**INTRODUCTION LETTER and PROPOSAL TEMPLATE**

**[N.B. Use this template to prepare your proposal. Once the proposal is complete and internally validated, please remove all captions in red colour, , add your own logos, headers/footers prior to finalising your proposal for submission to Verhaert. The proposal shall be submitted in a searchable and indexed PDF file for easier viewing.]**

**[COVER LETTER]**

From: **..........** (For the **Applicant** to insert name of the company/institute submitting the application)

Date: **..........** (For the **Applicant** to fill in the date of the proposal)

To: Verhaert New Products and Services

 Hogeakkerhoekstraat 21

 9150 Kruibeke

 BELGIUM

 **Contact person: Luisa Leroy and Sam Waes**

Subject: Application for the Belgium Space Solutions Proof of Concept – Call 1: 11/03/2021

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dear Sir/Madam,

With reference to the above Call for proposals, we are pleased to present this proposal:

1. The Applicant (potential Contractor) is:

**....** (full name of company or institute)

**....** (address of its seat)

E-mail: **........**

Telephone: **........**

County of origin (company) : **........**

VAT Number: **…….**

1. The Subcontractor(s) participating to the activity is (are):

**Please fill in the tables below**

**TEAM and Price Breakdown Information:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Prime Contractor****(Applicant)** | **Subcontractor 1** | **Subcontractor 2** |
| Economic Operator Complete Name and Legal Nature ([[1]](#footnote-1)) |  |  |  |
| SME (indicate YES or NO) |  |  |  |
|  |  |  |  |
| Total Price per Entity |  |  |  |  |  |
| **TOTAL PRICE** |  |

1. The cost-reimbursement contract for the activity in accordance with the funding conditions stated in the Call, amounts to: **……...... Euro** (insert the amount of the total price) all included with the sole exception of any import duties and value added taxes. (In case of proposal including Subcontract(s), an additional price information is to be stated in: a summary price breakdown showing the amount allocated individually to each of the participants, including the own share of the Contractor).
2. The contact person of the Applicant to whom all communications relating to this letter should be addressed is the following: **......** (name of contact person(s), telephone number, e-mail address – it being understood that two (2) contact persons, one technical and one legal/commercial, might be advantageous. Please fill in as needed.)

 a) for technical matters as follows:

|  |  |  |
| --- | --- | --- |
|   | To: | With copy to: |
| Name |  |  |
| Telephone No. |  |  |
| e-mail address |  |  |

 b) for contractual and administrative matters as follows:

|  |  |  |
| --- | --- | --- |
|   | To: | With copy to: |
| Name |  |  |
| Telephone No. |  |  |
| e-mail address |  |  |

1. for Personal Data Protection matters to be addressed to the Data Protection contact point as follows:

|  |  |
| --- | --- |
|   | To: |
| Name |  |
| Telephone No. |  |
| e-mail address |  |
| Mail Address |  |

1. Regarding the technical and management contents of this Proposal, we hereby certify that this application fully complies with the technical and management requirements of the subject Call, including the latter’s Introduction Letter and all other Appendices and/or Annexes.

In addition, the technical contents of this Proposal are free from any plagiarism. When use is made of material being quotations or citations from existing public literature such use is clearly indicated and due reference indications (source and author) are provided.

1. We hereby state that we have read and understood all the terms and conditions of the Draft Contract included in the subject Call and that we accept the said terms and conditions without any reservations. We also confirm that any sales conditions of our own shall not apply.
2. With reference to the Draft Contract, we hereby specifically confirm our full compliance.
3. (One of the 2 following alternative statements 8.a) and 8.b) is to be deleted)

8. a) Concerning the feasibility to export the deliverable items of the resulting Contract as that is foreseen in the Draft Contract including its Appendices, we hereby declare that we have examined the case and drawn the conclusion that there are no export restriction issues and thus no need to obtain specific licences or authorisations.

**or**

8. b) Concerning the feasibility to export the deliverable items of the resulting Contract as that is foreseen in the Draft Contract including its Appendices, we hereby declare that we have examined the case and drawn the conclusion that export restrictions and/or need of adequate licences or authorisations exist, and that the status regarding such requirements is at present the following:

- the Applicant **or (option)** its Subcontractor ?… (name) has obtained the following authorisation(s) in order to submit this application: ?………. (to specify)

**and/or** **(option)**

 - the Applicant **or (option)** its Subcontractor ?…. (name) will need to obtain prior to the placing of a Contract, the following authorisation(s): ? …… (to specify)

1. The legal representative to sign the resulting Contract on behalf of the Contractor will be: **.....** (name and title of the person)
2. The proposal is valid during the following time period, reckoning from the closing date for application submission: **......** months (to insert a number compatible with Verhaert’s Cover Letter)

We hereby acknowledge the right of Verhaert during the validity period of this Proposal, to require the Applicant to provide evidence of any element of its Proposal and to give additional detailed information, including on the price quotation, whatever the type of price is.

