Council of the
European Union

Brussels, 18 September 2023
(OR. en)

12333/23
ADD 1

LIMITE

CORLX 803
CFSP/PESC 1150
CONOP 69

NOTE

Subject:	Council Decision on Union support for the activities of the Preparatory Commission of the Comprehensive Nuclear- Test-Ban Treaty Organisation (CTBTO) in order to strengthen its monitoring and verification capabilities – ANNEX

ANNEX

SUPPORT FOR THE ACTIVITIES OF THE PREPARATORY COMMISSION OF THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION (CTBTO)

1. Background

On 12 December 2003, the European Council adopted the European Union Strategy against Proliferation of Weapons of Mass Destruction (the Strategy), Chapter III of which contains a list of measures that need to be taken both within the Union and in third countries to combat such proliferation.

- The Comprehensive Nuclear-Test-Ban Treaty (CTBT) which bans all nuclear explosions is an essential element in the international non-proliferation architecture. The CTBT is a strong collective confidence and security-building measure and a powerful constraint on the proliferation of nuclear weapons, preventing the development of nuclear weapons by countries that do not currently possess them, as well as upgrades to already existing nuclear arsenals.

The CTBT has established a powerful global norm against nuclear weapons testing, backed up by a state-of-art and highly sensitive global nuclear test monitoring system, the International Monitoring System (IMS) of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) which monitors compliance with the Treaty.

The Treaty has yet to enter into force and global efforts continue to achieve this key goal of the international peace and security community and agenda. In parallel, the IMS of the CTBTO provides a steady flow of real-time data via the International Data Centre to the international community to ensure that no nuclear test goes undetected. The Organization's on-site inspection capabilities and technologies are also being developed and readied for the Treaty's entry into force.

The European Union (EU) is actively implementing its Strategy and for more than a decade provides significant voluntary contributions to the Preparatory Commission for the CTBTO to promote CTBT entry into force and to sustain and further strengthen CTBTO's monitoring and verification capabilities.

2. Overall Objective

Aligned with the EU Strategy against Proliferation of Weapons of Mass Destruction, the overall objective of this project is to contribute to international peace and security and confidence building by promoting universalization and entry into force of the CTBT and strengthening the CTBTO's international monitoring and verification regime.

By improving capabilities of the CTBT verification regime, building capacities among experts from State Signatories and raising awareness among youth, parliamentarians, media and scientists, this project aims to contribute to "preserving peace, conflict prevention, and the strengthening of international security" as envisaged under Article 21 of the Treaty on European Union.

3. Specific Objectives

a) To strengthen the capabilities of the CTBT monitoring and verification system.

b) To strengthen the capabilities of the States Signatories to the CTBT to fulfil their verification responsibilities under the CTBT and to enable them to benefit fully from their participation in the CTBT regime.

c) To raise awareness of the CTBT and promote its universalization and entry into force.

4. Expected Outputs

a) The project will generate outputs contributing to strengthening the capabilities of the CTBT monitoring and verification regime by (1) enhancing radionuclide and atmospheric transport modelling pipelines, (2) improving the scientific understanding of the radioxenon background and its impact on CTBTO noble gas systems detection (3) improving the sustainment of the IMS auxiliary seismic stations, and (4) furthering CTBTO On-Site Inspection (OSI) capabilities build-up.

i) Enhancement of the Federation of Digital Seismograph Networks (FDSN) web service implementation that covers all seismic, hydroacoustic, and infrasonic (SHI) and radionuclide data, products, and formats.

ii) XeBET II software operational and ready to estimate the radioxenon concentrations for each IMS noble gas sample. The prototype will be implemented in the ATM pipeline with the output to be integrated into the radionuclide pipeline for enhancing the Automated Radionuclide Report (ARR) and the Reviewed Radionuclide Report (RRR) and Standard Screened Radionuclide Event Bulletin (SSREB). It will also be available in the Expert Technical Analysis tool set and in the NDC-in-a-Box.

iii) Prototype software allowing to implement uncertainties in atmospheric transport modelling (ATM) simulations for the purpose of isotopic ratio analysis (screening & timing) and machine learning (ML) studies.

iv) An upgraded ATM pipeline based on this prototype ATM-EPS. providing additional and essential information about the ATM uncertainties, improving credibility of the ATM results.

v) Provision of a software which is a) used by the IDC, and b) used by NDCs to do infrasound and hydroacoustic processing, and interactive analysis.

vi) Better understanding / characterization of the global radioxenon background, including its regional variations, especially at the JPX38 noble gas system.

vii) Refinement of the current understanding of known sources in Eurasia, leading to an improved understanding / interpretation of level ‘C’ episodes.

viii) Improvement of ATM, especially the high-resolution (HR) ATM.

ix) Development, testing and optimization of advanced source location algorithms / screening methods (to be applied for data of all other IMS noble gas systems).

x) Improved ability to detect, locate, and characterize a nuclear test from the radioxenon releases.

xi) Increased data availability up to 95 % or as close as feasible to 100% in a sustained manner at auxiliary seismic stations (AS) targeted.

