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| OUTLINE PROPOSAL TEMPLATE – ARTES SCYLIGHT |
| PROJECT NAME – Company name |
| Date: ……  Reference: …… |

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

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

**OUTLINE PROPOSAL TEMPLATE - ARTES SCYLIGHT**

Ver. 1.1

**Notes and Guidelines:**

1. The content of this template may be copied into your own corporate template for the purposes of preparing your outline proposal.
2. Parts highlighted in yellow in this template should be modified as appropriate for your proposed activity.
3. Text in blue and in a smaller font size (example) is for guidance and can be removed from the completed outline proposal document.
4. 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 Tenderer is advised to begin discussions with the relevant National Delegate(s) prior to submitting the outline proposal.
5. In this template “Letter of Invitation” refers to the Letter of Invitation part of the ARTES ScyLight Element Call for Proposals (ref. AO/1‑8893/17/NL/US). This is an important reference document that you should consult when preparing your outline proposal. A link to the Call for Proposals can be found on the ARTES web site.
6. In particular, please pay attention to the following sections of the Letter of Invitation when preparing your outline proposal:
   1. Section 2, which provides information on the scope of ARTES ScyLight activities and of the four ScyLight Development Phases.
   2. Section 3, which provides information about the outline proposal stage of the Tendering process.
   3. Section 5, which covers the key financial aspects of the ARTES ScyLight Element.
7. Please also take into consideration the information about the ARTES ScyLight programme element provided on the ARTES web site: <https://artes.esa.int/artes-scylight-secure-and-laser-communication-technology>.
8. The term “product” is used in this template, which is defined to be any hardware, software, system, sub-system or service.
9. An ARTES ScyLight outline proposal may cover one or more of the following four Development Phases: Definition Phase, Technology Phase, ScyLight Demonstration Phase and Product Phase.
10. An ARTES ScyLight outline proposal shall include the following main elements (these should be provided using this template, duly completed as appropriate):
    1. An overview of the proposed activity (Section 1 of this template).
    2. A description of the business potential for the item(s) to be developed (Section 2 of this template).
    3. A description of the development plan and of the proposed associated activity(ies) (Section 3 of this template).
    4. Information of the ScyLight Demonstration Phase, if proposed (Section 4 of this template).
11. The Agency needs to seek approval to place a contract for your proposed activity. The approval process is initiated with the information provided in the outline proposal, in particular the information provided in Section 1 of this template, plus, if proposed, a justification of why support is requested for a Technology Phase activity or a ScyLight Demonstration Phase activity. This justification shall be based on an assessment of the risks to be mitigated in the proposed development phase(s). See Section 2.4 for further information.

In order to avoid possible delays in the approval process, please be sure to provide clear, complete and consistent information for these specific elements of your outline proposal.

1. Regardless of the proposed development phase(s), you are encouraged to complete all parts of Section 2 “Business Potential” to the best of your ability using the latest information available to you.

However, it is recognised that, depending upon the initial maturity of the proposed development, not all of the requested information will be available. Consequently, completion of all parts of Section 2 is not mandatory if the starting phase of the proposed development is a Definition Phase, a Technology Phase, or a ScyLight Demonstration Phase. Completion of all parts of Section 2 is, however, mandatory if the starting phase of the proposed development is a Product Phase.

Information on the mandatory “Business Potential” outline proposal content is given in the guidance text in Section 2 of this template.

1. Section 2.6 “Return on Investment” of this template makes reference to a “Financial Forecast Workbook”. This is a separate Excel® template that is designed to help you to develop a financial forecast for a new product development.

The Financial Forecast Workbook template can be found on the ARTES web site (<https://artes.esa.int/documents>). Guidelines for using the Financial Forecast Workbook can be found in the “Guide” worksheet of the workbook itself, as well as in Section 2.6 of this document.

The information requested in Section 2.6 “Return on Investment” is only mandatory if the proposed activity starts with a Product Phase. In this case, or if the proposed activity starts with an earlier development phase and you have nevertheless completed the Financial Forecast Workbook, please include the populated Financial Forecast Workbook (i.e. the Excel® document) in your outline proposal submission.

1. To initiate the outline proposal review process, this completed template, plus the completed Financial Forecast Workbook (when appropriate), must be sent to the following email address: [scylight@esa.int](mailto:scylight@esa.int). An outline proposal will be reviewed by the Agency only if all required elements are provided.
2. If both the completed outline proposal template and the Financial Forecast Workbook are provided please ensure that the submitted versions of the two elements are mutually consistent. Failure to do so may lead to a delay in the Agency’s evaluation of your outline proposal.