1. By submitting the Proposal, I/we the undersigned herewith officially declare that the Proposal fulfils the Key Acceptance Factors listed below, as well as indicated in section 4 of the subject Call Cover Letter.
2. By submitting the Proposal, Verhaert is allowed to include the electronic version of public summary of work covered out in its database with public access.

|  |  |  |
| --- | --- | --- |
| Key Acceptance factor |  | Reference paragraph and page in proposal |
| The Application Introduction Letter and the Detailed Proposal contain a binding price; | [ ]  |  |
| The Introduction Letter and the Proposal contain a price type compliant with the one requested in the Call and that the application is compliant with the budgetary limit(s) applicable to the Call; |[ ]   |
| The Application Introduction Letter contains the confirmation of the validity period required in the subject Call; | [ ]  |  |
| The Application Introduction Letter is signed by the authorised representative(s) of the Applicant ; |[ ]   |
| The proposal pertains to the transfer of a space heritage technology (Call cover letter); |[ ]   |
| The Technology Description is fully filled in [Proposal Template]; |[ ]   |
| A target non-space application has been identified (including identification of industry, end-users, and description of use case scenario) [the Proposal Template]; |[ ]   |
| The Added Value of the Space heritage for the new application is clearly identified in the proposal [Proposal Template]; |[ ]   |
| The market opportunity has been validated (validation of the problem and of the value proposition) [Proposal Template]; |[ ]   |
| The Applicant confirms that the proposal shows the technical feasibility based on desk research which evidence the feasibility of the considered solution [the Detailed Proposal Template]; |[ ]   |
| A non-space receiver is involved in the activity [Proposal Template]; |[ ]   |
| The donor of the space heritage technology is independent from the end-user organisation involved in the activity. |[ ]  Not Applicable |

Done and signed for, and on behalf of **.....................** (Name of the company or institute acting as the Applicant ):

Signature: **..............................**

Name and title of the signatory: ........................ (Full name and function) duly authorized to commit the applicationing entity and its proposed Subcontractor(s) if any, for this purpose.

**[END INTRODUCTION LETTER]**

**[DETAILED PROPOSAL TEMPLATE]**

**DETAILED PROPOSAL FOR THE TECHNOLOGY TRANSFER PROOF OF CONCEPT:**

**TITLE OF THE PROPOSAL: [insert title]**

**Abstract [Key elements on the technology and its new application – Max 5 lines including keywords]**

**Technology Domain of the space heritage** (Tick TD which is applicable in the last column; otherwise describe the applicable technology domain in the last row)

|  |  |  |
| --- | --- | --- |
| **TD #** | **Technical Domain description** | **Applicable TD** |
| 1 | **On-Board Data Systems** |[ ]
| 2 | **Space System Software** |[ ]
| 3 | **Spacecraft Electrical Power** |[ ]
| 4 | **Space Environments & Effects** |[ ]
| 5 | **Space System Control** |[ ]
| 6 | **RF Payload and Systems** |[ ]
| 7 | **Electromagnetic Technologies & Techniques** |[ ]
| 8 | **System Design & Verification** |[ ]
| 9 | **Mission Operation & Ground Data systems** |[ ]
| 10 | **Flight Dynamics & GNSS** |[ ]
| 11 | **Space Debris** |[ ]
| 12 | **Ground Station System & Networks** |[ ]
| 13 | **Automation, Telepresence & Robotics** |[ ]
| 14 | **Life & Physical Sciences** |[ ]
| 15 | **Mechanisms & Tribology** |[ ]
| 16 | **Optics** |[ ]
| 17 | **Optoelectronics** |[ ]
| 18 | **Aerothermodynamics** |[ ]
| 19 | **Propulsion** |[ ]
| 20 | **Structures & Pyrotechnics** |[ ]
| 21 | **Thermal** |[ ]
| 22 | **Environmental Control Life Support (ECLS) & In Situ Resource Utilisation (ISRU)** |[ ]
| 23 | **EEE Components and quality** |[ ]
| 24 | **Materials and Processes** |[ ]
| 25 | **Quality, Dependability and Safety** |[ ]
| 26 | **Other: Name TD** |[ ]

