Sandia National Laboratories

OPEN SOURCE GEOGRAPHIC INFORMATION FOR SAFEGUARDS ANALYSIS

Exceptional Service in the National Interest

PROJECT OVERVIEW

With the increase of peaceful nuclear activity worldwide, the threat of illicit diversions of nuclear materials to non-peaceful, unregulated activities also increases. DOE/NNSA have identified the safeguarding of nuclear materials as a top priority for which the United States must provide leadership in developing technological solutions to address emerging verification challenges.

Recent advances in collaborative web technologies have resulted in an immense increase in geographically referenced open-source data. These data are becoming increasingly vital to nuclear safeguards and the detection of undeclared activities. This project seeks to enhance capabilities of safeguards analysts by enabling them to more efficiently and effectively utilize geographical referenced information from open sources by seamlessly integrating tools into their existing workflow.

We will work closely with safeguards analysts to understand specific needs and requirements and address these by integrating diverse sets of information technologies to ensure these geospatial data can be extracted, stored, organized, and shared in order to meet future safeguards challenges.

INFORMATION DRIVEN SAFEGUARDS

To adapt to the rapidly growing number of nuclear activities globally, verification practices are evolving to address an increasingly complex nuclear society. In response to this changing paradigm, NNSA commenced the Next Generation Safeguards Initiative in 2008 to revitalize the United States' role in international safeguards. This initiative is targeted in part at developing information technologies. Both NNSA and IAEA have identified information as the key driver of future verification practices. These Information Driven Safeguards seek to incorporate all available information for the timely detection of diverted nuclear materials and undeclared activities. This will require that we invest in information technology to collect, integrate, analyze and archive vast amounts of complex, heterogeneous safeguards related information.

> *These tools will be seamlessly integrated into the analysts' existing workflow to enable more efficient, effective use of geospatial information.*

OPEN SOURCE GEOGRAPHIC INFORMATION

Geographically referenced data is being generated and published to open sources at a profound rate, yet these data are often an overlooked, underutilized intelligence element. There currently exist no systematic methods for extracting these data and, because of the complexity of geospatial data, tools available for utilizing these data require training and expertise and therefore have a high adoption threshold.

Because of the inherently geographic properties of the nuclear fuel cycle, geospatial data are essential for effective verification and particularly important in searching for undeclared nuclear material and activities because of the geographic signals these activities produce. Moreover, geospatial information provide rich context to safeguards analysis which is essential for state level assessment. While other states are actively and aggressively pursuing the use of geospatial technology for safeguards the US appears to be lagging in this field. Enhancing the ability of analysts to efficiently utilize open sources geospatial data will be vital in staying competitive in nuclear safeguards.

INTEGRATED TECHNICAL APPROACH

To develop a tool that will be widely adopted by safeguards analysts we will work closely with analysts to understand their needs and requirements. We will also work with human factors experts to ensure a refined user interface. By integrating this capability into analysts' existing workflows and using industry standards for interoperability we hope to minimize the impact on existing operations and thus maximize the likelihood of adoption. We will consult with subject matter experts from across the laboratories to address the problems of working with large, complex and heterogeneous data. Our work will incorporate both commercially available and laboratory developed technologies for information retrieval, extraction, management and sharing to place the utility of open source geographically referenced information firmly within the safeguards analysts grip.

SIGNIFICANCE OF RESULTS

In direct support of Objective 4.3 of DOE/NNSA's Next Generation Safeguards Initiative, this work will allow Sandia to engage the International Safeguards information management community by providing information analysis solutions to improve State Level Assessments. Among the other beneficiaries, this project will support the IAEA in its emerging Information Driven Safeguards approach. Additionally, this work has the potential to impact a broad range of information driven analysis applications.

RELATED WORK

This project will leverage a variety of projects and technologies developed by Sandia and other National Laboratories, including:

- Network Grand Challenge, LDRD
- High-interest event detection in large, multi-modal data sets, Sandia LDRD
- Citrus text analysis, Sandia
- OpenCarto, National Renewable Energy Laboratory

Geographically referenced information is ubiquitous in Web 2.0 culture and can add vital context to safeguards analysis.

GOALS AND OBJECTIVES

This project will…

… enable safeguards analysts to efficiently utilize geographically referenced data with a minimal impact on their existing workflow.

… ensure industry standard interoperability with commercial software and data formats.

… provide a clearer understanding of how tools can be more effectively incorporated into the analysis methodology by providing insight into why new analytical tools are adopted.

… help maintain Sandia's and the United States' position at the forefront of safeguards technology.

Are you a safeguards analyst? Take our pilot survey!

http://bit.ly/caxkdK

This Quick Read code encodes the URL of the survey website

For more information, contact:

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