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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, structure and provide an overview of the product portfolio.

## Scope of the Proposed Activity

Please indicate the scope of the proposed activity, choosing one of the three options listed below.

The scope of our proposed activity is:

Optical Communication Terminals and Components  
Intra-Satellite Photonics/Optical Payloads  
Quantum Cryptography Technologies

Please indicate in the table below the development phase(s) (Definition, Technology, ScyLight Demonstration and Product) for which financial support is being requested in the present proposal. Include/remove table rows as appropriate. Please also indicate, by placing a “X” in the relevant table cell(s), which segment(s) (space and/or ground) are being addressed in each development phase.

This proposal addresses the following development phases and segments:

Table . Scope of the Proposed Activity

|  |  |  |
| --- | --- | --- |
| **Development Phase** | **Space Segment** | **Ground Segment** |
| Definition Phase | X | X |
| Technology Phase | X | X |
| Scylight Demonstration Phase | X | X |
| Product Phase | X | X |

## Background and Motivation for the Proposed Development

Please briefly explain the background and motivation for the proposed development and state the overall development objectives. Include, as appropriate, strategic goals, potential future direct and indirect returns on investment and any other potential tangible and intangible benefits to your organisation.

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

## Overall Planning and Cost Summary

Please identify the development phases required to prepare your product for commercial exploitation and, for each development phase, provide the anticipated start and end dates and the estimated cost and ESA co-funding (incurred or expected).

If the proposed activity starts with a Definition Phase it is mandatory to provide the requested information for all development phases for which financial support is being requested in the present proposal. Details for later development phases that fall outside of the scope of the present proposal (e.g. a Product Phase) need not be provided. However, details of these future phases are expected to be an outcome of the proposed Definition Phase activity.

In all other cases it is mandatory to provide the requested information for all development phases that are, or were, required to prepare your product for commercial exploitation (including past development phases, the proposed development phase(s) and any anticipated future development phases not covered by the present proposal).

Enter the details of the development phases in the following table. If you have completed the Financial Forecast Workbook, you may instead make reference to Table 1 of the workbook. Please also state the overall duration of the proposed activity.

The table below/Table 1 of the financial forecast workbook provides an estimation of the cost and schedule for the proposed development phase(s)/for all development phases necessary to prepare our product for commercial exploitation.

The overall duration of the proposed activity is XX months.

Table . Overall Planning and Cost Summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Development Phase** | **Included in Proposed Activity?** | **Total Cost (k€)** | **ESA Funding % of Cost** | **ESA Funding (k€)** | **Start Mon-YY** | **End**  **Mon-YY** | **Duration Months** |
| Definition | yes/no | ……… | ……… | ……… | ……… | ……… | ……… |
| Technology | yes/no | ……… | ……… | ……… | ……… | ……… | ……… |
| ScyLight Demonstration | yes/no | ……… | ……… | ……… | ……… | ……… | ……… |
| Product | yes/no | ……… | ……… | ……… | ……… | ……… | ……… |

Please indicate the intended date of full proposal submission (assuming that the go-ahead is given by ESA to do so). This information will be used for planning purposes to help ESA ensure a timely evaluation of your proposal.

The company is targeting to submit the full proposal on: Day/Month/Year

## Industrial Consortium and Cost and Price Breakdown

Please complete the following table, identifying the members of your industrial consortium and providing a price breakdown per development phase and per consortium member. Please ensure that the total cost and the requested ESA funding per development phase are consistent with the summary information given in the previous section.

Please note that your National Delegation may only support one development phase at a time.

Please also note that a copy of the table below 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.

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

Table . Cost and Price Breakdown

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

## Expenditure Outside of the Countries of the Tendering Consortium

If expenditures outside of the countries of the tendering consortium members are not declared at the time of outline proposal submission, or are underestimated with respect to those declared in the subsequent full proposal, then this may cause a significant delay to the award of a contract.

If the estimated expenditure exceeds 50 k€ please include and complete the table below.

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

The estimated expenditure is detailed in the table below.

