TO:	All Bidders	FROM:	Sally Alvarez de Schreiner Chief, Procurement Services
DATE:	20 June 2024		
		REF.:	RFP No. 2024-0092/MOGAPI
		TEL. NO.:	+43 1 26030 6350
		EMAIL:	procurement@ctbto.org

SUBJECT: **2nd Extension of Deadline and Clarifications No. 1 including revised documentation**
RFP 2024-0092/MOGAPI - Provision of software Engineering for the Development of an Operational Xenon Background Estimation Tool (XeBET) on a Call-Off Basis

Dear Bidders,

In reference to request for proposal (RFP) No. 2024-0092/MOGAPI concerning "Provision of software Engineering for the Development of an Operational Xenon Background Estimation Tool (XeBET) on a Call-Off Basis":

- Please find attached the **Clarifications No. 1** to questions raised by interested bidders.

- The **Terms of Reference, Financial Proposal Format** and **The Commission's Model Contract** documents part of the RFP are hereby replaced with the attached amended version of these documents (*Rev. 20 Jun 2024*) (revisions in track changes and highlighted in yellow for ease of reference).

- **The deadline for the submission of proposal is hereby extended from Monday 08 July 2024 to Monday 15 July 2024, 17:00 hours, Vienna (Austria) local time.**

Please take all of the above and attached documentation into account in the preparation and submission of your proposal.

We are looking forward to receiving your proposal prior to the extended deadline for the submission of proposal on 15 July 2024, 17:00 hours, Vienna (Austria) local time.

Sincerely,

SAS
Sally Alvarez de Schreiner
Chief, Procurement Services Section

Attachments:

1. *Questions and Answers – Clarifications No. 1*
2. *Bidder Statement*
3. *Terms of References – Rev. 20 Jun 2024*
4. *Attachment 3 – Financial Proposal Format – Rev. 20 Jun 2024*
5. *The Commission's Model Contract – Rev. 20 Jun 2024*

Clarifications No. 1 – RFP 2024-0092/MOGAPI

"Provision of Software Engineering Services for the Development of an Operational
Xenon Background Estimation Tool (XeBET) on a Call-off Basis"

CTBTO
PREPARATORY COMMISSION

Item#	QUESTION	ANSWER
1	How will the total 290 person days be distributed among components C1 and C2?	The Commission anticipates an allocation of a maximum of 200 person-days for Component C1 ("Scientific Methods") and a maximum of 90 person-days for Component C2 ("Software Engineering"). Thus, a combined maximum of 290 person-days. Please see the changes in the revised Terms of Reference (TOR), Rev. 20 Jun 2024 and Model Contract-Rev 20 Jun 2024, attached hereto.
2	Kindly note that the Bidders statement is missing	Please see attached the Bidders statement and include it as part of the technical proposal in accordance with the RFP instructions.
3	Please provide more information about your expectations with regard to Contractor Requirement 7.2.f: *Confirmation that the Contractor will be able to provide support on 24/7 basis during critical situations:* a) At what point will support be needed? During development of the software? During operation of the software? b) What defines critical situations and will we know in advance when a critical situation is expected?	a) If support is needed, this will be during the development phase. In the context of 24/7 support, this could be requested for a time period where the requests for software development and/or assistance in handling the software are potentially higher due to critical circumstances. b) A "critical situation" refers to a time-critical request for which we would need support outside the usual core working hours. This might relate to quick fixes for in-house exercises, expert meetings, etc. This will be communicated in advance.

BIDDER'S STATEMENT
PLEASE STATE BELOW & SUBMIT WITH PROPOSAL

Delivery Time:
Shipping weight (kg) and Volume (m³) – if applicable:
List of recommended consumables and spares including prices and details on local availability, if applicable (please tick): ☐ For one year period ☐ For a period of ………………………….
Warranty period if applicable (it shall be for a **minimum of 24 months**, starting from the acceptance of the goods/services by the Commission) – please tick below as applicable: ☐ For a two-year period ☐ For a period of ………………………….
Availability of local service in Vienna, Austria (if any):
State country of origin or assembly of all items quoted:
Quantity discount and early payment discount (if any):
Include documentary evidence of qualifications to perform the order, which shall establish to the Commission's satisfaction that the bidder has the financial, technical and production capability necessary to perform the order in its entirety and to provide spare parts and other necessary on-going services as required. Included in this quotation : **Yes** ☐ **No** ☐
Confirmation that the bidder has reviewed the Commission's General Conditions of Contract, Model Contract, and agreed to all terms and conditions. **Yes** ☐ **No** ☐ **Remarks:**
With regards to the software provided with the equipment, state and confirm whether the software licenses are transferable to third parties, i.e. the Commission or the Commission's State Signatories - list available at www.ctbto.og under Status of Signatures and Ratifications | CTBTO. Yes ☐ No ☐ Not applicable ☐ Remarks:
Name: **Name & Title of Contact Person:** **Signature & date:**

ANNEX B

REV. 20 JUNE 2024

TERMS OF REFERENCE

PROVISION OF SOFTWARE ENGINEERING SERVICES FOR THE DEVELOPMENT OF AN OPERATIONAL XENON BACKGROUND ESTIMATION TOOL (XEBET) ON A CALL-OFF BASIS

1. INTRODUCTION

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organisation (hereafter referred to as the Commission), located in Vienna, Austria, is the international organization establishing the global verification system under the provisions of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which bans any nuclear explosion below or above the Earth's surface, underwater and on the surface of the water or in the atmosphere. The verification system includes the International Monitoring System (IMS), a global network of monitoring stations that employ waveform technologies (seismic, hydro-acoustic and infrasound) and radionuclide technologies (particulate and noble gases), a global satellite communications infrastructure (the GCI), an International Data Centre (IDC), and the capability to carry out on-site inspections (OSI).

The IDC supports the verification responsibilities of the Commission by providing data products and services for effective global monitoring. The IDC collects and analyses data from the IMS network to detect and locate possible nuclear events. At the IDC, data are automatically processed by computer algorithms and then interactively analysed and reviewed by human analysts. Near-real-time data and data products/bulletins are distributed by CTBTO's Preparatory Technical Secretariat (PTS) to the State Signatories.

