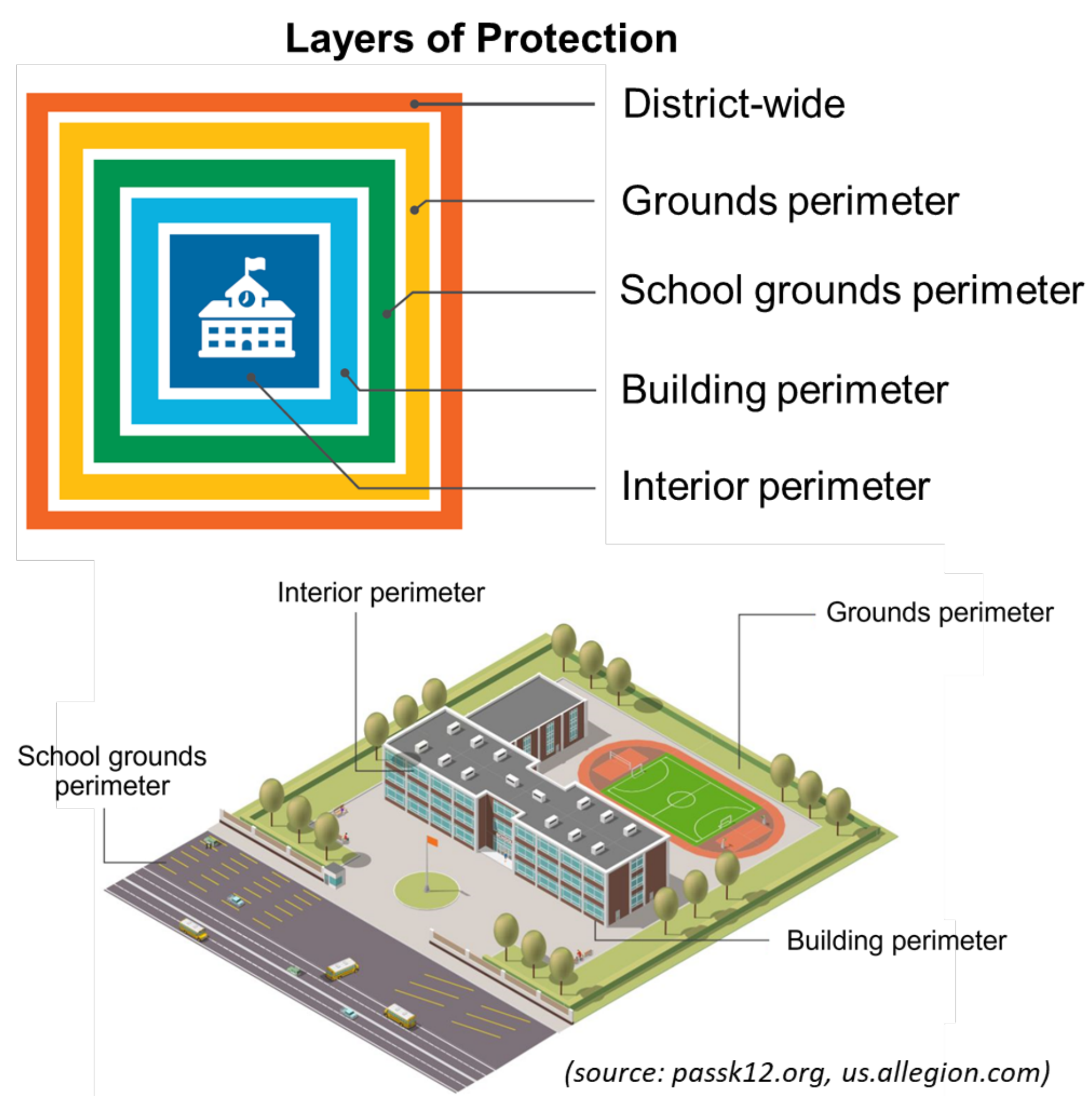


RC.2: Protecting Soft Targets (ProSoT): A Game-theoretic Framework for Multi-target, Multi-layer Defense against Strategic Attackers

Jun Zhuang (University at Buffalo) and Richard John (University of Southern California)
jzhuang@buffalo.edu and richardj@usc.edu

SENTRY Challenge

Given the limited resources available to protect soft targets and crowded places (STCPs), an optimal allocation of resources across different layers of security is critical to reduce terrorism and crime risks at schools, houses of worship, retail shopping, sporting events, ground transportation, etc.



