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**Conference on Facilitating the Entry into Force
of the Comprehensive Nuclear-Test-Ban Treaty**
New York, 29 September 2015

**BACKGROUND DOCUMENT BY THE PROVISIONAL TECHNICAL
SECRETARIAT OF THE PREPARATORY COMMISSION FOR THE
COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION
PREPARED FOR THE CONFERENCE ON FACILITATING
THE ENTRY INTO FORCE OF THE CTBT (NEW YORK, 2015)**

TREATY

1. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all nuclear test explosions, whether for a military or any other purpose. It covers all environments and does not set a threshold from which the prohibitions should apply. The preamble of the Treaty states that its objective is “to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects” and “to the process of nuclear disarmament”.
2. The CTBT, and the international norm of non-nuclear testing, have grown in strength since the adoption of the Treaty in 1996. In order to enter into force, the CTBT must be ratified by all 44 States listed in Annex 2 to the Treaty. These are the States which formally participated in the work of the 1996 session of the Conference on Disarmament, thus having contributed to the final stage of the negotiations on the CTBT, and which appear in the lists, compiled by the International Atomic Energy Agency (IAEA), of States with either nuclear power reactors (as of April 1996) or nuclear research reactors (as of December 1995).
3. Significant progress has been made towards the goal of entry into force and universalization of the Treaty. To date, the CTBT has been signed by 183 States and ratified by 164 States, including 36 of the 44 States listed in Annex 2. Since the 2013 Article XIV conference, several countries completed their ratification procedures: Niue in March 2014, Congo in September 2014 and Angola in March 2015.



4. More than 90 States attended the seventh Ministerial Meeting held on 26 September 2014 in New York to promote the Treaty. Foreign Ministers and other high level officials issued a joint call for the entry into force and universalization of the CTBT. The Treaty promises to remain a rallying point for nuclear non-proliferation and disarmament.

2013 ARTICLE XIV CONFERENCE

5. Under Article XIV, if the Treaty has not entered into force three years after the date of the anniversary of its opening for signature, a conference of those States that have already ratified it may be held to decide by consensus what measures consistent with international law may be taken to accelerate the ratification process and to facilitate entry into force. States Signatories will also be invited to attend the conference.
6. The 2013 Article XIV conference¹ was held on 27 September 2013 in New York with 80 ratifying States and 8 States Signatories participating, as well as 1 observer State. This conference adopted a Final Declaration calling upon all States which had not yet done so to sign and/or ratify the Treaty (CTBT-Art.XIV/2013/6, Annex). The declaration includes a number of measures to promote the entry into force of the CTBT.
7. The 2013 Article XIV conference recognized that the establishment of a Group of Eminent Persons by the Executive Secretary of the Preparatory Commission will assist the activities of ratifying States to promote the objectives of the Treaty and to facilitate its entry into force.
8. In the course of the follow-up to the 2013 Article XIV conference, and in accordance with paragraph 11(c) of the Final Declaration, Hungary and Indonesia, which served as the Presidency of the conference, were selected as coordinators of the process “to promote cooperation, through informal consultations with all interested countries, aimed at promoting further signatures and ratifications”. On 23 February 2015, at informal consultations within the framework of this ‘Article XIV process’, Japan and Kazakhstan were appointed to serve as Presidents-designate in preparing for the 2015 Article XIV conference in New York.

PREPARATORY COMMISSION

9. In advance of the entry into force of the Treaty and the establishment of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), a Preparatory Commission was established by States Signatories on 19 November 1996. Its purpose is to carry out the necessary preparations for the effective implementation of the CTBT and to prepare for the first session of the Conference of the States Parties to the Treaty. Altogether 139 States are accredited to the Commission and 143 have designated their National Authorities or focal points.

¹ Previous Article XIV conferences were held in Vienna (in 1999, 2003 and 2007) and in New York (in 2001, 2005, 2009 and 2011).

10. The Commission has two main activities. The first consists of undertaking all necessary preparations to ensure that the verification regime foreseen by the CTBT is capable of fulfilling its operational mission at entry into force. The second is the promotion of signature and ratification of the Treaty to achieve entry into force. The Commission is made up of a plenary body responsible for directing policy and composed of all States Signatories, as well as a Provisional Technical Secretariat (PTS) which assists the Commission in its duties and carries out such functions as the Commission determines.

