop report compiling all information, i.e. participants, programme, hand-outs, presentations, results, conclusions, shall be included.

D 1.2 Customer/User/Stakeholder Analysis:

- Presentation of customers interested in and willing to pay for the planned application/service.
- Presentation of paying customers, users and other stakeholders relevant to successfully develop, implement and operate the intended service concepts.
- Identification, quantification and validation of relevant needs and Key Performance Indicators (KPIs) which paying customers, users and other relevant stakeholders will use to evaluate the impact of the proposed application/service in their operational environment.

D 1.3 Value Proposition & Product/Service Offers Definition:

- Definition and validation of the value proposition(s) that the planned application/service will bring to the customers/users/stakeholders addressing their needs and KPIs.
- Definition of the product/service offers towards paying customers, users and other relevant stakeholders aligned with the needs and KPI identified through Task 1, and taking into account any performance, quality and mode of delivery, integration with and interfaces to operational processes and procedures.

4.1.2. Technical Feasibility Assessment (D1)

The deliverable D1 (Business Case) shall integrate the results of the task 2 activities and also include the following sub-elements:

D 2.1 System Definition:

- Definition of the system architectures providing the service offers identified in Task 1, taking into account any existing infrastructure of paying customers and other relevant stakeholders.

- Visualisation of the system architecture in terms of main building blocks and interfaces to external systems and services identifying key technologies required and their maturity status (existing, commercial-off-the-shelf, to be developed, market readiness, etc.).
- Presentation and justification of the role of the space asset(s) (Earth observation, satellite navigation, satellite communication, human spaceflight, etc.) which are subject for integration.

D 2.2 Technical Feasibility Analysis:

- Justification of the final service concept and its underlying system and validation of the service concept with the engaged customers, users and other relevant stakeholders.
- Identification of critical elements and risks related to development, implementation, and operation of the service and system from a developer perspective as well as from the perspective of paying customers, users and other relevant stakeholders, and presentation of mitigation strategies and measures.
- Assessment of the overall technical feasibility of the proposed service and system concept.

4.1.3. Commercial Viability Assessment (D1)

The deliverable D1 (Business Case) shall integrate the results of the task 3 activities and also include the following sub-elements:

D 3.1 Business Model(s):

- Definition of business model(s) based on the value proposition(s) and service offer(s) addressing as a minimum the customer relationships, distribution channels/paths to market, key resources, key activities, key partnerships, revenue streams and cost structure. Note: The Business Model Canvas (<https://strategyzer.com/canvas>) can be used and the individual elements described in detail.
- Definition of the end-to-end service value chain, including key resources, key activities and key partners involved, their roles, and the interactions amongst them, and taking into account existing tools and services of paying customers, users and other relevant stakeholders to interface with.
- Presentation of the validation activities of the business assumptions with the engaged customers, users and other relevant stakeholders.

D 3.2 Business Plan:

- Market analysis for the envisaged services including the size (Total Addressable Market (TAM), Serviceable Available Market (SAM), Serviceable Obtainable Market (SOM)) and attractiveness of the market/customer segment(s) represented by the engaged paying customers.
- Assessment of the competitive environment and of the main competitors including information on their services and value propositions.
- Presentation of the financial plan and financial forecast for development and sales, including profit and loss statement as well as cash flow statement for the next 5 years, making use of the 'Cashflow Forecast Workbook' available on the website <https://space4rail.esa.int/opportunities/ba-s4r/documents>.
- Presentation of the team, competences and capabilities required to implement and deliver the service. In case of missing competences and capabilities, presentation of the intended strategy to acquire them.
- Justification of the final business plan and its elements.

- Presentation of the validation activities with the engaged customers, users and other relevant stakeholders.

D 3.3 Viability Analysis:

- Identification of critical elements and aspects related to the business model(s) and business plan and their robustness, by addressing aspects such as market barriers, cost/benefit ratios, competitive positioning, key differentiators, growth potential, etc., and presentation of mitigation strategies and measures.
- Identification of critical elements and aspects related to non-economic aspects (e.g. liability, regulation, public acceptability, etc.) and presentation of mitigation strategies and measures.
- Assessment of the overall commercial viability of the proposed service and system concept.

