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| --- |
| OUTLINE PROPOSAL TEMPLATE – ARTES C&G – Version 4.0 |
| PROJECT NAME – Company name |
| Date: ……  Reference: …… |

|  |
| --- |
| [Author]  [Pick the date] |

|  |
| --- |
| [Author]  [Pick the date] |

**OUTLINE PROPOSAL TEMPLATE - ARTES C&G**

Ver. 4.0

**Notes:**

1. To prepare this Outline Proposal, please take into consideration the basic information about the ARTES C&G programme element provided on the ARTES web site: https://artes.esa.int/competitiveness-growth

In particular, the required objectives per Development Phase and Segment shall be respected.

Table 1

|  |  |  |
| --- | --- | --- |
| ***Development Phase*** | ***Main Activities*** | ***Outcome*** |
| **Definition Phase** | technical studies | performance requirements defined, or system analysis completed |
| **Technology Phase** | technical risk mitigation excluding any qualification or industrialisation | breadboard, prototype or Engineering Model (EM) |
| **Product Phase** | development, qualification, verification and industrialisation | for space: Engineering/Qualification Model (EQM) or similar |
| for ground:  verified product in a non- operational environment |
| **Demonstration Phase** | space product: in-orbit validation/demonstration "Atlas" | flight hardware |
| ground product: validation in operational environment | product validated in an operational environment |

1. An ARTES C&G outline proposal shall comprise the following two elements:
   1. This template, duly completed as appropriate.
   2. A supporting spreadsheet document:
      * “C&G Space Segment Financial Forecast Workbook (for Space Segment)
      * “Ground Segment” Financial Forecast Workbook” (For Ground Segment)

It can be downloaded at <https://artes.esa.int/documents>”) that provide the financial analysis elements of your business plan.

1. Formal authorisation from the National Delegation(s) of the companies involved is required for the proposed activity at the time of submission of the Full Proposal. Therefore the bidder is advised to begin discussions with the relevant National Delegate(s) prior to submitting the outline proposal.
2. To initiate the outline proposal revision process, the two completed documents must be sent to the following email address: [artes‑cg@esa.int](mailto:artescg@esa.int). An outline proposal will be informally reviewed by the Agency but only if both elements are provided simultaneously. It is preferable that you provide the completed spreadsheet file(s) in Excel format. However, you may include the financial analyses as PDF attachments to your proposal document.
3. Please ensure that the submitted versions of the two elements are mutually consistent. Failure to do so may lead to feedback delay.
4. The content of this template may be copied into your own corporate template for the purposes of preparing your outline proposal. Please note that the document can bear company-internal protective markings, but to avoid confusion with formal and internationally agreed markings for “Classified Information”, the following terminology shall be avoided:

* Restricted (or Restreint)
* Confidential (or Confidentiel)
* Secret
* Top Secret

1. Parts highlighted in yellow in this template should be modified as appropriate for your proposed activity.
2. Text in blue and in a smaller font size (*example*) is for guidance and can be removed from the completed outline proposal document.
3. In Section 1 (“Overview of the Proposed Activity”) and Section 3 (“Business Plan”) of this document please make reference to tables of the attached financial forecast workbook(s), providing supplementary information as necessary to substantiate the assumptions behind the commercial forecasts. Guidance on how to use the financial forecast workbook can be found in the workbook first sheet.

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# Overview of the Proposed Activity

## Company Information

|  |  |  |  |
| --- | --- | --- | --- |
| **Company Details** |  | **Contact Point** |  |
| Company Name: | ……… | Name: | ……… |
| Address: | ……… | Function: | ……… |
| Country: | ……… | Telephone: | ……… |
| SME Status: | yes/no | E-Mail: | ……… |

Key company information follows: ………

*Indicate the company size, turnover and structure and provide an overview of the product portfolio.*

*Describe briefly your background (and of your Subcontractor(s), if any) and experience related to the proposed activity.*

## Scope and Duration

*Please indicate in the table below a segment (Space Segment Payload, Space Segment Platform, Ground Segment) and one or more development phase(s) (Definition, Technology, Product, Demonstration/Atlas), for which financial support is being requested in the present proposal.*

*Place an “X” in the relevant table cell(s) and remove the table rows / columns as appropriate.*

* *One or more development phase(s) can be proposed.*

This proposal addresses the following development phase(s) and segment:

Table 1‑1 Scope of the Proposed Activity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Space Segment** | | **Ground Segment** | **Intended Start Date** | **Intended Duration (months)** |
| **Development Phase** | **Payload** | **Platform** |
| Definition Phase | X | X | X | dd/mm/yy | xx |
| Technology Phase | X | X | X | dd/mm/yy | xx |
| Product Phase | X | X | X | dd/mm/yy | xx |
| Demonstration Phase | (Atlas) X | (Atlas) X | X | dd/mm/yy | xx |

*To assist ESA in making sure resources are available to review the full proposal in a timely manner please provide the date you are targeting to be in a position to submit the full proposal. The full proposal should not be submitted prior to receiving approval from ESA to submit a full proposal and the date given below will be used by ESA for planning purposes only.*

The company is targeting to submit the full proposal at the following gate: Day/Month/Year

## Objectives

The objective/s of the proposed activity is/are to develop / validate / qualify / demonstrate a …

*Please define what is the target final product ready for commercial exploitation once all developments (under ARTES or outside) have been completed.*

*Should the product be an integrated end-to-end satcom solution composed of a combination of Space and Ground products, then the target final product shall be defined as ‘System and / or Service”. In this case the Business case shall be built around the ‘System / Service” target product.*

## Context

*Briefly explain the background and motivation for the proposed development. Provide more insight into the rationale that justifies this development, and the logic followed that led to the proposed product and development approach.*

The background and motivation for the proposed development is as follows: ……..

## Main Activities

To develop our product and deliver the value propositions, we need to perform the main activities identified in the table below for each of the proposed development phases.