Table . Estimated Expenditure Outside of the Countries of the Tendering Consortium

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

## Deliverables

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

Table . Key Deliverable Items

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Deliverable Item** | **Phase(s)[[2]](#footnote-3)** | **Notes** |
| hardware/ software/……… | ……… | Technology | ……… |
| hardware/ software/……… | ……… | Product | ……… |
| ……… | ……… | ……… | ……… |

## Dependencies

### Dependencies on Previous Development Activities

Please indicate whether or not the proposed activity is a continuation of a previous development activity or activities. If so, include and complete the table below.

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

Further details are provided in the table below.

Table . Previous Activities Followed Up by the Proposed Activity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Programme****[[3]](#footnote-4)** | **Activity Name****[[4]](#footnote-5)** | **Completion Date****[[5]](#footnote-6)** | **Brief Description** | **Outcome5** |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |

### Dependencies on other Activities

Please indicate whether or not there are dependencies between the proposed activity and other activities falling outside of the scope of the proposed activity. If so, include and complete the table below.

There are/are no dependencies between the proposed activity and other activities falling outside of the scope of the proposed activity.

Further details are provided in the table below.

Table . Dependencies Between the Proposed Activity and other Activities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Programme3** | **Activity Name4** | **Completion Date5** | **Brief Description** | **Nature of the Dependency[[6]](#footnote-7)** |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… |

# Business Potential

The extent of the information provided in this section shall be in line with the maturity of the proposed development phase(s).

You are encouraged to provide the best possible information on the business potential of your proposed development by completing all parts of this section to the best of your ability and using the latest information available to you. However, depending upon the proposed development phase(s), only some of the content of this section is mandatory. Guidance on the mandatory content is provided **in bold** at the start of each of the following sub-sections.

## Customers

### Target Customers/Users

**Provision of this information is mandatory for all proposed development phases.**

Please list in the table the individual customers/users and/or the customer/user groups that have been identified as potentially benefiting from the proposed development. Summarise in the table their main problems and needs, in particular those that are being addressed by the proposed activity.

Provide additional text below the table, as necessary, to elaborate on the potential customers/users and their needs.

The key customer/user groups targeted by our activity are identified in the table below.

Table . Key Customers/Users and their Needs

|  |  |
| --- | --- |
| **Customer/User** | **Their Problems/Needs** |
| ……… | ……… |
| ……… | ……… |
| ……… | ……… |

The customers/users …

### Customer/User Relationships

**Provision of this information is mandatory if the starting phase of the proposed development is a Technology Phase, a ScyLight Demonstration Phase or a Product Phase.**

Provide information of the nature of your relationship, if any, with the identified target customers/users.

Provide factual information whenever possible, for instance, existing contracts with figures. 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. If the product targets only one specific customer, a letter of interest from this customer shall be attached to the outline proposal, confirming the adequacy of the value proposition.

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

…

A letter of interest from our target specific customer: [Name of Customer] is attached.

### Sales Channels

**Provision of this information is mandatory only if the starting phase of the proposed development is a Product Phase.**

Describe the sales channels and indicate whether or not they 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.

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

## Value Proposition

**Provision of this information is mandatory for all proposed development phases.**

Summarise in the following table how the proposed development will address the problems and needs of the customers/users as identified in Section 2.1.1 (e.g. performance, cost, new features). Add any supplementary text that you feel is necessary to fully explain your value proposition.

The table below identifies the specific characteristics of our product that will address the previously-identified customer/user problems and needs.

Table . Key Product Characteristics

|  |  |
| --- | --- |
| **Customer/User Problem or Need** | **Product Characteristics Addressing this Problem/Need** |
| ……… | ……… |
| ……… | ……… |
| ……… | ……… |

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 adoption of our product by the customer(s) will/will not affect the way they are traditionally running their business. The impact on their business will be …….

If there is a strategic element to the proposed development provide a brief explanation. 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.

The strategic impact of the proposed development for our entity is …..

Add any supplementary text that you feel is necessary to fully explain your value proposition.

Other points to note regarding the value proposition are ……

## Market Assessment

### Position of the Product in the Market

**Provision of this information is mandatory for all proposed development phases.**

Indicate, by placing an “X” in one of the boxes in the following table, if your product is:

* An existing product, a new product, or an upgrade to an existing product (“incremental”)
* Addressing a new market, an existing market, or a new segment of an existing market (“incremental”).

Provide supplementary text as necessary to explain the position of your product in the market.

If you have more than one product, or if your product addresses more than one market, please indicate the positioning of each product in each of its target markets (by providing separate tables for each product/market combination).