D 3.4 Socio Economic Impact Analysis:

- Assessment of the potential socio-economic impact of resulting operational services regarding expected revenues, job creation across the value chain (i.e. for all partners involved in the service provision), export opportunities, establishment of new markets, investment leverage, and societal benefits.

4.1.4. Proof of Concept (PoC) (D2)

The deliverable D2 (Proof of Concept) shall present the outputs of task 4 and also include the following sub-elements:

D 4.1 Proof of Concept Definition:

- Definition of the most critical technical, operational, commercial elements which shall be validated within the PoC, including hypotheses, validation methods, and quantifiable success criteria.
- Presentation of the PoC outline, including objectives for the PoC, scope, schedule, approach, necessary training and communication material, and involvement of the customers, users and other relevant stakeholders (where necessary).

Note: the PoC might consist of a mock-up, simulations, etc. which is compiled on a minimum effort base, i.e. major development efforts shall be avoided.

D 4.2 Implementation and Validation:

- Report on the implementation and execution of the PoC, including the involvement of the customers, users and other relevant stakeholders.
- Presentation of the results, including assessment of the outcome on the most critical elements and validation of the results with the involved customers, users and other relevant stakeholders (where necessary).
- A specific chapter presenting the customer/user feedback shall be incorporated.
- Identification of any changes to outputs of Tasks 1, 2, 3.

4.2. Implementation Plan (Technical Phase 2)

This section presents the outputs of the task of technical phase 2 (Implementation Plan). It is expected that the Contractor involves the partners, customers, users, and other relevant stakeholders (where necessary) achieving a clear understanding on their interest in the targeted application/service, their willingness to pay for such application/service, and their further involvement.

4.2.1. Preparation for Service Implementation (D3)

The deliverable D3 (Preparation for Service implementation) shall present the outputs of task 5 and also include the following sub-elements:

D 5.1 Roadmap:

- Presentation of the conclusion concerning the feasibility and viability of the specified application/service and associated system, and wrap up of the critical success factors and risks for the implementation of the solution,
- Definition of the next steps for service implementation, taking into account potential success factors and showstoppers (e.g., technology maturity, lack of service provision history, capital requirements, etc.) and identification of critical milestones.
- In the case the decision is to go ahead outside the Space4Rail Downstream Applications in ARTES 4.0 framework, describe in detail what the next step shall be, highlighting any support required from the Agency.

D 5.2 Demo Project Outline Proposal:

- In the case the decision is to go ahead with a Space4Rail Downstream Applications in ARTES 4.0 Demonstration Project, present the Demonstration Project Outline Proposal using the template available under <https://space4rail.esa.int/opportunities/ba-s4r/documents>. (Note: The Demo Project Outline Proposal will require inputs from the different tasks of the Feasibility Study.)

D 5.3 Partner/Customer/User/Stakeholder Engagement

- Presentation of the partners, customers, users, other relevant stakeholders which are required to successfully engage into the next step and of their planned level of involvement.
- Presentation of the partnership agreements with those organisations that are required to provide the targeted operational services
- Presentation (evidence) of the involvement of important customers, including letters in which they express (in their own words) their interest in the targeted operational application/service as well as their willingness to pay.
- Presentation (evidence) of the involvement of other relevant stakeholders as necessary.
- Depending on the subject and when considered necessary or helpful, the organisation of a customer/user/stakeholder workshop might be considered. If such a workshop is carried out, the related workshop report compiling all information, i.e. participants, programme, hand-outs, presentations, results, conclusions, shall be included in D5.

4.3. Project Web Page (PWP)

The Contractor shall produce, as part of the PM package, a Project Web Page according to the template accessible under: <https://space4rail.esa.int/opportunities/ba-s4r/documents>. The Contractor shall ensure that the public image of the project is properly portrayed and maintained through the above Web Page.

