Contribution ID: **224** Type: **Roundtable Member**

The Conceptual Introduction of Internet of Things (IoT) and Blockchain Technology in Nuclear Material Accounting and Control at Facilities

Wednesday, 7 November 2018 09:30 (5 minutes)

The purpose of this study is to propose ideal applications of novel technology in nuclear safeguards, suggest possible scenarios of the application at the nuclear facilities and evaluate advantages and challenges when using the new concepts.
Numerous nuclear material accounting reports are submitted to IAEA, supplemented by accounting records, supporting documents and source data prepared by the facilities. Due to the vastness of data, the Agency and state authority need a significant amount of resources to ensure the consistency and integrity within the data. In addition, accidental or intentional human factors can be involved in preparing the reports.
The introduction of share-ledger (blockchain) technology combined with the Internet of Things (IoT) technology can provide possible solutions.
The IoT application in producing data reduces the engagement of human factors and increases reliability and accuracy of the information. National accounting reports (ICR, MBR, PIL) mainly require the elemental weights of nuclear material and their measurement can be automatized using chemical sample analysis, weight measurement with scale, non-destructive assay (NDA) and barcode system in case using shipper values.
Originally, the reliability of data can be ensured through the blockchain technique. Moreover, self-data checking function developed by the smart contract application greatly reduces the efforts of state authority and the Agency to accomplish consistency and integrity. The database becomes more reliable only when combined with IoT since input data should gain confidence.
Based on these concepts, two possible scenarios are developed for an imaginary nuclear power plant and a fuel manufacturing plant. The efficiency and cyber security aspects of these novel technologies are thoroughly evaluated. The result shows that the application not only enhances efficiency of streaming preparation of reports but also improves quality of the data. However, considerable efforts are needed to prevent the cyber-attack against the blockchain database.

Which ”Key Question” does your Abstract address?

TEC4.1

Which alternative ”Key Question” does your Abstract address? (if any)

TEC4.3

Topics

TEC4

Primary author: JEON, Jihye (Sejong University)

Co-authors: Prof. KIM, Geehyun (Sejong University); Mr PARK, Jinwoo (Pohang University of Science and Technology); Mr AHN, Seung Ho (Korea Institute of Nuclear Nonproliferation and Control)

Presenter: JEON, Jihye (Sejong University)

Session Classification: [TEC] Blockchain and Safeguards

Track Classification: Leveraging technological advancements for safeguards applications (TEC)