ARTES 4.0 Technology & Product Developments

Agile + Full Proposal

Part 3

Technical Proposal

Proposal title

Proposal Reference: reference number

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# Introduction

This document describes the final product and its constituent parts, from its current development status up to the point where it will be ready for commercialisation.

The Technical Proposal includes an overview of the technical work to be performed in names of Development Phases covered by the proposal, which are the subject of this proposal.

Include the following if appropriate

The product is an evolution of existing product or product line. Key details of the heritage product can be found in the product data sheet as below.

The proposed activity is a follow-up of a previous activity(ies). Key details of the previous activity(ies) product can be found in the technical note(s) as below.

The following supporting documents related to this Product Development Plan are attached to the proposal.

**Table 3‑1 Supporting documentation**

|  |  |  |
| --- | --- | --- |
| **Document Title** | **Scope** | **Reference** |
| data sheet or other equivalent document … | … | … |
| technical note or other equivalent document … | … | … |

# Description of the Final Product & Development Plan

## Product Overview

The top-level technical description of the overall product and its main sub-systems is the following: ……

Insert a block diagram showing key building blocks and major interfaces.

You may include images to show what the product and its constituent modules will look like

Insert figure - block diagram of the targeted product

The external interfaces of the product are: ……

The role of the product in the context of the overall system/service of its target users is ……

For example: the thruster is intended for small satellites providing deltaV for station keeping and is mounted externally to the spacecraft;

the high power amplifier will provide RF amplification within a small transportable VSAT terminal.

## Baseline Architecture

The main product or product elements, hardware and software, are described below.

**Table 3‑2 Baseline Architecture**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Product element** | **Functions/ Features** | **Design Concept & Constraints** | **Key Requirements** | **Critical Technologies** |
| Name of element 1 | …… | …… | …… | …… |
| Name of element 2 | …… | …… | …… | …… |
| etc. | …… | …… | …… | …… |

A product element could be, for example, a module, sub-system, component, technique or process.

Key requirements are those considered essential to the success of the proposed development, or those that are likely to significantly affect the course of the development (e.g. design drivers). These need to include at a minimum those listed in the business case.

The Tenderer should consider which of these key requirements should be included in the risk register.

**[Applicable only to Product Phase]** A complete list of the key product requirements specification driving the Product phase development is detailed in ANNEX 1

## Development Approach

Readiness levels definitions are available on the ARTES web site at <https://artes.esa.int/documents>  
(“TRL Definitions in ARTES Technology & Product Developments”)

The table below indicates the current readiness levels (RL) of the product, of each key product element (module/subsystem) and of the technologies that are critical to the success of the development. The basis for each RL assessment is indicated in the table.

**Table 3‑3 Summary of the current development status**

| **Product element or Technology** | **Current RL** | **Basis/Justification of the RL Assessment** |
| --- | --- | --- |
| Name of element 1 | …… | …… |
| Module 1 … | …… | …… |
| 3nm chip xx … | …… | …… |

To realise the product and deliver the value propositions, we need to follow the development approach identified in the table below for each product element and proposed development phase.

The proposed development tasks shall increase the competitiveness of the target product(s). Such activities may include all developments necessary to achieve such a goal (e.g. new features, tools, processes, techniques and technologies).

**Table 3‑4 Overview of the proposed development approach**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Product element** | **Part of proposed development?** | **Development Phase(s)** | **Start TRL** | **Target TRL** | **Development tasks** |
| Name of element 1 | yes/no | ……Technology |  |  |  |
| Name of element 2 | yes/no | ……Product |  |  |  |
| Name of element 3 | yes/no | …… |  |  |  |

Provide supplementary text as necessary to explain the development tasks and approach. The work to be performed on all product elements that form the target final product shall be described, even if the work will not be carried out within the scope of the proposed activity.

Include the following if applicable

The technology gap to the existing heritage product or product line specified in section 1 (Introduction) is: …...

The Tenderer should clarify the gap if the targeted product is an evolution of an existing one.

## Design Trade-Offs

The following table summarises the main design trade-offs that led to the selection of the baseline implementation, including the rationale for the selection in each case.

**Table 3‑5 Summary of the main design trade-offs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Design Trade-Off** | **Affected Performance Parameters** | **Implementation Options** | **Reason for Selecting the Baseline Implementation** |
| …… | ……. | …… | …… |
| …… | ……. | …… | …… |
| …… | ……. | …… | …… |

A more detailed discussion of the proposed technical developments and each design trade-off, including its implications and a justification for selecting the baseline solution, is provided herein below.

The trade-off between …….

## Verification & Validation (V&V) Approach

The table below identifies the verification & validation activities to be undertaken through dedicated tests or analyses during the development of the product, indicating the proposed Development Phase in which they will be carried out and on which model or/and environment they will be performed, including any verification/certification activities relevant to security requirements when applicable.

Column 1: The proposed Development Phase during which the V&V activity will be performed.

Column 2: The aspect(s) of the product to be confirmed by the V&V activity (e.g. product functions, technical performance, market potential, certification, etc.).

Column 3: The V&V method (test, analysis, simulation, inspection, etc.).

Column 4: **Model**: The analytical, simulation, hardware or software model that will be used as a vehicle to perform the verification.