xii) Improved sustainment and stability of AS stations targeted, including better performance over time, with reduced station downtime.

xiii) Furthering OSI build-up by translating the Model Text for the Draft OSI Operational Manual in two CTBTO languages: French, Spanish.

b) The action will generate outputs that will improve the National Data Centres (NDCs) capacities of States Signatories and provide foundational knowledge of the Treaty as well as an overview of OSI activities and equipment, using hands-on training.

i) Conduct of the OSI Regional Introductory Course (RIC-26) in the African region in early 2024.

ii) Increase of the number of experts from the African region in the ongoing OSI Linear Training Programme.

iii) Provision of the sixteen Capacity Building System (CBS) equipment including heavy duty servers with large storage, and installation of standardised software for NDCs to support the establishment and further development of national capacity to participate actively in the verification regime by accessing and analysing IMS data and IDC products.

iv) Two regional NDC trainings and two regional workshops to support experts from developing countries.

v) Four SeisComP training courses.

vi) Six follow up/maintenance visits.

vii) Maintenance for CBS systems.

c) Moreover, outputs generated by the action will strengthen the universal character of the CTBT, boost inclusivity and diversity in the Preparatory Commission for the CTBTO, and raise awareness about the CTBT among young professionals from non-signatories and non-ratifying countries, including States whose signature and ratification are required for entry into force of the CTBT.

i) A Series of lectures, namely the Citizen Journalism Academy, with leading communications experts for the next generation of journalists in nuclear disarmament and non-proliferation, providing them with a comprehensive vision of the CTBT and its role within the international peace and security architecture. The graduates of the Citizen Journalism Academy will also produce media and outreach products featuring the Science and Technology Conference and Science Diplomacy Symposium, raising the profile of the Treaty among youth audiences.

ii) Participation of CTBTO Youth Group members at Science Diplomacy Symposium 2024 and 2026

iii) Participation of CTBTO Youth Group members at Science and Technology Conference 2025

iv) Participation in the CTBTO Mentoring Programme of twelve early-career women in STEM from underrepresented geographical regions. The programme will include virtual workshops focused on Career Development, Communication, and the scientific/technical aspects of the CTBT, to help the participants improve their understanding of the CTBT and its verification regime.

v) Participation of the twelve Mentees of the CTBTO Mentoring Programme in the CTBTO Shadowing Programme in Vienna to get a better understanding of the Secretariat's work.

vi) Development of a space on LinkedIn that facilitates and encourages the connection among Mentees and Mentors and help them stay informed of CTBTO career opportunities and activities.

5. Duration

The total estimated duration of the action is 36 months.

Activity 1: Support to the verification technologies and monitoring system

Component 1: IDC SHI and RN Tools and Products Enhancement

Impact

By improving and enhancing radionuclide and atmospheric transport modelling pipelines and improving sustainability of Federation of Digital Seismograph Networks (FDSN) product generation and distribution, we aim to enhance the ability of the State Parties to monitor and interpret IDC data and products. This strengthens the verification regime and contributes to the non-proliferation goals in line with the Common Foreign and Security Policy (CFSP).

Product 1: FDSN products generation and format enhancements for SHI and RN products

Background

The Provisional Technical Secretariat (PTS), with support from EU Council Decision VIII, implemented the generation of its SHI products and data in compliance with the FDSN web service standard. This enabled National Data Centres (NDCs) as well as the International Data Centre (IDC) to request Seismic Hydroacoustic and Infrasound (SHI) IDC products and data from the International Monitoring System (IMS) using standard compliant client software.

To build on this initial achievement, the goal now is to enhance the scope of the FDSN web service implementation by PTS to additional formats and to provide access to IDC's Radionuclide (RN) products and data. This would mean that all product generation will be done by the FDSN web service implementation. This will create a clear separation of responsibilities between product generation, which will be done by the FDSN web services, and the product and data distribution methods (VDMS as well as SWP). By separating these responsibilities, the product generation and distribution system will be more flexible and easier to maintain. It also adds the capability for NDCs to query directly for IDC products through the FDSN web service, in addition to receiving IDC products through VDMS and SWP, meeting the need for on-demand product distribution.

Improved sustainability of IDC product and IMS data generation and distribution allows State Parties to review and analyse CTBTO data more easily and efficiently.

Expected Outcome

- To improve service to NDCs and the IDC with one central service to request SHI and RN data and products from.

Expected Outputs

- Enhancement of the FDSN web service implementation that covers all SHI and RN data, products, and formats.

Product 2: Development of an operational Xenon Background Estimation Tool (XeBET II)

Background

Radionuclide emissions from man-made global sources, related to peaceful activities, are frequently observed by the CTBTO noble gas network. These ever-present and highly variable emissions weaken the global monitoring of nuclear explosions. Knowing that this intricate problem will exist forever, there is strong consensus for a need to advance the current methodologies through necessary innovation, by adopting the lessons learned, and by utilizing cross-disciplinary approaches from atmospheric transport modelling (ATM) and radionuclide expertise. Such efforts provide a capability to distinguish for each IMS sample whether the observation can be explained with known sources, or whether it possibly contains a contribution from a nuclear explosion.