PROVISIONAL TECHNICAL SECRETARIAT

11. As of 30 June 2015, the PTS comprised 256 staff members from 78 countries. The number of staff at the Professional level was 171. The PTS is committed to a policy of equal employment opportunity, with a particular emphasis on improving the representation of women, especially in the scientific and technical areas within the Professional category. Sixty women held Professional positions as of 30 June 2015, corresponding to 35.09% of the Professional staff.
12. The approved Budget of the Commission for 2015 amounts to US\$126.3 million. From 1997 up to and including the financial year 2015, the total budgetary resources amounted to \$1113.4 million and €596.5 million. In equivalent US dollars this corresponds to a total of \$1862.8 million calculated using the budgetary rate of exchange of €1:\$0.796. Of this total, 79.5% has been dedicated to verification related programmes, including \$405.8 million (22%) for the Capital Investment Fund for the installation and upgrade of IMS stations.
13. In 2014 the Commission completed implementation of an International Public Accounting Sector Accounting Standards (IPSAS)-compliant Enterprise Resource Planning (ERP) system within budget and on time. This system has been in operation since May 2014 without notable problems. The 2014 financial statements, which were the first to be issued under IPSAS, were given an unqualified audit opinion by the External Auditor.

VERIFICATION REGIME

14. The CTBT provides for the establishment of a unique global verification regime that consists of an International Monitoring System (IMS), a consultation and clarification process, on-site inspections (OSIs) and confidence building measures. Data from IMS stations are to be sent via a secure global satellite network (the Global Communications Infrastructure (GCI)) to an International Data Centre (IDC) for processing and analysis, and IMS data and IDC products are to be made available to States.

International Monitoring System

15. The IMS is to consist of a network of 321 monitoring stations and 16 radionuclide laboratories. The mission of these facilities is to produce data for the detection of nuclear explosions. These data are to be provided to States Parties for verification of compliance with the Treaty after entry into force.

16. The momentum to complete the IMS network continues at a moderate pace. Progress has been made since mid-2013 in all four technologies – seismic, hydroacoustic, infrasound and radionuclide. As of 30 June 2015, 285 (89%) of the IMS stations had been installed. A total of 270 (82%) stations and 11 (69%) radionuclide laboratories had been officially certified as meeting the specifications of the Commission. Progress was also made towards completing the installation of further stations. Following the recognition of the importance of noble gas monitoring after the events in the Democratic People’s Republic of Korea in 2006, 2009 and 2013, the PTS has continued to emphasize noble gas technology. In 2014, a major milestone in the commissioning of the IMS network was the first certification of an IMS laboratory (RL3, Seibersdorf, Austria) – for noble gas analysis capability. As of 30 June 2015, of the 40 noble gas detection systems envisaged by the Treaty, 31 had been installed, of which 22 systems have been certified (55%).
17. In addition, political support was received from a number of countries hosting IMS facilities where the PTS could not proceed in previous years, bringing the prospect of a complete IMS network closer.

International Data Centre

18. The mission of the IDC is to support the verification responsibilities of States by providing data, products and services necessary for effective global monitoring after the entry into force of the Treaty.
19. The IDC continues in its provisional mode of operation and supports States Signatories by acquiring and forwarding continuous real time data, selected data segments and radionuclide spectra from the IMS. The IDC processes the IMS data along with compiled meteorological data and distributes the resulting products to support the verification responsibilities of States as well as their civil and scientific efforts. On average 11 terabytes of data and products are distributed every year. States are supported through an online help desk, data retrieval services, training courses, workshops, software and equipment.
20. The GCI receives and distributes IMS data and IDC reporting products. Using a combination of satellite, terrestrial and Internet technologies, this communications infrastructure now spans over 100 countries and territories. Subnetworks are being operated in eight States Signatories to complement the GCI. Adjustments to the physical infrastructure and procedures are made from time to time to ensure that the GCI continues to transmit data and products securely with 99.5% availability every year. The timeliness of data provided by the IDC has been substantially improved as a result of the GCI data repository being put into operation.
21. Through the International Noble Gas Experiment, the Workshop on Signatures of Medical and Industrial Isotope Production, support from European Union Council Decision V and contributions in kind from the United States of America, the global radioxenon background signature and the effects of emissions from the radiopharmaceutical industry on the IMS network have been studied. Efforts are being made in partnership with the industry to better understand the impact and to potentially mitigate emissions so that the detection capability of the IMS noble gas systems is as

sensitive as possible to nuclear explosions. The Executive Secretary of the Commission, Mr Lassina Zerbo, and the Chief Executive Officers of six medical isotope production facilities have already signed pledges on cooperation in noble gas mitigation.