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

Table . Market Positioning

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

The position of our product …

### Competitive Landscape

**Provision of this information is mandatory if the starting phase of the proposed development is a Technology Phase, a ScyLight Demonstration Phase or a Product Phase.**

Please list in the table below your competitors and/or competing solutions to the one you are proposing. Indicate the nature of the competition for each of the identified competitors/competing solutions. For example, an existing or potential supplier of the same type of product, an established supplier of similar products, a new entrant to the market, an entity known or suspected to have plans to develop the same type of product or a market incumbent. Please quantify the nature of the competition as far as possible (e.g. provide estimates of their market share, competitiveness in terms of pricing, etc.). Provide references to substantiate your assessment of the competition (e.g. web links, references to market analyses, data sheets, etc.).

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).

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

Table . Summary of the Competition

|  |  |  |
| --- | --- | --- |
| **Competitor** | **Nature of Competition** | **References** |
| ……… | ……… | ……… |
| ……… | ……… | ……… |
| ……… | ……… | ……… |

### Competitive Position

**Provision of this information is mandatory if the starting phase of the proposed development is a Product Phase and the proposed development targets a new product.**

Please complete the table below with a Strengths, Weakness, Opportunities and Threats (SWOT) analysis for the target product.

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, please identify your strategic options to achieve the development goals.

Note that a SWOT analysis and the corresponding strategic options to achieve the development goals are only required for the outline proposal when the proposed development targets a **new product** (you can remove the table below if it is not applicable). However, the full proposal shall include the SWOT analysis and the strategic options if the starting phase of the proposed development is a Product Phase.

Our key competitive differentiations are summarised in the following table.

Table . SWOT Analysis

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

## Risks

Please note the specific requirements outlined below for the Technology Phase and for the ScyLight Demonstration Phase in relation to risks and risk mitigation.

The Technology Phase covers activities to mitigate the technical risks of the development up to and including the manufacturing and test of a representative model of the product. If a Technology Phase is proposed, please ensure that you

* clearly identify the technical risks that are being addressed in the proposed Technology Phase and
* explain why you consider these risks high enough to justify a Technology Phase development as a mandatory step to de-risk a subsequent ScyLight Demonstration Phase or Product Phase development.

The ScyLight Demonstration Phase covers activities to mitigate technical and/or commercial risks in the operational environment prior to embarking on a product development (Product Phase). It has two different maximum co-funding levels (50% or 75%) for industrial entities (please refer to Section 5 of the Letter of Invitation for more information). The applicable maximum co-funding level depends upon an agreed assessment of the level of risk being mitigated in the ScyLight Demonstration Phase (“low” or “high” respectively).

ScyLight Demonstration Phase activities may be funded up to 75% if the activity is for in orbit demonstration of quantum cryptography technologies. In all other cases ScyLight Demonstration Phase activities will be considered as “low risk” (funded up to 50%) unless it is clearly demonstrated that:

* critical technical performance parameters cannot be validated outside of the intended operational environment, and/or
* barriers to market acceptance cannot be overcome without early deployment of the technology in the intended operational environment, in particular, significant new capabilities have not yet been exploited commercially by the industry of ESA Member States and Canada.

If a “high risk” ScyLight Demonstration Phase is proposed (funding up to 75%), please be sure to include a justification in the outline proposal for this categorisation of the risks.

### Risk Assessment

**Provision of this information is mandatory if the starting phase of the proposed development is a Technology Phase, a ScyLight Demonstration Phase or a Product Phase.**

Please list in the table below the main risks that are being addressed by your proposed activity, including technological, commercial and programmatic risks. Uniquely identify each risk (for ease of reference in Section 2.4.2) and assess its likelihood and severity (low, medium or high).

The major development risks being addressed by the proposed activity are summarised in the following table.

Table . Overview of the Risks being Addressed by the Proposed Activity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk Identifier** | **Type** | **Description** | **Likelihood** | **Severity** |
| R1 | technological/commercial | ……… | low/medium/high | low/medium/high |
| ……… | technological/commercial | ……… | low/medium/high | low/medium/high |
| ……… | technological/commercial | ……… | low/medium/high | low/medium/high |

### Risk Mitigation Activities

**Provision of this information is mandatory if the starting phase of the proposed development is a Technology Phase, a ScyLight Demonstration Phase or a Product Phase.**

Please complete the table below making reference to the risks identified in the previous section. Briefly describe each risk mitigation action and indicate in which of the proposed development phase(s) the associated risk will be partially or fully mitigated.