Addressing the Challenge

1. Digital Twins

- Using game-theoretic models to visualize vulnerable hotspots so stakeholders can adjust their systems to minimize risk
- Real time updates on how safe a population is during a mass casualty event so that agents can safely move these populations to a safer location

2. Optimal Location of Sensors/Cameras in Venues

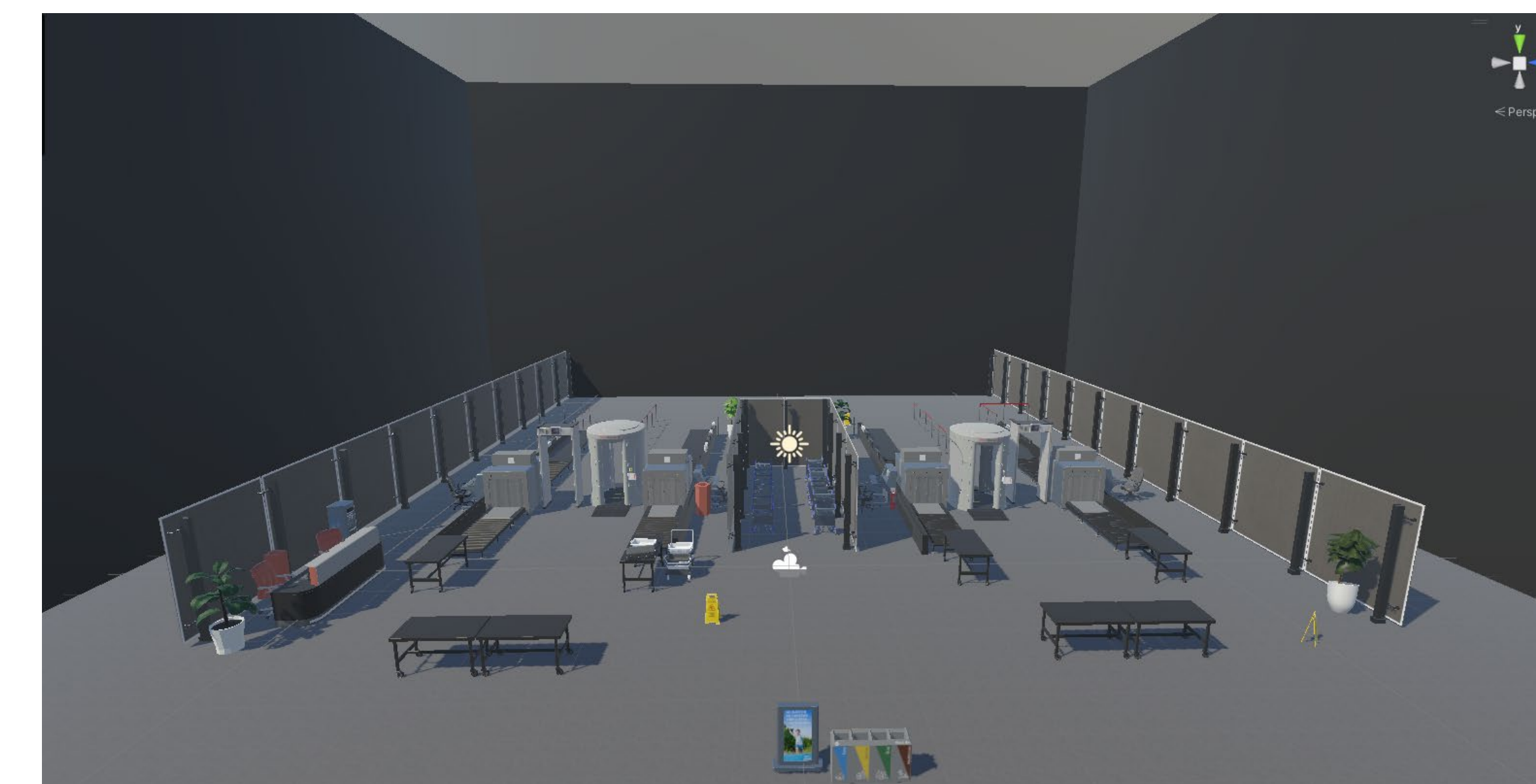
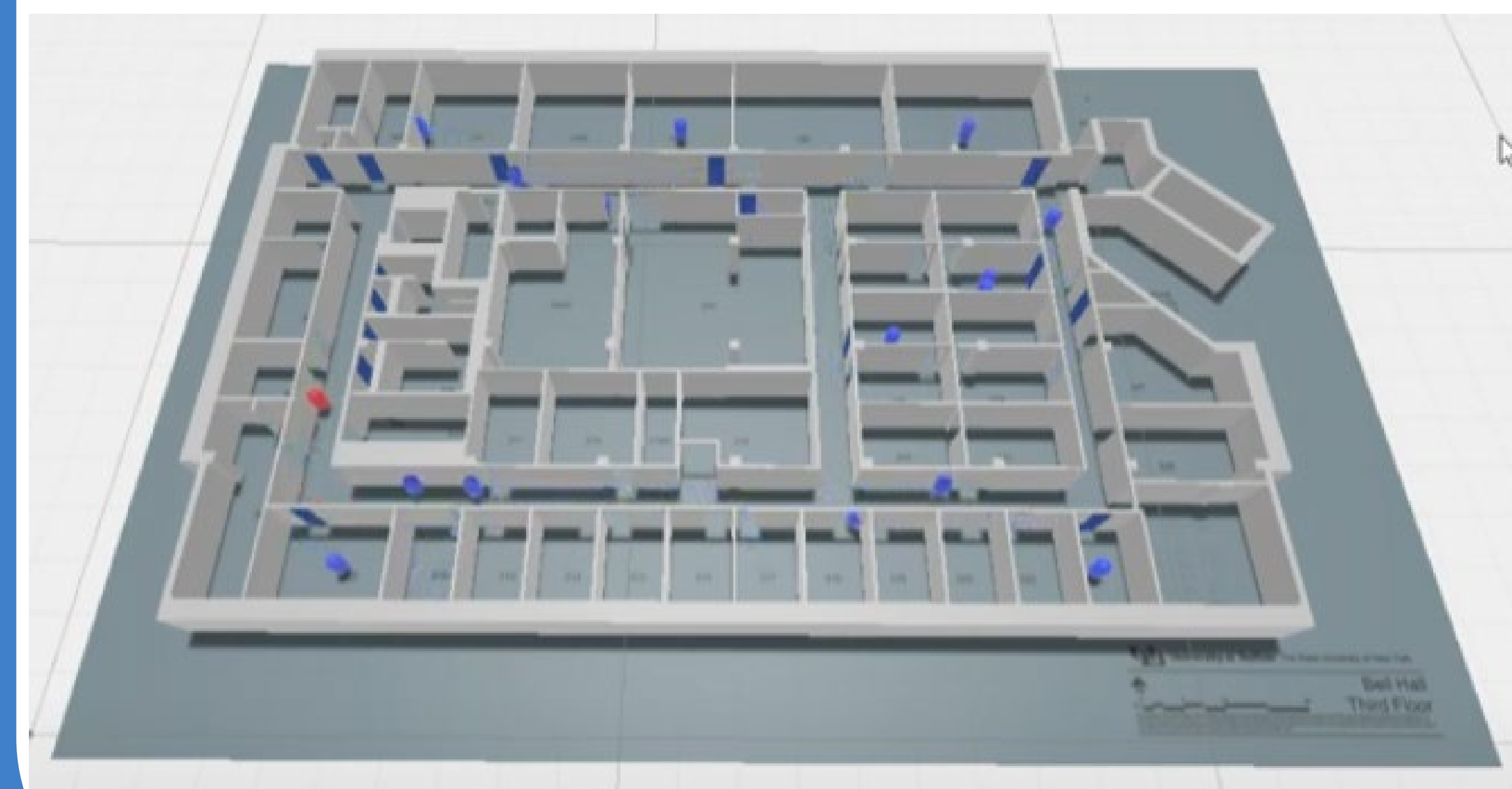
- Using game-theoretic models to optimize the procurement and placement of security devices like cameras and sensors
- 3-D visualization of optimized coverage areas to help stakeholders visualize tradeoffs in security systems

