The establishment of the IMS poses management and engineering challenges unprecedented in arms control verification, with stations scattered around the globe, many in remote and inaccessible locations. Some of the stations already existed when the IMS was envisaged, but most have had to be constructed from scratch or substantially upgraded.

The PTS has made excellent progress towards making the IMS fully functional, estimating that the system will be approximately 83% complete by 2006.[4] By early 2004 site surveys had been completed for 91 percent of the planned stations and laboratories (293 out of 321). In addition 81 monitoring stations (26 primary seismic, 11 auxiliary seismic, 4 hydroacoustic, 17 infrasound and 23 radionuclide)[5] and 4 radionuclide laboratories had been certified as satisfying all technical specifications.[6] Another 80 stations are under construction or are the subject of contract negotiations. Currently some 85 stations are contributing data to the IDC. The first system-wide performance test will take place in April-June 2005.

The IMS will perform better than the conservative estimates of the Group of Experts (GSE) during the CTBT negotiations in the early 1990s. Even in its unfinished state the probability of detecting a one kiloton explosion by seismic means is very high (militarily significant tests are likely to have yields of at least 5-10 kilotons). Overall the IMS may detect explosions as low as 10-25 tons.

The non-seismic verification technologies will increase verifiability further, while OSIs will be used to resolve doubts about highly suspicious events. The global network of scientific seismic stations which are not part of the IMS will add further substantial capability to CTBT verification worldwide (some observers, including those at the Washington-based Incorporated Research Institutes for Seismology (IRIS), maintain that the non-IMS system's capability exceeds that of the IMS).[7]

Added to these verification capabilities are the National Technical Means (NTM) of individual countries, in particular those of the United States, which runs its own network of seismometers, radionuclide detectors and satellite-based sensors for detecting nuclear tests. US laboratories are currently working on a second-generation satellite system to replace the original Vela system (which detected the purported characteristic nuclear 'flash' in the south Atlantic in September 1979 that was alleged to be a South African and/or Israeli nuclear test). Satellite photographs may also reveal nuclear test preparations such as the drilling of shafts, as occurred in the cases of Brazil and South Africa (even though the CTBT does not ban test preparations, in practice convincing evidence of a likely future violation is unlikely to be ignored).

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underwater nuclear tests. Infrasound is most effective in detecting atmospheric tests, but may also discern some underwater and shallow underground events. Seismic and acoustic detection technologies might not, however, in certain cases, provide enough conclusive data to reveal whether a large conventional explosion or a small nuclear test has taken place. Radionuclide stations, by detecting radioactive particles emanating from a nuclear explosion, could then be the most powerful tool in clarifying the nature of an event.

[4] Annex II to the Report of the Twenty-Second Session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization: Report of Working Group B, CTBT/PC-22/1/Annex II, 28 June 2004, p. 6.

[5] Information from the PTS, Vienna.

[6] At Seibersdorf, Austria, Helsinki, Finland, Bruyeres-le-Chatel, France, and Christchurch, New Zealand.

[7] 'Global Seismographic Network (GSN)', Incorporated Research Institutions for Seismology, www.iris. edu/about/GSN/.