Table 1‑2 Overview of Activities

|  |  |  |
| --- | --- | --- |
| **Development Phase** | **Activity** | **Description** |
| ……… | ……… | ……… |
| ……… | ……… | ……… |
| ……… | ……… | ……… |

*List all of the main activities that are to be performed in each of the proposed development phases (those which are considered critical to the success of that development phase). These could include, for example, evaluating a new technology, developing a new subsystem, interface adaptations, manufacturing process development, materials development, software/firmware development, qualification activities, test (verification) activities, validation activities.*

*Briefly explain the criticality of each key activity to the success of the associated development phase and to the overall activity.*

*When compiling this list of main activities, please keep in mind the objectives for each development activity presented in Table 1. In particular, the Technology Phase should target technical risk mitigation and not product qualification or industrialisation (these types of activity belong in the Product Phase).*

## Main Deliverables

A list of all main deliverable items from the proposed development is given in the table below.

Table 1‑3 Main Deliverable Items

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Deliverable Item** | **Phase(s)[[1]](#footnote-2)** | **Notes** |
| hardware/ software/  document | ……… | Technology | ……… |
| hardware/ software/  document | ……… | Product | ……… |
| ……… | ……… | Demonstration | Embedded / independent case |
| ……… | ……… | ……… | ……… |

## Space Segment Demonstration Phase (ATLAS)

*Include this section if this Full Proposal includes a Space Segment (Atlas) Demonstration Phase or Technology Phase where an early in-orbit experiment is proposed.*

*For a proposed activity that includes a Demonstration Phase:*

*1 The proposal shall support the demonstration of new or significantly upgraded capabilities at product, system or service level.*

*2 The proposal must identify if the equipment is:*

*a. “embedded” if it is part of the main commercial mission (e.g. insertion of a new generation equipment into a redundancy ring of a conventional equipment, such as an LNA, TWTA or telecommand receiver), or*

*b. “Independent” case where it is on board alongside the main mission but does not form part of the operational mission (e.g. stand-alone platform elements, or mini payload as a hosted payload on a large satellite), or*

*c. “Independent” case where the flight hardware represents the main purpose of the mission (e.g. a demonstration payload on a dedicated small sat mission).*

*Support for satellite platform, launch, in-orbit testing and early operations costs can be provided for an independent case, but not for an embedded case.*

An overview of the proposed Space Segment Demonstration Phase activity is provided in the table below.

*Include the following table only if the proposed space segment activity includes a Demonstration Phase as an Embedded or Independent case*

Table 1‑4 Products to be Flown in the Proposed Demonstration Phase

|  |  |  |
| --- | --- | --- |
| **Product** | **Currently Proposed to Customers for Flight** | **Type of Deployment (ATLAS Case)** |
| ……… | yes/no | Embedded/Independent |
| ……… | yes/no | Embedded/Independent |
| ……… | yes/no | Embedded/Independent |

*Include the following table only if the proposed space segment activity includes a Demonstration Phase as an Independent Case where the flight hardware represents the main purpose of the mission or Technology Phase where an early in-orbit experiment is proposed.*

Table 1-5 Independent Case in the Proposed Demonstration Phase

|  |  |
| --- | --- |
| **Type/size of Spacecraft** | **Key functional requirements of the spacecraft** |
| ……… | ……… |
| ……… |
| ……… |
| ……… |
| ……… | ……… |
| ……… |
| ……… |
| ……… |

## Overall Planning and Cost Summary

*Development phases that overlap in time are allowed. However, the Financial Forecast Workbook for the Ground Segment assumes that the commercial phase does not overlap with the development phases. In case of a different assumption, please provide any relevant information.*

*If appropriate, you may break down any development phase into separate work items.*

The “Planning and Costing Summary” table of the attached financial forecast workbook provides an estimation of the cost and schedule for all development and follow up activities[[2]](#footnote-3) required before commercial exploitation.[[3]](#footnote-4)

*Optionally, you may provide a copy of the table in this section, replacing the illustrative example given below.*

A copy of this table is provided below.

Table 1‑5 Planning and Costing Summary

## Project Cost and Price Breakdown

The following table presents the cost and requested ESA funding for each development phase included in this proposal.

*Please note that your National Delegation may only support only one Development Phase at a time.*

*Please note a copy of Table 1‑6 will be sent to all the relevant national delegates by ESA upon submission of the outline proposal if they are not in copy of the email containing the outline proposal.*

**Table 1‑6 Project Cost and Price Breakdown**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Development Phase** | **Company/ Organisation** | **Country** | **Cost (k€)** | **Price (k€) (requested from ESA)** | **% Funding from ESA** | **National Delegation Support[[4]](#footnote-5)** |
| ……… | Prime | ……… | ……… | ……… | ……… | yes/no |
|  | Subcontractor 1 | ……… | ……… | ……… | ……… | yes/no |
|  | Subcontractor 2 | ……… | ……… | ……… | ……… | yes/no |
|  | ……… | ……… | ……… | ……… | ……… | yes/no |
| ……… | Prime | ……… | ……… | ……… | ……… | yes/no |
|  | Subcontractor 1 | ……… | ……… | ……… | ……… | yes/no |
|  | Subcontractor 2 | ……… | ……… | ……… | ……… | yes/no |
|  | ……… | ……… | ……… | ……… | ……… | yes/no |

## Expenditure Outside of the Countries of the Bidding Consortium

Expenditure above 50 k€ outside of the countries of the bidding consortium members (i.e. in other ESA Member States and/or outside of the ESA Member States) is/is not foreseen.

*Include the text and complete the table below only if expenditure above 50 k€ is foreseen outside of the countries of the bidding consortium members.*

The estimated expenditure is detailed in the table below.

**Table 1‑7 Estimated Expenditure Outside of the Bidding Consortium**

|  |  |  |  |
| --- | --- | --- | --- |
| Destination of Expenditure | Total Expenditure | Country(ies) | Nature of Expenditure, potential supplier and Justification |
| Other ESA Member States | ……… k€ | ……… | ……… |
| Outside of the ESA Member States | ……… k€ | ……… | ……… |

# Product Definition, Development and Verification

*Describe briefly the approach you will take to elaborate and develop the opportunity within this activity, including definition of main requirements, description of starting point, identification of elements to be developed, verification activities, top level risk assessment and validation/qualification status at the end of the activity.*

## Product Description

The product consists of ………… The main components of the product are …….

