TO:	All Bidders	FROM:	Sally Alvarez de Schreiner Chief, Procurement Services Section
DATE:	28 February 2025		
		REF.:	RFP No. 2025-0014/JIBRIL
TEL. NO.:		TEL. NO.:	+43 1 26030 6350
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SUBJECT: **Clarifications No. 1 – RFP 2025-0014/JIBRIL**
Provision of Software Engineering and related Seismology Services for the SHI Expert Technical Analysis Suite (SHI-ETA).

Dear Bidders,

In reference to the request for proposal (RFP) No. 2025-0014/JIBRIL pertaining to the *"Provision of Software Engineering and related Seismology Services for the SHI Expert Technical Analysis Suite (SHI-ETA)"*

- Please find attached Clarifications No. 1 to questions raised by interested bidders.
- The Terms of Reference, document part of the RFP is hereby replaced with the attached amended version of the document (Rev. 26 Feb 2025) (revisions are highlighted in yellow for ease of reference).

Clarifications No. 1 and amended Terms of References (Rev. 26 Feb 2025) are an integral part of the RFP documents and shall be considered in the preparation and submission of proposals.

In case you have already submitted your proposal, you are kindly requested to submit a revised proposal as per the new amended Terms of Reference.

We are looking forward to receiving your proposal prior to the submission deadline on **7 March 2025, 17:00 hours, Vienna (Austria) local time.**

Sincerely,

Sally Alvarez de Schreiner
Chief, Procurement Services Section

Attachment:

- *Questions and Answers - Clarifications No. 1*
- *Annex B- Terms of Reference Rev. 26 Feb 2025*

Item#	Question	Answer
1	The project requires a diverse team of software engineers and SMEs. The document specifies a need for at least eight team members over a two-year period. However, another section of the document imposes a limit of 800 person-days for the project. Could you clarify the expected team size and allocation?	Not all team members from the roster are going to work at the same time; please see ToR section 4.1 "Initiating Work", the software team shall be a subset of the team roster, as described under ToR section 8.2
2	What software development methodologies do you follow?	The Commission follows "Agile methodology, preferably Scrum"; please see ToR sections 3.2 "Requested Services", 3.3 "Output and Deliverables", and "8.1 General Requirements".
3	How frequently do you conduct release cycles?	Upon request from the Commission, please see section 3.2 of the ToR.
4	How often do you roll out major features?	See response to question 3 above.
5	You mentioned a two-year warranty. Is it expected to begin after the initial release or upon full project completion?	After project completion.
6	Who is responsible for managing the backlog, delivering detailed task descriptions, acceptance criteria, and definitions of done?	The Commission is responsible for all the tasks mentioned in the question 6 through Formal Requests for Delivery (FRDs).
7	Was there a previous team working on this project? If so, what were their skill sets?	This is not relevant and cannot be disclosed. The team under this tender shall met the requirements specified in the ToR.
8	Are there any other teams in the Commission that we should coordinate with?	The Commission may include some other Commission internal team to coordinate with, if deems necessary, to be involved in the development of the portal.
9	Could you describe the skill set required for each team member?	For the criteria that must be fulfilled by the Team Roster as a whole (not by each member)", please refer to ToR section 8.2.5 "Requirement for the Team Roster".
10	Are there any additional skills or qualifications that we should consider?	Please refer to ToR section 8.2.5 - "Requirement for the Team Roster".
11	Could you please provide additional details on the specific functionalities expected for the ETA suite? What are the performance benchmarks for the ParMT and SCT components related to shallow event depth, magnitude determination, and cross-correlation capabilities?	Please refer to ToR Section 3 "Scope of Work", please note that the ToR define: "… the provision of on-site and off-site software engineering services and related seismology services for improving and maintaining the SHI expert technical analysis suit (SHI-ETA)." As specified under Section 4 of the ToR "ORGANIZATION OF WORK", when the Work is Called off, the detailed scope of the service shall be defined.".