3. Early Warning via Social Media Monitoring

- A machine learning and social media framework to help alert authorities to mass casualty events as soon as they are detected

4. Human Experiments

- Participants will play role of adversary; study human decision-making in this context
- Data will be used to validate/update game models – align game prescriptions with human decision:



Accomplishments

Performance Metrics:

- Equilibrium solutions for game models; solutions will be validated with data from human experiments
- ML algorithms will be evaluated using accuracy, precision, recall, and other metrics
- Publications, outreach, transition

Project Milestones:

- Year 1: Stakeholders identified, game models, pilot experiments and protocols
- Years 2 & 3: Experiments, validation, ML, software tools, transition

Next Steps

Supporting the Virtual SENTRY Framework: This project will provide the Virtual SENTRY with a principled, adaptive approach to incorporating game-theoretic methods into the decision support system.

Transition Strategy:

- We will create open-source software tools that allow for the (i) running of the game models, (ii) running of the ML models, and (iii) visualization of optimal resource allocation plans.
- The user interface will be transitioned as a component of the larger virtual SENTRY project to stakeholders, allowing end-users to implement the models

Potential Partnerships and Stakeholders:

- Collaborating with other SENTRY projects (e.g., RA.1, RC.1, RD.1, RD.2, RD3)
- Support DHS components in their operational risk management, decision-making, and planning: CISA (e.g., Infrastructure Security Division); TSA (e.g., Operations Support and Security Operations groups); CBP (e.g., Office of Field Operations and Operations Support/Intelligence groups).
- Other federal/state/local/private stakeholders (schools, houses of worship, retail shopping, sporting events, ground transportation, etc.)