22. Improvements are being made to the atmospheric transport modelling (ATM) capability of the IDC. Global meteorological data with higher resolution are now available and will be used to produce better quality ATM products for the needs of States Signatories. In parallel, the IDC is working on regional, high resolution meteorological and ATM simulations to support requests for in-depth studies of events of special interest.
23. The second phase of IDC re-engineering, initiated in 2014, focuses on the design of the seismic, hydroacoustic and infrasound (SHI) processing system as a whole and aims to develop a unified software architecture that will guide further development and sustainment of the IDC SHI processing software. The PTS is engaged in efforts to extend the current SHI analysis software provided to National Data Centres (NDCs) with additional functionalities, in particular in the area of infrasound processing and real time automatic processing. The project also aims to enable NDCs to more easily combine IMS data and IDC products with data from local and regional stations and from other global networks.

Sustaining and Maintaining the IMS

24. In accordance with Article IV of the Treaty, the Technical Secretariat supervises, coordinates and ensures the operation of the IMS and its component elements. Preparing a global verification regime is not just about building stations. It is about taking a holistic approach to establishing and sustaining a system that meets the verification requirements of the Treaty and ensures minimal downtime of IMS facilities. Operational experience with the system has increased over time, leading to the establishment of an IMS sustainment structure and concerted efforts for more effective operations, preventive maintenance, logistical and engineering strategies and programmes. These sustainment activities are essential to preserve the investment already made by States Signatories.
25. Since 2013, the PTS has continued to develop its expertise in configuration management, logistics support analysis, establishment of equipment support contracts, shipping and customs clearance, and storage and advance location of spares to ensure availability of replacement equipment and consumables on site. It has also continued to recapitalize IMS facility components reaching the end of their operational lives and to address unscheduled maintenance in a timely fashion. Furthermore, owing to the central role played by station operators in resolving problems on site and hence contributing to high levels of data availability, the PTS has continued to invest in local training courses for station operators that are tailored to their needs. Monitoring software has also been developed to facilitate the tasks of monitoring and detecting incidents in the IMS network. Web based software has been made available to station operators, allowing them to monitor the status of their stations remotely, including the data flow to the IDC.
26. As the IMS network grows, the costs associated with its sustainment also rise. Provisions are in place to address peaks in obsolescence of IMS equipment in the foreseeable future. However, workable solutions need to be identified by the

Commission in the case of repairs at IMS facilities following damage caused by natural forces. In 2010, extrabudgetary funding was successfully secured to accommodate a multimillion dollar reconstruction at two IMS stations in the Juan Fernández Islands (Chile), both of which are now back in operation.

27. Operation and maintenance of IMS auxiliary seismic stations are the responsibility of the host countries. Challenges related to sustainment of these stations have been more systematically addressed jointly with the host countries and other organizations over the last two years. These efforts have resulted in improved levels of data availability and a better understanding of roles and responsibilities for sustaining them. The European Union provides financial support for IMS auxiliary seismic stations that do not belong to parent networks and are hosted by developing countries or countries in transition.
28. Increasing the number of facility agreements and arrangements between the Commission and the States hosting IMS facilities is important for providing the required support for the functioning and sustainment of the IMS. The development of mechanisms such as timely customs clearance and tax exemption for equipment brought into an IMS host State has proven to be highly relevant.
29. The PTS has continued to focus on engineering and development activities, with the aim of improving the robustness of IMS monitoring facilities and enhancing the performance and capabilities of associated technologies. Progress has been made with the quality assurance/quality control (QA/QC) programme. Scheduled calibration of primary and auxiliary seismic stations has been performed on an annual basis since 2012 with the support of all station operators. Similarly, a comprehensive QA/QC programme is regularly performed for all radionuclide stations.
30. The IMS ensures its scientific and technological relevance through a technology development programme. The programme relies on regular interaction with the science and technology community and includes studies and experiments at test facilities and laboratories. Technology specific road maps to assess relevant technical developments are being developed, with the noble gas technology road map being quite advanced.
31. Advances were made in the calibration of sensors in the IMS network. This involved the test deployment of the first self-calibrating infrasound sensor at an infrasound station and the initiation of calibration procedures for T phase hydroacoustic stations.
32. Improvements of PTS computer systems have been implemented to eliminate temporary downtime of service and enhance the efficiency of PTS operations.
33. Since 2013, a new definition of data availability has been employed that accounts for the quality of the raw data. The PTS operations and sustainment strategy and the joint efforts with delegations, national governments, station operators and national institutions have been rewarded. High levels of data availability from IMS stations are being achieved, and initiatives in place should result in enhanced levels in the medium term. Levels of 97.7% and 95.7% for infrasound and primary seismic station networks respectively were reached during 2014. Data availability for the hydroacoustic network and auxiliary stations during 2014 was 88.8% and 85.8% respectively. The radionuclide