With every review meeting, starting from the publication of the Project Web page and ending with the conclusion of the contractual activities, the Contractor shall provide an updated version of the “Current Status” paragraph of the Project Web Page.

The “Current Status” paragraph of the Project Web Page will be the opportunity for the study to inform the general public about the status of the progress. A final version of the Project Web Page shall be provided together with the Final Report. This final version shall include a paragraph summarising the most significant achievements of the study.

All study information to be published including the "project web page" will duly respect any relevant confidentiality agreement established among the partners.

4.4. Final Report (FREP)

The Contractor shall deliver, not later than five (5) working days before the Final Review, a Draft Final Report, on which ESA will provide comments within one week after said review.

The Final Report (FREP), which is intended for general publication, is to be written in a concise form and shall describe the major accomplishments of the study along the various tasks. It shall be self-standing, not requiring to be read in conjunction with reports issued within the study and shall be suitable for non-experts in the field. It shall consist of about 25 pages of content and shall not contain Proprietary Information.

The front cover of the report shall carry the following text within a delineated box of at least 10 cm x 4 cm, preferably located in the top or bottom left-hand corner of the cover:

“EUROPEAN SPACE AGENCY CONTRACT REPORT

The work described in this report was done under ESA contract. Responsibility for the contents resides in the author or organisation that prepared it.”

The Final Report shall not contain any confidentiality/copyright statement other than the following:

“The copyright in this document is vested in [Company]. This document may only be reproduced in whole or in part, or stored in a retrieval system, or transmitted in any form, or by any means electronic, mechanical, photocopying or otherwise, either with the prior permission of [Company] or in accordance with the terms of ESTEC Contract no [Contract no].“

Within four weeks after the Final Review the finalised version of the Final Report shall be delivered as follows:

- One (1) electronic searchable, indexed and not encrypted PDF and one (1) original WORD format file shall be sent to the ESA Information and Documentation Centre (email: esa.ids@esa.int)
- Upload the finalised version of the Final Report in electronic form into the distributed Project Collaboration Tool (see section 5.4)

4.5. Final Data Package (FDP)

Together with the finalised version of the Final Report, the Contractor shall deliver to ESA the Final Data Package (FDP), uploading the final versions of all main deliverables (FREP, PWP, D1 – D5, Digital Media) in electronic form into the distributed Project Collaboration Tool (see section 5.4).

4.6. Deliverable Hardware

Article 2 para. 2.1.3 of the Contract applies.

4.7. Deliverable Software and Content

A list of the software and content to be produced or procured shall be presented.

5. REQUIREMENTS FOR MANAGEMENT, REPORTING, AND DELIVERABLES

5.1. Contractor Project Manager

The nominated Project Manager shall be responsible for the management and execution of all work to be performed and for the coordination and control of the work within the project team. The Project Manager will be the official point of contact with the Agency during the execution of the work.

During the contract execution, the Project Manager shall notify the Agency of any critical risk that may arise, analysing the cause, assessing the potential impacts on the project in terms of time, objectives and scope and formulating in the shortest possible time a mitigation strategy.

5.2. Document Confidentiality

All deliverable documents produced in the frame of the study and marked as “Proprietary Information” will be treated in confidence (see Clause 52.2 of the ESA General Clauses and Conditions).

The Project Web Page and the Final Report shall not contain any “Proprietary Information” since they are intended for public dissemination.

5.3. Submission of Documentation

All documentation shall be delivered in electronic form, using preferably MS Word or Adobe Acrobat format with pictures and tables embedded in the document. The documentation shall not impose limitations on the ability to be commented and printed.

5.4. Distributed Project Collaboration Tool

During the execution of the project the web-based project collaboration tool shall be used. This collaborative environment is intended to replace the usual electronic communication tools (e.g. E-Mail with attached document and/or FTP) within the project team and in the communication with ESA, as well as for recording and tracking Action Items.