		The requested services are described under ToR section 3.2 "Requested Services", indicate: (… Requirements & Analysis, Design, Build and code, Testing and quality assurance, Deployment, Maintenance and continuous improvement of software, Other Services …), etc.
12	Are there any specific output formats or reporting requirements that the final deliverables should adhere to?	Please refer to section 3.3 of the ToR "Output and Deliverables".
13	While the RFP outlines the overall objectives, could you clarify the anticipated project timeline or key milestones (e.g., phases for system analysis, development, testing, and deployment) for this assignment?	The RFP refers to the provision of software engineering and related seismology services for the SHI expert technical analysis suite (SHI-ETA), **on a Call-off basis** through the issuance by the Commission of formal request for delivery (FRD) during the contract period (kindly refer to Clause 3 of the Model Contract). The services will be requested as and when required (please refer to Section 4 of the ToR). Specific objectives, requirements, timelines and milestones will be defined and managed by the Commission.
14	What is the expected timeframe for achieving post-completion support during the two-year warranty period?	As requested under ToR section 8.1.7, the Warranty after the completion of the user acceptance testing. The expected timeframe for achieving post-completion support cannot be answered with a specific value, the "post-completion support" depends on the bug(s) complexity.
15	The RFP requires a team of at least eight qualified staff, including a Project Manager, Back-end Developers, Front-end Developers, and other specialists. Are there any additional role specifications or skill distribution requirements beyond those mentioned?	The ToR did not specify/mention roles. Please refer to section 8.2.5 of the ToR "Requirement for the Team Roster. Criteria must be fulfilled by the Team Roster as a whole (not by each member).
16	Could you provide further details on the required working hours or the overlap expected with the Commission's schedule?	Commission's working hours (9 am to 5 pm CET); please refer to ToR section 8.1.8 "…. the Contractor will be able to adjust the working hours of its relevant staff …… to overlap at least two hours with the Commission's working hours".
17	Could you clarify any specific performance metrics or service level expectations that must be met during the two-year warranty period for post-completion support and bug fixes?	Acceptance criteria and performance of services will be defined in the FRDs.
18	While the eligibility criteria and technical requirements are outlined, are there any additional evaluation factors or specific weighting guidelines (e.g., for technical	Please refer to RFP instructions for preparation and submission of proposals section 14 "Evaluation of the Proposal and Award".

	approach, team qualifications, or cost) that would help us tailor our proposal?	
19	In page 43 of the RFP "page 5 of the ToR", different services were mentioned under ToR section 3.2 "Requested Services", i.e. "…for the provision of services to develop some software tools for station operators and a new SO-Portal", please clarify?	It was a printing error, please find attached Amended ToR - page No. 5 to reflect the correct description of the services.

ANNEX B

TERMS OF REFERENCE -REV 26 FEB 2025

FOR THE PROVISION OF

SOFTWARE ENGINEERING AND RELATED SEISMOLOGY SERVICES FOR THE SHI EXPERT TECHNICAL ANALYSIS SUITE (SHI-ETA), ON CALL-OFF BASIS

TABLE OF CONTENTS

1. INTRODUCTION

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organisation (hereinafter referred to as the "Commission", CTBTO" or "PTS"), located in Vienna, Austria, is the international organisation establishing the global verification system under the provisions of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which bans any nuclear explosion on the surface of the earth, underground, in the atmosphere, underwater and on the surface of the water. 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 (hereinafter referred to as the GCI), an International Data Centre (IDC) and the capability to carry out on-site inspections (OSI). More information can be found under www.ctbto.org.

One of the IDC services to the States Parties is **Expert Technical Analysis** (ETA):

Paragraph 19 of the Protocol to the CTBT (Part I) says that "***The IDC shall carry out, at no cost to States Parties, special studies to provide in-depth, technical review by expert analysis of data from the IMS, if requested by the Organization or by a State Party, to improve the estimated values for the standard signal and event parameters***".

Paragraph 20 provides that the methods for supporting data access, and the provision of data shall include the following service:

"…Assisting individual States Parties, at their request and at no cost for reasonable efforts, with expert technical analysis of IMS data and other relevant data provided by the requesting State Party, in order to help the State Party concerned to identify the source of specific events. The output of any such technical analysis shall be considered a product of the requesting State Party but shall be available to all States Parties."