network performed at a level of 85.4% (particulate stations) and 80.3% (noble gas systems) in 2014.

34. Post-certification activity contracts, agreements and arrangements support station operators in operating and maintaining primary IMS stations after certification. The PTS has implemented standardized operation and maintenance plans, which have been submitted and accepted for 95 stations thus far. This approach also helps to keep operational costs at a reasonable level, while ensuring sufficient funding to keep the stations well maintained. Keeping the operational costs of IMS stations at a reasonable level is a joint responsibility of the PTS and the host country.

On-Site Inspections

35. On-site inspections (OSIs) represent the ultimate verification measure of the CTBT in order to address possible compliance concerns with the Treaty. An OSI can only be invoked after the entry into force of the Treaty. The sole purpose of OSI is to clarify whether a nuclear weapon test explosion or any other nuclear explosion has been carried out in violation of the Treaty and to gather facts which might assist in identifying any possible violator.
36. The Commission has continued to build up the OSI verification regime in accordance with Treaty requirements. Considerable progress has been made in the last two years with the finalization of the OSI action plan, finalization of the second training cycle for inspectors as well as the preparation and conduct of the Integrated Field Exercise (IFE) in Jordan in November-December 2014.

2014 Integrated Field Exercise

37. The IFE took place from 3 November to 9 December 2014. It represented the largest full scale field exercise carried out by the PTS since its inception. The objectives of the 2014 IFE were to:
- Test crucial aspects of the launch, pre-inspection, inspection and post-inspection phases in an integrated manner;
 - Test progress made towards the further development of procedures (including the draft OSI Operational Manual and OSI subsidiary documentation), techniques (including associated equipment) and the training programme since the IFE in Kazakhstan in 2008;
 - Identify gaps and areas requiring further development and training.
38. Over the course of the 2014 IFE, the inspection team used 15 of the 17 techniques for the terrestrial environment that are permitted under the Treaty. It applied these techniques in an integrated manner in an inspection area of nearly 1000 square kilometres east of the Dead Sea in Jordan. Exercise activities at the Operations Support Centre (OSC) established at the Equipment Storage and Maintenance Facility (ESMF) in Guntramsdorf, Austria, were carried out simultaneously.