Credential and guidelines for accessing the tool will be provided in due time, typically by the Negotiation Meeting.

5.5. Reporting - Minutes of Meetings (MOM)

Written Minutes of Meetings from those meetings attended by ESA shall be prepared and made available by the Contractor, and have to be signed at the end of the meeting. The minutes shall clearly identify all agreements made and actions accepted together with, where relevant, an update of the Action Item List.

To establish a uniform and consistent procedure to identify the Action Items among the different ARTES projects, the Contractor shall keep track of the Action Items adopting the following action identification scheme:

Action X.Y

where X is the identifier of the meeting (0: Negotiation Meeting, 1: First Review Meeting, 2: Second Review Meeting, etc.), and Y is the Action number starting from 01 at each new meeting.

In case the Distributed Project Collaboration Tool is adopted, Actions items shall be recorded there as “Issues”, and the associated status shall be kept up to date by the Project Manager using the “Update Issue” feature.

In case of urgent or critical problems, new Actions can be originated by the Agency and/or by the Contractor even outside the normal scheduled meetings.

5.6. Reporting - Monthly Progress Report (MPR)

The Contractor shall provide, within the first five working days of each month, a concise status report following the template provided under <https://space4rail.esa.int/opportunities/ba-s4r/documents> summarising the main activities performed in the last month, a list of the activities planned to be performed in the coming month, any potential problems and the corrective actions planned or taken by the Contractor. To the extent possible, the progress report and annexed documentation shall be delivered in MS Word format by using the Distributed Project Collaboration Tool. Within the progress report, the updated Current Status paragraph to be inserted in the Project Web Page shall be provided after each review meeting.

5.7. Bar Chart Schedule (BCS)

The Contractor shall be responsible for maintaining the bar-chart for work carried out under the Contract, as agreed at the negotiation meeting. The Contractor shall present an up-to-date chart for review at all consequent meetings, indicating the current status of the contract activity (WPs completed, documents delivered, etc.).

5.8. Risk Register (RR)

The Contractor shall be responsible for maintaining a risk register, agreed at the negotiation meeting. The starting point for this risk register are the potential problem areas identified in the Full Proposal. It shall be updated throughout the feasibility study taking into account any newly identified risks. It shall present the potential risks, their likelihood and severity, and propose meaningful mitigation measures. The Contractor shall present an up-to-date risk register in the review meetings.

5.9. Media Relations and Events

Should the Contractor plan to initiate contacts with media in the context of the study, coordination with the ESA Technical Officer is required by providing the draft content one (1) month before intended publication. Wherever possible, liaison with the Contractor will be established to agree on the text, Frequently Asked Questions, and material to be provided to media.

Should the Contractor plan to participate in trade fairs, exhibitions, or other events where the Project is displayed, coordination with the ESA Technical Officer is required by providing the draft content two (2) months before the event takes place, to ensure a correct representation of ESA and, where possible, ensure consistency with the ESA Corporate Visual Identity.

This obligation shall cease after 3 years of contract completion.

5.10. Contract Closure Documentation (CCD)

The Contract Closure Documentation is required at the end of the Contract for feasibility studies with an ESA price above 250 kEUR. For the avoidance of doubt, “end of the Contract” shall mean the finalisation of a series of tasks as defined in this document. The contents of the Contract Closure Documentation shall conform to the layout provided in Annex B hereto.