According to Annex 2 to the Protocol, one of the defining parameters estimated by the IDC is the hypocentre solution based on SHI data, which includes the origin epicentre coordinates and depth. Moreover, one of the characterization parameters for International Data Centre Standard Event Screening mentioned in the same Annex is focal mechanism. In routine IDC processing, source location is calculated with the globally robust and steady technique providing quasi uniform location accuracy and uncertainty which depends on the quality of relevant detections. For ETA, advanced and state-of-the-art techniques should be used to enhance automatic and interactive location.

2. BACKGROUND

The procedures and software for the Expert Technical Analysis and Special Studies (ETA/SS)

were intensively studied and developed during the last years at the IDC, resulting in development of the Expert Technical Analysis Suite Prototype for SHI data. The ETA Suite consists of two major components: ParMT and SCT.

ParMT (Parametrical Moment Tensor Estimator) is an ETA tool for the shallow events depth

and magnitude determination based on the moment tensor estimation.

Spot Check Tool (SCT) is an implementation of the master-event approach (match filtering). Information backbone of the SCT is a historical IDC database allowing for testing current event hypotheses with the archived event bulletins using master event approach. Computation backend of SCT is a set of FORTRAN 77 programs and shell scripts providing/building XSEL (cross correlation standard event list) and conducting automatic comparison with SELs (same day analysis) and REB (upon its completion) bulletins. Frontend is a Web-based graphical interface implemented as a portlet of the IDC Liferay portal in Docker container providing access to the backend in web services. SCT backend can run in fully automatic mode, while frontend GUI (integrated into a Liferay portal) provides a user an interactive mode of operation, allowing intuitive event selection and configuration of the backend tool as well as review of the results in tables and visualization tools. Liferay portal allows various access levels for different users, so independent internal reviewers, IDC analysts and external users will be able to securely utilize specific fine-tuned features of the SCT.

ParMT and SCT were developed using a wide range of technologies including FORTRAN77, FORTRAN90, C, Java CUDA, bash, C-shell, Python and Angular. Data exchange in the applications is based on JSON files. Additional products like Liferay, ORACLE, RHELx are used in the development of the SHI Expert Technical Analysis suite (SHI-ETA).

Given the large volume of data used in the SHI_ETA processing, it is necessary to improve the performance of the applications through parallelization.

3. SCOPE OF WORK

The Commission seeks to establish a Contract with an Initial Call-off Period of two (2) years, and options to extend the Contract twice for two (2) years each (two additional Call-off Periods). The maximum volume of work under the Call-off Periods is shown in the table below:

	Years	Person days per Year	Total
Initial Call-Off Period	2	400	800
1st Extension	2	200	400
2nd Extension	2	200	400
Contract Total			**1600**

This is the maximum volume, and the Commission reserves the right, at its sole discretion, to call-off less or no person-days at all.

These Terms of Reference defines the technical framework for the provision of on-site and off-site software engineering services and related seismology services for improving and maintaining the SHI expert technical analysis suit (SHI-ETA).

The services include research in seismology for methods and algorithms related to ParMT and SCT, design, development, testing, documentation, and maintenance of software. At the time when the Work is called-off (see Section 4 for the organization of work), the detailed scope of the service shall be defined.

3.1 Objectives

The overall objective of this project is to provide further development of the Expert Technical Analysis and Special Studies (ETA/SS) frameworks and software in compliance with the Treaty, and support for their implementation at the IDC, targeted at the related IDC Commissioning tests and experiments as guided by the PTS Performance Monitoring and Testing Framework (hereinafter referred to as "the Work"). The software supporting the ETA/SS is currently the ETA suite composed by are divided into ParMT and SCT.

3.2 Requested Services

The Preparatory Commission seeks to establish a Call-off Contract for the provision of software Engineering and related Seismology Services for the SHI expert Technical analysis Suite ("the Services" or "the Work") under the terms outlined in this TOR.

Several best practices and standards have been established within the Commission including ITIL for IT service management, PRINCE2 for project management and Scrum-like Agile methodology for software development. Software developments are done in a Jenkins based continuous integration and testing environment. Tasks should be accomplished under Agile software development methodologies and following the IDC change management processes. The Commission uses Gitlab, JIRA and Confluence as main tools for managing and documenting software in a containerized development (Docker and Kubernetes).

The Work includes but is not limited to following tasks within the Software Development Life Cycle.