An existing *scientific* software development project, XeBET (contract no. 2022-1179), currently paves the way for XeBET II by providing a software prototyping environment to test and demonstrate new data-driven scientific methodologies. XeBET II is the logical and important follow up to XeBET to utilize that prototype outcome for the provision of a software that *operationally* provides the best background estimation flag in the ATM pipeline. XeBET II will therefore enhance the nuclear screening quality accordingly.

Expected Outcome

- To make XeBET II software operational and ready to estimate the radioxenon concentrations for each IMS noble gas sample. The prototype will be implemented in the ATM pipeline with output to be integrated into the radionuclide pipeline for enhancing the Automated Radionuclide Report (ARR) and the Reviewed Radionuclide Report (RRR) and Standard Screened Radionuclide Event Bulletin (SSREB). It will also be available in the Expert Technical Analysis tool set and in the NDC-in-a-Box.

Expected Outputs

XeBET II is a software solution ready to be integrated into the ATM and radionuclide pipelines. It provides three Outputs:

- Creation of a solution for the flag "backtracking to known sources" that is part of the Categorization Scheme agreed by the Commission but not yet implemented in the IDC radionuclide reports.

- Enhancement of the SSREB to provide real automatic screening results rather than simply extracting information from the RRR.

- Provision of a tool for expert technical analysis.

All these functionalities will be made available for NDCs as part of the NDC-in-a-Box software. XeBET II will serve as a starting point for further enhancements and add-on development. By incorporating XeBET II into the operational ATM pipeline, it can be better estimated whether an anomalous signal can be attributed to a nuclear explosion or to known sources, which greatly improves the quality of the verification regime in the long term.

Product 3: Enhanced Atmospheric Transport Modelling (ATM) by Ensemble Prediction System

Background

The Atmospheric Transport Modelling (ATM) operational system deployed and used at the CTBTO produces source receptor sensitivity (SRS) fields which specify the location of the air masses prior to their arrival at any radionuclide station of the International Monitoring System (IMS) network. Consequently, the ATM computations support the radionuclide technology by providing a link between radionuclide detections and the regions in which possible sources are located.
A common and legitimate question regarding ATM products is related to their uncertainties and confidence level. It is recognized that uncertainties can be estimated using a set of equivalent simulations, an ensemble, rather than a single simulation. Based on the study funded by EUVII (Heading 1, Component 4), it was found that to benefit from ensemble properties, it is sufficient to have an ensemble composed of arbitrarily selected 10 members. This conclusion is especially important in the context of operational work at IDC, which requires more than 280 ATM simulations performed daily.

The current ATM operational system is based on a Lagrangian Particle Dispersion Model, FLEXPART. The work on updating FLEXPART-CTBTO version with the newest scientific enhancements implemented in the community version FLEXPART v10, was funded by EU VIII. A further enhanced version of the updated FLEXPART-CTBTO version will provide computational performance gains and more reliable and robust processing by using high performance computing resources with GPUs (Graphics Processing Unit), funded by EU Council Decision VIII (reference made to Heading 1, Component2, Project4). A new community release announced for 2023 as FLEXPART v11 and its potential improvements will also be investigated, and if deemed necessary it will be incorporated as well.

The project will result in further enhancements by extending the ATM capabilities to include ensemble modelling for 10 Ensemble Prediction System (EPS) members. Using EPS analysis will allow to estimate confidence levels in ATM guidance. To fulfil this task, the prototype software developed during EUVII, facilitating the estimation of uncertainties of modelled time series for source term inversion will be further enhanced. Moreover, the use of modelled ATM uncertainties for the purpose of isotopic ratio analysis and machine learning (ML) studies will be further investigated.

Introducing uncertainties in the ATM model predictions, provides for more accurate analyses for screening & timing (isotopic ratio analyses) and source localization. Ensemble prediction is also well suited as one of the methods to be used in a better background estimation of radionuclides. Overall, it gives State Parties a better understanding of the possible source location and timing of a radionuclide release and will in the long term greatly improve the quality of the verification regime. It
strengthens the capabilities of the CTBT monitoring and verification system considerably by providing essential information about ATM uncertainties that has been requested by the State Signatories.

Expected Outcome

- To enhance ATM system (ATM-EPS) which provides essential information about ATM uncertainties, improving credibility of the ATM results.

Expected Outputs

- Prototype software allowing to implement uncertainties in ATM simulations for the purpose of isotopic ratio analysis (screening & timing) and machine learning (ML) studies.

- An upgraded ATM pipeline based on this prototype ATM-EPS providing additional and essential information about the ATM uncertainties, improving credibility of the ATM results

Product 4 - Update of the multi-waveform technology processing and interactive system

Background

The infrasound and hydroacoustic processing software, DTK-(G)PMCC, supported through EU-VIII funding, has gone into operational use at the IDC and is now shared with member states through NDC-in-a-Box. This success now leads to requests from NDCs to continue to update the software and enhance the processing for hydroacoustic data using the tool. Moreover, there is also a need to update the associated tool DTK-DIVA, which offers the ability to do interactive analysis combining information about station noise, processing results, and, for infrasound data, to join data processing analysis with the knowledge of the atmosphere.