More information on CTBTO is available at www.ctbto.org.

2. BACKGROUND

The persistent presence of up to four non-naturally occurring CTBT-relevant radioxenons in a highly dynamic atmosphere makes a positive association of an IMS detection with a nuclear test challenging. These ever-present and highly variable emissions originate from globally distributed nuclear power plants, nuclear research reactors, and foremost, from medical isotope production facilities form a persistent background in the atmosphere. Since these radioxenons pose a challenge for the global monitoring of nuclear explosions, an estimated prediction of this background contribution, next to the daily observations alone, is required to support better Expert Technical Analyses (ETA) and a more reliable and confident characterization of nuclear events. A first approximation of the xenon background can be obtained by the existing Continuous Emitting Sources (CES) functionality in WEBGRAPE (IDC's postprocessing data visualisation environment for Atmospheric Transport Modelling (ATM)), which the IDC may employ for a requested ETA. There is, however, a requirement to have a more confident estimation of the predicted xenon background. More confidence in analysing these observations results in a more reliable judgement on backtracking detections to known sources. Novel data-driven scientific methods combined with ATM are crucial in realizing this.

The IDC uses its in-house developed ATM pipeline to produce Source-Receptor-Sensitivity (SRS) data files as its standard ATM product. Each SRS field is a matrix containing values indicating the transported dilution factors of an initial tracer concentration by means of meteorological data for a specific period. The ATM pipeline works with meteorological data from the European Centre for Medium-Range Weather Forecasts (ECMWF) and the National Centers for Environmental Prediction (NCEP). The SRS result is based on a backward simulation (from an initial to an earlier time) and aims to reveal a source region from which one or more potential radionuclide (RN) releases related to detections at RN stations might have originated. ATM simulations from an initial to a later time, on the other hand, the so-called forward mode, also produces an SRS file, a so-called 'plume' file, which may be required to enhance RN monitoring satisfactorily when there is knowledge of a potential source location, by forecasting where the plume heads and which IMS station might be affected the days following a source event.

The Preparatory Commission seeks to establish a Call-off Contract for the provision of services (hereinafter referred to as the "Services" or the "Work") to confidently estimate the radioxenon background employing data-driven scientific methods by developing an operational Xenon Background Estimation Tool under the terms outlined in these Terms of Reference (hereinafter referred to as "ToR"). The Work is divided into two components related to scientific methods and software engineering, respectively, hereinafter referred to as the "Components" and "C1" and "C2". These may be contracted together or separately.

3. PROJECT OBJECTIVES

The next-generation Xenon Background Estimation Tool (XEBET) is IDC's next step in the scientific software development to confidently estimate the radioxenon background by employing data-driven scientific methods on sample data from IMS observations, on prediction data from simulations done through atmospheric transport modelling (ATM), and on any available emission data from established sources and other data characterising any of these or other source terms. Operationally, such a flag is an important potential qualitative indicator for the RN pipeline and its analysis operations as it indicates that the IMS detection can be confidently backtracked to known sources.

<u>Ideal capacity</u>: If there is no statistically significant difference between prediction and observation and all established source emissions are known a priori with perfect accuracy in space and time, and the ATM simulations of all transported radioxenons provide perfect accurate results in space and time, the observed signal correlates perfectly with the predicted background signal caused by these known sources. As such, a flag of confidence is raised indicating the backtracking to known sources was successful. In case a statistically significant difference is still present, then this is due to a possible nuclear test *or* to an unknown non-nuclear test contribution (e.g., an undisclosed military or civil power plant, a known or unknown nuclear accident, etc.) The flag is then not raised and screening studies may be initiated to check the unknowns and analyse their characteristics for this detection.

<u>Realistic capacity</u>: Currently, knowledge of historical and contemporary long-term consecutive emissions from established sources is fragmented in space and time (and thus uncertain), for example, not readily available emission data (operations), higher or lower emissions than assumed, unclear timeframes and -stamps, etc. These fragmented emission data sets are then combined with the uncertainties involved in current ATM runs relevant to provide the causality between source emissions and reliable IMS detections. Both sources of uncertainties are not quantified so that a statistically significant difference between an IMS detection and an ATM prediction based on these source emissions might not only point to a possible nuclear test (or to an unknown non-nuclear test contribution like an undisclosed military or civil power plant, a known or unknown nuclear accident, etc.) but also point, and herein lies the challenge for XEBET, to misrepresentations due to these uncertainties. Uncertainty quantification (UQ) can provide more confidence by utilizing data-driven scientific methods to provide a priori a threshold of confidence attached to a flag (raised or not). If the flag is raised and the threshold is met, the backtracking to known sources was successful, and confidently so. If the threshold was not met in that case, the backtracking was successful but lacking enough confidence. The same applies in case the flag is not raised. The threshold is based on a ranking of (combinations of) scientific methods utilizing the uncertainty quantifications incorporating all data types; both threshold and ranking need to be defined. A rank-based threshold is attached to a flag and forms a qualifier for the flag. Resulting flagged backgrounds not only can initiate a screening procedure but can also be used as input for a better source-term estimation/characterisation in case the threshold was not met. This, then, can iteratively enhance the source term and the ranking of UQ thresholds since source-term estimation utilizes similar if not the same scientific methods to determine the source characteristics for an atmospheric radionuclide based on measurements and might be an integral part in a confidence-to-flag procedure.

XEBET's scope aims to mitigate the lack of confidence in the background estimation by advancing on a better quantification of uncertainties for all relevant data types present in source-term characterisations, transport physics, and observational data. If this software runs confidently and maturely, it can be operationalized in the RN, plus that it may be very suitable for CTBTO's ETA. XEBET builds on its smaller frontrunner project with same name, which paved the way to demonstrate a basic functionality in software to predict background on a per sample basis (per station).

4. ORGANIZATION OF WORK

The Commission may ask for Services described in Section 5.

4.1 WO Project Call-off

The work will be called off in the form of Work Orders (WOs). Each WO shall include the exact scope of work and the required deliverables to be performed and delivered by the Contractor as well as related acceptance criteria.

