Implementation of Task Variance Model in Security Assessment Models

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SBIR Project Synopsis

- FOA-0002360 DOE-2021 Phase2 Release 2; Topic 39R Advanced and Small Reactors Physical Security Cost Reduction
- The Light Water Reactor Sustainability program developed a new method to modernize how access delay timelines are computed
  - Uses Bayesian methods to combine SME and small performance test datasets
- Proposed integrating this method into our COTS force-on-force modeling and simulation tool (Simajin/Vanguard)
  - Phase 1 research efforts were positive and as a result shifted attention to advanced reactors where there is potential for greater impact due uncertainty

Develop Full-Featured Uncertainty Plugin

- Completing Development of a Full-Featured and Production Quality Plugin for Simulation Management Tool
  - Allows incorporation of Risk Informed Timeline (RIT)-generated distributions
  - Flexibility a key factor to manage uncertainty data for various applications
    - Accuracy related to throwing breaching charges
    - Time delay for traversal of breach holes
    - Task time for operator actions to change reactor conditions
  - Most elements of uncertainty will be site or reactor design specific
  - Plugin architecture allows randomization for global parameter as well as parametric values within scenario components
  - Analysts can utilize plugin in domain-specific terms or concepts

Preparations for Case Study

- Recently Completed an Analysis for NuScale to Support a License Application
  - Selected as case study to apply uncertainty analysis to understand the impact to security related costs based upon conservative assumptions
  - Base analysis included many assumptions using expected requirements for an NRC force-on-force exercise
  - Sensitivity studies were executed to explore some elements of uncertainty with respect to limited performance data
- Case Study Parameters Defined and Performance Data Analysis Initiated
  - Work with subject matter experts or source data to develop distributions

Next Steps

- Conduct Initial Case Study
  - Finalize elements of uncertainty to include
  - Execute simulations and analyze outcomes in contrast with baseline
  - Review results with NuScale
  - Document results and prepare to present findings
- Identify Additional Opportunity for Another Case Study
  - Alternative reactor designs may yield additional areas of uncertainty to explore
- Engagement with Industry Groups (e.g., NEI)
  - Garner support for repository related to common uncertainty data