5.11. Overview of Deliverables

Name	Deliverable	Reference to Section	Initial Submission	Updating	Final Submission
D1	Business Case	4.1.1 4.1.2 4.1.3	PM		BCR
D2	Proof of Concept	4.1.4	PM		BCR
D3	Preparation for Service Implementation	4.2.1	FR		FR
PWP	Project Web Page	4.3	PM	BCR	FR
FREP	Final Report	4.4	FR [BCR] ²		FR [BCR] ²
FDP	Final Data Package	4.5	FR		FR [BCR] ²
H/W	Hardware (if applicable)	4.6	FR		FR [BCR] ²
S/W	Software (if applicable)	4.7	FR		FR [BCR] ²
MOM	Minutes of Meetings	5.5	NM	every meeting	FR
MPR	Monthly Progress Report	5.6	KO + 1 month	every month	FR
BCS	Bar Chart Schedule	5.7	within the proposal	as necessary and at reviews	FR
RR	Risk Register	5.8	within the proposal	as necessary and at reviews	FR
DM	Digital Media	5.9	as necessary	as necessary	as necessary
CCD ³	Contract Closure Documentation	5.10	FR		FR [BCR] ²

NM: Negotiation Meeting

KO: Kick-Off

PM: Progress Meeting

BCR: Business Case Review

FR: Final Review

² If study closed after Technical Phase 1.

³ Only required for feasibility studies with an ESA price above 250 kEUR.

ANNEX A: FEASIBILITY STUDY CHECKLIST

FS-1 Value Proposition and Market Opportunity	
FS-1-1	The value proposition(s) addressing the market can be summarised in one sentence and is included as part of an "elevator pitch" understandable by the market
FS-1-2	A clear market opportunity [e.g. customer problem and size/EUR of the problem] has been identified and evidenced through a customer pipeline
FS-1-3	The analysis of the market shows no showstoppers or they can be mitigated (e.g., regulation, certification, liberalisation, etc.)
FS-1-4	A " champion customer " has been identified, who is representative enough and demonstrates tangible interest in being involved in a later step (Demonstration Project)
FS-2 Market Size and Competitive Landscape	
FS-2-1	The sizes of the top priority market segments are shown to be large enough to justify developing a new service (there is a pipeline of potential customers), and segment leaders are identified
FS-2-2	Market external environment has clear potential for growing
FS-2-3	The 2-3 most relevant competitor solutions have been recognised, if applicable
FS-2-4	The value propositions of competitor solutions have been identified and analysed, if applicable
FS-2-5	A competitive advantage w.r.t competitor solutions has been identified, if applicable
FS-2-6	The market size to be captured has been determined and justified w.r.t. the competitors
FS-2-7	A " Survival Strategy " has been drawn up (planned response to reactions coming from competitors)
FS-3 Feasibility of the Technical Concept	
FS-3-1	A concise and complete service/system concept has emerged that includes the relevant inputs, key activities and main outputs
FS-3-2	Core service components exist (COTS or "market ready") and can be integrated and brought to market
FS-3-3	Core technical service components can deliver to satisfy the market opportunity : there is a sound technical approach

FS-3-4	The 2-3 main technical risks are identified and meaningfully addressed (incl. weaknesses and threats)
FS-3-5	Service concept shows in a clear and meaningful way the integration and utilisation of at least one space asset

FS-4	Business Model and Business Plan
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FS-4-1	A clear and complete end-to-end service value chain has been identified
	The business model shows understanding of the implications of the chosen value proposition :
FS-4-2	<ul style="list-style-type: none"> - Customer(s) ability to pay - Overall business costs - Sufficient return to sustain the service value chain
	The business model clearly identifies:
FS-4-3	<ul style="list-style-type: none"> - Distribution channels/path to market - Key partnerships - Key resources (partly addressed in FS-2/3) - Key activities (already identified as part of FS-2/3)
	The preliminary business plan is credible :
FS-4-4	<ul style="list-style-type: none"> - Credible growth strategies - Clear and credible cost/revenue projections - NPV > 0 in 3 to 5 years
FS-4-5	A meaningful risk assessment has been conducted, including the 2-3 most important risks for commercialisation (incl. weaknesses and threats)