4.1.1 Initiating Work

Since the IDC follows the Scrum software development methodology, WOs generally follow Scrum sprints and cover software development services to be performed within approximately four (4) weeks. Therefore, a WO is issued during a sprint planning meeting, and the work items to be addressed in that WO (sprint) are recorded in the Commission's Jira-based tracking system. Initiation of the sprint constitutes the issuance of the WO. In the case of a WO issued outside of the Scrum framework, the Commission will supply the work to be performed in writing to the Contractor. The Contractor shall respond with an estimate of the number of person-days required to complete the work and the delivery date. After the estimate and delivery date are accepted, the Commission will issue the WO to the Contractor.

The Contractor shall perform the work only after receipt of the WO.

4.1.2 Completion and Acceptance

At the end of a particular WO, the Contractor shall submit to the Commission the deliverables within the period of performance stated in the respective WO. The deliverables may include:

- Updated Software Design Documents.
- Updated Software User Guide.
- Description of how to use the programming interfaces developed under this Contract.
- Updated source code or configuration files.
- WO Report.

Typically, in accordance with the Scrum methodology, the Contractor will present the work performed during the sprint, including demonstrations of the newly developed software, within the Sprint Review meeting.

5. SCOPE OF WORK

This section describes the scope of work under the Contract.

At the time when the work is called off (see Section 4 for the organization of work), the detailed scope of the Services shall be defined.

5.1 Objectives

The objective of the Project is the supplying of scientific and software engineering services for the development of a software tool that provides:

a) A key functionality to procedurally estimate and analyse the background estimations for the activity concentrations for one or multiple stations, for selected timeframes, and for one or multiple sources, regional or global.

b) A procedure to confidently compute a flag based on quantifying the uncertainties in data types used for comparisons and associations between IMS measurements, ATM predictions, and source emissions/characteristics (including prospective source-term estimation steps).

c) Prospective scientific methods as key drivers in the sketched procedure in b).

d) A threshold based on ranking these prospective scientific methods in c).

e) A flag, annotated with this threshold qualifier, pointing to a known-source contribution when raised.

f) A demonstrated readiness to be able to interact with the operational RN and ATM pipelines and their data and as such has operational functionality based on the resulting flag. This readiness is foreseen as demonstrated with a software script based on the functionality as given in a).

g) Flagged predicted background estimations that can be used in an ETA through the functionality as given in a) and foreseen as demonstrated through a GUI.

The Project scope of work include two Components for XEBET, which may be contracted together or separately:

- Component C1: Scientific Methods
- Component C2: Software Engineering

If there are two Contractors, they need to work together since both Components are interlocked.

If requested by the Commission in a WO, the Contractor shall support the Commission in the Services defined under Section 5.2.

5.2 Requested Services

5.2.1 Familiarization with precursor project XEBET

Should the Contractor not be familiar with the precursor project XEBET, they shall interview and work with the staff of the Commission to study and learn about XEBET's scope, functionality, and current method(s). This brief familiarization is required to be able to perform the Services specified for both Components C1 and C2 (Sections 5.2.25.2.1 and 5.2.3) and is expected to take place only once and is expected to take up to a maximum of 5 person-days during the first call-off period.

5.2.2 Selection of tasks for Component C1 - Scientific Methods

Tasks for Component 1:

- Identify and assess prospective data-driven scientific methods.

- Identify and assess the uncertainty quantification (UQ) related to each prospective scientific method (or combinations thereof) for each type of data available (emission data, simulation data, detection data, inverse-modelled data) for selected timeframes (from days to years).

- Identify and assess an iterative procedure to rank methods to obtain a threshold relevant for a confident background estimation.

- Develop the scientific methods and their UQ for the functional software layer.

- Provide Component 2 with any prospective scientific method and test the method(s) received from Component 2 in the updated prototype XEBET or in any other working prototype developed.

- Perform other related tasks.

5.2.3 Selection of tasks for Component *C2 - Software Engineering*

Tasks for Component 2:

- Develop the software tool XEBET. The next generation software tool *can* be based on the three-layer architecture of the prototype software XEBET and use the prototype XEBET as a concurrently updated testbed for testing the software:
  - ✓ *Frontend layer*: Implement all user requirements in a fully functional graphical user interface (GUI).
  - ✓ *Functional layer*: Implement the methods provided by Component C1.
  - ✓ *Backend layer*: Implement operational access to databases from IMS observations, ATM simulations, and (non-operational) emission inventories.
- Develop a script using the command line interface (CLI), based on the tool, that could demonstrate an operational readiness in the radionuclide pipeline.

- Translate the requirements, architecture, and design into software using Agile software development methodologies.

- Support the deployment of software under development following IDC change management processes.

- Write, review, and update software documentation and procedures.

- Enhance workflow status monitoring, logging, and reporting.

- Perform other related tasks as assigned by the PTS.

5.3 Output and Deliverables

The Contractor shall submit a report for each WO, as defined in Section 4.1.2, to the Commission electronically via email and within the first five (5) working days after the WO finished, describing all the activities performed during the preceding WO, including but not limited to:

- A summary of tasks done.
- A summary of problems that have arisen.
- The status of tickets, bug reports, and possible fixes (if applicable).
- The status of all active development tasks.
- Intermediate results if available.
- An updated plan for all active development tasks.
- Time spent on each activity worked on.

All documentation shall adhere to the IDC Software Documentation Standard, which expresses precise requirements for elaborating, reviewing, approving, and using IDC software-related documents. This Standard will be shared with the Contractor at the start of the project. Guidelines and recommendations from this Standard are required for the deliverables described in Section 4.1.2.

6. WORK LOCATION AND TIMEFRAME

6.1 Location of Performance

For all tasks, the Contractor's personnel will be expected to work off-site. The Commission will provide the Contractor remote access to the relevant infrastructure in the PTS network. The infrastructure comprises but is not limited to, software, servers, web services, LANs, and databases.

The Contractor may be required to travel to the premises of the Commission in Vienna, Austria, as applicable, for a three-day two-person visit once every 12 months. The dates for the on-site Work will be agreed between the Commission and the Contractor before issuing the WOs. In case on-site work is required, the Commission will provide at its premises a suitable work environment (workspace, meeting rooms for presentations and trainings, standard stationery, internet connection) to the Contractor's personnel to perform the services under the Contract, as required.

