Development of Technology and Human Capacity Building in the Fields of Nuclear Nonproliferation and Nuclear Security to Support the Peaceful Use of Nuclear Energy

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) conducted several technological and human resources development activities related to nuclear nonproliferation and nuclear security in cooperation with affiliated domestic and overseas institutions toward building a world without nuclear weapons or nuclear terrorism (Fig.1).

Technology Development for Japanese and International Applications

Numerous technologies are being developed to strengthen nuclear nonproliferation and security considering the domestic and international trends. A current project on nuclear material detection and measurement includes developing a nondestructive assay technology to measure nuclear material retaining high radiation levels, and conducting wide-area monitoring to strengthen nuclear security at large-scale events, like sports games (Topic 7-1). Nuclear forensics technology that is used to identify the origin and processing history of nuclear materials used in criminal acts has been improved. The development of artificial-intelligence-based small, low-cost detectors for first responders in the event of an act of nuclear terrorism and forensic nuclear signature analyzers is ongoing. These developments will help improve nuclear forensic capabilities through international joint sample analysis exercises. Furthermore, methodologies to evaluate and reduce the attractiveness of nuclear or radioactive material for nuclear terrorism are being developed in collaboration with the United States of America.

Policy Research Based on Technical Expertise

Based on the requests from related ministries, the ISCN researched and investigated the technical process of denuclearization from the viewpoints of effectiveness and efficiency, with reference to the case research and factor analysis for achieving denuclearization in the past, i.e., until March 2021. The technical process includes disposing nuclear materials that are usable in nuclear weapons, rendering inoperable or dismantling facilities producing such materials, and verifying entire denuclearization process. The ISCN also continuously updates the "Nuclear Non-proliferation Pocketbook" and "Report on Nuclear Non-proliferation Trends."

Capacity-building Support Activities

The ISCN has conducted capacity building support activities targeting Asian countries since 2011. As of March 2022, over 5,800 participants, mainly from Asian countries (including Japan), have joined the ISCN training activities on nuclear nonproliferation (safeguards) and nuclear security. In fiscal year 2022, when the travel restrictions were lifted, the ISCN resumed in-person regional training activities. It successfully optimized the training effectiveness by exploring the best mix of in-person and virtual methodologies developed over the past two years. These capacity-building support activities have contributed to human-resource development in Asia and have received high praise internationally and domestically.

Contributions to the International Verification Regime for CTBT

To establish a global verification regime for nuclear testing, the Japan Atomic Energy Agency (JAEA) has been operating provisionally the international monitoring system facilities of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and the national data center. Furthermore, following the voluntary contribution of the Government of Japan to the CTBT Organization (CTBTO) in February 2017, a joint radioactive noble-gas measurement project was conducted by the JAEA and CTBTO in Horonobe in Hokkaido and Mutsu in Aomori since 2018 for strengthening the capability of the CTBTO to detect nuclear tests. This project continues observations to elucidate the behavior of the radioactive xenon background, mainly in the East Asian region, and is making significant contributions to realizing national policies. The duration of this project has been extended until March 2024.

Efforts to Promote Public Understanding on Nuclear Nonproliferation and Nuclear Security

The ISCN promotes public understanding of nuclear nonproliferation and nuclear security through the ISCN newsletter containing articles on international trends and their analyses of nuclear nonproliferation and nuclear security and ISCN activities, and by organizing the International Forum on Peaceful Use of Nuclear Energy, Nuclear Non-Proliferation and Nuclear Security.

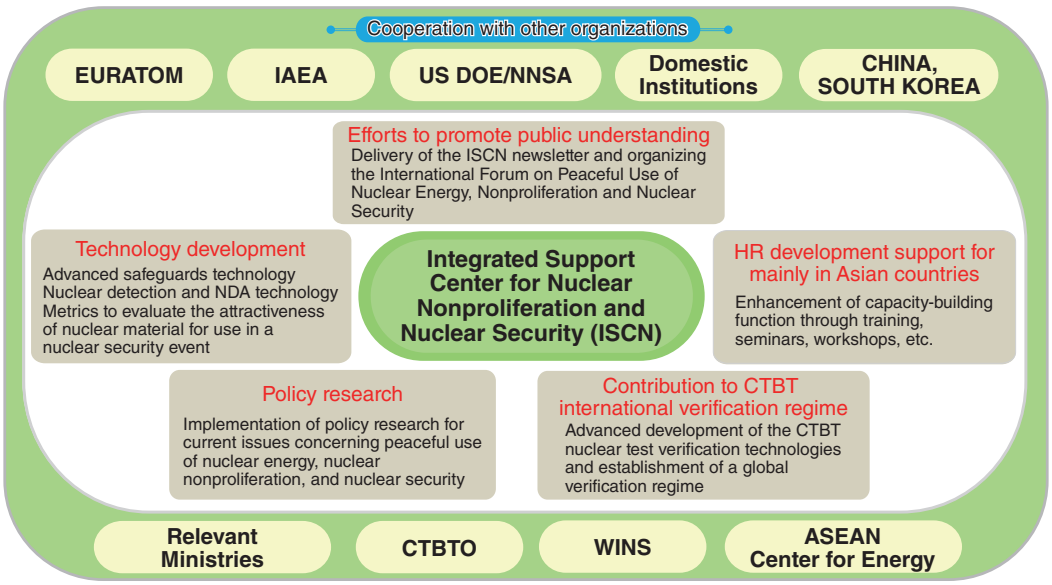

Fig.1 Summary of the activities and affiliated institutions of the Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN)
The ISCN has played an active role in strengthening nuclear nonproliferation and nuclear security through cooperation with its affiliated domestic and international institutions.