*The applicable definition of product is:*

* *Space Segment HW, SW.*
* *Ground Segment HW, SW.*
* *Systems/Service: integrated end-to-end satcom solution composed of a combination of Space and Ground Segment products.*

*The definition of a “Product” is provided in ANNEX 1. It is understood as the final product ready for commercialisation. The proposed development activities 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).*

*Include text to describe how the product operates in its host environment (e.g. its parent sub-system, the end-to-end system) if this is not fully described by the above elements, or if some elements need further explanation or clarification.*

The product is illustrated in the following high-level block diagram, which identifies the key building blocks and major interfaces.

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

The main elements are described in the table below.

Table 2‑1 Product elements overview

|  |  |  |
| --- | --- | --- |
| **Product element** | **Functions/Features** | **Critical Technologies** |
| Name of element 1 | … | … |
| Name of element 2 | … | … |
| Etc. | … | … |

*All modules that form the final product shall be described, even if not part of this activity including key features/performance/attributes.*

## Product Specification

The main requirements for the product and its constituent parts are given in the following table:

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).

Table 2‑2 Key Product Requirements

| **Product Requirements** | | |
| --- | --- | --- |
| **Requirement ID** | **Requirement Name** | **Description of criticality** |
| … | … | … |
| … | … | … |
| … | … | … |

## Heritage and starting point

### 

### Previous activities

The proposed activity is/is not a follow-up of a previous activity/previous activities.

*Include the text and complete the table below only if the proposed activity is a follow-up of a previous activity or activities. Any other public funded (ESA/National/EU) activity linked to the proposed development shall be described.*

Further details are provided in the table below.

Table 2‑3 Previous Activities Followed Up by the Proposed Activity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Programme[[5]](#footnote-6)** | **Activity Name[[6]](#footnote-7)** | **Completion Date[[7]](#footnote-8)** | **Brief Description** | **Outcome** |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |

### Starting point

The starting point and technical work to be performed on main functional modules, sub-assemblies and final product are described in the table below:

Table 2‑4 Heritage and development activity of the Product

|  |  |  |
| --- | --- | --- |
| **Product element** | **Starting point / Heritage** | **Start TRL** |
| ……… | ……… | ……… |
| ……… | ……… | ……… |
| ……… | ……… | ……… |

*The assessment of the current TRL should be substantiated by a brief description of the current status of maturity or heritage of the product, with supporting evidence wherever possible.*

## Development Approach

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

Table 2‑5 Overview of the Proposed Development Approach

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Product element** | **Developed in the Proposed Activity** | **Development Phase(s)[[8]](#footnote-9)** | **Target TRL[[9]](#footnote-10)** | **Development Activities[[10]](#footnote-11)** |
| Module xxx | yes/no | ……… |  |  |
| sub-system yyy | yes/no | ……… |  |  |
| Component, material or process zzz | yes/no | ……… |  |  |

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

*Provide supplementary text as necessary to fully explain the development activities and approach.*

*The work to be performed on all Product/element that form the final product shall be described, even if not part of this activity. If a Product/element development is not included in the proposed activity, its development approach shall be described in the column “when developed”*

*Please provide a concise product roadmap, if relevant.*

The development approach is illustrated in the following schedule bar chart:

## Overview of Verification Activities

The following table provides an overview of the verification activities to be performed and the corresponding verification environment or facilities.

*Complete the following table as appropriate, indicating the verification activities that are planned to be carried out in each of the proposed development phases (Definition, Technology, Product, Demonstration), and ensuring consistency with the deliverables listed in Section 1.6.*

*For example, in the Definition Phase verification of a key performance parameter could be by computer simulation using a specific software package (the verification environment/facility), or technical trade-off/analysis. Alternatively, the performance of key enabling technology could be assessed by testing of representative hardware samples. In later development phases (e.g. the Product Phase) verification will typically involve tests performed on a development model (e.g. EQM), using specific test facilities.*

*Column 1: Development Phase during which the verification activity will be performed.*

*Column 2: The aspect(s) of the product to be confirmed by the verification activity (e.g. product functional requirements, technical performance requirements, etc.).*

*Column 3: The verification method (test, analysis, simulation, inspection, etc.).*

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

*Column 5: The verification environment. For Space Segment and Ground Segment developments this is typically the environmental (e.g. thermal) conditions.*

Table 2‑6 Overview of Verification Activities

| **Development Phase** | **Functionalities/ Requirements Verified** | **Verification Method** | **Model** | **Environment** |
| --- | --- | --- | --- | --- |
| … | … | … | … | … |
| … | … | … | … | … |
| … | … | … | … | … |
| … | … | … | … | … |

The product test matrix is the following:

|  | **Test phases** *(for instance temperature, vacuum, etc.)* | |
| --- | --- | --- |
|  | *For instance, Initial ambient test* | *For instance, hot thermal vacuum test* |
| Requirement 1 | … | … |
| Requirement 1 | … | … |
| … | … | … |

## Validation Activities

*Complete this section only for a Ground Demonstration Phase.*

The proposed development validation[[11]](#footnote-12) activities are indicated below. The validation activities will be supported by …

*Examples of validation support means are test beds, facilities, assets, satellite capacity and pre-operational services.*

1. Duration of the validation activities (pilot): … months.
2. Number of pilot sites to be equipped and geographical locations: …
3. Number/type/name of user organisations involved in/and definition of the pilot activities: …
4. Objectives of the pilot and related Key Performance Indicators to be achieved during the pilot: …

## Risks

The major development risks associated with the proposed activity are summarised in the following table.

Table 2‑7 Overview of the Major Development Risks[[12]](#footnote-13) and the Proposed Risk Mitigation Actions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Risk Identifier** | **Description** | **Likelihood** | **Severity** | **Mitigation Actions** | **Mitigation Phase(s)[[13]](#footnote-14)** |
| ……… | ……… | low/medium/high | low/medium/high | ……… | ……… |
| ……… | ……… | low/medium/high | low/medium/high | ……… | ……… |
| ……… | ……… | low/medium/high | low/medium/high | ……… | ……… |

*Include and complete the following text if the proposed activity includes a Technology Phase, explaining why some risks are considered high enough to justify a Technology Phase development as a mandatory step to de-risk a subsequent Product Phase development.*

The risks to be addressed in the Technology Phase, as identified in the table above, are considered to be of sufficiently high risk to jeopardise the success of a Product Phase development. The reasons for this assessment are as follows: ……..