Provision of a software to the IDC and to NDCs offers improved hydroacoustic processing (through DTK-(G)PMCC), and comprehensive analysis and visualization (through DTK-DIVA). Improved hydroacoustic processing enhances the ability of the verification regime to locate nuclear tests conducted underwater. The enhancement of DTK-DIVA enhances the ability of experts to combine a variety of information from seismic, hydroacoustic, and infrasound detections and obtain more detailed understanding of a source event.

Expected Outcome

- To provide a software which is a) used by the IDC, and b) used by NDCs to do infrasound and hydroacoustic processing, and interactive analysis.

Expected Outputs

- Built hydroacoustic and infrasound events, and comprehensive analysis of these events.

Component 2: Continuing the radioxenon background campaigns in different regions of the world

Impact

Further improve the scientific understanding of the radioxenon background and its impact on CTBTO noble gas systems, which strengthens the capabilities of the CTBT monitoring and verification system.

Background

The xenon radioisotopes are the most likely to be observed noble gas signatures of underground and underwater nuclear explosions. They play a major role when confirming whether an event is nuclear in nature.

Radioactive xenon monitoring is a highly sensitive technique, but the reliable interpretation of the detections strongly depends on the local background knowledge and understanding. More than 500 nuclear facilities around the world regularly release radioactive xenon during routine operations. Nuclear power plants, research reactors and medical isotope production facilities are indeed generating radioxenon during normal routine operations. The emissions from these numerous anthropogenic sources create a significant background that may hide the radioxenon signals originating from a nuclear explosion.

The discrimination between the radioxenon background and signals resulting from a nuclear test is therefore a complex and challenging task. To this end, the noble gas background that can be expected in different regions of the world must be sufficiently investigated, as it is the only way to ensure a correct and accurate interpretation of radioxenon detections at the IMS stations by State Signatories.

Even though the CTBTO noble gas systems form a unique network, the full range of possible background features that may occur is not fully covered. More specific empirical data are required for further developing, enhancing, and validating screening methodologies. Well-designed field measurements are the best way to gain the necessary additional knowledge of the radioxenon background, especially in regions where interferences between potential CTBT-relevant observations and the normal regional background might be observed.

With the contribution received from the European Union within the framework of the EU Council Decision III, the Commission developed and purchased two transportable systems for measuring the four radioxenon isotopes of interest for the CTBTO. Within the framework of the EU Council Decision V, VI, VII and VIII, several radioxenon measurement campaigns were conducted in different parts of the world. With the contribution received from Government of Japan in 2017, the Commission purchased a third transportable system.

Two systems are currently operating in Mutsu and Horonobe, Japan. These locations have been selected with the goal of temporarily running a high-density mini network in the region of the IMS noble gas system JPX38, located in Takasaki, Japan. This is the first occurrence of having several systems close enough to each other to allow specific scientific studies on experimental data, and to (1) develop and test methods to refine understanding the background and (2) design, test and further develop advanced screening methodologies.

The Government of Japan has agreed before with the CTBTO's intention of deploying a 3rd system in Fukuoka, Japan, expanding the temporary high-density configuration towards the South-West. The deployment of this 3rd system shall be done as soon as this is possible.

An overview of past measurement campaigns is given in the following publication: https://doi.org/10.1016/j.jenvrad.2022.107053. This overview demonstrates the value of the radioxenon background measurement data collected through the years, lays out scientific findings and provides considerations for the design of future measurement campaigns.

The scientific data gathered by this effort gives the scientific community the rare chance to obtain measurement data from a mini network, the correct size to measure the accuracy of their high-resolution atmospheric transport models. This, in turn, helps the scientific community much more clearly to understand how radioxenon background levels measured at stations vary, which will significantly aid the ability of the PTS to analyse the significance of radioxenon detections. When State Parties trust the ability of the verification regime to discriminate between background xenon and xenon from an event of potential interest, the non-proliferation regime is strengthened.

Of direct interest for the PTS, collected data will be used to refine the understanding of, and further characterize, known sources across Eurasia frequently impacting the noble gas system JPX38. As this mini-network configuration enables the observation of the same release event at different locations close to that system, they will be used for:

testing and optimizing advanced source location algorithms, and

obtaining a better understanding of frequent level C episodes (where level C indicates the presence of a CTBT-relevant xenon radioisotope at anomalously high concentration).

The optimization and advance of screening methods as an outcome of this campaign will be reflected in the IDC analysis, not only with regard to RN38 data, but for data of all other IMS noble gas systems. Again, this will significantly aid the ability of the PTS to analyze the significance of xenon detections, consequently strengthening the verification regime.

