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# The Role of Groups of Scientific Experts in Facilitating Better International Relations, Particularly in Arms Control.

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## **The Role of Groups of Scientific Experts in Facilitating Better International Relations, Particularly in Arms Control.**

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During some key arms control negotiations discussions between scientific experts have been used as a surrogate for progress in the negotiation until the political process was ready to move forward. At times such groups of experts have been used to provide capabilities that facilitate agreement on difficult technical issues for the monitoring or verification of compliance with the treaty. What follows is a summary of the use of technical discussions to keep momentum while the political process is maturing.

### **The Group of Scientific Experts**

In July of 1976 the Committee of the Conference on Disarmament established “an Ad Hoc Group of Government-appointed experts to consider and report on international co-operative measures to detect and identify seismic events, so as to facilitate the monitoring of a comprehensive test ban”. A couple of years later the Committee of the Conference on Disarmament (CCD) became the Conference on Disarmament (CD). The scientific expert group was tasked to “specify the characteristics of an international monitoring system”. For political reasons the Group’s work was limited to seismic verification. This group was known as the Group of Scientific Experts (GSE).

Over the years, the GSE developed and tested several concepts needed to assist in the verification of a potential comprehensive test ban treaty. The group developed its own plan of work. It took some time before they really got down to detailed work on seismic verification. It has been reported that in the early days the most successful part of their meetings was to agree on a date for the next meeting.

However, they eventually developed some specific recommendations for and experiments to demonstrate the capabilities of a proposed international seismic system. One of the key features was the communications network that supported the transfer of the data from each of the seismic stations to a central location (later called the International Data Center which is part of the International Monitoring System). The GSE developed and tested several concepts for an International Seismic Monitoring System (ISMS) for the purpose of assisting in the verification of a potential comprehensive test ban treaty.

The GSE planned and conducted its third global technical test (GSETT 3) in order to test new and revised concepts for an ISMS. GSETT 3 was an unprecedented global effort to conduct an operationally realistic test of rapid collection, distribution and processing of seismic data. The full scale test phase of GSETT 3 began in January

1995 during the CTBT negotiations. A global network of seismograph stations provided data to an international data center, where the data was processed and results made available to participants. The basic concept of the GSETT-3 experiment was used as the model for the International Monitoring System that was outlined in the CTBT and has been implemented under the provisional CTBT Organization.

Thus, this group, while having no specific role in the negotiation, (however, several of the key people in the GSE supported their government's delegation to the CTBT) developed and then presented ideas and technologies that were valuable when the serious negotiations were finally begun.

Over the years, the GSE developed and tested several concepts for an International Seismic Monitoring System for the purpose of assisting in the verification of a potential comprehensive test ban treaty. During the years between 1976 and 1994 when the CTBT was on and off the agenda for negotiations in the CD, the GSE allowed technical progress on verification to continue. The GSE was disbanded in 1996 upon the completion of the CTBT negotiations in the CD.

### **Arms Control and Regional Security (ACRS) working group of the Middle East Peace Process: If at first you don't succeed, Try Again - RELEMR, et,al**

The US State Department asked DOE if the model of regional engagement through seismology could be applied to the Middle East and in particular, if it could be a possible project in the Arms Control and Regional Security (ACRS) working group of the Middle East Peace Process. A proposal was made and presented by LLNL at the ACRS meeting in 1995, but unfortunately, the Middle East Peace Process was suspended without implementation of the proposal for regional engagement in seismology.

In an effort to maintain the momentum from the ACRS meeting, LLNL joined with the US Geological Survey in supporting the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Reducing Earthquake Losses in the Extended Mediterranean Region (RELEMR) program. RELEMR was primarily focused on hazard mitigation and earthquake engineering, and with the addition of LLNL, expanded its scope to include seismology. The primary activity of RELEMR is regional technical meetings that over the years have included most countries in the Middle East and North Africa including Israel. Funding of the meetings is primarily from the US State Department and UNESCO.

