International Forum on Peaceful Use of Nuclear Energy, Nuclear Non-Proliferation and Nuclear Security 2025

Panel Discussion: Topic 3 (HRD)

Yoshiki KIMURA

Laboratory for Zero-Carbnon Energy, Institute of Integrated Research

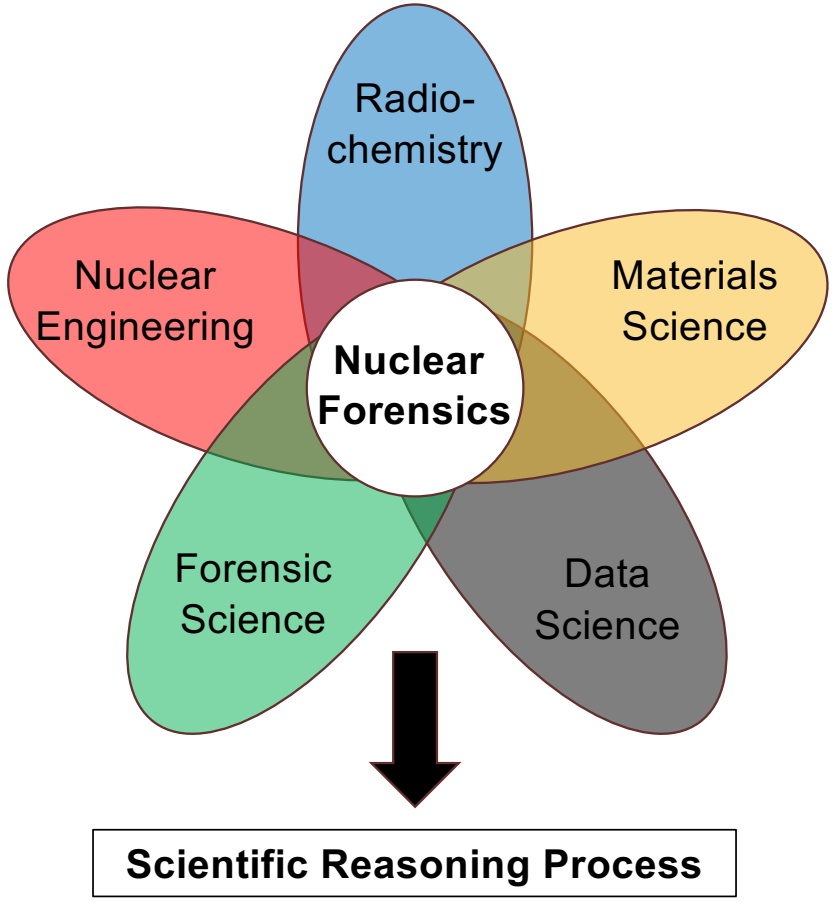
Institute of SCIENCE TOKYO

December 11 (Thu.), 2025

Characteristics of Nuclear Forensics from Academic Viewpoint

Institute of SCIENCE TOKYO

- **Multidisciplinary**
  - ✓ Radiochemistry, Materials Science, Nuclear Engineering, Data Science, Forensic Science...
- **For Next-Generation Researchers: Social Mission + Scientific Exploration**
  - ✓ Nuclear Security, Criminal Investigation
  - ✓ Identifying histories and criminal acts through material analysis and observation
- **Systematic Formation of Scientific Inference Processes**
  - ✓ Analysis/Observation → Hypothesis → Verification → Reasoning
  - ✓ **Can become a core training domain supporting the scientific literacy development.**

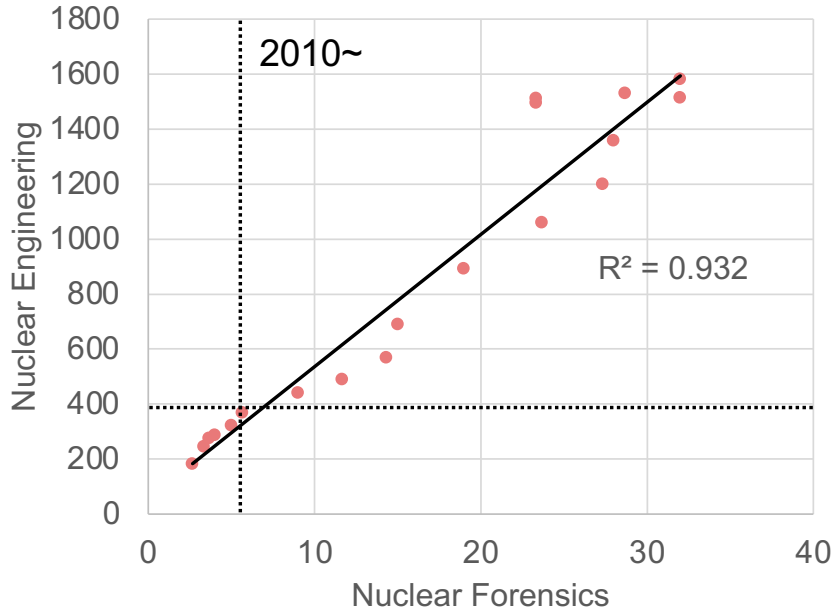


Building a HRD Framework in the US

Institute of SCIENCE TOKYO

National Nuclear Forensics Expertise Development Program* (2008-)

- **Seamless pipeline: undergraduate → postgraduate → national institutes**
  - ✓ Co-evolutionary linkage between nuclear forensics and core technology fields
  - ✓ **Reactivation of the nuclear engineering community**, which had declined in the US since 1970s
- **Investment in nuclear forensics research contributes to strengthening core research capabilities**
  - ✓ **Simultaneous enhancement of security and core technologies**, rather than training specialists in a single field*



US papers published on nuclear forensics and nuclear engineering in *ScienceDirect* (2005–2025 / Moving average)

* https://conferences.iaea.org/event/16/contributions/7143/attachments/3105/3723/FINAL_Connelly-Daitch_IAEA_NF_Conf_Paper_Exp_Devel.pdf

Strengthening Resilience through HRD

- **Current situation: Japan already has advanced nuclear forensics research infrastructure** (JAEA-ISCN, NRIPS)
- **Challenge: Lack of sustained research resources within academia and formalized HRD functions**
  - ✓ Academia-research institution collaboration pipeline: **Academic participation can contribute to ”Security expert training + Broadening the capabilities in nuclear engineering"**
- **Nuclear forensic expert = Fundamental expert supporting national resilience**
  - ✓ Scientific reasoning capability based on material analysis: **Applicable across multiple fields including decommissioning/waste management, innovative reactor development, security and safeguards**