Requirements & Analysis – requirements gathered based on the business needs of the PTS:

- Provide software solutions in accordance with IDC user requirements and/or review and refine existing software solutions provided by the PTS. The outcome of this step would be a formal document for guiding the work;

- Manage Jira tickets for tracking the work;
- Estimate the effort and resources to execute the work;
- Analyse the requirements keeping the design and code of the software in mind.
- Analysis of the current functionality of a software system;

Design – Convert to software specifications:

- Recommend/evaluate design approaches;
- Software Architecture support;
- Recommend frameworks, tools, and libraries for building the software solution;
- Upgrade interfaces as required.

Build and code – translating the design to a computer-legible language; application and designed modules are made ready for deployment:

- Write code using the chosen programming language;
- Delivery, acceptance support and implementation support of each deliverable;
- Code refactoring for specific modules.

Testing and quality assurance:

- Development of acceptance test plans;
- Support PTS in testing and running the Software on development machines;
- Design and Implement test cases for code quality, unit testing, integration testing, performance testing, security testing, among others;
- Create testing reports.

Deployment – operational modules and applications are release to PTS IT-environment:

- Implementation of CI/CD pipeline and integration into the IDC CI/CD framework;
- Delivery of the final documentation agreed for each task, typically consisting of Software Design Description, Software User Manual, Software configuration and administration manuals;
- Implement deployment and release policies;
- Provide installation and usability assistance;

- Adjust operating system settings, Docker runtime, and container orchestration parametrisation;
- Provide training/Demos or other services associated with operating the software.

Maintenance and continuous improvement of operational software:

- Perform software troubleshooting;
- Adapt software to changes in the PTS IT-environment;
- Provide proactive and/or reactive support services;
- Implement software patches and updates;
- Migrations for major releases of software;
- Provide on-site support upon request from the PTS;
- Create monitoring scripts;
- Support in log analysis.

Other Services:

- To continue tuning and calibrating the software with the data from the IDC database and historical data from other sources (including IRIS, DTRA, LLNL, etc.), taking into account data and metadata- related issues (instrument response, geographical coverage, insufficient metadata, etc.);
- To develop an interface or a plugin allowing parsing of the ParMT-based body and surface wave synthetic seismograms (regional and teleseismic) to Spot Check Tool, thus providing substantial SCT code reuse;
- To estimate potential improvement in screening power of focal mechanism with the use of the UNE models based on historical and IMS data;
- To improve performance in cross-correlation (computation engine of Spot Check Tool);
- To add new bulletins/external events to the SCT. Current implementation of Spot Check Tool provides means for checking events from a set of IDC bulletins: SEL3, LEB, REB, VSEL;
- To make proposals on the other ETA/SS related implementations which were already considered at the IDC (for instance, blind source separation based on Independent Component Analysis (ICA) or/and cepstral analysis, and ambient noise tomography for refining crustal velocity model beneath IMS arrays);
- To evaluate and implement parallelization for specific computational tasks.

3.3 Output and Deliverables

Deliverables shall be defined at the time when work is called-off (see Section 4 for the organization of work). The deliverables should follow standards specified by the Commission, which are based on industry best practices.

The Commission may select deliverables from the below list, or request other deliverables deemed relevant to the project.

Project-oriented:

- Project plan: a plan document specifying the roles and responsibilities, schedule, milestones, deliverables and effort expressed in number of days;
- Progress Report and updated project plan;
- Risk management plan;
- Monthly report of complete and ongoing activities;
- Resource planning (vacations, reinforcement staff, onsite work);
- Handover report.

Software-oriented:

- A statement of the requirements / objectives of the software component;
- Recommendations / guidelines to help the Commission staff adhere to the implementation / design concepts;
- Results of review and inspection (architectural, database design, code, documentation when applicable);
- Status of active technical support issues.
- Status of tickets, bug reports and possible fixes.
- Status and updated plan for all active development tasks.
- Reports on security issues and vulnerabilities of the delivered modules or extensions
- Source code documented as per agreed coding standards;
- Changelog: a description of what changes were made relative to the previous release, along with a list of files that were modified by each change. Each release shall also include a list of outstanding items to be done, including any and all known defects;
- Test plans, test cases, test scripts and test results (of unit test, integration and system test and when applicable regression test);
- Updated technical documentation for the software components, as per agreed standards;

- Technical documentation including design documents for the software components as per agreed standards (e.g., User guides and manuals, Help files, technical specifications, Training materials);
- Testing reports;
- Jira - Agile reports for Scrum teams;

Process and Training oriented:

- Configuration management plan;
- Minutes of workshops or (tele)conferences for knowledge transfer to the Commission staff
- Training material;
- Application-Workflows, Error messages dictionary.