FS-5	Service provision team
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FS-5-1	The management structure is clear and there is a clear allocation of responsibilities; in particular, there is a project management preferably with service development expertise
	Team has (or will acquire) the necessary capabilities :
FS-5-2	<ul style="list-style-type: none"> - Business development expertise - Service provision capacities (people, skills, infrastructure) - Technical skills (experience, development, testing...) - Understanding and experience of the target market
FS-5-3	Team has a key differentiator that constitutes a "Unique Selling Proposition"
	Core team is credible to support the long-run activities, including:
FS-5-4	<ul style="list-style-type: none"> - Managing and scaling-up businesses, incl. taking key decisions - Attracting resources (e.g. private capital, personnel) - People skills (e.g. communication, relationship, trust)



FS-6	Roadmap and Way Forward
FS-6-1	The starting point and the goal to achieve (e.g. income in 5 years) are clearly identified
FS-6-2	The main assumptions/critical success factors against which to design the roadmap are identified and are quantifiable (e.g. partnership agreements, capital needs, staffing, regulation approval, access to IPR, delivery mechanism in place, etc.)
FS-6-3	Clear decision points are set to check assumptions/decision criteria and revise risks
FS-6-4	The team has contingency plans (if required) to change action after a decision point



ANNEX B: LAYOUT FOR CONTRACT CLOSURE DOCUMENTATION

for
 ESA/ESTEC Contract Nr. [INSERT NUMBER]
 “[INSERT ACTIVITY TITLE]”,
 hereinafter referred as the “Contract”

Section 1 – Parties, contract duration and financial information

Contractor	[CONTRACTOR NAME]	
Sub-Contractor(s) <i>(state if not applicable)</i>	[NAME AND COUNTRY] [NAME AND COUNTRY] [NAME AND COUNTRY] [NAME AND COUNTRY]	
Contract duration Per Contract	From:	Phase 1 from:
	To:	to:
		Phase n from:
		to:
Total contract price <i>(including all CCNs, Work Orders, Call of Orders)</i>	EUR	
and total contract value <i>(in case of co-funding; state if not applicable)</i>	EUR	
broken down as follows:	Original contract price	XXX EUR (XXX EUR)
	and original contract value <i>(in case of co-funding; state if not applicable)</i>	EUR



	CCN x to n	EUR	in total
	Work Order x to n	EUR	in total
	Call-off Order x to n	EUR	in total

Section 2 – Recapitulation of deliverable items

2.1 Items deliverable under the Contract

If any of the columns do not apply to the item in questions, please indicate “n/a”.

Table 2.1.1 – Items deliverable according to the Management Requirements

Type	Ref. No.	Name / Title	Description	Location ⁴⁾	Property of	Rights granted / Specific IPR conditions ⁵⁾
Documentation				n/a	n/a	
Hardware						
Software			(delivery in object code)			
Other						

⁴ *In case the item is not delivered to ESA, please indicate the location of the deliverable and the reason for non-delivery (e.g. loan agreement, waiver, future delivery, etc.)*

⁵ *e.g. IPR constraints, deliverable containing proprietary background information (see also 2.1.4 below)*



Table 2.1.2 – Other deliverable items: Inventory of items produced or purchased under the contract
(if applicable)

[OPTION 1: No Fixed Assets]

No Fixed Asset has been acquired under the Contract by the Contractor and/or its Sub-Contractor(s).

[OPTION 2: Fixed Assets]

All fixed assets are listed below. The Contractor certifies that all its obligations with regards to Fixed Assets (see also Article 2.1.3 and Article 4 of the Contract) have been fulfilled.

Item name	Part/ Serial reference number	Location	Resale Value

Table 2.1.3 – Customer Furnished Items and Items made available by the Agency

Any Customer Furnished Items and/or Items made available by the Agency to the Contractor and/or its Sub-Contractor(s) under the Contract, are listed in the following List of Customer Furnished Items and Items made available by the Agency. The following tables certify which of the items have been returned to the Agency and which of the items remain in the custody of the Contractor, and/or a Sub-Contractor(s) and/or a third party for further ESA work or for other purposes.