The following table identifies the proposed mitigation activities for the risks identified previously.

Table . Proposed Risk Mitigation Actions

|  |  |  |
| --- | --- | --- |
| **Risk Identifier** | **Risk Mitigation Action** | **Mitigation Phase(s)** |
| R1 | ……… | ……… |
| ……… | ……… | ……… |
| ……… | ……… | ……… |

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 ScyLight Demonstration Phase or 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 ScyLight Demonstration and/or Product Phase development. The reasons for this assessment are as follows: ……..

Please include the following statement if the proposed activity includes a ScyLight Demonstration Phase for in orbit demonstration of quantum cryptography technologies.

The proposed ScyLight Demonstration Phase is for in orbit demonstration of quantum cryptography technologies. For this reason support is requested for a “high risk” ScyLight Demonstration Phase development.

In all other cases, if the proposed activity includes a ScyLight Demonstration Phase that addresses technological and/or commercial risks that you consider to be “high risk”, justifying a co-funding level of up to 75% for industrial entities, please include and complete the following text. Please identify which of the risks identified in the table above you consider to be “high risk” and, in each case, explain your rationale for this assessment.

Risks R1,…, which are proposed to be mitigated in the ScyLight Demonstration Phase, are considered to be sufficiently high to justify the requested co-funding of XX% for this phase. The reasons for this assessment are as follows: ……..

## Resources

### Key Partners

**Provision of this information is mandatory for all proposed development phases.**

Please identify in the table below the key partners who will help you to realise the proposed development and/or assist in the exploitation of the outcome. Indicate in each case their involvement (if any) in the proposed development and the type of agreement you have, or intend to have, with them.

Our key partners are identified in the table below.

Table . 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) |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |

### Key Resources and Dependencies

**Provision of this information is mandatory for all proposed development phases.**

Please list in the table below the key resources you will require to successfully conclude each of the proposed development phases.

Resources could include, for example, assets, company competences, key suppliers, consultancy services, and manufacturing, test or other facilities. Indicate whether or not the resources are expected to be in place at the time of need. If not, explain the actions to be taken to secure their availability on time. Indicate potential issues associated with each key resource. These could include, for example, long lead items, software licensing, patent constraints, procurement policies and national/international restrictions (e.g. export restrictions).

If there is a risk that any key resource will not be in place at the time of need, explain what actions will be taken to secure the availability of that resource when needed.

Critical resources and dependencies are identified in the following table. We confirm that all of the resources are in place to realise our proposed development.

Table . Key Resources and Dependencies

|  |  |  |  |
| --- | --- | --- | --- |
| **Development Phase** | **Required Resource** | **In Place** | **Potential Issues** |
| ……… | ……… | yes/no | ……… |
| ……… | ……… | yes/no | ……… |
| ……… | ……… | yes/no | ……… |

There is a risk that …… resource(s) will not be in place at the time of need. The following actions are planned to secure the availability of that/those resource(s) when needed: ……

## Return on Investment

An overview of the development cost and schedule is provided in Section 1.4. The subsections below provide the additional information required to perform a financial return on investment calculation for the proposed product. A Financial Forecast Workbook template (Excel® document) is provided for this purpose. This return on investment calculation is mandatory only if the proposed activity starts with a Product Phase. If a return on investment calculation is provided the completed Financial Forecast Workbook template should be attached to your outline proposal.

### Development Costs and Schedule

**Provision of this information is mandatory if the starting phase of the proposed development is a Product Phase.**

Please identify the development phases required to prepare your product for commercial exploitation and, for each development phase, provide the anticipated start and end dates and the estimated cost and ESA co-funding profiles (incurred or expected). Table 1 and Table 2 of the Financial Forecast Workbook are provided for this purpose.

Tables 1 and 2 of the Financial Forecast Workbook should be completed as follows:

* Table 1 “Planning and Costing Summary”: identify the development phases and provide the outline schedule for each development phase.
* Table 2 “Development Costs”: provide an estimate of the development costs and ESA co-funding over time for each development phase in accordance with the schedule information defined in Table 1.

Your attention is drawn to the detailed guidelines for completing Table 1 that are provided in the Financial Forecast Workbook.

Once both tables have been completed Table 1 provides an overview of the development costs and the planning for the proposed activity. Please ensure that the content of Table 1 is consistent with the information presented in Section 1.4 of your proposal.

The development costs and schedule are summarised in Table 1 (“Planning and Costing Summary”) of the financial forecast workbook.