4. ORGANIZATION OF WORK

The Services will be initiated by the Commission in writing through a Formal Request for Delivery (FRD).

4.1 Initiating Work

Before the issuance of an FRD to the Contractor and upon receipt of a written request from the Commission, containing elaborations and definitions as to the nature of the software project, the Contractor shall provide, at a minimum, within one (1) week of receiving the written request, the following information in the form of a work plan for each service identified in the written request:

- A list of staff (software team) who will be working on the software project, and the role of each of these staff. The software team shall be a subset of the team roster, as described in section 8.2;
- Work plan and key schedule for the project initiation;
- Ballpark estimate of the total cost to be allocated of the software project, broken into services;
- Commencement date and completion date of the service;
- Where applicable, travel shall be organized by the Contractor and reimbursed by the Commission on the basis of simple economy return ticket for the most direct route upon presentation of supporting documents.

After review of the work plan for each of the service identified in the written request, and only after acceptance by the Commission, the FRD shall be issued to the Contractor.

Each FRD shall be based on one (1) or more of the services described in this ToR under section 2 and on the approved work plan for each of the service to be completed. The Commission will forward FRDs to the Contractor with adequate advanced notice and containing all necessary details, expected deliverables, and minimum requirements for satisfactory performance.

The Commission shall not be held liable for the performance of any service(s) which have been performed before the formal issuance of an FRD to the Contractor.

Since the IDC follows the Scrum software development methodology, generally the work is based on Scrum sprints and cover software development services to be performed within the span of approximately 4 weeks. Sprints are recorded in the Commission's JIRA-based tracking system. The Commission will provide the description of the work to be performed in writing to the Contractor and the Contractor shall respond with an estimate of the number of person-days required to complete the work and with a delivery date. After acceptance of the estimate and delivery date, the Commission will issue the Sprint to the Contractor.

Prior to issuing Sprint, the Commission and the Contractor shall also agree on the place of work (on-site/off-site or a combination thereof).

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

4.2 Completion and Acceptance

At the end of a particular service under the FRD, the Contractor shall submit to the Commission the deliverable(s) as stated in the respective FRD. The work will be reviewed by the Commission staff and by the Commission management against requirements and the Commission internal working practices and standards.

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 for software and common libraries, including documentation.

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

5. RESOURCES BY THE COMMISSION

The Commission will provide to the Contractor remote access to the relevant infrastructure in the PTS network, should it be deemed necessary. "Infrastructure" comprises, but is not limited to software, servers, VLANs and databases. The Commission will also make reasonable efforts to cooperate with the Contractor in connection with its performance under the Contract, including, but not limited to, reasonable and timely access to the Commission's personnel, documentation, and databases and other necessary identified sources of information.

For on-site work to be performed at the PTS headquarters in Vienna, Austria, the Commission will provide at its premises a suitable work environment (work space, meeting rooms for presentations and trainings, standard stationery, internet connection) to the Contractor's personnel to perform the services under the Contract, as required.

5.1 Location

For all tasks, the Contractor's personnel will be expected to work off-site the premises of the Commission in Vienna, Austria. Only for the purposes of meetings, on-site installation, or other activities as required, the Contractor's personnel might be required to work for limited periods at the Commission's premises. These on-site days shall be agreed with the Commission prior to the issuance of the relevant FRD.

The Contractor will be required to travel to the Headquarters of the Commission in Vienna up to 4 times per year. Each visit shall not exceed 5 days in duration.

Where applicable, the Contractor shall make all the travel arrangement (visas, hotels etc.) for their personnel, if travels are required.

For off-site work, the Contractor shall provide its own infrastructure, hardware and software environment necessary for the completion of its work under the Contract. The Contractor shall communicate with the Commission by telephone, or electronic mail, as appropriate. All costs incurred by the Contractor as a result of such communication with the Commission for the performance of work under the Contract, shall be borne by the Contractor.