All travel arrangements shall be the Contractor's responsibility if travel is required. The Commission shall reimburse travel costs (other than daily subsistence allowance (DSA) based on the most direct and economical route upon presentation of supporting documents and in accordance with the Contract provisions. Per-diem amounts shall be based on the applicable United Nations DSA rates published by the International Civil Service Commission (ICSC).

6.2 Timeframe

The Commission seeks to establish a Call-Off Contract for Work during a period from the entry into force of the Contract until 30 November 2026 or the performance of a maximum of 290 person-days by the Contractor, whichever occurs first. The Commission anticipates an allocation of a maximum of 200 person-days and a maximum of 90 person-days for the Components C1 ("Scientific Methods") and C2 ("Software Engineering"), respectively. At its sole discretion, the Commission reserves the right to call off fewer or no person days at all.

The commencement and completion date for the performance of the work will be set out in the respective WO.

7. REQUIREMENTS FOR THE CONTRACTOR

7.1 Contractor's responsibilities

For off-site work, the Contractor shall provide its own infrastructure, hardware, and software environment necessary to complete its work under the Contract. The Contractor shall communicate with the Commission via video conferencing (preferably MS Teams), electronic mail, or telephone.

The Commission has a change management process that covers reporting and tracking software problems and releases software updates in its Development, Testbed, and Operational environments. An Integrated Ticketing System based on the Jira software supports this change management process. The Contractor personnel shall familiarize themselves with this process and follow it when applying changes and releasing software, including recording the time spent in each WO. The Commission's Configuration Change Board shall approve all software and configuration changes.

The Contractor shall deliver a source code through incremental releases according to the Agile software development methodology (preferably Scrum). In particular, the Contractor shall follow the "Release Early, Release Often" (RERO) software development philosophy, which emphasizes the importance of early and frequent releases in creating a tight feedback loop between developers, testers, and users. Each new delivery shall include a description of what changes were made relative to the previous release and a list of files modified by each change.

All source code developed under this Contract shall follow the IDC Coding Standards (which include recommended coding style, the required implementation of unit tests, and use of open standards and open-source libraries where possible) and shall compile and run under the Linux operating system family (currently RHEL/CentOS 7.x). The IDC guidelines for requirements engineering shall form the basis for eliciting and documenting requirements.

The Contractor shall work with the Git/GitLab version control system to maintain the software. All source code releases shall be delivered via this version control system.

7.1.1 Contractor's key personnel

The Contractor shall provide key personnel with demonstrated capability and capacity to perform the Services described in Section 5 above. The Contractor's key personnel shall also have demonstrated compliance with the requirements set out in Section 7.3. At a minimum, the following information shall be provided for each of these key personnel:

- Name.
- Nationality.
- Role.
- Employed since. (Please specify whether the key personnel are a permanent member or rather, if they are contracted for the duration of the Contract on an ad-hoc basis.)
- Type(s) of Service(s) from Section 5, which the key personnel will perform.
- Curriculum Vitae

The activities under this project are financed by the European Commission, and the Contract shall not be made available to, or for the benefit of, third parties – whether entities, individuals or groups of individuals - designated by the EU as subject to restrictive measures in the lists provided at www.sanctionsmap.eu.

7.1.2 Maintenance of the key personnel, Conditions of Amendment

The Contractor shall maintain an up-to-date version of the key personnel (hereinafter called "Team Roster") for the duration of the Contract. The Contractor shall inform the Commission when personnel is to be removed or added to the Team Roster and if personnel details are modified.

If the Commission determines, at its sole discretion, that the Team Roster lacks the capacity or capability to perform a specific work within the specified timeframe or quality, the Contractor shall provide, within five (5) working days after the Commission makes a request, the details of skilled and experienced personnel to be added to the Team Roster for consideration by the Commission.

The Commission shall be entitled to confirm whether the proposed Team Roster amendment is acceptable.

Before issuing a WO, as described in Section 4.1.1, the Contractor shall propose a list of personnel to the Commission working under this WO. The Team shall be selected from the Team Roster.

The Contractor shall ensure that each Team member:

- Is dedicated to the project during the contract period (unless otherwise agreed).
- Is not reassigned from the project without the prior written consent of the Commission.

The Contractor shall satisfy the following mandatory requirements for the initial key personnel assigned to the Project:

- An established pre-screening process to identify suitable staff.
- By naming a relevant successful project in the CV, provide reasonable evidence that the proposed Team is appropriately skilled and experienced to carry out the WO.

The Contractor shall satisfy the following mandatory requirements at the start and throughout the Contract:

- Familiarization with IDC's IT infrastructure and services is required and should be conducted right from the start as part of the first WO.
- Provision of training to address a gap in knowledge identified after a Team member has started their assignment, at no cost to the Commission, upon request by the Commission.
- Adding or replacing poor-performing Team members at no cost to the Commission upon request by the Commission.

The Commission shall be entitled to confirm whether the proposed Team is acceptable.

The Commission reserves the right to seek an immediate replacement for any Team member deemed unsuitable for the assigned tasks as determined by the Commission. If no suitable replacement can be provided by the Contractor, the Commission reserves the right to terminate the assignment of the unsuitable Team member with immediate effect. Continuity of personnel for the full implementation of this Contract is an important consideration. Therefore, the Contractor shall take necessary measures to

ensure a seamless transition when taking over the Services and keep changes to personnel assigned to the Commission to a minimum throughout the duration of the Contract.

7.2 Contractor's requirements

The Contractor shall satisfy and prove the following mandatory requirements:

a. **1** - The Contractor for **Component 1** shall have a minimum of four (4) years of experience in scientific methods research projects of similar scope and complexity of which results were published in at least one (1) peer-reviewed journal. **2** - The Contractor for **Component 2** shall have a minimum of four (4) years of experience in developing software of similar scope and complexity.

b. Confirmation that the staff turnover has been below 20% per year over the past three (3) years.

c. Confirmation of a minimum of one (1) year experience working with modern issue tracking and ticket management systems, preferably Jira.

d. Confirmation of the warranty period of two (2) years after the completion of the user acceptance testing. Terms and conditions of post-warranty support and bug fixes should be available and clearly specified.

e. Confirmation that the Contractor will be able to adjust the working hours of staff assigned to the Team for a sprint meeting that overlaps at least two hours with the Commission's working hours (9 a.m. to 5 p.m. CET/CEST).