### Revenue Streams

**Provision of this information is mandatory if the starting phase of the proposed development is a Product Phase.**

Please complete the revenue elements of Table 3 “Product Sales Assumptions for the Commercial Exploitation Phase” of the Financial Forecast Workbook, identifying potential sales scenarios and, in each case, providing estimates of unit sales volumes and sales price evolutions over time. Describe the potential sales scenarios and present the underlying assumptions that led to the revenue predictions.

Our projection in terms of the market we aim to capture in the short term is shown in Table 3 (“Product Sales Assumptions for the Commercial Exploitation Phase”) of the financial forecast workbook for each of the identified commercial opportunities.

The assumptions behind these sales projections are ….

### Cost of Sales

**Provision of this information is mandatory if the starting phase of the proposed development is a Product Phase.**

Please complete the cost elements of Table 3 “Product Sales Assumptions for the Commercial Exploitation Phase” of the Financial Forecast Workbook, providing, for each identified potential sales scenario, an estimate of the cost per unit sold over time. Present the underlying assumptions that led to the cost estimates.

Cost of sales assumptions are presented in Table 3 (“Product Sales Assumptions for the Commercial Exploitation Phase”) of the financial forecast workbook.

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

### Financial Indicators

**Provision of this information is mandatory if the starting phase of the proposed development is a Product Phase.**

Please complete Table 4 “Cost of Capital Assumed in the Return on Investment Calculations” of the Financial Forecast Workbook with your assumption for the cost of capital. Based on the information you have provided in Tables 1 to 4 inclusive, a financial analysis will be automatically calculated in Table 5 of the “Analysis” worksheet and the results summarised in Table 6 of the same worksheet.

Make reference to the results of the financial analysis below.

The financial forecast is shown in Table 5 (“Financial Analysis”) of the financial forecast workbook, assuming the cost of capital stated in Table 4 of the workbook.

Figure 1 (“Cumulative Discounted Cash Flow”) of the financial forecast workbook shows the projected cash flow for two cases, one with and one without ESA financial support.

The Internal Rate of Return (IRR), the Net Present Value (NPV) and the break-even point for the project are shown in Table 6 (“Financial Indicators”) of the financial forecast workbook, showing the effect of the ESA financial support.

# Product Definition, Development and Verification

## Product Description

Please describe the product(s) to be developed in terms of the major building blocks or modules, the functions and features of each module, the internal and external interfaces and how the product operates in its host environment.

The product to be developed consists of ………… Its main components are …….

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 features/performance/attributes, and highlight key building blocks and major interfaces.

The main functional modules are described in the table below.

Table . Functional Modules of the Product

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Functions/Features** | **Description** | **Critical Technologies/ Techniques** |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… |

The external interfaces of the product are summarised in the table below.

Table . External Interfaces of the Product

|  |  |  |
| --- | --- | --- |
| **Interface Identification** | **Key Parameters** | **Purpose** |
| ……… | ……… | ……… |
| ……… | ……… | ……… |
| ……… | ……… | ……… |

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.

## Development Approach

An overview of the proposed development approach is given in the table below.

Table . Overview of the Proposed Development Approach

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Current TRL** | **Basis of the Current TRL Assessment[[7]](#footnote-8)** | **Developed in the Proposed Activity** | **Development Phase(s)[[8]](#footnote-9)** | **Target TRL[[9]](#footnote-10)** | **Development Activities[[10]](#footnote-11)** |
| ……… | ……… | ……… | yes/no | ……… | ……… |  |
| ……… | ……… | ……… | yes/no | ……… | ……… |  |
| ……… | ……… | ……… | yes/no | ……… | ……… |  |

An item could be, for example, a module, sub-system, component, technique or process. 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.

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

## Model Philosophy

Verification of the product and its constituent elements will be performed using the models identified in the following table.

Modify and complete the following table as appropriate, ensuring consistency with the deliverables listed in Section 1.7.

Table . Model Philosophy

|  |  |
| --- | --- |
| **Item** | **Model(s)** |
| ……… | BB, EM, EQM, PFM (delete as appropriate) |
| ……… | BB, EM, EQM, PFM (delete as appropriate) |
| ……… | BB, EM, EQM, PFM (delete as appropriate) |

## Overview of Test and 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, ScyLight Demonstration, Product).

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 by a 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.