This group began doing seismic workshops about once or twice a year in the Middle East region starting in 1996. One of the most difficult issues the group faced was where to hold the meetings. If a meeting were planned in Israel some of the Arab state representatives would not be able to attend; if it was in Egypt, the Israelis

would not be able to get visas to attend and so on. So many of the meetings have been held in Cyprus, Turkey, Malta, and one or two in Paris. The RELEMR meetings have continued meeting about 2 times a year for 17 years.

This RELEMR group actually conducted a few very useful experiments such as a calibration explosion in the Dead Sea, and the process was able to develop improved technical capabilities in seismic monitoring for a number of the Arab states and succeeded in developing a number of individuals in the region who could advise their governments on seismic monitoring of the CTBT. The program was also successful as the Israeli scientists did develop working relationships with some of the seismologists in the Arab countries.

Parallel to the RELEMR meetings, LLNL initiated a bilateral cooperation with the Jordan Seismological Observatory that involved a deployment of two broadband seismometers in Jordan, exchange visits of seismologists, and joint research projects. LLNL also initiated a bilateral cooperation with King Saud University in Saudi Arabia, which also resulted initially in a few temporary deployments of seismic stations as well as an ongoing technical cooperation in seismological research.

The focus of LLNL's interest in the Middle East changed from the Middle East in general to the Persian/Arabian Gulf region in 2002. Partially as a result of the Masafi earthquakes in the UAE and Oman, LLNL took advantage of the interest in seismology and deployed two temporary broadband seismic stations in the UAE to complement stations already in the region. Also because of the earthquakes and because of concern regarding earthquakes to the economic infrastructure of the region, LLNL and the University of Sharjah initiated a regional seismology meeting and called it the Gulf Seismic Forum (GSF). The first GSF was held in Sharjah, UAE in 2004.

The project has installed modern seismic monitoring stations in Jordan, Kuwait, Oman, and Saudi Arabia with stations planned for UAE, Iraq, and additional stations in Jordan.

In 2010, in response to the continuing worldwide interest in the CTBT, LLNL worked with CTBTO and initiated the first in an anticipated series of training workshops conducted by LLNL and CTBTO on the CTBT responsibilities of signatory nations, and on the operation of National Data Centers.

These groups continue to meet and exchanges seismic data through a regional data center in Turkey. This allows the sharing of data between organizations that otherwise would not be able to share seismic data. The data on the regional data center server is accessible by all participants in this regional effort.

Thus, the program has improved seismic monitoring capabilities through the deployment of seismic networks in some of the countries, and increased the seismic expertise of the Arab scientists in the region.

### **Nuclear Forensics International Technical Working Group (ITWG)**

The Nuclear Forensics International Technical Working Group (ITWG) was formed in 1995 in response to the encouragement by the P-8 countries to investigate technical cooperation on nuclear forensics. The primary goal of the ITWG is to advance the international capability for nuclear forensics to meet the needs of law enforcement, nonproliferation, and public health /safety /environment. A key objective is to develop a preferred approach to nuclear forensic investigations that is widely understood and accepted as credible.

Participants in the ITWG are not formally representative of their respective governments, but they are supported by their national governments or organization to participate in the ITWG, and they are expected to communicate results of meetings to their sponsors. The key individuals that facilitated the formation of the group were Klaus Meyers of Germany, Sid Niemeyer of LLNL and Gordon Dudder of PNNL. This started as a meeting of the willing. State Dept. encouraged and sponsored the US participants (initially some other agencies, at best, tolerated the ITWG).

A distinctive feature of the ITWG is that it provides a forum for people from different professional communities (e.g. scientists, law enforcement, security) to share technical information. Typically the ITWG holds annual meetings (the 17th meeting was just held last month), and Task Forces work between meetings on specific needs. The ITWG encourages informal working relationships among the participants, with a focus on the technical elements of nuclear forensics.

The technical elements of the ITWG's work on nuclear forensics includes: 1) development of protocols; 2) evaluations and recommendations regarding technical equipment; 3) prioritize technical methods for forensic analysis of nuclear and non-nuclear materials associated with illicit materials; 4) development of forensic databanks; 5) execute inter-laboratory exercises; and 6) facilitate technical assistance to countries in response to specific requests. To date, three major round-robin exercises have been completed, and the experience gained in these exercises have been pivotal in developing relationships among scientists and for developing a common understanding of the preferred technical approach to a nuclear forensics investigation. This approach has been codified in a "Model Action Plan". The most comprehensive publicly-available document on the ITWG's Model Action Plan has been published by the IAEA in a 2006 document entitled "Nuclear Forensics Support." (IAEA nuclear security series, ISSN 1816-9317; no. 2).