For these reasons support is requested for the identified Technology Phase activities.

# Business Plan

*The Business Plan is intended to analyse the strategic context and commercial potential of the output of the proposed activity and to demonstrate that the Contractor’s initiative is conceived to lead to a commercial exploitation.*

*It shall be provided from both Tenderer’s and Industrial participants perspectives.*

*The Business Plan shall provide the commercial rationale for the proposed development activities with the key commercial aspects, including the potential Satcom target market, the target customers, the competitive environment and own positioning, as well as the market strategy.*

*The extent of information provided in this section shall be in line with the maturity of the proposed development phase(s) (e.g. for the initial Development Phases such as Definition and Technology, only preliminary information on the business case is required).*

*Please note that the Business Plan presented in this document shall be related to the* ***target final product(s)*** *to be sold on the market. The target product(s) may include other elements or features not covered by the proposed activities.*

*The supporting spreadsheet (“C&G Space Segment and System – Financial Forecast Workbook”, or “C&G Ground Segment– Financial Forecast Workbook”) can be downloaded from* [*https://artes.esa.int/documents*](https://artes.esa.int/documents)*.*

*Assuming favourable feedback on your outline proposal by the Agency, the business plan provided here in the outline proposal should be carried forward to form part of your associated Full Proposal (with updated information, as appropriate).*

## Confirmed Business Case

*Include this section only if you intend to propose an activity having a “confirmed business case”.*

*A “confirmed business case” is one that satisfies the following conditions:*

* *The Tenderer has received a commercial order from a customer for the product to be developed.*
* *A positive return on investment is anticipated based on this commercial order alone (i.e. it is not dependent upon any other product sales)*
* *The product has reached an appropriate level of maturity, such that performance specifications and commercial terms and conditions have been released by the customer of the development to be undertaken,*

*Provide all necessary elements to justify the credibility of the opportunity.*

*Specific provisions are made for proposed activities with a “confirmed business case”:*

* *Prior work, which fulfils all required conditions, can be accepted for up to 20% of the cost of the Development Phase.*

*Provide the following statements in support of your claim of a confirmed business case:*

The proposed activity has a confirmed business case and satisfies the associated criteria for eligibility/is expected to satisfy the associated criteria for eligibility at the time of Full Proposal submission:

1. A letter from our customer confirming their intended commercial procurement of our product/evidence that a commercial order has been placed for our product is attached as Annex X to this outline proposal.
2. Technical and commercial requirements have been received from the customer.
3. The Financial Indicators of the Business Plan of our Outline Proposal show positive returns (e.g. ROI, IRR, PBP, NPV) based on this commercial order alone.

## Market Analysis

*This section is optional if it is proposed to develop a product with a “confirmed business case”. Otherwise this section is mandatory.*

The position of our product in the market is summarised in the matrix below.

Table 3‑1 Market Positioning

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Product** | |
|  |  | **Existing / Incremental** | **New** |
| **Market** | **Existing / Incremental** | X | X |
|  | **New** | X | X |

Our product is:

• Space Segment hardware/ Software.

• Ground Segment hardware / Software.

• Systems/Service: integrated end-to-end satcom solution composed of a combination of Space and Ground Segment products.

Our product is addressing the sector of …… (e.g. provide a few examples), which has the following characteristics: …. (e.g. geographical reach, trends, sales model).

The Total Available Market (TAM) of the targeted product is the following:

*TAM (the total worldwide market available for your product) shall be presented, including quantitative figures. If the product is new (not existing), market of a similar product may be used.*

The Serviceable Available Market (SAM) of the targeted product is the following:

*The SAM (the market you can really address with your product and your channels, it comprises all your potential customer segments) shall be presented including quantitative figures and assumptions.*

*In case you already have a market share of this market, you shall present it including quantitative figures and factual information (for instance, sales existing products in this market, or of previous generation, for the different customer segments).*

Our projection in terms of Serviceable Obtainable Market (SOM or target market) we aim to capture in the short term for each of the identified customer segments is shown in Table 3 (“Product Sales Assumptions for the Commercial Exploitation Phase”) of the financial forecast workbook.

The assumptions behind these sales projection are ….

*Present the SOM (The percentage of the Serviceable Available Market that your company could realistically reach in the short term) and the underlying assumptions that led to the projected sales volumes over time taking into account competition, trends, demand forecast, sales channels and other elements that could have influence. This value is usually estimated taking into account specific customers (or group of customers) within the customer segment to which you actively try to sell the product/s to.*

## Competitive Landscape

*This section is optional if it is proposed to develop a product with a “confirmed business case”. Otherwise this section is mandatory.*

Our key competitors and the nature of the competition are identified in the table below.

Table 3‑2 Summary of the Competition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Competitor** | **Nature of Competition** | **Description of competitor product** | **Market Share** | **References** |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |

*Columns 1 & 2: show the competitors already present in your market (SAM) or serving it partially, indicate the nature of the competition highlighting their value proposition in relation to the market you are trying to serve for each of the identified competitors. It shall include the Strength/Weakness of competitor’s product compared to targeted product. For example, an existing or potential supplier of the same type of product with same characteristics and lower price, a new entrant to the market with an innovative value proposition, a market incumbent.*

*Column 3 - Description of competitor product: Quantify the nature of the competition as far as possible (e.g. performance, competitiveness in terms of pricing, performance, etc.).*

*Column 4: Quantify their market share.*

*Column 5: provide references to substantiate your assessment of the competition (e.g. web links, references to market analyses, data sheets, etc.).*

Our key competitive differentiations are summarised in the following table.

*Identify your competitive advantage and competitive strategy. (e.g. using a SWOT analysis).*

Table 3‑3 SWOT Analysis

|  |  |
| --- | --- |
| STRENGTHS  - List of strengths | WEAKNESSES  - List of weaknesses |
| OPPORTUNITIES - List of opportunities | THREATS - List of threats |

*Strengths are characteristics that give you an advantage over your competitors.*

*Weaknesses are characteristics that place you at a disadvantage with respect to the competition. Opportunities are (usually external) elements that you could exploit to improve your business prospects. Threats are elements (e.g. external influences) that could threaten your business prospects.*

*Add supplementary material as necessary to fully describe the competitive environment.*

On the basis of the SWOT analysis, our strategic options to achieve the commercial goals are ………

## Business Model Canvas

*A single page Business Model Canvas is available at* [*https://artes.esa.int/documents*](https://artes.esa.int/documents) *and may be used as a tool to help generate and structure the overall Business Plan.*

### Customer Segments and Value Proposition

*This section is optional if it is proposed to develop a product with a “confirmed business case”. Otherwise this section is mandatory.*

The table below identifies the key customers/customer segments identified as Serviceable Obtainable Market (SOM or target market), targeted by the proposed product(s) and the specific characteristics of our product(s) that will address the customer problems/needs.