Expected Outcome

- To improve understanding of the global radioxenon background, including its regional variations, and a better interpretation of CTBT-relevant detections. This outcome will be achieved through a large range of scientific studies performed on the collected data – by the PTS, and more generally, by the scientific community. Internally, the CTBTO has already initiated several scientific studies based on data collected by the transportable systems. This includes, for example, studies:

    - To better understand and characterize the contribution pattern of known sources on IMS East-Asian stations over the whole cycle of seasonal variations,

    - To refine knowledge on the emissions / emission patterns from the largest medical isotopes productions facilities in Europe, and assess their impact on the radioxenon background,

    - To investigate how additional measurements can be used to develop tools for accurately estimating the expected radioxenon background from known sources,

    - To develop sample association techniques using decay consistency analysis for studying the same detection event at multiple locations.

    Continuing the radioxenon background measurement campaign in Japan has still a lot to offer in terms of scientific knowledge and development. There is no other place in the world where a high-density configuration operates, and this is a unique opportunity. Collecting more data with the high-density network by continuing the implementation of the ongoing campaign in Japan is crucial for strengthening conclusions from the first studies.

Following the measurement campaign in Japan, the systems will be available for use by the PTS for follow up studies. Possible guidelines on the use of the transportable systems provided by the PrepCom will be duly considered and the project scope adjusted accordingly. As an alternative, the systems may also be used as temporary backup or training systems.

Expected Outputs

The main expected outputs are:

- Better understanding / characterization of the global radioxenon background, including its regional variations, especially at the JPX38 noble gas system,
- Refinement of the current understanding of known sources in Eurasia, leading to an improved understanding / interpretation of level C episodes,
- Improvement of atmospheric transport modelling (ATM), especially the high-resolution (HR) ATM,
- Development, testing and optimization of advanced source location algorithms / screening methods (to be applied for data of all other IMS noble gas systems),
- Improved ability to detect, locate, and characterize a nuclear test from the radioxenon releases.

Component 3: Sustainment of Certified IMS Auxiliary Seismic Stations

Impact

Improved sustainment of the IMS auxiliary seismic stations strengthens capabilities of the CTBT monitoring and verification system and contributes to the global security and nuclear non-proliferation.

Background

This project component will continue to address failing auxiliary seismic stations (AS) and stations with a history of poor performance which need urgent maintenance action, preferably targeting stations located in countries facing financial hardship. In addition, preventive maintenance actions will be implemented where necessary and justifiable. The latter will be done by addressing issues with obsolete equipment and consequent upgrade as well as through improvement of equipment sparing levels.

The support to the IMS AS and the improvement of the technical knowledge and skills of their operator(s) include necessary and justified station visits and on-site troubleshooting during which practical demonstrations and training are also foreseen to take place. Attention is drawn to the fact that this is achieved in conjunction with other actions such as station operators' technical trainings, which periodically take place at the Vienna International Centre.

As in previous programmes, full-time staff within the Maintenance Unit of the Monitoring Facilities Support Section (IMS/MFS/M) will be required to plan and execute troubleshooting and maintenance projects at the relevant AS stations.

Expected outcome

- To address station problems caused by instrumental malfunction, equipment failure, end of life, obsolescence or lack of spares that result in extended outages or downtime contributing to poor performance and frequent loss of mission capability.

- To contribute to global security on nuclear non-proliferation by making a genuine measurable impact on IMS Network Detection Capability and AS Network segment reliability. The impact of this project will be reflected in all target stations brought to a technical level compatible with the IMS technical requirements in a sustained manner through improved sustainment of the IMS AS. It is expected that it will considerably improve data availability and data quality at the stations which are the focus of the programme because of equipment repair, replacement, or system improvement.

- To improve sustained performance through the strengthening of the stations' systems and equipment as well as through the enhancement of the technical knowledge of the station operators involved.

Expected outputs

- **Increased data availability and data quality of AS stations targeted as part of this programme:** To reach more than 95 % data availability or as close as feasible to 100% reached in a sustained manner at target stations. The measured quantity for this expected result is authenticated data availability, which is expected to improve after the activity at the station is concluded.

- **Improved sustainment and stability of AS stations targeted:** This includes achieving better performance over time, with reduced station downtime. The measured quantity for this expected result is improved authenticated data availability over the course of a period of three months (minimum) following the conclusion of the activity at the station.

Activities

- **Technical activities:**

    - Station problem troubleshooting and diagnostic in cooperation with the station operators.

    - Solution identification based on equipment repair; replacement or improvement (or a combination of these).

    - Implementation, testing and training: field campaign involving equipment installation, equipment testing and training of station operators. Station visits as necessary by PTS staff.

- **Commercial/technical activities:**
    - Purchase of equipment and/or services. Liaison with contractors and suppliers.
    - Shipping and importation (when applicable).
    - Commissioning and monitoring.

Component 4: Translation of Model Text for the Draft OSI Operational Manual

Impact

By having the latest version of the draft OSI Operational Manual (OM) available in two more UN official languages for IFE 25, not only enhances the CTBTO multilingualism and contributes to the OSI capabilities build-up, but it also strengthens the capabilities of the CTBT monitoring and verification system.

Background

The On-Site Inspection (OSI) Operational Manual is one of the documents that needs to be approved following the Entry Into Force (EIF) of the CTBT. It guides the implementation of the provisions of the Treaty and its Protocol on the conduct of an OSI, and includes general principles and guidelines, as well as technical, operational, and administrative procedures.