6. REPORTING

The Contractor shall submit a Monthly Report to the Commission, electronically via email and within the first five (5) working days of each calendar month, describing all the activities performed during the preceding month, including but not limited to:

- Summary of technical support activities done;
- Status of active technical support issues;
- Status of tickets, bug reports and possible fixes;
- Status and updated plan for all active development tasks; and
- Plan for future activities.

7. CONTRACTOR'S RESPONSIBILITIES

At the start of each project, the Contractor shall detail and implement a project management system, that clearly defines how the work is to be managed and controlled. It should include at a minimum:

- Approval by the Commission of the division of the project in stages within defined milestones and deliverables;
- Authorization to proceed from one stage to the other by the Commission;
- Approval by the Commission of the scope, costs and schedule of each stage of the project.
- Planning and assurance of quality for each stage of the project;

- Monitoring of the progress of the project by the Commission through continuous status;
- Reports (automated status reports is preferable) and timely issue escalation procedures;
- Final report and Lessons learned report at the end of the project;
- Risk management;
- Communication plan.

For off-site work, the Contractor shall provide their own infrastructure, hardware, and software environment necessary for the completion of its work under the Contract. The Contractor shall communicate with the Commission by telephone, electronic mail, or video teleconferencing, as appropriate. All costs incurred by the Contractor as a result of such communication with the Commission for the performance of work under the Contract, shall be borne by the Contractor.

8. REQUIREMENTS FOR THE CONTRACTOR

The Contractor shall satisfy the following mandatory requirements:

8.1 General Requirements

The Contractor shall satisfy the following mandatory requirements:

8.1.1 To be a company established for at least 4 (four) years;

8.1.2 To have a minimum of five (5) years of using a formal project management methodology;

8.1.3 To have a minimum of five (5) years of experience in providing software development services using an Agile methodology, preferably Scrum;

8.1.4 To allocate at least 8 staff who meet the requirements in the Team Roster as described in Section 8.2.5;

8.1.5 To have experience of three (3) or more years in working with a modern issue tracking and ticket management systems, for example Jira;

8.1.6 To have at least three customer references for similar projects managed in English (reports, documents, written and oral communication) duly documented;

8.1.7 To provide a warranty period of two (2) or more 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;

8.1.8 To provide documented evidence, in the form of a plan, that the Contractor will be able to adjust the working hours of its relevant staff (e.g., project manager and lead developers), assigned to a Software Team, to overlap at least two hours with the Commission's working hours (9 am to 5 pm CET), on the Commission's request;

8.2 Team Roster

8.2.1 Constitution of the Team Roster

The Contractor shall provide and maintain a Team Roster with details of staff that are expected to be involved in the performance of work on-site and/or off-site for the Commission. At a minimum, the following information shall be provided as part of the roster for each of these staff:

1) Name
2) Role
3) Employed since
4) Type(s) of Service(s) from Section 3, in which the staff may be involved.
5) Curriculum Vitae

The Contractor shall demonstrate:

6) The capacity of the suggested Team Roster to provide the Services described in section 3.
7) The compliance of the suggested Team Roster with requirements set out in sections 8.2.5.

The Team Roster shall be appropriately skilled and experienced to carry out the role and service(s) listed Section 3.

8.2.2 Maintenance of the Team Roster, conditions of amendment

The Contractor shall maintain an up-to-date version of the Team Roster for the duration of the Contract. The Contractor shall be responsible to inform the Commission when staff is to be removed or added to the Team Roster, and if the details of a staff are modified.

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

The Commission shall be entitled to confirm whether or not the proposed Team Roster amendment is acceptable.

8.2.3 Contractor's Personnel

The bidder must propose a Team Roster with sufficient expertise to cover all services described in section 3.2.

Prior to the issuance of a FRD, as described in section 4, the Contractor is requested to propose to the Commission a list of staff (Software Team) that will be working under the FRD. This Software Team shall be selected from the Team Roster.

The Contractor shall ensure that each staff of the Team Roster:

1) is dedicated to the project during the development period (unless otherwise agreed); and
2) is not re-assigned from the project without the prior written consent of the Commission.