Table 3‑4 Customer Segments/Needs and Key Product Characteristics/Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **Customer/Customer Segment** | **Customer Problems/Needs** | **Product Characteristics Addressing this Problem/Need** | **Key product requirement** |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |

*Each customer segment targeted should be clearly identified. Add any supplementary text you feel is necessary to clarify the nature of your intended customers and to explain their main needs.*

*Add any supplementary text that you feel is necessary to explain your value proposition fully. For example, you could explain how the proposed development fits into* ***your overall product development strategy*** *to meet the needs of the customers in the longer term.*

*Indicate whether or not the adoption of the product is going to change the way the customers are traditionally running their business, for instance, if the product is bringing a disruptive innovation.*

*The proposed development activities 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).*

*Please note that the Business Plan presented in this document shall be related to the target product(s) to be sold on the market. The target product(s) may include other elements or features not covered by the proposed activities*

### Value Chain

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

The following diagram describes the value chain, its team composition and their role in the commercial exploitation phase of the product / service.

Figure 3‑5 Project Team Composition and Roles

**EXAMPLE**



*Provide a diagram which illustrates the value chain and the interactions among customers, users, project team and other key stakeholders (e.g. regulators) in the commercial exploitation phase of the product you intend to realise. Include a discussion of the changes, if any, introduced in the value chain by the proposed new product and/or service.*

### Revenue Streams

*This section is optional if it is proposed to develop a product with a “confirmed business case”. Otherwise this section is mandatory.*

In the commercial exploitation stage, our product(s) will be sold to our customers as described in the table of the financial forecast workbook.

*Show here the product/s pricing scheme as reported in the financial forecast workbook: Refer to the relevant table that records your assumptions regarding the product revenue stream:*

* *“Product Pricing” for the Ground Segment.*
* *“Product Sales Assumptions for the Commercial Exploitation Phase” for the Space Segment and Systems.*

The underlying assumptions that led to the projected product unit sale price and unit cost are the following: ……

*This shall include, for instance:*

* *a description on how cost reduction will be achieved;*
* *a justification that the projected unit sale is competitive (what value are your customers willing to pay, what do your customers currently pay).*
* *how much does every revenue stream contribute to the overall revenues?*

*For the Definition and Technology Phases an estimation (target) shall be provided in line with the maturity of the proposed activity. Provide estimated ROM (Rough Order of Magnitude) prices including all features, even if they are developed outside of the proposed development activities.*

### Cost Structure

The key elements of cost for realising the value proposition are the following: ……

*You should list the most important costs that characterize your business opportunity in terms of:*

* *Key resources costs (e.g. hubs, satellite bandwidth, sales personnel, financing)*
* *Key activities costs needed in order to pursue your business opportunity (e.g. R&D, sales, marketing, creating and delivering value, maintaining Customer Relationships, and generating)*
* *All development costs required to reach the final product ready for commercial exploitation shall be provided. This should include costs linked to previous, current and future developments that are directly relevant to reach the final targeted commercial product (for instance, delta qualification required for other product variants not covered by the EQM, material, parts & processes evaluations / qualifications, etc.). This may include operations cost.*

The following assumptions have been made when deriving the figures provided in this table: ……

*Refer to the relevant table(s) in the financial forecast workbook that record your assumptions regarding the costs associated with the commercial exploitation phase:*

* *Table “Cost of Sales”, Table “Operational Expenditures” and Table “Capital Expenditures” for the Ground Segment.*
* *Table “Development Costs” for the Space Segment and Systems.*

*Optionally, you may also provide a copy of the relevant table(s) in this section.*

### Channels

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

In the commercial exploitation stage, our product(s) will be sold to the customers via these channels: ……

*Indicate whether or not the sales channels are already established. If not, explain how they will be created. If customers are new for your company (i.e. your company has not sold products to them in the past), please explain your approach to reaching these customers.*

### Customer Relations

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

Our relationships with the key customers already exist/must be created/have to be improved.

*Provide factual information, for instance, existing contracts with figures. If the product targets only one specific customer, a letter of interest from this customer has to be attached to the outline proposal, confirming the adequacy of the value proposition. Indicate whether or not customer representatives will be involved in the proposed project and, if so, the kind of formal agreement that you intend to set up with them.*

### Key Activities to establish the business

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

*You should describe crucial activities you must do to make your business model work. (e.g. Key Activities for the Value Proposition, for establishing the distribution channels, to have in place the key resources, to establish the customer relations, to secure the agreements with the key partners).*

*Note that key technical development activities shall be described in the implementation proposal.*

### Key Resources

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

*You should describe crucial resources (physical, intellectual, human, financial) you must have to make your business model work. (e.g. Key Resources for the Value Proposition, for having channels in place, to establish the customer relations, to secure the agreements with the key partners, to make your revenue stream work).*

### Key Partners

*This section is optional if you propose to develop a product with a “confirmed business case” or a Space Segment product fitting in the white area as identified in Table 3-1. Otherwise this section is mandatory.*

*You should describe crucial stakeholders (suppliers, partners, users, etc.) you must have to make your business model work.*

The Key partner during the commercial exploitations of the product are listed in the table below.

Table 3‑6 Key Partners

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Partner Type** (e.g. Satellite Prime, Operator, Service Provider, Supplier, User, Customer) | **Partner Name** (company name, country, web link) | **Involvement in the Project** (e.g. none, subcontractor, supplier, integrator) | **Type of Agreement** (e.g. NDA, partnership agreement, contract) | **Existing Agreement** |
| ……… | ……… | ……… | ……… | Yes |
| ……… | ……… | ……… | ……… | No (planned) |
| ……… | ……… | ……… | ……… | ……… |

The following table provides an overview of the positioning of the different Subcontractor(s) and key external actors together with their position in respect to the development and commercial exploitation of the proposed project.