Working Group B is conducting the third round of elaboration of the draft Operational Manual by focusing on the outstanding issues and lessons learned from the Integrated Field Exercise in 2014 (IFE14).

A large-scale Integrated Field Exercise (IFE) is planned to be conducted in 2025 as part of the On-Site Inspection (OSI) Exercise Programme for 2022- 2025 (CTBT/PTS/INF.1613), adopted at the Fifty-Eighth Session of the Preparatory Commission (CTBT/PC-58/2). The draft Operational Manual will be the important document to be tested in the exercise. As the response to the call for multilingualism by the States Signatories, there is a need for the document be translated into all UN languages. This will enable technical experts from all regions of the world to have a precise understanding of the document and will essentially contribute to the build-up of the OSI capabilities.

Expected Outcome

- To enhance CTBTO Multilingualism and contribute to OSI capabilities build-up.

Expected Outputs

- Translation of the Model Text for the Draft OSI Operational Manual in two CTBTO languages: French, Spanish.

Activities

The work to translate the latest version of the Model Text for the Draft OSI Operational Manual from English to two official CTBTO languages: French and Spanish, will be outsourced through a standing arrangement of the PTS with United Nations Office in Vienna.

The translated Model Text for the Draft OSI Operational Manual should be available by latest end of May 2024.

Activity 2: Integrated capacity building

Component 1: OSI Regional Introductory Course (RIC) for the Geographical Region of Africa

Impact

Provision of foundational knowledge of the Treaty and its OSI-related provisions as well as an overview of OSI activities and equipment, using hands-on training for experts of States Signatories, in developing countries, resulting in an increase in nominations and participation in the ongoing OSI linear training programme.

Background

As capacity building activities, OSI Regional Introductory Courses (RIC) have proven to be fundamental in strengthening the CTBT's verification regime, specifically in the development of an OSI Inspectorate Training Program and in the nomination of surrogate inspector trainee candidates for that program from Signatory States.

Records show a correlation between the increased numbers of nominees from a geographical region after the conduct of a RIC. The Commission has initiated the OSI Training Linear Programme (2022-2025) which aims for the integration of training for all training cycles and to provide for more effective skills maintenance training.

The project is to conduct 1 RIC in the CTBT African geographical region in order to have the broadest geographical and gender pool of trainees under the OSI Training Linear Programme.

The Regional Introductory Course will be conducted in March 2024.

The RIC is delivered as an 8 day on-site blended learning course that incorporates theoretical and mostly hands—on introductory training on OSI treaty protocols, equipment, techniques, and procedures. The RICs end with a capstone field exercise that validates the effectiveness of the training program.

Expected Outcome

- To acquaint national technical experts and personnel from the States Signatories of the region with the OSI regime.
- To broaden the pool of experts from the States Signatories of the region who are available to participate in OSI related activities and to identify potential candidates for the Provisional Technical Secretariat (PTS) roster of surrogate inspectors.

Expected Outputs

- Quantitative increase of participation of experts from this region in the ongoing OSI Linear Training Programme
- Means of verification will be a comparative analysis of the roster of Surrogate Inspectors in the OSI Database from the 1st to the 3rd Training cycles versus the roster at the mid-point of the OSI Linear Training Programme.

Activities

- RIC-26 to be conducted in the African region in early 2024.

Component 2: Building Capacity of National Data Centres

Impact

Strengthen and maintain support for the Treaty's verification regime through the establishing and improving National Data Centres (NDCs) capacities of States Signatories, in particular in developing countries, to enable them to take full advantage of the data and products generated by the verification system.

Background

Capacity building has proven to be fundamental underpinning the CTBT verification regime. The Commission continues supporting the States Signatories in assisting and providing means to develop capabilities to actively participate in CTBT verification regime. Developing countries from different continents have started taking advantage of the provision of IMS data and IDC products as these are useful not only for verification purposes but also for civil, scientific, and industrial applications. The capacity building strategy of the Commission has been recognised by Working Group B (WGB). During the lifespan of the European Union funding, scientific and technical staff of States Signatories have participated in specialised trainings on the use of the NDC-in-a-box software package, as well as CTBT-related knowledge that directly benefits national authorities. Developing countries institutions hosting NDCs have also been benefitting from provision of basic equipment to establish or further develop their capacity for data processing.

Expected Outcome

- To strengthen CTBT verification regime and increase use of IMS data and IDC products by NDCs of developing countries.

Expected Outputs

- Provision of the Capacity Building System (CBS) equipment to NDCs to support the establishment and further development of national capacity to participate actively in the verification regime by accessing and analysing IMS data and IDC products.
- On-site technical visits to NDCs for providing technical assistance for installation and/or maintaining of a Capacity Building System.
- Support for experts from developing countries with needed background and training to facilitate their participation of Workshops and Training courses organized by the CTBTO.
- Organization of regional workshops and trainings.