The **V&V environment** : For a Ground Segment Demonstration Phase specify as below:

* Duration of the validation activities in months.
* Number of validation sites/units to be equipped and geographical locations
* Number/type/name of user organisations involved in/and definition of the validation activities:

Column 5: The main standard(s) (e.g. ECSS, MIL, ESCC, ISO) applicable to the activity, if any.

**Table 3‑6 Summary of the V&V approach**

| **Development Phase** | **Product Functionalities / Requirements** | **V&V Method** | **Model /**  **Environment** | **Standard(s)** |
| --- | --- | --- | --- | --- |
| ……Technology | ……. | …… | …… | …… |
| …… | ……. | …… | …… | …… |
| …… | ……. | …… | …… | …… |
| …… | ……. | …… | …… | …… |

Provide below any additional details to complement the information given in the table.

The V&V approach in the development of the product from its current state to the point where it is ready for commercial exploitation is as follows. …...

The product test sequence is the following: …...

The product test matrix is the following: …...

The elements test sequence is: …...

# Third Party Products/Rights

No products or rights of third parties are planned to be used in the development of this product.

or

(delete the inapplicable paragraph)

The following third party products/rights are planned to be used in this product development: …....

The technical reasons for adopting a solution based on these third party products/rights are …....

The impact of this approach on the technical activities and the resulting products and their usage is …....

Financial information relating to the use of third party products/rights is provided in section …... of the Financial Proposal (Part 6).

# Technical Risk Analysis and Mitigation Plan

Please include only the major technical risks that may impact the viability of the activity.

The table below identifies the technical risks associated with the development of the product based on a preliminary risk analysis. They have been analysed in terms of their severity (potential impact) and probability of occurrence.

**Table 3‑7 Technical risks and proposed mitigation actions**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Risk Identifier** | **Description of Risk and Impact** | **Likelihood** | **Severity** | **Development Phase** | **Mitigation Actions** |
| R.1 | …… | low/medium/high | low/medium/high | ……Technology | …… |
| R.2 | …… | low/medium/high | low/medium/high | ……Product | …… |
| …… | …… | …… | …… | …… | …… |

Provide further information below as required to properly explain the risk mitigation strategy and plans

The risk mitigation plan is …...

The risk management plan can be found in …....

# Information Security, Security Risk Analysis and Treatment Plan

To ensure the proper level of protection of the sensitive information it is required that a preliminary Security risk assessment is performed.

In case the preliminary security risk assessment has identified any activity outputs with sensitive data/information, the following paragraph shall present how security is integrated into the Project lifecycle and development plan, the process and frameworks to be applied, the outcome of the preliminary security assessment and planned secure development lifecycle.

It is expected that this section, or the one on the Design Development (par. 9.3), includes an overview of the intended Secure Development Lifecycle that will highlight the security activities.

It is expected that this section illustrates the type of service/capability, the type of data/information and identification of the main assets.

It is expected that this section illustrates the required Information Security properties associated to the previously defined information assets. This mapping shall allow the identification of the correct level of sensitivity.

Where possible and relevant, include paragraphs/subsection/reference detailing the methods used and a first iteration of the preliminary risk analysis with the related risk treatments (e.g. mitigations/controls needed) that will be included and the residual risks.

Where possible and relevant (it is recommended to capture any specific security requirements validation/certification[[1]](#footnote-2) into the development activities (see also par. 9.4).

# Ground Segment Demonstration Phase

Include this section only if a Ground Segment or End-to-End System Demonstration Phase is proposed.

## Stakeholder Statements

The users and other stakeholders involved in the Demonstration Phase have issued statements confirming their participation in the operational validation of the End-to-End System and indicating their interest in the future use of the product and/or its commercial exploitation. Representatives of the user organisations involved in the trial utilisation of the product shall participate in the on-site acceptance test (SAT).

Alternatively, a statement detailing how the selected users and stakeholders in the demonstration phase represent the target market users should be provided. These statements are attached as Annex 2 to this part.

## Ground Segment Architecture

We confirm that the ground segment architecture is of a scale sufficient to demonstrate the commercial attractiveness of the product.

The number of validation sites to be equipped and their geographical locations are: …

The User organisations involved in/and their main validation tasks: …

Provide supplementary information as necessary to describe how each product is embedded in the Ground Segment architecture and its intended operational use in the context of both the proposed Demonstration Phase and the end-to-end system.

The operational use of Product 1 will be …

The operational use of Product 2 will be …

1. Product Requirments Specification

[Applicable only to Product Phase]

**Technical Requirements**

Include the requirements of the product(s) to be developed and the main technical requirements of its constituent parts (in particular for the new assemblies to be developed such as sub-assemblies, modules, components, etc.)

Include the following statement if the product specification is provided as a separate document

The requirements for the product and its constituent parts are presented in document reference(s), a copy/copies of which is/are attached to this proposal.

**Annex 2**

Include if the full proposal includes a Ground and/or End-to-End System Demonstration Phase

**Statement from users and/or stakeholders**

Statements from users and/or stakeholders confirming their participation in the operational validation of the Ground Segment product and/or the End-to-End System and indicating their interest in the future use and/or exploitation of the product are attached.

1. whether formal such as NIST FIPS, common criteria, or informal such as additional security coding practices, hardening/vulnerability scans, etc. [↑](#footnote-ref-2)