Table 3‑7 Partners’ Positioning

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Partner** | **Background and Experience** | **Role in the project implementation** | **Role in commercial exploitation** | **Key obstacle for partnership (e.g. IPR constraints)** |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |

## Financial Indicators

*Refer to the relevant tables and figures in the financial forecast workbook that quantify the expected return on investment:*

* *Table “Profit & Loss and Cash Flow Statement” and Table “Financial Indicators with and without ESA Support” for the Ground Segment.*
* *Table “Financial Indicators” and Figure “Cumulative Discounted Cash Flow” for the Space Segment and Systems.*

The financial forecast is detailed in the attached financial forecast workbook. It shows the impact of ESA financial support on the return on investment.

*You shall also provide a copy of the relevant tables/figures in this section, replacing the placeholders below.*

A copy of the relevant information is provided below:

The Internal Rate of Return (IRR), the Net Present Value (NPV) and the break-even point are ….

# Space Segment (Atlas) or system Demonstration Phase

*Include this section only if the Full Proposal includes a Space Segment (also known as Atlas) or a System Demonstration Phase or Technology Phase where an early in-orbit experiment is proposed. See the notes following each table for guidance on how to complete the tables.*

*Please see the Call for Proposals cover letter for a definition of the “Embedded” and “Independent” cases.*

*Indicate if each product to be flown is new for your company, or is a heritage product that will be significantly modified or improved (“upgrade”). If the product to be flown is an upgrade of a heritage product, provide a description of the changes/innovation with respect to the heritage product and the reasons why you consider the upgrade to be substantial enough to merit support for a flight opportunity under the ARTES C&G Demonstration Phase.*

## General In-Orbit Demonstration information

The purpose of the Space Segment Demonstration Phase is: ………

Support is being requested within the Demonstration Phase of a Space Segment activity for an Embedded Case/Independent Case as a hosted payload/an Independent Case where the flight hardware represents the main purpose of the mission.

*or*

Support is being requested within the Technology Phase where an early in-orbit experiment is proposed. The in-orbit experiment will be implemented as an Embedded Case/Independent Case as a hosted payload/an Independent Case where the flight hardware represents the main purpose of the mission.

## Information related to an In-Orbit Demonstration Embedded Case

*Include this section only if the proposed space segment activity includes a Demonstration Phase Embedded Case. See the notes following each table for guidance on how to complete the tables.*

**Table 4.1 Intended Flight Configuration**

| **Item** | **Statement** |
| --- | --- |
| Number of flight items to be embarked on the mission for which support under ARTES C&G is requested: | ……… |
| Reason why this number of supported flight items is the minimum number necessary to demonstrate in orbit heritage: *(if more than one)* | ……… |
| Total number of flight items of the same type to be flown on the mission (i.e. without ARTES support): | ……… |
| The product(s) will be incorporated into the main mission as follows: | brief description of how the product(s) will be incorporated within the main mission  *(e.g. standalone unit, within an equipment redundancy ring)* |
| Current Relationship to Flight Customer | Marketing to them/  Already Identified Flight Opportunity/  Formal Proposal submitted/  In Negotiation |
| The prime contractor has been informed that support is being sought from the Agency for a flight opportunity for the product(s): | yes/no |
| The flight opportunity supported by the Agency will be the first demonstration of the product(s) in space: | yes/no |

*If possible, identify a specific flight opportunity (spacecraft/mission name), the name of satellite operator and the name of the space segment prime contractor. If this information is not yet available, indicate to which satellite manufacturing primes and satellite operators you are offering the product(s) for flight on future missions.*

*For each product type, indicate the number of flight items for which support is requested under ARTES. If more than one item, explain the rationale for this number of units and why you consider that it is the minimum necessary to demonstrate in orbit heritage. Also indicate the total number of flight items of the same product type to be flown on the mission (i.e. including those items for which no support is being requested under the ARTES C&G Demonstration Phase).*

drawing showing how the product will be incorporated within the main mission,

*In the drawing please clearly indicating the flight items for which support under ARTES C&G is requested and how they interface with other flight items. Add explanatory text as necessary to properly explain the flight configuration and the role of the supported flight items within the platform/payload.*

*If applicable, modify and include the following statement, listing the changes to the product(s) required for each potential flight opportunity.*

The product will require the following modifications compared to that currently under/having recently completed qualification:

1. Modification 1.
2. Modification 2.
3. …

*If applicable, modify and include the following statement, listing the activities for which support is requested by the prime (from European Participating States only).*

The proposed space segment Demonstration Phase includes the following activities at prime level for which support is requested from the Agency by the prime:

1. Prime manufacturer activity 1.
2. Prime manufacturer activity 2.
3. …

*Complete the following statement, providing a draft/preliminary list of telemetry and data related to the product(s) to be collected during the first year of operation of the product(s) in orbit.*

It is proposed to collect the following data to demonstrate the performance of the product in its operational environment during its first year in orbit:

1. Parameter/data type 1.
2. Parameter/data type 2.
3. …

## Information related to an In-Orbit Demonstration Independent Case as a hosted payload

*Include this section only if the Full Proposal includes a Space Segment (Atlas) or System Demonstration Phase or Technology Phase where an early in-orbit experiment is proposed flying as an Independent Case as a hosted payload.*

**Table 4.2 Overview of the Flight Opportunity**

| Item | **Statement** |
| --- | --- |
| Name of spacecraft/mission: | ……… |
| Satellite operator(s): | ……… |
| Prime manufacturer(s): | ……… |
| Product(s) proposed to be flown in the Demonstration Phase: | ……… |
| Beneficial owner of the product(s) once in orbit: | company name/not applicable |
| Nature of the product(s): | new/upgrade |
| Summary of changes/innovation with respect to the heritage product(s): | ……… |
| Justification for support for a flight opportunity under ARTES C&G Demonstration Phase: | ……… |

## Information related to an In-Orbit Demonstration as an Independent Case where the flight hardware represents the main purpose of the mission.