Activities

- Two NDC trainings and two regional workshops
- Four SeisComP training courses
- Six follow up/maintenance visits
- The purchase of sixteen CBS systems including heavy duty servers with large storage and installation of standardised software
- Maintenance for CBS systems.

Component 3: Participation of technical experts from developing countries in official technical meetings of the CTBTO Preparatory Commission (Technical Experts Support Project, in short TESP) [1]

[1] Abbreviation reference change proposed to read 'Technical Experts Support Project' [TESP] as no longer a "pilot project" after 16 years of its existence

Impact

To strengthen the universal character of the CTBTO Preparatory Commission, boost inclusivity and diversity through increased technical capacity of experts in developing countries to meaningfully contribute to CTBTO policy-making processes.

Background

In November 2006, during its Twenty-Seventh Session (13-17 November 2006), the Commission agreed to establish a pilot project aimed to support the participation of technical experts from developing countries in the work of Working Group B (TESP). The TESP has since been repeatedly extended.

Many developing countries lack the financial resources to enable their experts to participate in the scientific and technical work being undertaken in official technical meetings of the CTBTO Preparatory Commission. This means that there is a clear and systemic deficit in the involvement of developing country representatives in recommendations made and decisions taken, on key technical issues relevant to the Treaty's verification regime. This deficit is particularly problematic given that many stations of the Treaty's International Monitoring System are, or will be, located on the territory of developing countries and are managed by their country's institutions. Moreover, many developing countries are in the process of establishing and improving their NDCs to enable them to take advantage of the data products generated by the verification system, to be used not just for verification but also for civil and scientific purposes.

The funding will allow the CTBTO to select at least 12 leading technical experts from developing countries working on CTBT-related issues and fund their participation in Working Group B on verification issues meetings twice a year at the CTBTO Headquarters in Vienna, Austria. Achieving gender balance and geographical spread will be key criteria for selection consideration.

Expected Outcome

- To enhance the knowledge and skills of technical experts from developing countries regarding CTBTO's verification technologies and the broader civil and scientific applications, which will ultimately contribute to long-term national development outcomes in relevant areas.

- To improve gender balance and geographical diversity among experts from developing countries engaged in policy discussions on the CTBT verification regime.

Expected Outputs

- Attendance of at least 12 technical experts from developing countries for two in-person Working Group B meetings per year in Vienna is funded (with an equal male to female ratio).

- Training of experts on scientific and technical aspects with respect to the CTBT verification technologies and civil and scientific applications.

Activity 3: Outreach

Component 1: Next Generation Outreach for the CTBT

Impact

Development of a pool of future leaders in disarmament and nonproliferation spheres, by encouraging intergenerational dialogue, cross-regional synergies, and cross-dimensional studies, eventually contribution in strengthening the capabilities of State Signatories to the CTBT.

Background

The empowerment of the next generation of experts, capable of advocating for the mission of the CTBT, both politically and technically, and advancing the universalization and entry into force of the Treaty is a cross-cutting commitment of the CTBTO.

Since 2016, the CTBTO has been at the forefront within the UN system of opening its fora to civil society and actively engaging the next generation, especially through the flagship CTBTO Youth Group outreach programme. The programme has offered the next generation of experts (coming from over 125 countries), unique capacity building, research, and educational opportunities in the typically closed nuclear non-proliferation and disarmament environment.

The component will support a sustainable, scalable, and well-governed ecosystem of youth initiatives, that aims to build youth capacities globally with ever greater insight and impact. The aim is to organize capacity building activities tailored to specific target groups, such as young journalists, scholars and prospective decision-makers from the remaining non-ratifying and non-signatory States of the CTBT. This approach will raise awareness and foster informed advocacy for the CTBT among the next generation of experts from diverse backgrounds, and eventually, support the universalization and entry into force of the Treaty.

Expected Outcome

- To establish a new cohort of empowered and engaged young professionals, equipped with a keen knowledge of nuclear disarmament and the CTBT, its universalization and entry into force.
- To increase and diversify (both regionally and profile-wise) the network of young professionals that support universalization and entry into force of the Treaty, while simultaneously helping to improve the international visibility of the CTBT.
- To improve social media presence of CTBT-related topics.

Expected Outputs

- Series of lectures with leading communications experts.
- Capacity building of the next generation of journalists in nuclear disarmament and non-proliferation, providing them with a comprehensive vision of the CTBT and its role within the international peace and security field.
- Science and Technology Conference and Science Diplomacy Symposium coverage by graduates of the Citizen Journalism Academy, raising the profile of the Treaty among youth audiences.
- Social media and outreach products featuring the CTBT developed and published online by the CTBTO Youth Group members.

Activities

- Participation of CYG members at Science Diplomacy Symposium 2024 and 2026
- Participation of CYG members at Science and Technology Conference 2025
- Citizen Journalism Academy
- The Citizen Journalism Academy will strengthen the communication and social media skills of Youth Group members. Professional social media trainers will provide hands-on workshops and mentoring to CYGs, teaching them how to:
- conduct effective interviews with various stakeholders - diplomats, technical experts, other young people – on how to prepare, research, and pose appropriate questions.
- develop professional products to post on Facebook, Twitter, YouTube, and others, using Canva and other mobile journalism techniques to record audio and create impactful visual images.
- conduct successful outreach events.
- optimise social media use for powerful message delivery.