1. **TECHNICAL PART** **AND APPLICATION PART**
	1. SPACE HERITAGE AND SPACE TECHNOLOGY READINESS LEVEL (TRL):

Nota bene: A space heritage technology can be hardware, software, know-how, processes, methodologies or systems developed or adapted for space applications. Satellite borne data, GNSS signals and satellite communication capacity are not considered as space heritage technologies in the context of technology transfer. In case the technology was originally developed for terrestrial purposes (and later spun into space), the space heritage refers to the technical adaptations made on the terrestrial baseline.

Provide the following elements to describe the space heritage technology:

1. Name of the technology:
2. Abstract:

Provide an abstract of the technology in less than 3 lines including keywords – provide at least one illustrative picture.

1. Space origin:

Indicate what problem it does solve in space, and when/what it was developed for, e.g. a space mission, technology development program). In case the technology was developed under one or more ESA contract(s), please provide the activity name(s) and contract number(s).

1. Description of the technology:

Indicate what functions it performs, its key features and capabilities, and describe how the technology is physically implemented (in case of hardware).

1. Innovation and advantages:

Describe the innovative aspects of the technology, as well as its advantages with respect to alternative technologies which perform equivalent functions.

1. TRL:

Identify with justification the current level of maturity of the technology (TRL) for space applications. Please refer to Annex 2 to this Template for the description of TRLs.

1. IPR:

Provide the IPR situation in case relevant (are background IPRs needed? Has an invention been protected by patent, etc).

[ ]  The Applicant confirms and agrees to allow Verhaert and ESA to keep and publicize its technology description for further opportunities at Verhaert in the framework of Space Solutions ( i.e. post it on the ESA’s and Verhaert’s websites, bring it to the attention of non-space organization looking for a solution, put you in contact with such organizations.

1.2 NEW APPLICATION OF THE SPACE HERITAGE [Defining the Current situation and challenge]

1. New application domain:

Describe the new domain of application.

1. Current use case scenario and End-users:
* Describe the current operational situation without making use of the new solution.
	+ Identify the intended customers of your solution, and describe their role in the value chain. Customers shall be understood as the stakeholders who are candidates to procure directly your solution
	+ Identify end-users and describe their operational role. End-users shall be understood as stakeholders who are candidates to operationally use the solution (possibly embedded into a larger system). NB: end-users and direct customers may be the same, in case your solution can be used as a standalone product.

1.3 MARKET OPPORTUNITY

1. Problem and Problem validation:

Describe the operational limitations or problems faced in this use case scenario (which you think the space technology can help to solve), and explain the impact(s) of those problems (e.g. large costs, safety issues, lack of performance, issues of maintenance, disposability, environmental footprint, etc…).

Provide evidence of validation of the problem(s) by receivers and possibly other relevant stakeholder(s). Typically, evidence comes in the form of words from the receiver(s), e.g. quote(s) from a trade journal, excerpt from an interview, etc.

1. Other stakeholder(s):

Identify all stakeholders (other than the end-users and direct customers) and describe their stake(s) with regards to the problem being solved and the solution being brought (e.g. implementation, procurement, operation, maintenance, health & safety, end of life, etc.).

1. Stakeholder requirements:

Provide the requirements from receivers and all other stakeholder(s), as previously identified. Be as specific as possible, with quantitative requirements when applicable. NB: Cover aspects related to performance, interfacing, costs, maintenance, operational availability & down time, end of life, health & safety, etc…. as applicable.

1. Suitability of space heritage technology:

Justify your assumption that the space heritage may be relevant to solve the problem(s) currently faced in the target application.

1. Value proposition and market fit validation:
* Describe the value proposition (i.e. the value that is intended to be delivered to the customer) for the primary target market, i.e. the pains which your product aims to relieve, and/or the gain(s) it intends to provide;
* Present the product features which enable this value proposition;
* Explain how this value proposition addresses and solves (or alleviates) the problems faced by the customers;
* Provide elements of validation of the value proposition by (a) end-user representative(s).
1. Competition analysis:
* Identify competitive offers.
* Compare those competitive offers with yours, in relation to salient stakeholder requirements.