*Include this section only if the Full Proposal includes a Space Segment (Atlas) Demonstration Phase or Technology Phase where an early in-orbit experiment is proposed flying as an Independent Case where the flight hardware represents the main purpose of the mission.*

**Table 4.3 Overview of Flight Opportunity(s)**

| Item | **Statement** |
| --- | --- |
| Number of Spacecraft | ……… |
| Type of Spacecraft | ……… |
| Orbit | ……… |
| Number of spacecraft | ……… |
| Platform Manufacturer | ……… |
| Payload Manufacturer | ……… |
| Company who will be registered owner of the spacecraft | ……… |
| Country through which the satellite will be registered (in UN Database). | ……… |
| Company responsible for operating the satellite. | ……… |
| Justification for support for an Independent case mission under ARTES C&G Demonstration Phase: | ……… |

## Cost Information related to an Independent Case

*Include this section only if the proposed space segment activity includes a Demonstration Phase Independent case.*

Table 4.4 Independent Cost Breakdown

| **Activity element** | **Estimated Cost** | **Price to ESA** |
| --- | --- | --- |
| Accommodation studies | ……… | ……… |
| Flight equipment or sub-system development including manufacturing, assembly, integration and test | ……… | ……… |
| Accommodation of the innovative item, including assembly, integration and test on the spacecraft | ……… | ……… |
| Portion of the main mission spacecraft platform cost (as a shared resource between the main mission and the item) | ……… | ……… |
| Portion of the launch cost (as a shared resource between the main mission and the item) | ……… | ……… |
| Launch campaign (testing and early operation phase specific to the item, for validation of function and performance or monitoring) | ……… | ……… |
| IOT and validation of the performance and function of the product | ……… | ……… |

*Note the costs associated with launch costs can only be supported, if the flight item will not be used to generate any income to the company during the operational lifetime of the spacecraft.*

The co-funding for the activity (alongside ESA) will be provided by name of company that will provide the funds that make up the difference between the identified cost of the activity and the price paid by ESA.

*Note the company providing the funds may be the tenderer themselves from internal funds, or a third party who has an interest in the demonstration of the product in orbit.*