   ✓ A monthly sprint meeting is foreseen, but this might change to any time frame as deemed necessary by the Commission.

f. Confirmation that the Contractor will be able to provide support on 24/7 basis during critical situations.

7.3 Contractor's key personnel requirements

7.3.1 Requirements for staff on the Team Roster for _Component 1 - Scientific Methods_

The Contractor shall ensure that the following minimum requirements are met by at least one (1) team member to provide the Scientific Methods support as part of the Services. The Contractor shall also ensure the continuity of having at least one (1) member meeting the following minimum requirements at the start and throughout the Contract (for example, when the original one (1) member needs to be replaced).

Said minimum requirements are:

a. Advanced university degree in Mathematics, Physics, or a related scientific/ technical subject.

b. Demonstration of a minimum of three (3) years of experience with statistical analysis is required. Details need to be provided.

c. Part of the experience in b) must include a proven experience with time series forecasting, probability theory, Bayesian statistics, linear models, inverse methods, and Monte Carlo methods. Proven experience implies at least one (1) publication in at least one (1) peer-reviewed journals related to the scope of the Services as defined in Section 5.2.2.

d. At least one project (1) that shows experience with machine learning or deep neural networks is required. Details need to be provided.

e. Excellent communication skills in English are essential.

f. A good understanding of software development methodologies. Shortly describe past software development methodologies.

g. Knowledge of atmospheric transport modelling (ATM) is required, demonstrated by at least one (1) publication in at least one (1) peer-reviewed journal.

h. Demonstrated practical experience with Git and GitLab is an **advantage**. Details shall be provided.

i. Knowledge of 'nudging' (data assimilation method) is an **advantage**. Please, provide details.

j. Experience with the ATM model FLEXPART, used at the CTBTO, is an **advantage.** Details shall be provided.

k. Experience with radionuclide analysis is an **advantage**, especially regarding radioisotopes, their decay, and techniques to analyse their data. Details shall be provided.

The Team proposed by the Contractor shall, as complementary as possible, fulfil the above minimum requirements (Team coverage of minimum requirements).

7.3.2 Requirements for staff on the Team Roster for _Component 2 - Software Engineering_

The Contractor shall ensure that the following minimum requirements are met by at least one (1) team member to provide the Software Engineering support as part of the Services. The Contractor shall also ensure the continuity of having at least one (1) member meeting the following minimum requirements at the start and throughout the Contract (for example, when the original one (1) member needs to be replaced).

Said minimum requirements are:

a. Advanced university degree in Computer Science or Mathematics, Physics, or a related scientific/ technical subject.

b. A minimum of two (2) projects demonstrating a practical experience with Git and GitLab.

c. A minimum of five (5) years of demonstrated experience in the last ten (10) years as a software developer in the scientific domain.

d. Demonstrated experience with at least three (3) projects using Python is mandatory.

e. Demonstrated experience with at least three (3) projects using MySQL is mandatory.

f. Demonstrated experience with at least three (3) projects using Linux/Shell is mandatory.

g. A minimum of five (5) years of relevant experience in developing software to automatically process data in near-real-time.

h. A minimum of five (5) years of relevant experience in providing services for the development of Unix and Linux-based client/server systems.

i. Experience with the Scrum framework. Details should be provided for three (3) projects that demonstrate this experience.

j. Experience in software testing. Details should be provided for three (3) projects that demonstrate this experience.

k. Experience in radionuclide analysis is an **advantage -** details shall be provided.

l. Knowledge of atmospheric transport modelling (ATM) is an **advantage**.

m. Excellent communication skills in English are essential.

The Team proposed by the Contractor shall, as complementary as possible, fulfil the above minimum requirements.

8. RISK MANAGEMENT

The Contractor shall provide a business continuity plan and thorough risk assessment plan at the project's commencement to identify potential risks that could impact the successful execution of the outlined software development activities in these Terms of Reference, including contingency plans, as appropriate. Risks may include but are not limited to technical challenges, changes in project requirements/scope, resource constraints, schedule delays, integration difficulties, and third-party software dependencies. The risk assessment plan should be consistently updated, aligning with the delivery of project milestones or significant accomplishments.

Upon the project's satisfactory completion, the Contractor is obligated to conduct a final review of the initially identified risks. Risks that have been effectively mitigated or did not materialize should be officially closed, accompanied by appropriate documentation. The insights gained from the risk management process should be methodically documented and shared with the Commission, thereby contributing to the knowledge repository for forthcoming software development endeavours.

MODEL CONTRACT – *Rev.20 Jun 2024*

(Shopping Cart No.   )
(SAP No.   )

between

THE PREPARATORY COMMISSION

FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY

ORGANIZATION

and

THE NAME OF THE CONTRACTOR

for

**PROVISION OF SOFTWARE ENGINEERING SERVICES
FOR THE DEVELOPMENT OF AN OPERATIONAL
XENON BACKGROUND ESTIMATION TOOL (XEBET)
ON A CALL-OFF BASIS**

~~May~~ June 2024

TABLE OF CONTENTS

[TO BE UPDATED ONCE SPECIFIC CONTRACT IS PREPARED]

MODEL CONTRACT

This CONTRACT is entered into between the PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION (hereinafter referred to as the "Commission"), having its office located at Vienna International Centre, Wagramer Strasse 5, 1400 Vienna, Austria, and _____ (hereinafter referred to as the "Contractor"), having its registered office located at _____ [address] (both hereinafter individually referred to as the "Party" and collectively as the "Parties").

The Parties hereto mutually agree as follows:

1   DEFINITIONS

In this Contract, words and expressions shall have the same meanings as respectively assigned to them in the General Conditions of Contract and the Terms of Reference. In addition, the following words and expressions shall have the meanings hereby assigned to them:

 "Annex A" means the Commission's General Conditions of Contract.

"Annex B" means the Commission's Terms of Reference.

"Annex C" means the Contractor's Proposal dated XXX.

"Contract" means this document, its Annexes and any further modifications or such further documents as may be expressly incorporated in this Contract by the Parties in accordance with Clause 21 below.

