# Chapter 23
# Introduction


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Session 4 of the XX E. Amaldi Conference was devoted to three invited talks on the role of science in establishing technical partnership and cooperation at the international scale. The invited contributions of the session were (1) Technical Cooperation Programme—Nuclear Technology Contributing to Development, presented by Ana Raffo-Caiado (IAEA), (2) CTBTO Science and Technology for a Safer World, presented by Randy W. Bell (CTBTO) and (3) Science Beyond boundaries: SESAME and the international Cooperation, presented by Chris Llewellyn-Smith. There was also a testimonial by a staff scientist, Gihan Kamel from SESAME. Since papers of the invited speakers are printed in this volume, it suffices for me to draw attention to some of the points in these work which I believe establish the foundations for the role of science in successful international cooperation. Some points that came up in discussions will also be briefly presented.

*Technical Cooperation (TC) Programme—Nuclear Technology Contributing to Development (Ana Raffo-Caiado) (IAEA).* In this presentation the speaker described the TC Programme, which is celebrating its 60th anniversary this year, as the best "hidden" program of International Atomic Energy Agency (IEAE), because it is not brought to the attention of the general public often enough. The TC programme aims to provide support 'to the member states to build, strengthen and maintain capacities in the safe peaceful and secure use of nuclear technologies' (www.iaea.org/technicalcooperation). The areas covered include human health, water resource management, sustainable energy development, environmental challenges, rural development and agriculture. Through its support of national, regional and interregional projects the programme contributes not only to local capacity building within a partner state but also encourages partnership for exchange of ideas, knowhow and expertise beyond the borders of a single country and strengthens scientific networks. The TC programme, although initially designed for providing

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assistance has, over the years, evolved into a platform for collaborations that helps to share responsibilities to serve the mutual benefits of countries involved. TC activities target mainly needs in four geographical regions: Africa, Asia and Pacific, Europe and Latin America.

In the framework of this programme support have been provided through services categorized as 'Training Fellowships', 'Conferences, Symposia and Seminars', Scientific Visits', 'Expert Assistance', and 'Training Courses and Workshops'. Thousands of people have been trained in human resources capacity building activities. In different types of projects funds have been provided also for equipment. Over the years the programme has helped to build competent nuclear regulatory authorities for radiation safety and security implementations. The broad range of services provided have helped to bring governments, private sector and civil society together to improve living conditions, to establish schemes for achieving national goals and for sustaining development.

*CTBTO Science and Technology for a Safer World (Randy W. Bell) (CTBTO).* In this presentation the speaker introduced the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which, with its 183 signatories, serves as an effective arms control instrument, banning all nuclear explosions in any environment. The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), is built around this treaty, and has as its major component the science-based technical Verification System capable of monitoring, detecting, and reporting nuclear explosions. The Verification System is built on two pillars, namely the International Monitoring System (IMS) and the On-Site Inspections (OSIs).

The IMS is a global network of seismic, hydroacoustic, infrasound (atmospheric pressure wave) sensors, and atmospheric radionuclide sensors that can monitor for signs of testing all around the World. IMS, currently has monitoring stations in about 100 countries and will increase this number to over 330 stations in the coming years. The International Data Center (IDC) where all data are collected is based in Vienna. Here data are processed and analysed by the international staff at IDC and are immediately made available to all Member States. With its stations even in the most remote places around the world, the IMS can credibly verify if countries are complying with the ban on nuclear testing. This operation provides a huge service to its members as well as a validation that individual countries could not have done on their own. Proper functioning of IMS is achieved through a rigorous training programme for local capacity building on scientific and technical applications related to the monitoring systems. This provides an added value to the Member States and adds to the pool of supporters who will carry CTBTO to the coming generations. The OSIs aspect of the verification scheme on the other hand can be launched only after the Treaty enters into force. So far it has been progressing through field exercises, which are life-seize tests of on-site inspections. These operations last over several weeks and test different aspects of on-site inspection.