**ANNEX 1  
Terminology Used in ARTES Competitiveness & Growth**

|  |  |
| --- | --- |
| Breadboard (BB): | An initial development model for a space product, electrically and functionally representative of the complete end item, or of one or more key elements of the end item. It is used to prototype the intended design and to mitigate technical risks. Verification is typically performed in a laboratory environment. |
| Business Model | The mechanism(s) by which an organisation generates revenue. There is a wide array of business models – some examples include monthly subscriptions to services, direct sales to organisations, channel resellers, technology licensing, etc. The choice of business model is critical to success in capturing the business opportunity. An organisation can have more than one business model to achieve its objectives. |
| Business Model Canvas | Business Model Canvas is a strategic management and lean start-up template for developing new or documenting existing business models. |
| CAPEX: | Capital Expenditure or CAPEX is investment in the long-term, consisting of assets that are bought by the company and go on the balance sheet. The value of those assets is typically depreciated over the years. |
| Channels | An organisation you form a partnership with to represent your solution in a specified market. Channel Partners can include: resellers, service providers, system integrators, distributors, etc. |
| Confirmed Business Case | The following conditions must be met:   * The Tenderer has received a commercial order from a customer for the product to be developed. * A positive return on investment is anticipated on the basis of this commercial order alone (i.e. it is not dependent upon any other product sales). * The product has reached an appropriate level of maturity, such that performance specifications and commercial terms and conditions have been released by the customer of the development to be undertaken.   The commercial opportunity must be judged as credible by ESA. |
| Cost | In ESA terms, “cost” refers to the total cost of development including labour, travel, development tools, subcontractors, external services, etc. |
| Customer Segment: | A group of customers identified on the basis of their needs, behaviours, or other traits that they share. |
| Customer: | An individual or an organisation that meets three criteria: 1. they have a problem they want to solve; 2. they have money/budget to spend to solve the problem; 3. they are willing and authorised to execute the buying decision. |
| Domain | In ESA terms, it can be a Space Segment or Ground Segment related development |
| Definition Phase: | Consists of the set of activities in which system performance requirements are defined, and system level analyses are performed. |
| Demonstration Phase: | Consists of the activities needed to validate the operational effectiveness and capabilities of the final product in its final configuration and within the user utilisation environment. |
| EGSE: | Electrical ground support equipment. |
| Engineering Model (EM): | Flight representative model in terms of form, fit and function used for functional and failure effect verification. The engineering model is usually not equipped with high reliability parts or full redundancy. The engineering model is also used for final validation of test facilities, ground support equipment and associated procedures. See ECSS‑S‑ST‑00‑01C. |
| Engineering Qualification Model (EQM): | Model which fully reflects the design of the flight model except for the parts standard, used for functional performance and EMC verification and possibly for qualification. Military grade or lower-level parts can be used instead of high reliability parts, provided they are procured from the same manufacturer with the same packaging. Functional performance qualification includes verification of procedures for failure detection, isolation and recovery and for redundancy management. The engineering qualification model may also be used for environmental testing if the customer accepts the risk, in which case the qualification model rules apply. See ECSS‑S‑ST‑00‑01C. |
| ESA Price | The amount of ESA funding that can be granted to a successful bidder. |
| Flight Model (FM): | End product that is intended for flight. The flight model is subjected to formal functional and environmental acceptance testing. See ECSS-S-ST-00-01C. |
| Ground Segment: | Consists of all the ground-based elements of a satellite communication system. |
| Ground Support Equipment (GSE): | Non flight product (hardware/software) used on ground to assemble, integrate, test, transport, access, handle, maintain, measure, calibrate, verify, protect or service a flight product (hardware/software). See ECSS‑S‑ST‑00‑01C. |
| Internal Rate of Return | Refers to the rate of return used to measure and compare the profitability of investments. It is the value that the cost of capital has in order to have a NPV equal to 0. |
| Market: | A group of buyers looking to solve different types of problems. A market can comprise many different types of customer segments. |
| MGSE: | Mechanical ground support equipment. |
| Model: | Physical or abstract representation used for calculations, predictions or further assessment. Model can also be used to identify particular instances of the product e.g. flight model. See ECSS‑S‑ST‑00‑01C. |
| Net Present Value | Net Present Value is an important value in discounted cash flow analysis, and is a standard method for using the time value of money to assess the viability of long-term projects. NPV reflects the fact that expenses or revenues that will not occur until sometime in the future should be discounted to reflect the impact of risk, interest, and inflation over that time period. |
| OPEX: | Operational costs, or OPEX, are the costs associated with the day-to-day running of the company or the used up expenses. (e.g. employee wages, R&D funds) |
| Partner | A relationship between two parties to collaborate to achieve agreed upon objectives. For example, a business partnership between two organisations could be between a manufacturer and a reseller to distribute products to a defined territory or customer segment. |
| Pay Back Period | Refers to the period of time required for the return on an investment to "repay" the sum of the original investment |
| Pre-operational Stage: | Is the activity related to the utilisation of a product in a user representative environment. This corresponds to the pilot stage. |
| Product: | A product is any hardware, software, system or sub-system or service item that is ready for commercial exploitation. |
| Product Development Plan: | Is the development logic to develop a product ready for commercial exploitation using the C&G Development Phases as required (Definition, Technology, Product, and Demonstration), but including as a minimum a Product Phase or a Demonstration phase. |
| Proto Flight Model (PFM): | Flight model on which a partial or complete proto flight qualification test campaign is performed before flight. See ECSS‑S‑ST‑00‑01C. |
| Qualification: (space products) | That part of verification which demonstrates that the product meets specified qualification margins. This can apply to personnel, products, manufacturing and assembly processes. See ECSS‑S‑ST‑00‑01C. |
| Qualification Model (QM): | Model which fully reflects all aspects of the flight model design, used for complete functional and environmental qualification testing. A qualification model is only necessary for newly-designed hardware or when a delta qualification is performed for adaptation to the project. The qualification model is not intended to be used for flight, since it is over-tested. See ECSS‑S‑ST‑00‑01C. |
| Revenue | Revenue is the total/gross amount of sales for a given product, service or company. Revenue is also a term used to describe Turnover. |
| Return on Investment | This is the amount, expressed as a percentage, that is earned on a company's total capital calculated by dividing the total capital into earnings before interest, taxes or dividends are paid. Colloquially, ROI is often used to express the idea that the benefit gained through any type of investment (e.g. time, resources) outweighs the investment. |
| Scaled Engineering Model (Scaled EM): | Engineering model that is not fully representative of the end product, but is sufficiently representative to permit the verification of critical functions of the product in a relevant environment. Critical functions are those functions of the product that deserve control and special attention in order to mitigate technical risks. |
| Sector | A sector is one of a few general segments in the economy within which a large group of companies can be categorized. A sector represents a group of industries and markets that share common attributes. Each sector has unique characteristics and a different profile. |
| Serviceable Available Market (SAM) | is the portion of the total available market (A/the segment/s (i.e. definable subgroup)) that the product/s and/or service/s fills. |
| Serviceable Obtainable Market (SOM) | is the percentage of the serviceable available market that a company aims to capture in the short term |
| Space Segment: | Part of a space system, placed in space, to fulfil the space mission objectives. Space segment activities relate to any product to be used on a spacecraft. |
| Target Market | Look at Serviceable Obtainable Market |
| Technology Phase: | Consists of the activities performed to mitigate the technical risks of the product development up to and including the manufacturing and test of a representative model of the product (e.g. an Engineering Model), but excluding qualification or industrialisation.  The Technology Phase may exceptionally include early in-orbit experimentation to verify the functioning of the technology in an end-to-end system context when it is not possible to test the technology in a ground-based environment. |
| Technology Readiness Level (TRL) | TRL definition is available on the ARTES web site at <https://artes.esa.int/sites/default/files/TRL%20Definitions%20in%20ARTES%20Core%20Competitiveness.pdf> |
| Total Available Market (TAM) | or Total Addressable Market, is the total market demand for a product or service. I represent the revenue opportunity available for a product/s and/or service/s. It counts the total of all unit sales of all competing product/s and/or service/s |
| Validation: | Process which demonstrates that the product is able to accomplish its intended use in the intended (pre)operational environment. The user shall have a key role in this process. Validation addresses whether a product will satisfy the needs of its users. Validation proves it is the right product. |
| Value Proposition: | This is a statement of the value that a company or solution offers to its customers and/or partners. It is expressed from the perspective of the value to the target customer and addresses the main benefit(s) derived by the use of the product. |
| Value Chain | An informal set of organisations that participate together in an ecosystem to satisfy the needs of users and other stakeholders. Organisations participate at specific levels of a Value Chain to add capabilities to complement other components or solutions in the chain. Companies in a Value Chain look to collaborate with other members of the same chain in areas such as marketing, sales, and development. |
| Verification: | Process which demonstrates through the provision of objective evidence that the product is designed and produced according to its specifications and the agreed deviations and waivers, and is free of defects. Users are not involved in the verification. Verification addresses whether a product satisfies the requirements placed upon it. Verification proves the product is right. |

1. The item is deliverable during or at the end of the indicated phase(s). [↑](#footnote-ref-2)
2. For example, ARTES C&G Development Phases partly funded by ESA, or covered by other programmes/funds. [↑](#footnote-ref-3)
3. Please note that the provided table is limited to a maximum of 20 years span (within a ±10 year time interval with respect to the commercial launch date of the product). [↑](#footnote-ref-4)
4. yes = The National Delegation has been contacted with regard to the proposed activity.  
   no = The National Delegation has not yet been contacted with regard to the proposed activity.  
    [↑](#footnote-ref-5)
5. For example, a National, EU or ESA programme, or an internal project (i.e. company financed). [↑](#footnote-ref-6)
6. For an ESA activity please include the contract number. [↑](#footnote-ref-7)
7. 3 Expected or actual, as appropriate. [↑](#footnote-ref-8)
8. The development phase(s) in which the proposed development will take place. [↑](#footnote-ref-9)
9. The TRL for this item at the end of the proposed development. [↑](#footnote-ref-10)
10. Brief description of the proposed main development activities for this item. [↑](#footnote-ref-11)
11. For the definition of the “Verification” and “Validation” terms, please refer to Annex 1. [↑](#footnote-ref-12)
12. Technical and programmatic risks. [↑](#footnote-ref-13)
13. The development phase(s) in which this risk will be mitigated. [↑](#footnote-ref-14)