"Contractor" means the legal entity named in the preamble of this Contract or its successors. The Contractor shall be the only interface for all matters pertaining to execution of the Work under this Contract.

"Goods" means the equipment to be supplied and delivered by the Contractor under the Contract as requested by the Commission under the WO.

"Services" means the activities or tasks to be performed by the Contractor under the Contract as requested by the Commission under the WO.

"Party(ies)" means the Commission and/or the Contractor, as the context requires.

"Rule(s)" means any regulation(s), official directive(s), ordinance(s), guideline(s), customs and practices.

"Work" means all the Goods and Services to be provided by the Contractor, including its affiliates and/or subcontractors, in order to fulfil all its obligations under the Contract, and the remedying of any defects therein.

"Work Orders ('WO')" mean orders issued by the Commission which specify the (parts or portions of) Work to be performed by the Contractor upon request by the Commission in accordance with Annexes B and C.

2   AIM OF THE CONTRACT

The aim of this Contract is to provide services namely, the Provision of software engineering services for the development of an operational Xenon background estimation tool (XEBET) on a call-off basis (hereinafter referred to as the "Services" or "Work") to the Commission.

3   ENTRY INTO FORCE AND DURATION OF THE CONTRACT

The Contract shall enter into force upon the date of the last signature by the authorized Representatives of the Parties (hereinafter referred to as the "**Effective Date**") and shall be valid until the Parties fulfill all their obligations hereunder.

4   COMMENCEMENT AND COMPLETION OF THE WORK

The Commission shall have the right, but not obligation, to call-off the Works in the form of WO from the Effective Date until 30 November 2026, or the performance of a maximum of 290 (two hundred ninety) person-days by the Contractor, whichever occurs first (hereinafter referred to as the "**Call-off Period**"). The commencement and completion date for the performance of the Works (hereinafter referred to as "**Commencement Date**" and "**Completion Date**", respectively) will be set out in the respective WO.

[IN CASE OF AWARD TO MULTIPLE CONTRACTORS, PLEASE CHOOSE BELOW AS APPLICABLE]

IN CASE OF AWARD FOR COMPONENT C1 ("SCIENTIFIC METHODS")

The Commission shall have the right, but not obligation, to call-off the Works in the form of WO from the Effective Date until 30 November 2026, or the performance of a maximum of 200 (two hundred) person-days by the Contractor, whichever occurs first (hereinafter referred to as the "**Call-off Period**"). The commencement and completion date for the performance of the Works (hereinafter referred to as "**Commencement Date**" and "**Completion Date**", respectively) will be set out in the respective WO.

IN CASE OF AWARD FOR COMPONENT C2 ("SOFTWARE ENGINEERING")

The Commission shall have the right, but not obligation, to call-off the Works in the form of WO from the Effective Date until 30 November 2026, or the performance of a maximum of 90 (ninety)

person-days by the Contractor, whichever occurs first (hereinafter referred to as the "**Call-off Period**"). The commencement and completion date for the performance of the Works (hereinafter referred to as "**Commencement Date**" and "**Completion Date**", respectively) will be set out in the respective WO.

5 STANDARD OF WORK

The Contractor shall perform the Work in a workmanlike manner in conformity with standard professional practices, using qualified personnel and in strict accordance with the Contract. The Contractor shall furnish the highest skill and judgement and cooperate with the Commission, including all the Commission's consultants and agents, in best furthering the interests of the Commission and the aim of this Contract. The Contractor shall provide efficient business administration and supervision, and it shall perform the Work in the best way and in the most expeditious and economical manner consistent with the requirements of the Contract.

6 RESPONSIBILITIES OF THE CONTRACTOR

(a) The Contractor shall provide the Work described in Annexes B and C.

(b) The Contractor shall provide qualified English-speaking personnel as necessary to perform the Work under this Contract. The key persons shall be available for possible tasks related to the Work throughout the duration of the Contract period. Any replacement of the key personnel shall be made in accordance with Clause 7 of Annex A.

(c) The Contractor acknowledges that after the completion of the Work under this Contract, the Commission shall own the Software and source code described in Annex B and developed in this Contract and the Contractor shall have no rights in that Software or source code unless granted by the Commission under Clause 24 of this Contract or in writing under a separate agreement.

7 ORGANISATION OF CONTRACT IMPLEMENTATION

(a) During the term of the Contract, the Commission has the right, but not the obligation, to initiate performance of the Work through the issuance of individual WOs in accordance with Annex B based on the firm fixed unit prices set out in Annex C. The Contractor shall not perform any Work if not requested by the Commission through an WO. However, the Contractor may propose a WO for the Commission's evaluation.

(b) The WO issued by the Commission shall be the basis for acceptance, invoicing and payment of any Work performed by the Contractor.

(c) The performance of the Work shall be made in full in accordance with the respective WO. Partial service performance of a WO will not be accepted and reimbursed without prior written agreement by the Commission.

(d) The Work shall be performed at the place and within the approved Work Plan specified in the relevant WO.

(e) The Commission may revise a WO as and when it may deem necessary.

8   WARRANTY

    (a)   The provisions of Clause 28 of Annex A shall apply to the Work performed by the Contractor.

    (b)   The Contractor shall ensure that the Commission shall experience no loss of service or support level by sub-contractors or repair agents acting on behalf of the Contractor.

9   PERMITS, NOTICES, LAWS AND ORDINANCES

    (a)   The Contractor shall obtain and pay for all permits and inspections necessary for the proper execution and completion of the Work that are customarily obtained upon execution of this Contract and that are legally required at the time the Proposal is received by the Commission. This shall include, but not be limited to, work permits, visa, or similar.

    (b)   The Contractor shall give all notices required by the nature of the Work.

    (c)   If the Contractor notices that the Work or any part thereof required under this Contract is not in accordance with applicable laws and Rules, or with technical or safety standards, it shall promptly notify the Commission thereof in writing.

10   PROTECTION OF PERSONS AND PROPERTY

    (a)   The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programmes in connection with the Work.