Customer Furnished Items

Item name	ESA Inventory Number	Location	Insurance Value	ESA DECISION		
				Confirmation of Receipt	Deliver	Leave at (Sub-) Contractor's Disposal



Items made available by the Agency

Item name	ESA Inventory Number	Location	Replacement Value	Deliver	Leave at (Sub-) Contractor's Disposal

Table 2.1.4 – **Background Information used and delivered under the Contract**
(see Clause 57 of the General Clauses and Conditions)

The following background information has been incorporated in the deliverable(s):

Proprietary Information <i>(title, description)</i>	Owner <i>(Contractor, Sub-Contractor(s), Third Party/ies)</i>	Affected deliverable <i>(which documents, hardware, software, etc.)</i>	Description impact on ESA's rights to the deliverable⁶	Other/comments

⁶ if not explicitly stated otherwise, the contractual stipulations shall prevail in case of conflict with the description provided in this table



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Section 3 – Output from / Achievements under the Contract

3.1 **Technology Readiness Level (TRL)**

N/A

3.2 **Achievements and Technology Domain**

N/A

3.3 **Application of the Output/ Achievements**

N/A

3.4 **Further Steps/Expected Duration**

Please tick off as appropriate:

No further development envisaged.

Further development needed:

Please describe further development activities needed, if any, including an estimate of the expected duration and cost.

3.5 **Potential Non-Space Applications**

N/A



Section 4 – Statement of Invention

[OPTION 1: NO INVENTION]

In accordance with the provisions of the above Contract, [Company] hereby certifies both on its own behalf and that of its consortium/Sub-Contractor(s), that no Intellectual Property Right(s) has(ve) been registered in the course of or resulting from work undertaken for the purpose of this Contract; and that no inventions have been made in the course of or resulting from work undertaken for the purpose of this Contract that generated knowledge that could be registered as Intellectual Property Rights.

[OPTION 2: INVENTION]

In accordance with the provisions of the above Contract, [Company] hereby certifies both on its own behalf and that of its consortium/Sub-Contractor(s) that the following Intellectual Property Right(s) has(ve) been registered in the course of or resulting from work undertaken for the purpose of this Contract.

.....

[OPTION]: In accordance with the provisions of the above Contract, [Company] hereby certifies both on its own behalf and that of its consortium/Sub-Contractor(s) that the following inventions have been made in the course of or resulting from work undertaken for the purpose of this Contract but have not been registered as Intellectual Property Rights:

.....

[OPTION]: In accordance with the provisions of the above Contract, [Company] hereby certifies both on its own behalf and that of its consortium/Sub-Contractor(s) that the following inventions have been made in the course of or resulting from work undertaken for the purpose of this Contract and are foreseen for and/or in the process of registration:

The Agency’s rights on such registered and/or unregistered Intellectual Property Rights shall be in accordance with the ESA GCC Part II provisions as amended by the above Contract.

The above statements provided in the various sections of this Annex A “Layout for Contract Closure Documentation” for ESA Contract No. **4000xxxxxx/xx/XX/XXX/xxx** *[insert the corresponding Contract number]* have been made after due verifications.

The Contractor furthermore certifies that all its obligations with regard to Fixed Assets, if any, have been fulfilled.

If required by ESA, an updated version shall be provided for incorporating amendments requested by ESA.



Name of Contractor: <i>[insert Contractor name]</i>	
Authorised signatory: <i>[insert Authorised signatory full name]</i>	 <i>[signature of the Authorised signatory]</i>
Date: <i>[insert date]</i>	

ANNEX C: LIST OF ACRONYMS

ARTES	Advanced Research in Telecommunication Systems
BCR	Business Case Review
CAPEX	Capital Expenditures
CCD	Contract Closure Document
DM	Digital Media
FDP	Final Data Package
FR	Final Review
FREP	Final Report
KO	Kick-Off
KPIs	Key Performance Indicators
MOM	Minutes of Meetings
MPR	Monthly Progress Report
NM	Negotiation Meeting
OPEX	Operational Expenditures
PM	Progress Meeting
PoC	Proof of Concept
PWP	Project Web Page
RR	Risk Registry