39. In all, 364 experts from 53 States Signatories, the PTS and Jordan participated in the exercise. About 150 tonnes of equipment were transported to Jordan by sea and air, including equipment worth over \$10 million provided by 10 States Signatories (Canada, China, the Czech Republic, France, Hungary, Italy, Japan, Sweden, the United Kingdom and the United States of America) and the European Union as voluntary contributions. Logistics and operations support assured the shipment of all equipment, as well as industrial gases and other dangerous goods, to Jordan.
40. The 2014 IFE followed the time lines defined in the Treaty and its Protocol. However, the duration of the launch and inspection phases was compressed by approximately half and specific OSC related activities were carried out ahead of time.
41. Preparation of a scientifically credible and comprehensive scenario for the IFE commenced in March 2012 with the establishment of a task force of external experts from States Signatories. This scenario group undertook major efforts to simulate the application of OSI techniques by the inspection team. Scenario preparations, which included nine meetings and a site visit in June 2014, culminated in a dress rehearsal in Jordan in September 2014. This had the primary objective of sharing the basic scenario information with designated inspected State Party (ISP) representatives to prepare them for their roles during the exercise.
42. The following training activities for the 2014 IFE were carried out:
- Radioactive noble gas equipment training in China in April 2013 for the radionuclide sub-team and PTS technical experts.
 - Airborne techniques skills training in Italy in September 2013 in the operation of airborne equipment.
 - Training in Jordan in December 2013 for experts from the host country.
 - Field testing and training in deep continuation period techniques (CPTs) in Hungary in March 2014 to familiarize the CPT sub-team with the active seismic and electromagnetic equipment.
 - Radionuclide and noble gas training at the ESMF in May 2014 to prepare the radionuclide sub-team.
 - A preparatory training course at the ESMF in June 2014 to prepare the inspection team and members of the ISP for their duties during the IFE.
 - OSC staff training at the ESMF in September 2014.
43. As a result of an in-depth review process, 48 OSI Quality Management System (QMS) documents (standard operating procedures, work instructions and manuals) were approved, while a further 35 documents were authorized for use as drafts during the IFE. In addition, some 200 forms and templates extracted from approved or authorized QMS documents were prepared. More than 500 equipment and software user manuals related to inspection equipment and techniques as well as academic and scientific material were also compiled and organized by OSI topic code for use during the IFE.

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44. An OSI e-library populated with more than 1500 documents was put into operation in June 2014. The e-library was successfully interfaced with the PTS QMS Document Management System, ensuring automatic replication of all approved OSI QMS documents in the OSI e-library. The e-library was also interfaced with the Integrated Information Management System (IIMS) for use in the field. Furthermore, e-book readers including a full set of IFE documentation were prepared for use during the IFE.
45. Exercise players comprised three groups:
- The inspection team, comprising 58 experts from the PTS and States Signatories who were selected from the roster of surrogate inspectors. No more than 40 individuals participated in inspection activities in Jordan at a given time.
 - The ISP team, comprising 44 experts from the PTS, States Signatories and the host country. No more than 34 individuals participated in inspection activities in Jordan at a given time.
 - The OSC staff, comprising 44 PTS staff and 6 trained surrogate inspectors. OSC staff coordinated and supported preparations for the launch of the OSI and provided technical, logistical, administrative, security, operational and legal support and maintained communications with the inspection team in the field. In addition, the OSC staff served as the focal point between the Director-General (played by the Director of the OSI Division), the PTS and the inspection team in the field and reported daily to the Director-General.
46. The control team comprised 22 experts from States Signatories and 1 PTS representative. Its main task was to ensure that the boundaries of the scenario were respected and that the objectives of the exercise were accomplished. The evaluation team comprised 10 external experts from States Signatories and 2 support staff from the PTS. Its key task was to determine the extent to which the objectives of the 2014 IFE were met.
47. Technical experts nominated by States Signatories followed the exercise proceedings as observers in three different formats: a point of entry programme on 7-9 November 2014, a technical observer programme on 18-27 November 2014, and a resident observer programme for the duration of the 2014 IFE.
48. In addition, there was a high level visitor programme, including the official opening ceremony, on 15-16 November 2014. Dignitaries included Prince Feisal Al-Hussein of Jordan, the Minister of Energy and Mineral Resources of Jordan Mr Mohammad Hamed, the Minister of State for Media Affairs and Communications of Jordan Mr Mohammad Al Momani, the United States Under Secretary of State for Arms Control and International Security Ms Rose Gottemoeller, the United Nations High Representative for Disarmament Affairs Ms Angela Kane, three members of the Group of Eminent Persons, ambassadors from the Permanent Missions in Vienna and the Executive Secretary. Representatives of Permanent Missions in Vienna were also able to follow the IFE proceedings through briefings at the OSC on 13 November and 3 December 2014.

49. Notwithstanding the pending detailed assessment, the 2014 IFE clearly showed that major improvements have been made since the IFE in 2008. There has been considerable progress in the development and integrated application of several inspection techniques, the underlying operational and logistical concept as well as the development of OSI procedures. The exercise also confirmed the validity of the 2014 IFE planning and preparatory concept, of which the three build-up exercises (BUEs) were an integral part.