Summarize your findings in the following table. The commercial situation in the last column refers to the level of presence of the competitive product on the market, e.g. is the product being developed? Has newly entered the market, or is it an established offering? How dominant is it on the market?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Competitor** | **Country of Origin****(ISO Code)** | **Salient Product Characteristics** | **Strengths** | **Weaknesses** | **Key differentiators** | **Tec. maturity****(current TRL)**  | **Commercial situation?** |
| Competitor A | **……** | **……** | **……** | **……** | **……** | **……** | **……** |
| Competitor B | **……** | **……** | **……** | **……** | **……** | **……** | **……** |
| Competitor X | **……** | **……** | **……** | **……** | **……** | **……** | **……** |
|  Your solution  | **……** | **……** | **……** | **……** | **……** | **……** | **……** |

1. Market:
* Identify and characterize the possible market segments
* Provide an estimate of the total market and the serviceable obtainable market, and provide evidence to justify your estimates.

## TECHNICAL SOLUTION

1. System requirements:

Provide the system requirements, both functional and non-functional, at system level.

1. Conceptual design:

Describe the conceptual design for the new product; illustrative schematics or diagrams are encouraged.

1. Justification and feasibility:

Justify the technical choices made; discuss and assess the feasibility of the solution, in relation to the most significant / critical system requirements. Provide some results of analysis previously carried out.

1. Importance of space heritage:

Explain the significance of the space heritage technology for achieving the value proposition intended for the particular application which you target (NB: refer to section 1.1 for a definition of space heritage); explain how the space heritage may provide advantage(s) and added value to solve the problem of the new application (as captured by the requirements) with regard to prior art and competing solutions.

1. Technical maturity:

Identify with justification the current level of maturity of the technology under development in the context of the new application.

## TECHNICAL RISKS & MITIGATION PLAN

1. Technical risks:

Identify the (critical) requirements, i.e. those requirements which may be difficult to meet. Discuss and assess the associated risks.

1. Mitigation plan:

Define a mitigation plan for those technical risks.

## PoC PROGRAMME OF WORK

(1) PoC test objectives and approach:

* Define the objectives of the PoC test.
* Define your mid-term and final term objectives.
* Describe the intended approach / methodology for implementing the PoC verification tests.
* Provide assessment of resources (facilities, equipment, etc. ) required to build the breadboard / simulation software and to implement the PoC verification tests.
* Work logic:

Present the work logic of the activity; insert a flow chart showing the logical flow of work from step to step, with reviews, dependencies, and critical path clearly shown.

1. Work package description:

Provide a description of the work (in the form of work packages) which will be implemented to achieve the objectives of the activity (as outlined in the AO Introduction Letterand again below). For each work package describe:

* Title
* Objective
* Work package leader (Name of responsible company/institute, Name of the WP Manager)
* Approach
* Relevant ressources (incl. labour volume)
* Inputs
* Outputs
1. Involvement of end-users:

Explain how end-users will be involved. Describe their role for each of the work packages which they are involved in.

1.7 FEASIBILITY OF THE ACTIVITY

1. Suitability of key personnel:

Introduce key personnel (incl. short CVs with information directly relevant to this activity) and explain how key personnel have the appropriate experience, expertize and skills to satisfactorily fulfil their assignment in this activity.

Nota bene: a “key person” is a person who substantially contributes, in terms of effort and knowledge, to the work carried out under a Contract, and who is explicitly nominated to perform such duties. Key persons are individuals with a certain degree of seniority and whose knowledge, reputation and/or skills in the relevant areas or disciplines are critical to achieving the objectives of the Contract.

1. Suitability of organisations facilities:

Present an overview of the involved organisations, and explain how the facilities & equipment required to implement the programme of work will be at the disposal of the activity.

1. Risks and mitigation plan for activity implementation:

Identify potential risks pertaining to the implementation of the activity. Propose a mitigation plan (and reflect it in the work logic, work package description & management plan). The technical risks requested in the proposal template **shall not** be considered here. This could be for instance risk related to COVID-19.

1. **MANAGEMENT PART**

2.1 MANAGEMENT PLAN

[Explain how the activity will be managed to ensure compliance with the proposed schedule (2.2)].

2.2 PLANNING

 2.2.1 Proposed Schedule

[Provide a starting date and a synthetic summary of the schedule in relation to the workflow including duration, planning assumptions (e.g. envisaged start date, holidays etc.) and identifying and explaining key planning drivers and dependencies].

2.2.2 Meeting and Travel Plan

Indicate if any Travel is planned to accomplish the work (e.g. for suppliers or subcontractor).