Table . Overview of Test and Verification Activities

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item to be Verified** | **Verification Activity** | **Verification Objective** | **Development Phase** | **Model** | **Verification Environment/ Facilities** |
| ……… | ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… | ……… |
| ……… | ……… | ……… | ……… | ……… | ……… |

# ScyLight Demonstration Phase

Include this section only if the proposed activity includes a ScyLight Demonstration Phase.

## Overview of the Flight Opportunity

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 item(s) for flight on future missions.

The table below provides a summary of the flight opportunity for the proposed ScyLight Demonstration Phase.

Table . Overview of the Flight Opportunity

| **Item** | **Statement** |
| --- | --- |
| Name of spacecraft/mission: | ……… |
| Satellite operator(s): | ……… |
| Prime/spacecraft manufacturer(s): | ……… |
| Launch provider: | ……… |
| Item(s) proposed to be flown in the ScyLight Demonstration Phase: | ……… |
| The proposed legal owner of the item(s) once in orbit.  Note that the legal owner assumes liability for the flight item once in orbit. This may or may not be the same as the beneficial owner of the item. | company name |
| Beneficial owner of the item(s) once in orbit:  See Annex 2 for a definition of the “beneficial owner”. | company name |
| The source of the co-funding for the activity (alongside the ESA contribution)  Note that 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 item in orbit. This may or may not be the same as the beneficial owner of the item once in orbit. | company name |

## Intended Flight Items

Please provide a list of the items to be launched into space for which funding is requested.

The table below lists the items to be launched into space as part of the ScyLight Demonstration Phase and, in each case, the proposed build standard. These items will be developed as part of the activity for which support is being requested.

Table . Intended Flight Items

| **Item** | **Build Standard of the Flight Item** |
| --- | --- |
| ……… | e.g. EM/EQM/PFM |
| ……… | ……… |
| ……… | ……… |
| ……… | ……… |

## Intended Flight Configuration

Please provide and complete a separate copy of Table 4.3 below for each of the flight items identified in Table 4.2.

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

Please include a drawing showing how the item will be incorporated within the main mission, clearly indicating the flight items for which support under ARTES ScyLight 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.

The following table(s) describes the intended flight configuration for each of the flight items proposed as part of the ScyLight Demonstration Phase.

Table . Intended Flight Configuration for Item Name

| **Item** | **Statement** |
| --- | --- |
| Number of flight items to be embarked on the mission for which support is requested under an ARTES ScyLight Demonstration Phase: | ……… |
| Reason why this number of supported flight items is the minimum number necessary to demonstrate the technology in orbit:  (if more than one) | ……… |
| Total number of flight items of the same type to be flown on the mission (i.e. without ARTES ScyLight support): | ……… |
| Interface between flight item(s) and the rest of the spacecraft and payload. | brief description of how the item(s) will be incorporated within, and interfaced to, the main mission and spacecraft platform |

## Statements Relating to the Proposed ScyLight Demonstration Phase

Please complete the table below to the best of your ability.

We provide the following statements concerning out proposed ScyLight Demonstration Phase.

Table . Statements Relating to the Proposed ScyLight Demonstration Phase

| **Ref.** | **Item** | **Statement** |
| --- | --- | --- |
| 1 | Status of the flight demonstration opportunity. | Seeking flight opportunity/  Already identified flight opportunity/  Formal proposal submitted/  In negotiation |
| 2 | The prime or spacecraft contractor has been informed that support is being sought from the Agency for a flight demonstration opportunity for the technology. | yes/no |
| 3 | The entity who will assume ownership and liability for the flight items at the time of launch has been informed that support is being sought from the Agency for the flight demonstration opportunity. | yes/no |
| 4 | The entity who will assume ownership of the flight item at the time of launch has been informed that all liability for the flight item will reside with them. | yes/no |
| 5 | The beneficial owner of the item(s) once in orbit has been informed that support is being sought from the Agency for the flight demonstration opportunity. | yes/no |
| 6 | The company/organisation providing the co-funding for the activity (alongside ESA) has been informed that support for the activity is being sought from the Agency for the flight opportunity. | yes/no |
| 7 | It is confirmed that the item(s) once in orbit shall be exclusively used for demonstration purposes for at least 1 year in its operational orbit location. | yes/no |
| 8 | The tenderer confirms that in the ScyLight Demonstration Phase no profit is gained with the hardware/software developed. | yes/no |

## Support for Spacecraft Prime Contractor Activities

Indicate whether or not support is requested for activities performed by the spacecraft manufacturer/prime contractor. If so, please list the activities below and provide the associated costs in Section 4.7.

