

# RA.1: Adaptive Layered Surveillance Systems

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## SENTRY Challenge

Protecting soft targets and crowded places (STCPs) requires:

- Developing agile surveillance systems capable of detecting contextual anomalies
- Dynamic managing protocols to focus suitable sensors on areas of emerging threats
- Developing real-time models of threat evolution and likely human response
- Use of these models to develop mitigation strategies and predict their likely outcome.

**This project will develop a framework to accomplish these goals while respecting the time and computational budgets required by field deployments.**

## Accomplishments

Performance Metrics include

- Effectiveness in early detection of events and false alarms or mis-detection rates as a function sensor capabilities and locations
- Success rate in learning models of threats as a function of the time required for training and computational budget; and
- Effectiveness in predicting human reactions as a function of the perceived level of risk and amount of data collected.

**Initial deliverable:** a proof of concept support system developed using simulated and IRB/DHS approved datasets.

## Addressing the Challenge

### • Technical Gaps

- Need to account for intelligent threat agents** that can learn and exploit vulnerabilities.
- Need for pro-active multi-modal sensor networks that can concentrate on critical information** (e.g., behavior of a specific person or features of a specific object left behind).
- Need for tools that accurately model people's reactions and crowd response** to enable real-time mitigation of a threat.

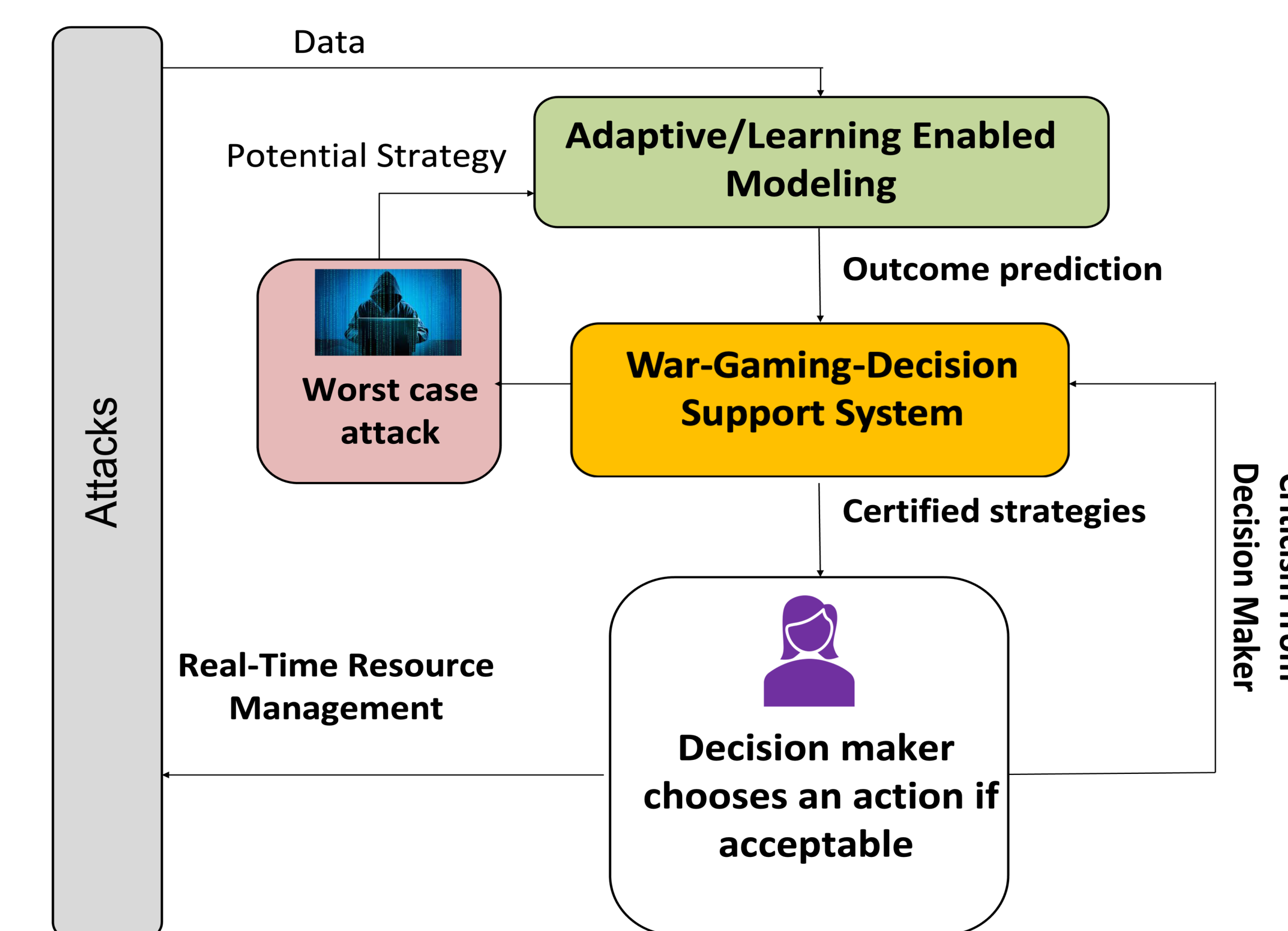
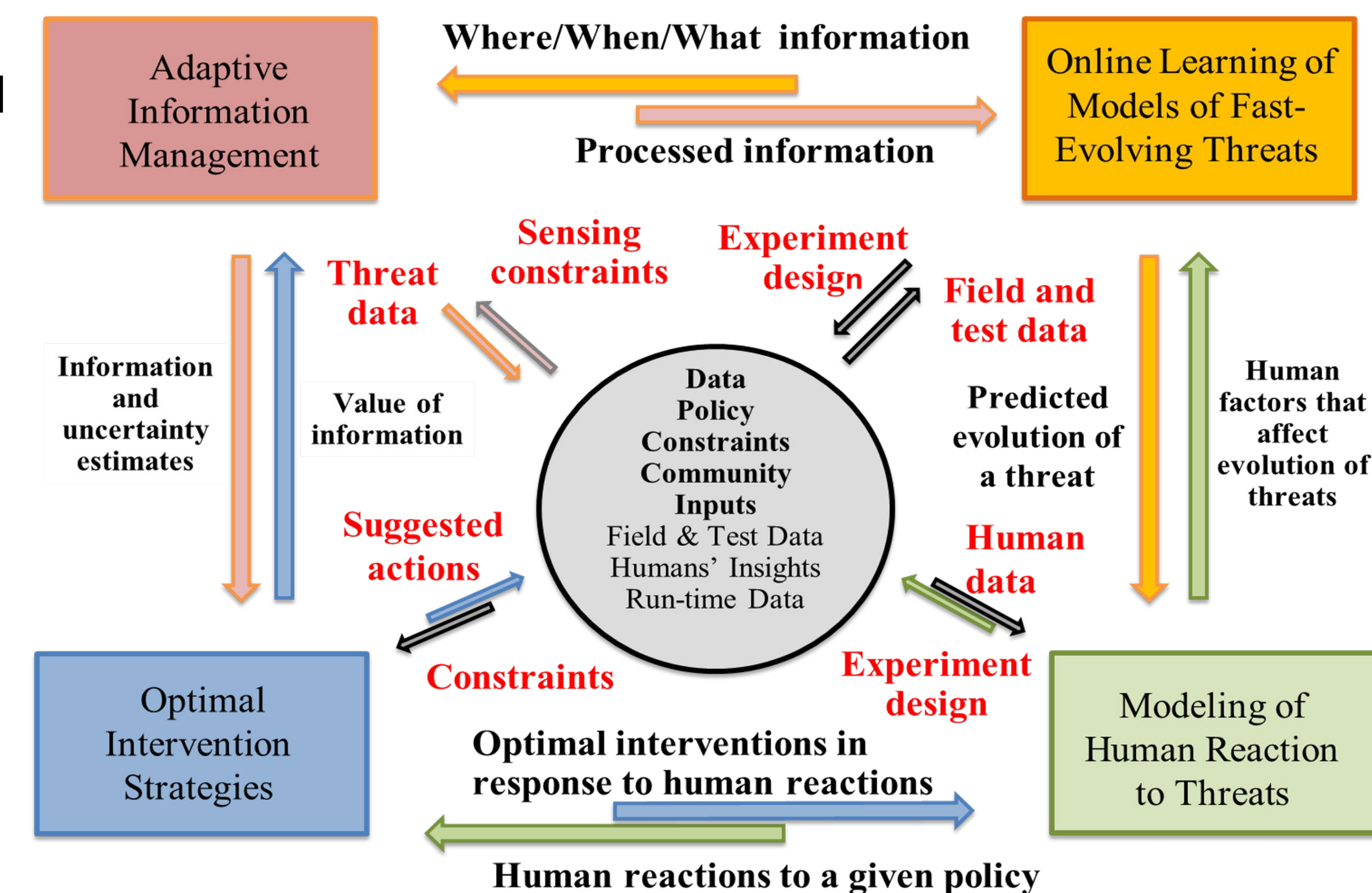
### • Technical Approach is organized around four sub-thrusts:

- Information management to counteract intelligent adversaries
- Real time learning of predictive models of fast evolving threats
- Modeling human reactions to these threats, and
- Developing optimal intervention strategies

• **Initial data collection** will use high fidelity VR environments.

• **Advances to the State of the Art** by creating a new class of real-time decision support systems, based on combinations of physical and data-driven models. These decision support systems will adapt to novel scenarios, where data is collected – and decisions are made – in real time.

• **Virtual Sentry Framework:** This project will collaborate with RA.2 and RA.3 to design experiments with human actors at facilities such as the GC campus test-bed.



## Next Steps

- **Transition Strategy:** For initial testing and prototyping, SENTRY testbeds at NU will be leveraged to demonstrate our layered surveillance management's response to human, UAV and vehicle threats
- **Stakeholders:** **DHS Office of Intelligence Analysis (OIA)**, addressing its HSE goal of integrating analytic and collection requirements; **CISA's Infrastructure Security Division**, **TSA Security Operations**, **FEMA's Response and Recovery Division**, local agencies tasked with monitoring and securing soft targets, transportation hubs, vendors in the security monitoring and response.