QUALITY ASSURANCE AND PERFORMANCE MONITORING

50. The PTS undertakes to continuously enhance effectiveness and efficiency through its QMS, which encompasses all contributing PTS processes and work products. One of the functions of the QMS is to identify and implement key performance indicators (KPIs) for evaluating these processes and products. The overall aim of the QMS is to support the objective of consistently meeting verification system requirements.
51. The performance monitoring and testing framework was established by the PTS to create a culture in which quality is monitored as part of normal activities so that customers, such as States Signatories and NDCs, have assurance that the Commission is in compliance with the requirements set forth in the Treaty and its Protocol. As part of this process, NDCs, which use the products and services of the IDC, meet in annual workshops to provide their feedback.
52. The 2014 NDC Workshop, which took place from 12 to 16 May in Vienna, Austria, was organized by the PTS, supported through the contribution of the Government of Austria. The objective of the workshop was to provide a forum for NDC experts to share their experience in fulfilling their verification responsibilities and to provide feedback on all aspects of the data, products, services and support provided by the PTS.
53. New landmarks in the exchange of experience and knowledge have been reached through a series of NDC Preparedness Exercises (NPEs) conducted by the NDCs. NPEs represent a further advance along the learning curve for NDCs to perform their verification duties, enhancing the dialogue and cooperation between experts in the various CTBT monitoring technologies and the PTS.
54. Following the successful conclusion of the evaluations of the three OSI BUEs in 2012-2013, preparations for evaluation of the 2014 IFE continued. Applying the principal lessons learned from the process of evaluating the earlier BUEs provided a more comprehensive definition of the operational capability targeted by the evaluation of the 2014 IFE. An OSI was broken down into 18 operational capability targets providing 4500 performance indicators subject to the evaluation. Moreover, it enabled a better means to manage the information gathered about each target to make the actual assessment more efficient whilst also providing for the historical record. In this regard, a bespoke evaluation information management system (EIMS) was developed.
55. The external evaluation team of 10 evaluators undertook the summative evaluation of the 2014 IFE in Vienna and Jordan using the EIMS system. In March 2015, the evaluation team met in Vienna to validate the technical data contained within the EIMS

prior to it being exported to create a technical report. This material was then used as the basis for drafting a high level evaluation report intended to provide a strategic overview of the principal findings. A workshop was held in Vienna from 29 June to 1 July 2015 for the evaluation team to meet with stakeholders to harmonize the reports based on prior written feedback received and their real-time interaction with stakeholders. The high level report will be presented to States Signatories in August 2015. The mass of technical details gathered by the team will be made available to stakeholders at the same time in a background paper.

2015 SCIENCE AND TECHNOLOGY CONFERENCE

56. Mindful of the obligation under Article IV of the Treaty that States Parties cooperate with the CTBTO “in the improvement of the verification regime, and in the examination of the verification potential of additional monitoring technologies”, the CTBT: Science and Technology process was established in 2006 to engage with the global scientific and technological research community. This process continued in June 2015 with the fifth in a series of biennial conferences hosted by the Commission in the Hofburg Palace, Vienna, with support from the Federal Ministry for Europe, Integration and Foreign Affairs of Austria. Attendance was over 800, with 80 oral presentations, over 250 research posters, panel discussions and an opening day with high level invitees providing a political and diplomatic context. The conference provided a forum for the Commission to maintain awareness of emerging technologies relevant to CTBT verification. It also explored methodologies for monitoring the performance of the verification regime and considered topics related to capacity development and the education and training of those who contribute to the installation and maintenance of relevant monitoring facilities and to data processing and analysis.

INTEGRATED CAPACITY BUILDING AND TRAINING

57. The Commission accords high importance to training and capacity building to improve the capacity of States Signatories to effectively fulfil their verification responsibilities under the Treaty and to benefit fully from their participation in the verification regime, in particular through the use of IMS data and IDC products (for verification as well as for their own civil and scientific applications).
58. In addition to traditional training methods, information and communication technologies such as e-learning offer broader possibilities to expand and further enhance capacity building. Training and capacity building are provided to States Signatories that have access to IMS data and IDC products (more than 1600 authorized users from 134 States) as well as to those that do not have access (49 States) and those that do have access but make limited use of the information.
59. The training targets a variety of audiences, namely IMS station operators, technical staff of NDCs, OSI inspectors, officials, diplomats and PTS staff. Currently, 45 e-learning modules, 18 of which are in the official languages of the United Nations, are available. Since 2009, more than 300 NDC technical staff from 80 States Signatories have been

trained. The current training programme includes (nominally per year) 7 NDC and 14 station operator events, for all 4 technologies.