The proposed ScyLight Demonstration Phase includes/does not include activities at spacecraft/prime contractor level for which support is requested from the Agency.

These activities are:

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

## In-Orbit Data

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

It is proposed to collect the following data to demonstrate the performance of the flight item(s) in its/their operational environment during its/their first year in orbit:

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

## Flight Opportunity Cost Breakdown

A breakdown of the costs of the proposed ScyLight Demonstration Phase is provided in the table below.

Table . Cost Breakdown

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

**ANNEX 1**

**Definition of Technology Readiness Level (TRL)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TRL** | **ISO Definition** | **Associated Model(s)** | **Performance Requirements** | **Test Environment Representative of Operational Environment** |
| 1 | Basic principles observed and reported | Not applicable | In elaboration | Not applicable |
| 2 | Technology concept and/or application formulated | Not applicable | In elaboration | Not applicable |
| 3 | Analytical and experimental critical function and/or characteristic proof-of-concept | Mathematical models, supported e.g. by sample tests | Partly Defined | No |
| 4 | Component and/or breadboard functional verification in laboratory environment | Breadboard | Partly Defined | No |
| 5 | Component and/or breadboard critical function verification in a relevant environment | Scaled EM for the critical functions | Fully Defined | Yes (for critical functions subject to scaling effect) |
| 6 | Model demonstrating the critical functions of the element in a relevant environment | Full scale EM, representative for critical functions | Fully Defined | Yes (for critical functions) |
| 7 | Model demonstrating the element performance for the operational environment | QM / EQM / PFMa | Fully Defined | Yes |
| 8 | Actual system completed and accepted for flight (“flight qualified”) | PFM / FM | Fully Defined | Yes |
| 9 | Actual system “flight proven” through successful mission operations | PFM / FM | Fully Defined | Yes |

a  A PFM may be used to achieve qualification provided that the commercial customer accepts the risk and it is demonstrated that the use of an alternative qualification model (e.g. EQM) is not viable. In this case the cost of the flight hardware is not supported by ESA.

See also “Guidelines for the use of TRLs in ESA programmes”, ESSB-HB-E-002, Issue 1, Rev 0, 21 August 2013 (available on the ARTES web site at <https://artes.esa.int/documents>).

**ANNEX 2  
Terminology Used in ARTES ScyLight**

|  |  |
| --- | --- |
|  |  |
| 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. |
| Beneficial Owner | Entity that enjoys the possession and/or benefits of ownership (such as receipt of income) of the item even though its ownership (title) is in the name of another entity. |
| 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. |
| 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. |
| 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. |
| 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 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. |
| Market: | A broad landscape 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. |
| OPEX: | Operational costs, or OPEX, are the costs associated with the day-to-day running of the company or the used up expenses. |
| Pre-operational Stage: | Utilisation of a service performed as part of an applications project, used to validate the requirements and assess the success criteria. This corresponds to the pilot stage. |
| Product: | A product is any hardware, software, system or sub-system, service or application item that is ready for commercial exploitation. |
| Product Development Plan: | Is the development logic to develop a product ready for commercial exploitation using the SCYLIGHT Development Phases as required (Definition, Technology, Scylight Demonstration and Product), but including as a minimum a Product Phase or a Scylight 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. |
| 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. |
|  |  |
| 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. |
| Validation: | Process which demonstrates that the product is able to accomplish its intended use in the intended 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. |
| 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. yes = The National Delegation has been contacted and is in favour of the proposed activity.  
   no = The National Delegation has not yet been contacted.  
   under discussion = The National Delegation has been contacted and discussions are ongoing. [↑](#footnote-ref-2)
2. The item is deliverable during or at the end of the indicated phase(s). [↑](#footnote-ref-3)
3. For example, a National, EU or ESA programme, or an internal project (i.e. company financed). [↑](#footnote-ref-4)
4. For an ESA activity please include the contract number. [↑](#footnote-ref-5)
5. Expected or actual, as appropriate. [↑](#footnote-ref-6)
6. For example, schedule interdependencies, input/output interdependencies, external influences on key decision points, both for the proposed activity and for other activities (i.e. include the impact of the proposed activity on other activities, if appropriate). [↑](#footnote-ref-7)
7. Brief description of the current status of maturity or heritage of the product and evidence for the TRL assessment. [↑](#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)