2.3 DELIVERABLE ITEMS

2.3.1 Documentation

[For each of the deliverable documents proposed by the Applicant , a description, in the form of a bullet list of the main contents shall be added. This shall be sufficient to understand the contents, scope and depth of the envisaged document or report].

|  |  |  |  |
| --- | --- | --- | --- |
| **Doc ID** | **Title** | **Milestone** | **Description of documents \*** |
| TD | Space Technology Description | Final Review | See below |
| TDP | Technical Data Package  | Final Review | Including verified requirements with non-space user/non-space application, signed by the user |
| MTR | Mid Term Report | Mid Term Review | see below |
| FR | Final Report  | Final Review | see below |
| FP | 2 summarizing slides | Final Review | Template to be provided  |

* TD TECHNOLOGY DESCRIPTION

The TD shall contain the following:

- Title;

- Abstract: (in 2 lines and possibly include the keywords and pictures);

- Space origin: indicate what problem does it solve in space, when/what was it developed for, e.g. Mission, etc);

- Description of the technology: indicate what functions it performs and the technical implementation to perform those functions;

- Innovation and advantages including its key features;

- Describe the innovative aspects of the technology: try to specify innovation by comparison with prevailing technologies and include performance and operational ranges;

- TRL: identify with justification the current level of maturity of the technology (TRL) for space applications. Please refer to Annex A to this Template for the description of TRLs

* IPR situation in case relevant (are background IPRs needed? Has an invention been protected by patent, etc).

· MTR MID-TERM REPORT

The Mid Term Report shall provide a complete description of all the work done until the Mid Term Review. If problems have occurred or are envisaged (including delay) in the implementation of the work, the MTR shall highlight them as well as mitigation measures taken or planned.

· FR FINAL REPORT

The Final Report shall provide a complete description of all the work done during the study and shall be self-standing, not requiring to be read in conjunction with reports previously issued. It shall cover the whole scope of the study, i.e. a comprehensive introduction of the context, a description of the programme of work and report on the activities performed and the main results achieved.

The Final Report is a mandatory deliverable, due upon completion of the work performed under the Contract. For the avoidance of doubt, “completion of the work performed under the Contract”shall mean the finalisation of a series of tasks as defined in the Applicable Documents under Article 1.2.

**The Proof of Concept Final Report** shall contain at minimum the following:

**i Matured market study** and development of BCM (Business Canvass) refer to <https://en.wikipedia.org/wiki/Business_Model_Canvas>

**ii Proof of concept and results obtained**:

· Built prototype| breadboard | simulation S/W

· Test objectives & approach

· Implementation of test plan

· Results of tests & analysis test results

· Technical specifications/ procedures of the breadboard

**iii Proof of concept and results obtained**:

· Elaborate subsystem requirements and system architecture (physical and functional) (if applicable)

* + Development/demonstration plan towards maturity level including cost to completion
1. **FINANCIAL PART**
	1. PRICE QUOTATION FOR THE CONTEMPLATED CONTRACT:

[Enter here the total amount quoted as a cost reimbursed Price (CRP), in Euro, delivery duty paid, exclusive of import duties and value added taxes in BELGIUM]

3.2 DETAILED PRICE BREAKDOWN

* + 1. Breakdown of the total price per work package [annex 4: Cost reporting]
		2. Milestone Payment Plan

[Provide a Milestone Payment Plan using the table here below, taking into account Article 4 of the Draft Contract.

All claims for payment shall be linked to the achievement of defined schedule milestones with tangible deliverables including as the case may be, achieved performance of service. Examples of such milestones are the satisfactory completion of WPs and delivery of the related output.]

 [You are requested to indicate below for only information purposes, the Milestone Payment Plan that is envisaged for Subcontractor(s)]

|  |  |  |  |
| --- | --- | --- | --- |
| **Milestone and month**  |  | **Workpackage Description**  | **Payment**  |
| M+1  | Kick-off |  | 0,00 |
| M+3 | Mid-term  | WPx- WPX | Max. 50% |
| M+6 | End-term  | WP  | Remaining part up to 100% max |

1. **CONTRACTUAL PART :**
	1. INTELLECTUAL PROPERTY RIGHTS

4.1.1. Right to use/modify Intellectual Property

[The Applicant confirms that they have the right to use /modify the intellectual property rights (IPR) which is subject to the technology transfer. The specific types of rights shall be identified (e.g. ownership, license, etc.)