Component 2: CTBTO Mentoring Programme

Impact

Creating a talent pipeline of 12 early-career female candidates for positions in non-proliferation and nuclear disarmament to strengthen the capabilities of the States Signatories to the CTBT to fulfil their verification responsibilities under the CTBT and to enable them to benefit fully from their participation in the CTBT regime.

Background

In 2022, CTBTO launched a tailored mentoring programme for 12 early-career women in STEM on the margins of CTBT's Anniversary and the planned Science and Diplomacy Symposium. CTBTO is dedicated to connecting early-career women in STEM with the PTS technical experts. Mentoring provides an opportunity for women to build networks, strengthen desired skill sets and gain clarity around their personal and professional goals. Mentoring is an opportunity for all involved - mentors and mentees – to learn and enhance their skills. The Preparatory Commission of the CTBTO recognizes, however, that to reach gender parity and to address existing inequalities, men play an important role. As such, the PTS mentors include both women and men.

This virtual Mentoring Programme for all early-career women in STEM (preference is given to candidates from Africa; Latin America and the Caribbean; the Middle East and South Asia; South-East Asia, the Pacific and the Far East) is one example of CTBTO's initiatives aimed at creating a talent pipeline supporting gender equality, diversity and the empowerment of the next generation.

As a result of the 2022 pilot version of the Mentoring Programme, mentees participated, among other things, in one-on-one mentoring sessions to monthly thematic seminars coupled with skill boosters and sessions on raising awareness of the CTBTO's mission and activities. One of their goals was also to formulate research papers to be presented at the 2023 Science and Technology Conference on 19-23 June. Mentees were also able to participate in the 2022 Science and Diplomacy Symposium.

Another initiative developed as part of this programme is providing these mentees with an advanced opportunity for their career path. One of the mentees was nominated by her Permanent Mission to participate in CTBTO capacity-building activities to train surrogate inspectors for the successive cycles of the Mentoring Programme, CTBTO aims at broadening the Observer status for the mentees in other CTBTO capacity-building activities.

Beyond the formal induction programme, CTBTO expects these women to become part of the talent pipeline for competitive and high-quality candidates for future technical positions in the Secretariat.

Benefits for mentors:

- sharing experiences and knowledge.
- practicing and reinforcing their skills.
- learning and growing professionally and personally.
- seeing different perspectives and learning from the experiences of others.
- making new connections across a wide network of professionals.
- contributing to an enabling work environment in and beyond CTBTO.
- gaining the satisfaction of adding to others' development and success, while possibly making a real difference in their mentee's life.

Benefits for mentees:

- sharing experiences, learning, and receiving tailored professional guidance.
- building confidence, developing skills, and strengthening competencies.
- increasing motivation.
- developing strategies for dealing with professional needs in a safe and supportive space.
- learning and growing professionally and personally.
- seeing different perspectives and learning from the experiences of others.
- encouraging greater self-efficacy.
- making new connections across a wide network of professionals.

Benefits for the Commission and the countries:

- facilitating the exchange of information on career opportunities and relevant events and promoting through dedicated support the submission of applications by the targeted audience for vacant positions.
- creating a pool of potential technical experts contributing to the Organization.
- ensuring that early career individuals may have access to meaningful job experience qualifying them to contribute to the mission of international organizations.
- strengthening an enabling work environment in and beyond the CTBTO.

Expected Outcome

- To create a pool of potential competent female candidates for early-career positions in non-proliferation and nuclear disarmament.
- To support early-career female professionals' that have an interest in CTBT.
- To raise awareness of CTBT verification regime.
- To identify and engage with women who are technical experts
- To increase talent pool of experts (including from NDCs) who may consider applying for posts through the regular recruitment process.
- To improve reporting to the Working Group B (WGB) on Cross-Cutting Issues, covering the underrepresentation of women in WGB-related activities.

Expected Outputs

- Identification, development, and support for another cohort of 12 early-career women in STEM from underrepresented geographical regions who, with an improved understanding of the CTBT and its verification regime, may become candidates for participating in CTBTO held events and positions.
- Invitation to travel to Vienna and participate in the CTBTO's Shadowing Programme to get a better understanding of the Secretariat's, at the end of the Mentoring Programme. The mentees will present their progress, developed during the Mentoring Programme.
- Utilization of the LinkedIn platform to develop a space that encourages and facilitates the connection among Mentees and Mentors and help them stay informed of CTBTO career opportunities and activities.

Activities

- Career Workshop (Virtual) that includes 3 exercises (skill boosters).
- Communication Workshop (Virtual) that includes 3 exercises (skill boosters).
- Workshop from International Data Center (Virtual) that includes 3 exercises (skill boosters).
- Workshop from International Monitoring System (Virtual), that includes 3 exercises (skill boosters).
- Workshop from On-Site Inspection (Virtual) that includes 3 exercises (skill boosters).
- In-person Shadowing Programme for mentees.