    (b)   The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury and loss to:

        (i)   all employees on the Commission's premises and all other persons who may be affected thereby;

        (ii)   all the Work, equipment, its spare parts, materials and supplies to be incorporated therein, whether in storage on or off the Commission's premises, which are under the care, custody or control of the Contractor or any of its subcontractors; and

        (iii)   other property on the Commission's premises or adjacent thereto.

    (c)   The Contractor shall give all notices and comply with all applicable laws and Rules bearing on the safety of persons and property and/or their protection from damage, injury and loss.

    (d)   The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for the safety and protection of persons and property, including posting danger signs and other warnings against hazards and promulgating safety regulations.

    (e)   When the use or storage of combustible, explosive or other hazardous materials is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

(f)   The Contractor shall be responsible for the prevention of accidents on the Commission's premises during the execution of the Work.

(g)   In any emergency affecting the safety of persons or property, the Contractor shall promptly act to prevent threatened damage, injury and loss.

(h)   The Contractor shall promptly remedy all damage and loss to any property, referred to in Sub-Clause (b) above, caused in whole or in part by the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible under Sub-Clause (b) above, except damage and loss attributable to the acts or omissions of the Commission or anyone directly or indirectly employed by it, or of anyone for whose acts the Commission may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to its obligations under Clause 9 of Annex A.

11   RESPONSIBILITIES OF THE COMMISSION

The Commission shall designate members of its staff to act as points of contact for the Contractor to ensure that the Work is carried out in accordance with Annexes B and C and shall promptly notify the Contractor thereof. The Commission shall respond promptly to requests for information by the Contractor regarding the Work.

12   CONTRACT PRICE

(a)   For each WO issued during the Call-off Period specified in Clause 4 above, the Commission shall pay to the Contractor, in consideration of the full and proper performance of its obligations under the Contract, as follows:

   (i)   A firm fixed person-day rate pursuant to Annex C;

   (ii)   If applicable, daily subsistence allowance (DSA) based on the applicable United Nations DSA rates published by the International Civil Service Commission (ICSC);

   (iii)   If applicable, travel costs (other than DSA) based on the most economic and direct route and relevant supporting documentation of costs actually incurred subject to Clause 13(ii) below;

   (hereinafter altogether referred to as the "**Contract Price**").

(b)   The person-day unit prices set out in Annex C shall be held fixed for the entire duration of the Contract.

(c)   The Contract Price shall cover all costs and expenses incurred by the Contractor for the full and proper performance of all relevant obligations under the Contract (including travel, allowances, management and remuneration of the personnel, national income tax, medical insurance, and social security contributions).

(d)   The Contractor shall be reimbursed by the Commission for such taxes on the basis of actual amounts paid and duly documented by the Contractor as per Clause 13(e) below.

OR

(e)   No Taxes are applicable under this Contract.

13   PAYMENT

(a)   The Contract Price shall be paid upon satisfactory completion of each deliverable for the Work and satisfactory completion of each WO and submission of the following:

   i)   Invoice drawn up in accordance with this Clause 13;

   ii)   If applicable, supporting documentation referred to in Clause 12(a)(iii) above. Payment by the Commission of any such estimated travel costs shall not exceed 10% (ten percent) of the estimated amount in the WO;

   iii)   Any other documentation that might be required under the applicable WO.

(b)   The Commission will make the payments to the Contractor on the basis of an invoice submitted by the Contractor as per Sub-Clause (d) below. All payments shall be made within 30 (thirty) days of the receipt and acceptance of the invoice, provided that the Work has been satisfactorily completed and has been accepted by the Commission.

(c)   The making of any payment hereunder by the Commission shall not be construed as an unconditional acceptance by the Commission of the Work accomplished by the Contractor up to the time of such payment.

(d)   The Contractor shall submit an invoice electronically, from the Contractor's official e-mail address in PDF format, duly signed and stamped by the Contractor and submitted to the Commission's email address specified in Clause 22 below. Each invoice shall contain the Contract number (CTBTO and SAP numbers), detailed banking instructions, including the name and address of the Contractor's bank, account number, account holder's name and SWIFT, IBAN and/or ABA codes for payment by electronic transfer.

[PARAGRAPH (e) BELOW ONLY APPLIES IF THERE ARE TAXES (SEE CLAUSE 12 (d) ABOVE). IF NO TAXES ARE APPLICABLE UNDER THIS CONTRACT, PARAGRAPH (e) SHOULD BE OMITTED.]

(e)   Applicable Taxes payable by the Contractor and/or its subcontractor(s) in respect of the Work shall be invoiced separately or be separately identified on the invoice. Actual payment of the Taxes must primarily be supported by original documentation such as invoices, bank account statements, transfer orders, or receipts issued by the local tax or customs authorities. If submission of such original documentation is not possible for justifiable reasons, their copies

could be accepted by the Commission provided that they are duly signed and certified by local tax or customs authorities. In case the currency in which the Taxes are levied is not the currency of the Contract, bank statements (or equivalent) showing the exchange rate used for the conversion should be submitted to the Commission, in addition to any other supporting documentation.

14 TEMPORARY SUSPENSION OF WORK

The Commission may, at any time, temporarily suspend the Work, in whole or in part, being performed by the Contractor under this Contract by giving 30 (thirty) days' advance notice in writing to the Contractor. The Work so suspended shall be resumed by the Contractor on the basis of a revised time schedule and on terms and conditions to be mutually agreed upon between the Parties.

15 DELAYS AND EXTENSION OF TIME

(a)   If the Contractor is delayed at any time in the progress of the Work by any act or omission of the Commission or by any of its employees, or by any other contractor employed by the Commission, or by changes in the Work ordered by the Commission, or by any causes beyond the Contractor's reasonable control, or by any other cause which the Commission determines may justify the delay, then the time for completion of the Work shall be extended by an amendment to this Contract in accordance with Clause 21 below for such reasonable time as the Commission may determine.

(b)   Any request for extension of the time for reasons referred to in Clause 15(a) above shall be submitted to the Commission not later than 20 (twenty) days after the commencement of the delay, otherwise said request shall be deemed to be waived. Such request shall state grounds for the delay and shall provide an estimate of the probable effect of such delay on the progress of the Work.