The structure and the nature of cooperation in the Verification System of CTBTO promotes trust and understanding among members of the Treaty. The data collected n the IMS is transmitted to the members without interpretation, expecting

them to use own experts for this purpose. Whenever necessary training in data analysis is provided by the CTBTO. The transparent, open and inclusive features of data sharing provide evidence that the members are complying by the rules of the Treaty and this made the treaty one of the most accepted arms control instrument in the world.

*Science Beyond boundaries: SESAME and the international Cooperation (Chris Llewellyn-Smith) (Oxford University).* In this presentation we were introduced to SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East), an international third generation synchrotron radiation (SR) laboratory which has recently come into operation in Jordan. Members of SESAME are Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority and Turkey: countries that are troubled by political, religious and cultural divides. SESAME is conceptually modelled on CERN, which was established to build bridges among countries after the World War II however, SESAME has to operate while wars are still going on among its members.

SR sources offer facilities for a wide range of fields from medicine to archaeology and even to arts, enabling scientists to work in the same environment round the clock. In this scientific environment, SESAME aims to foster not only high quality research but also cooperation among the visiting scientists. The project has grown also through the support provided in different ways by observer countries consisting of Brazil, Canada, China, EU, France, Germany, Greece, Italy, Japan, Kuwait, Portugal, Russian Federation, Spain, Sweden, Switzerland, the UK, and the USA.

A key element in SESAME's activities is local capacity building in the framework of a rigorous training programme. Through international efforts involving Brazil, Canada, China, France, Germany, Italy, Japan, Portugal, Spain, Sweden, Switzerland, UK and USA, IAEA, ICTP, EU, and UNESCO, scientists and engineers have been trained to build, operate and to use SESAME when it is ready.

Despite the financial difficulties it had to face during the establishment phases the experimental programme of SESAME has already begun on a limited scale with minimal supporting infrastructure. There were over 50 applications to the first call for experiments on the X-ray fluorescence and the infrared beamlines reflecting the scientific interest from the region. A unique feature planned for SESAME is the use of solar power for its operation. When it comes to operation When this is realized it will not only put SESAME on a sustainable basis, but will make it the world's first accelerator powered entirely by renewable energy.

*Testimonial by Gihan Kamel (SESAME, Egypt).* In this presentation the effective role of SESAME in countering brain drain in the region was discussed. Gihan Kamel, a physicist, has returned to the region after spending several years in the early phases of her career in Italy in institutions similar to SESAME. At SESAME she is the beamline scientist for the EMIRA infrared beamline.

This session of the XX E Amaldi conference diverged from others that took place on the same day from the perspective of exploring scientific and technical cooperation as alternative ways of keeping channels of communication open during challenging times such as those that the world is going through currently.

Key elements that emerged from the three presentations as important for successful scientific and technical cooperation are:

- Local capacity building and development of local expertise through cooperation. This is a crucial factor to improve quality of life and also to provide a sustainable basis for development.
- Building trust and credibility in partnerships through openness, transparency and information sharing.
- Development of a neutral/equal footing environment that will be mutually beneficial for the partners and nurture cooperation.
- Support for projects that are driven by scientific curiosity and addressing specific needs in a region.

Some of the points that came up during the discussion period after the talks were:

- Exploration of possible cooperation between Pugwash conferences and SESAME.
- A sobering discussion on the effect of political issues hampering efforts for improving understanding among people through scientific cooperation. Reality of such effects was discussed through real life examples like visa difficulties for some members for attending SESAME Users Meetings, or sanctions on Iran.
- A question prompted discussions on protective mechanisms used by the TC Programme to ensure that projects that do not comply with non-proliferation agreements are not supported or the shared analyses from IDC of CTBTO are not misused. The respective speakers clarified these issues with detailed information on the proposal evaluation process at the TC Programme as well as on data processing at IDC. It was explained that local experts who have access to details to ensure quality guide proposing groups. In the second stage of the evaluation different groups at IAEA come together to evaluate proliferation and safety aspects before the final decision. As far as data analyses at IDC is concerned, it was explained that countries are not given any data interpretation but that they should turn to their own experts to carry out data evaluation.