60. The need to invest in the next generation of nuclear non-proliferation and disarmament specialists is a key driver of the education activities of the Commission. These aim to broaden knowledge of the Treaty and to develop capacities in States Signatories to effectively confront the political, legal, technical and scientific challenges facing the Treaty and its verification regime. To achieve this objective, the Commission developed the online CTBT Education Portal, complete with issue specific training modules, a database of CTBT related resources and materials, and an archive of lectures on the Treaty and the science and technology that underpin its verification regime. The Commission also became the first security based international organization to create a free and open educational platform on iTunes U, which allows users to access and download lectures, documents and presentation files on the policy, legal, technical and scientific aspects of the CTBT.
61. The Commission organized the “CTBT Public Policy Course: Verification through Diplomacy and Science” from 1 to 9 September 2014. It was made possible through financial support from the European Union, the Government of Norway and the Swedish Radiation Safety Authority. The course covered policy and legal aspects of the Treaty as well as the verification technologies and their civil and scientific applications. It focused on practical understanding of Treaty related issues with a specific focus on OSI to raise awareness about the 2014 IFE.
62. To broaden the scope of its engagement with the academic community, the Commission held two CTBT Academic Forums on 8-9 May 2014 and on 26 June 2015 (as part of the 2015 CTBT Science and Technology conference). Theses involved academics from a range of universities and research institutes from every continent and included representatives from seven out of the eight remaining Annex 2 States. The main objectives were to further explore innovative methods for integrating Treaty related issues into academic curricula and address research needs and opportunities.

OUTREACH ACTIVITIES

63. The purposes of the PTS outreach activities include: enhancing understanding and implementation of the Treaty among States, media, civil society and the general public; promoting signature and ratification of the Treaty and thereby its universality and entry into force; assisting States Signatories in their national implementation of verification measures and in gaining benefits from the peaceful applications of the verification technologies; and assisting in promoting the participation of States Signatories in the work of the Commission.
64. Most of the interaction with States to raise awareness about the Treaty and promote signature and ratification takes place in the context of bilateral consultations and correspondence. While special emphasis has been placed on those States listed in Annex 2 to the Treaty and those hosting IMS facilities, virtually all States have been approached by the PTS in its outreach efforts since September 2013. In addition to regular dialogue with Permanent Missions in Vienna and those representations based in

Berlin, Geneva and New York, visits by PTS staff were conducted in a number of capitals. Consultations were also held, at all levels, on the margins of global, regional and subregional conferences and other gatherings.