* 1. IMPORT AND EXPORT LICENCES

[This section is only to be completed in case of items or services that are subject to envisaged or probable inclusion of import/export restrictions, other than those from the Applicant ’s own country, in either the body of the work performed under this activity or in a resulting product or service. For the purpose of this section, ‘items’ shall be taken to include EEE parts and materials, ‘services’ shall be taken to include testing and coating and such restrictions include, as example, US ITAR, Israeli Export Control etc. ]

* + 1. Import and Export Licences applicable to this Activity

[OPTION1]

The Applicant declares that no items subject to import or export control will be used in the execution of this activity.

[END OPTION1]

[OPTION2]

The Applicant declares that the following items, subject to import or export control will be used in the execution of this activity:

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Control Type and Country of Origin | Deliverable affected | Comment |
|  |  |  |  |
|  |  |  |  |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ATTACHMENT**:

ANNEX 1: TECHNOLOGY READINESS LEVEL (TRL)

**ANNEX 1: TECHNOLOGY READINESS LEVEL (TRL)**

ESA has adopted the Technology Readiness Level (TRL) scale as a way to measure the maturity of a technology. It has now become a well-established standard. For additional information on definitions, please refer to ECSS-E-AS-11C.

|  |
| --- |
|  **Technology Readiness Levels[[2]](#footnote-2)** |
| **9** | Actual system “flight proven” through successful mission operations |
| **8** | Actual system completed and accepted for flight “flight qualified” |
| **7** | Model demonstrating the element performance for the operational environment  |
| **6** | Model demonstrating the critical functions of the element in a relevant environment |
| **5** | Component and/or breadboard critical function verification in a relevant environment |
| **4** | Component and/or breadboard validation in laboratory environment |
| **3** | Analytical and experimental critical function and/or characteristic proof-of-concept |
| **2** | Technology concept and/or application formulated |
| **1** | Basic principles observed and reported |
|  |  |

 Figure 1 – Technology Readiness Levels adopted in ESA since 2005

Regarding the maturity status of software the same number of TRL are indicatively used. A short description using software engineering terms is shown in Figure 2.

| **TRL** | **Software Maturity**  |
| --- | --- |
| **9** | Live Product  |
| **8** | General Product |
| **7** | Early Adopter Version |
| **6** | Product Release |
| **5** | BETA Version |
| **4** | ALPHA Version |
| **3** | Prototype |
| **2** | Algorithm |
| **1** | Mathematical Formulation |

Figure 2 – Technology Readiness Levels using software engineering terms

Figure 3 gives an indicative correspondence between commonly used engineering terms and TRL levels:

| **TRL** | **Commonly Used Engineering Terms**  |
| --- | --- |
| **9** | Mission Operations. Flight Qualified Hardware/Software  |
| **8** | Theoretical First Unit. Flight Unit. Flight Spare.  |
| **7** | System Demonstration. |
| **6** | High-Fidelity Laboratory Prototype. Engineering Qualification Model. Subsystem model. Development Model. System Model.  |
| **5** | High-Fidelity Breadboard. Brassboard. Engineering Breadboard. Function-Oriented Model. |
| **4** | Component. Breadboard.  |
| **3** | Laboratory Experiments.  |
| **2** | Systems Analyses. Pre-Phase-A Studies.  |
| **1** | Scientific Research.  |

Figure 3 – Technology Readiness Levels and associated Common Engineering Terms.

Figure 4 gives an indicative list of readiness levels for applications and service developments

| **TRL** | **Applications and Services** |
| --- | --- |
| **9** | Application/service operationally deployed and used by paying customers |
| **8** | Application/service completed and validated, commercial offer ready |
| **7** | Trials with customers/users to validate utilisation and business models |
| **6** | Demonstration of prototype in relevant environment, price policy identified |
| **5** | Application/service verified using operational elements, customers/users not involved |
| **4** | Application/service verification in laboratory environment, market segment(s) and customers/users identified |
| **3** | Concept analysis performed and target market identified |
| **2** | Application/service concept formulated, market opportunities not yet addressed |
| **1** | Scientific research |

Figure 4 –Readiness Levels for Applications and

**[END DETAILED PROPOSAL TEMPLATE]**

1. Specify here the type of business entity to which the company belongs (e.g Limited Company, Société Anonyme, AG etc). [↑](#footnote-ref-1)
2. ref. Technology Readiness Levels - A White Paper April 6, 1995, John C. Mankins, Advanced Concepts Office, Office of Space Access and Technology, NASA) [↑](#footnote-ref-2)