16 CONTRACTOR'S CLAIMS AND REMEDIES

In no event shall the Contractor make any claim against the Commission for or be entitled to additional costs or compensation resulting from any delays in the progress or completion of the Work or any portion thereof, whether caused by the acts or omissions of the Commission, including, but not limited to, damages related to overheads, loss of productivity, acceleration due to delay and inefficiency. The Contractor's sole remedy in such event shall be an extension of time for completion of the Work, provided the Contractor otherwise meets the requirements and conditions set forth in this Contract.

17 ENTIRE AGREEMENT

This Contract represents the final agreement in respect of the Work and shall supersede all prior agreements and representations between the Parties in this respect. Annexes A to C shall constitute integral parts of this Contract and shall be of full force and effect.

18 DISCREPANCIES

If there are discrepancies or conflicts between any of the documents that are part of this Contract, the document to prevail shall be given precedence in the following order:

(i) This document;

(ii) The Commission's General Conditions of Contract (Annex A);

(iii) The Commission's Terms of Reference (Annex B);

(iv) The Contractor's Proposal (Annex C);

(v) The relevant WO.

19 SEVERABILITY

If any term and/or provision of this Contract is or becomes invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions of this Contract shall not in any way be affected or impaired thereby.

20 NO WAIVER

Failure by a Party to enforce a right shall not be deemed to be a waiver of that right unless otherwise expressly provided in this Contract.

21 CONTRACT AMENDMENT

No modification of, or change in, this Contract, or waiver of any of its provisions, or additional contractual relationship with the Contractor shall be valid unless approved in the form of a written amendment to this Contract, signed by duly authorized Representatives of the Parties.

22 TRANSMISSION OF NOTICES AND OTHER DOCUMENTS

Notices, invoices, reports and other documentation under the Contract shall be delivered or sent to the relevant Party as follows (or to such person/title, address or email address as the Party may substitute by notice after the date of the Contract):

(a) The Commission:

<u>For Contractual Issues:</u>

Chief, Procurement Services Section
Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)
Vienna International Centre
Wagramerstrasse 5, P.O. Box 1200
1400 Vienna, Austria
Tel: + (43 1) 26030 6350
E-mail: procurement@ctbto.org

For submission of invoices:

Accounts Payable
CTBTO Financial Services Section
Vienna International Centre
Wagramerstrasse 5, P.O. Box 1200
1400 Vienna, Austria
Tel: + (43 1) 26030 6292
E-Mail: Payable_Invoices@ctbto.org

For invoices and payment related enquiries:
Payments@ctbto.org

(b)   The Contractor:

For Contractual Issues and Invoices and Related Enquiries:

Name: ……………..
Title ………………
Address ………………
Tel: ……………………
Email: ………………..

23   EFFECTIVENESS

(a)   Except as provided below, any communication in connection with the Contract will be deemed to be given as follows:

(i)   if delivered in person, at the time of delivery;

(ii)   if by registered mail or courier, when received;

(iv)   if by electronic communication, when retrievable by the Commission in document form.

(b)   A communication given under Clause 23(a) above that is received or becomes retrievable on a non-working day or after business hours at the seat of the Commission will only be deemed to be given on the next working day of the Commission.

24   SOFTWARE LICENCE

The Commission hereby grants the Contractor a non-exclusive, non-transferable, irrevocable license to use the Software for the duration of the Contract and for the purpose of doing the Work under the Contract. The use of the source code is only for the duration of the Contract and for the Work required under the Contract. All title, ownership rights and intellectual property rights in and to the Software shall remain with the Commission. The Contractor acquires no title, right or interest in the Software, other than the license(s) specifically granted herein by the Commission.

IN WITNESS hereof, the duly authorized Representatives of the Parties have executed this Contract:

For and on behalf of the **PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION:**

_____

[Name and Position]

Date: _____   Place: Vienna, Austria.

For and on behalf of **[REGISTERED NAME OF THE CONTRACTOR]:**

_____

[Name and Position]

Date: _____   Place: _____

LIST OF ANNEXES

ANNEX A: THE COMMISSION'S GENERAL CONDITIONS OF CONTRACT

ANNEX B: THE COMMISSION'S TERMS OF REFERENCE

ANNEX C: THE CONTRACTOR'S PROPOSAL

ATTACHMENT 3 - *Revision 20 June 2024*
Summary of Financial Proposal

**PROVISION OF SOFTWARE ENGINEERING SERVICES FOR THE DEVELOPMENT
OF AN OPERATIONAL
XENON BACKGROUND ESTIMATION TOOL (XEBET) ON A CALL-OFF BASIS - WOs**

Description (ToR)	Unit	QTY	Max. 200 person-days for C 1 Unit Price (Currency)
Tasks under Section 5 (Scope of Work)			
Off-site work-estimated days: 194 person-days	person-day	1	
On-site work-estimated: 6 days	person-day	1	
Travel : Return travel for On-site work	RT/Trip	1	

Description (ToR)	Unit	QTY	Max. 90 person-days - for C 2 Unit Price (Currency)
Tasks under Section 5 (Scope of Work)			
Off-site work-estimated days: 84 person-days	person-day	1	
On-site work-estimated: 6 days	person-day	1	
Travel : Return travel for On-site work	RT/Trip	1	

NB:

1) Please specify currency (USD or Euro only). The rates shall be firm and fixed throughout the term of the Contract.

2) This is a unit-based Contract. The exact number of working days will be determined/called-off in the form of Work Orders (WOs) at the rates quoted in this Attachment.

3) The person-days noted are an upper limit, and the Commission reserves the right, at its sole discretion, to call-off fewer person-days or no person-days at all.

4) Estimated costs for travel based on the most economic and direct route shall be specified in the Financial Proposal. Bidders shall indicate whether the travel costs (without DSA) are firm and fixed for the duration of the Contract, or they are estimated. In the case the travel costs are estimated, payment shall be based on actual costs against relevant supporting documentation e.g. invoices for travel, and shall not exceed 10% of the estimate.

5) If applicable, Daily Subsistance Allowance (DSA) shall be calculated based on the values provided by the International Civil Service Commission (ICSC) https://icsc.un.org/. Daily subsistance/per diem will be reimbursed at the applicable Daily Subsistance Allowance (DSA) rate of the United Nations (and UN EUR/USD exchange rate, if applicable).