65. A number of events and activities are organized by the PTS which allow for bilateral consultations with participants from both signatory and non-signatory States. In October 2013, for example, the PTS in cooperation with the Government of Angola and the European Union organized a national seminar in Luanda on the CTBT. The seminar was attended by key lawmakers and a wide range of senior government officials involved in Angola's process of ratifying the CTBT, which was subsequently completed in March 2015. The CTBT Regional Conference for the South East Asia, the Pacific and the Far East (SEAPFE) region in Jakarta, Indonesia, on 19 and 20 May 2014 served to further increase intra-regional cooperation on ratifying the Treaty among SEAPFE countries.
66. Participation by the Executive Secretary in major events and high level bilateral talks constitutes a key element of PTS outreach efforts. Such events have included the American Geophysics Union Conference (San Francisco, December 2013); the third session of the Preparatory Committee for the 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) (New York, April-May 2014); the 2014 James Martin Center for Nonproliferation Studies diplomatic workshop (Annecy, March 2014); the conference celebrating Africa Day (Berlin, May 2014); the Arms Control Association conference entitled "Nuclear Weapons Testing: History, Progress, Challenges" (Washington, D.C., September 2014); the Hoover Institution conference entitled "The Power to Act: Advancing Nuclear Security to Prevent the Unthinkable" (Stanford University, September 2014); the World Economic Forum Summit on the Global Agenda (Dubai, November 2014); the 2014 Moscow Nonproliferation Conference: Nuclear Energy, Disarmament and Nonproliferation (Moscow, November 2014); the Prague Agenda conference (Prague, December 2014); the Vienna Conference on the Humanitarian Impact of Nuclear Weapons (Vienna, December 2014); the 2015 James Martin Center for Nonproliferation Studies diplomatic workshop (Annecy, March 2015); the 2015 Review Conference of the Parties to the Treaty on the NPT (New York, April 2015); the World Economic Forum on Africa (Cape Town, June 2015); and the diplomatic workshop entitled "The 2015 NPT Review Conference: Results and Next Steps" (Baden, June 2015).
67. The Executive Secretary participated in meetings of the Group of Eminent Persons, comprising internationally recognized experts on disarmament and non-proliferation, in Stockholm, Sweden (April 2014), and Seoul, Republic of Korea (June 2015). A further meeting is planned in Hiroshima, Japan (August 2015).
68. The Executive Secretary held bilateral discussions with high level officials, including United Nations Secretary-General Ban Ki-moon (September 2014) and a number of foreign ministers, on the margins of the aforementioned events and during other seminars, workshops, briefings and visits. He also attended events related to nuclear non-proliferation and disarmament convened by individual governments. With a view to strengthening bilateral interaction with the Commission and raising awareness about the Treaty, the Executive Secretary has visited 26 States since September 2013.

69. The PTS has continued to promote preparations for national implementation of the CTBT through its programme of legislative assistance to States on the measures to be taken in accordance with Article III of the CTBT. Model legislation and commentary have been widely distributed by the PTS and are available on the CTBTO public web site.
70. A significant portion of the outreach activities of the Commission is carried out using voluntary contributions provided by States Signatories. Among the activities conducted by the PTS on the basis of such contributions was the project facilitating the participation of experts from developing countries in technical meetings of the Commission as well as an information visit in November 2013. Voluntary contributions have also been provided to build capacity in developing countries and to enhance understanding of the work of the Commission, applications of the CTBT verification technologies and the benefits accruing from membership of the Commission, including the potential benefits derived from the civil and scientific applications of the verification technologies.
71. The PTS has continued to promote the Treaty and its verification regime through interaction with States, media, civil society, educational and scientific institutions, think tanks and the general public. Using a proactive and targeted approach, public information activities generated considerable media coverage for key events such as the 2014 IFE and the 2015 Science and Technology Conference. Video reports, interactive features and animations are notable characteristics of outreach activities. The strategic use of social media, as well as the publication of public information material in a range of different languages, have been further intensified to reach new audiences, in particular in the remaining Annex 2 States. This has led to increased visibility for the Treaty and its verification regime in print, online and broadcast media worldwide. Media outreach and other public information activities have continued in the form of articles, interviews, press releases, briefings, publications such as the magazine *CTBTO Spectrum*, exhibitions and presentations.

CIVIL AND SCIENTIFIC BENEFITS OF THE TREATY

72. There is a range of civil and scientific applications for the verification technologies of the Treaty that can benefit States Signatories. The abundance of data and products available to States Signatories can facilitate their civil and scientific activities, including, for example, natural disaster warning and preparedness, sustainable development, knowledge expansion and human welfare. More than 50 contracts have already been signed, thus providing scientists with free access to IMS data through the virtual Data Exploitation Centre.
73. As an example of the civil and scientific applications of the verification technologies, the Commission has agreed on terms under which IMS seismic and hydroacoustic data can be made available to recognized tsunami warning organizations. Fourteen such agreements or arrangements are currently in place for which data from 101 IMS stations are being sent. Tsunami warning organizations have confirmed that the use of IMS data, which are more timely and reliable than from other sources, increases their ability to identify potentially tsunamigenic earthquakes and to issue more rapid warnings.

CONCLUSION

74. Since the 2013 Article XIV conference, considerable progress has been achieved in the promotion of the Treaty and the advancement of its verification regime. The call for early entry into force has continued to feature prominently in the agenda of the international campaign for nuclear non-proliferation and disarmament. The verification regime of the Treaty has moved closer to completion, further improving its operational readiness and thereby increasing the confidence in its capability to detect any nuclear explosion test in any environment.