Contribution ID: **208** Type: **Poster**

Mapping National Legal Frameworks for Radiological Security

The hundreds of thousands of radioactive sources in use worldwide (in perhaps every UN Member State) pose a significant risk for misuse if not well-secured. Evidence from recent decades shows that some terrorists seek to cause mass casualties and mass disruption, and they have shown an interest in acquiring nuclear and radiological devices to such ends. Use of a radiological weapon by terrorists or other criminals would have an immense impact. A 2018 study by Sandia National Laboratories estimated the detonation of a Radiological Dispersal Device (RDD) using an IAEA Category 3 source in New York city would have a $24 billion impact and, although it would prompt no immediate fatalities, the evacuation would cause about 800 deaths (based on evidence from the Fukushima evacuation) [1]. As important, such an event would likely prompt international action –and likely over-reaction –to constrain trade in radioactive sources, a trade in which virtually every country participates and on which many lives depend.

In a paper presented at the 2018 International Conference on the Security of Radioactive Material, the Stimson Center identified a total of 248 national laws, regulations or their equivalents in 104 UN Member States that contained an obligation to secure or physically protect radioactive sources, apparatus or facilities [2]. Assessing those measures against 11 key elements in the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, the paper revealed significant gaps existed in most national legal frameworks. In 2019, again with funding from the Government of Finland, the Stimson Center updated that database and built an additional database assessing related trade measures against the Guidance on the Import and Export of Radioactive Sources.

To provide new insights into implementation of the Code and Guidance, in this analysis the author prepared three composite indices of the national legal framework for securing radioactive sources, apparatus and facilities. The first composite index creates a score for each UN Member State based on the domestic-focused laws, regulations and similar measures in place, as updated in 2019, compared against 11 key elements of the Code. The second composite index creates a score for each UN Member State based on the national trade-focused laws, regulations and similar measures for radiological security compared against 15 key elements of the Guidance. The final composite index links those two scores for an overall radiological security legal framework score for each UN Member State. The author then uses choropleth maps (i.e., maps showing geographic areas, in this instance States, using a color gradient for a variable) to provide new insights into the index data, from geographic clusters to unexpected outliers. As much about implementation of the Code and the Guidance remain uncertain, the author sees this work as exploratory. The author hopes the analysis will help generate new hypotheses that will help the international community in its efforts to increase radiological (and nuclear) security.

[1] United States Government Accountability Office, "Combating Nuclear Terrorism:
NRC Needs to Take Additional Actions to Ensure the Security of High-Risk Radioactive Material,"Report to Congressional Committees, GAO-19-468 (Washington, DC: April 2019).
[2] Richard T. Cupitt, "Improving Global Radiological Source Security: National Legal Frameworks, Penalty Provisions, and Preventive Enforcement,"paper presented at the IAEA International Conference on the Security of Radioactive Material, December 2018, Vienna, Austria.

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Track Classification: CC: Implementation of national legislative and regulatory frameworks, and international instruments