The value of the ITWG is demonstrated by the steady growth in number of participating countries and number of attendees, e.g. a typical annual meeting now has about eighty to ninety participants from about thirty countries.

The seventeenth annual meeting of the ITWG was recently held in the Hague from June 26-28. Approximately 92 persons participated, representing 34 nations, 3 International Intergovernmental Organizations & 1 NGO. China wanted to send an individual, but he was unable to get a visa in time.

The initial focus on the P-8 and western and eastern European countries has now expanded to include participants from most continents, with particular focus on expansion of Asian countries. The co-chairs continue to review the proceedings from ITWG-17 in an effort to identify areas in which the group's focus should change to reflect the increased international interest in nuclear forensics.

### **US/Russian Work on Securing Nuclear Materials**

With the collapse of the Soviet Union at the end of 1991, there were serious concerns about the scientific expertise of the weapons experts in Russia and other states that emerged from the Soviet Union. The US engaged these states and was able to assess the most needed security issues emerging from this unprecedented reorganization. The identified critical needs were removal and/or destruction of Soviet nuclear weapons capabilities, delivery systems, and warheads outside of Russia; establishing effective inventory control and safeguarding of nuclear materials, and stabilizing the financial situation of the weapon scientists.

The congress allocated funding through the Nunn-Lugar programs to accomplish these critical tasks. The efforts required significant cooperation between the technical specialists of Russia and other former USSR states and the technical specialists of the US and a few of its allies. This program was a fantastic success and some aspects of it still continue.

Given the commitment of the US administration and the Congress, these efforts were well funded, had appropriate oversight, and we successfully conducted without the major security issues.

However, the attitude of the Russian government to this cooperation has diminished, but it still encourages work on some aspects of these programs. However, in areas dealing with scientific cooperation between the US nuclear weapons laboratories and the Russian nuclear institutes there appears to be less enthusiasm for this cooperation today, except in areas where the Russians see important technical capabilities that they are trying to develop (high-powered laser systems and plasma physics capabilities).

Thus, there may be some trade space between what we would like to pursue with Russian participation and what the Russian government would like to pursue with our cooperation.

### **Proposed Cooperative Groups that didn't work**

Because the seismic cooperation in the Middle East was so successful, it was natural to try a similar approach in some other areas of the world. In 2001, LLNL, USGS, and UNESCO initiated a new regional cooperation program in South Asia modeling after RELEMR. The program was called Reducing Earthquake Losses in the South Asia Region (RELSAR), and included all South Asian countries as well as China, Iran, and Thailand. The goal was to engage both India and Pakistan in the working group. A first meeting was held, but there has not, to date, been sufficient interest from the targeted states. There continues to be efforts to initiate this new forum.

Similarly, at one of the times when the US thought that North Korea was trying to get on the right track, a proposal for a seismic working group in North East Asia was suggested. Before much could be done to move forward on the idea, North Korea entered one of its contrary periods and the idea was dropped.

### **Summary**

I believe that instituting a set of technical activities that may in the future assist in the monitoring or verification of nuclear weapons or weapon materials elimination or control could be a way to have some positive activities occurring while the political folks are working to move forward on the political front. The times scales could be significantly different. I could envision work that would enhance CTBT verification, development of methods for test-site transparency, and the monitoring of nuclear materials production and storage being pursued. Some of these activities could be of interest for and value to already existing agreements. But any of them could provide some activity that could encourage others to join in the discussions of the larger agenda.

Specific technical topics that could be on the list that would take significant development are:

- Anti-neutrino measurements to verify the production of Pu in reactors.
- Anti-neutrino measurements as a test-site transparency measure
- Local seismic networks as a test site transparency measure
- Use of satellite systems to monitor for low level seismic activity at former test-sites or suspected test-sites

- Development of advanced systems needed to improve the On-site inspection regime of the CTBT

I'm sure others could add to this list.

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