The Contractor shall satisfy the following mandatory requirements:

3) An established pre-screening process to identify suitable staff;
4) Provide reasonable evidence that the proposed Software Team is appropriately skilled and experienced to carry out the work plan;
5) Replacement of poor performing Software Team members or provision of specific training to address a gap in knowledge identified after a Software Team member has started his or her assignment, at no cost for the Commission, upon request by the Commission;
6) Establishment of an induction program to help new members of the Software Team become productive within a predefined period after the start of their assignment for the Commission. The duration of the period will be from one to three months depending on the type of service.

The Commission shall be entitled to confirm whether or not the proposed Software Team is acceptable.

The Commission reserves the right to seek an immediate replacement for any Software Team member, who is found unsuitable for the assigned tasks as determined by the Commission. In such cases, the Commission will request a replacement Contractor staff, with equal or better qualifications and experience, to complete the tasks. If no suitable replacement consultant can be agreed upon, the Commission reserves the right to terminate the assignment of the unsuitable Software Team member with immediate effect. Continuity of staff is an important consideration. The Contractor shall therefore take necessary measures to ensure a seamless transition when taking over the services and keep changes to staff being assigned to the Commission to a minimum throughout the duration of the contract.

8.2.4 Proficiency level

In its proposal, the Contractor shall provide three levels of staff proficiency, with a quote per person-day for each level:

7) Junior
8) Standard
9) Expert

The proficiency level of a member of the Team Roster shall be determined at the time when a project is initiated, and the Software Team is defined for that project. It shall be determined based on the expertise and level of experience of that member in the

task he/she is to perform under a given project (e.g., the same person may be considered "Expert" on one project, and "Standard" on another one). The proposed proficiency levels for each member of the Software Team are subject to the Commission's approval. If deemed necessary by the Commission, the Contractor may be requested to provide further evidence of the proficiency level of a Software Team member at any time during the project, and the Commission reserves the right to modify the proficiency level of a Software Team member.

8.2.5 Requirement for the Team Roster.

The following criteria must be fulfilled by the Team Roster as a whole (not by each member)**:**

8.2.5.1 A university degree in Computer Science or another scientific/technical subject with a high computational content;

8.2.5.2 A minimum of 5 years of recent professional experience in developing applications of similar scope as mentioned in the section 3, using state of the art technologies;

8.2.5.3 A minimum of 2 years of recent professional experience in using a software versioning system, preferably Gitlab;

8.2.5.4 A minimum of 3 years of recent professional experience in working with at least one Agile methodology, and experience working in an Agile framework;

8.2.5.5 A minimum of five (5) or more years of experience, providing software maintenance and support services for complex and custom software systems;

8.2.5.6 A minimum of 2 years of recent professional experience in working with Linux operating systems and TCP/IP;

8.2.5.7 A minimum of 2 or more years of recent professional experience in working with Fortran, C, C++, Java, Perl, Python, and UNIX/Linux shell scripting languages, APIs, SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application;

8.2.5.8 A minimum of 2 years of recent professional experience in working with the Public Key Cryptography Standards, PKCS#11, PKCS#12, API and OpenSSL libraries, Apache, Docker runtime, and container orchestration parametrisation;

8.2.5.9 A minimum of 3 years of recent professional experience in working with object-oriented development and design patterns, exposure to project management methodologies and incremental software development techniques;

8.2.5.10 A minimum of 3 years of recent professional experience in the design and implementation of complex web portals / content management systems;

8.2.5.11 A minimum of 3 or more years of recent professional experience in working with all elements of the Software Development Lifecycle: Eliciting and documenting business

process flows, use cases, requirements, quality management plans, user acceptance testing, and end -user training;

8.2.5.12 A minimum of 2 or more years of recent professional experience working with, and understanding of, requirements definition and software system design methodologies Knowledge of web -based internet application development architectures;

8.2.5.13 At least one of the team roster should have university degree in Geophysics, Earthquake Science, or other similarly quantitative fields with experience in moment tensor inversion, waveform cross correlation, waveform modelling, and analysis of seismicity catalogues.

9. RISK MANAGEMENT

The Contractor shall update the risk assessment plan at the project's commencement to identify potential risks that could impact the successful execution of the implementation activities outlined in the ToR. 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 shall 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 CTBTO, thereby contributing to the knowledge repository for forthcoming software development endeavours.