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Modeling and Spatial-Temporal Analysis of Cyber-Physical Impacts

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Changing the World's Energy Future

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Modeling and Spatial-Temporal Analysis of Cyber-Physical Impacts

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National Challenge: Enable resilience and emergency planners to perform reliable, measurable, and data-driven analyses of the local and regional effects of a cyber attack

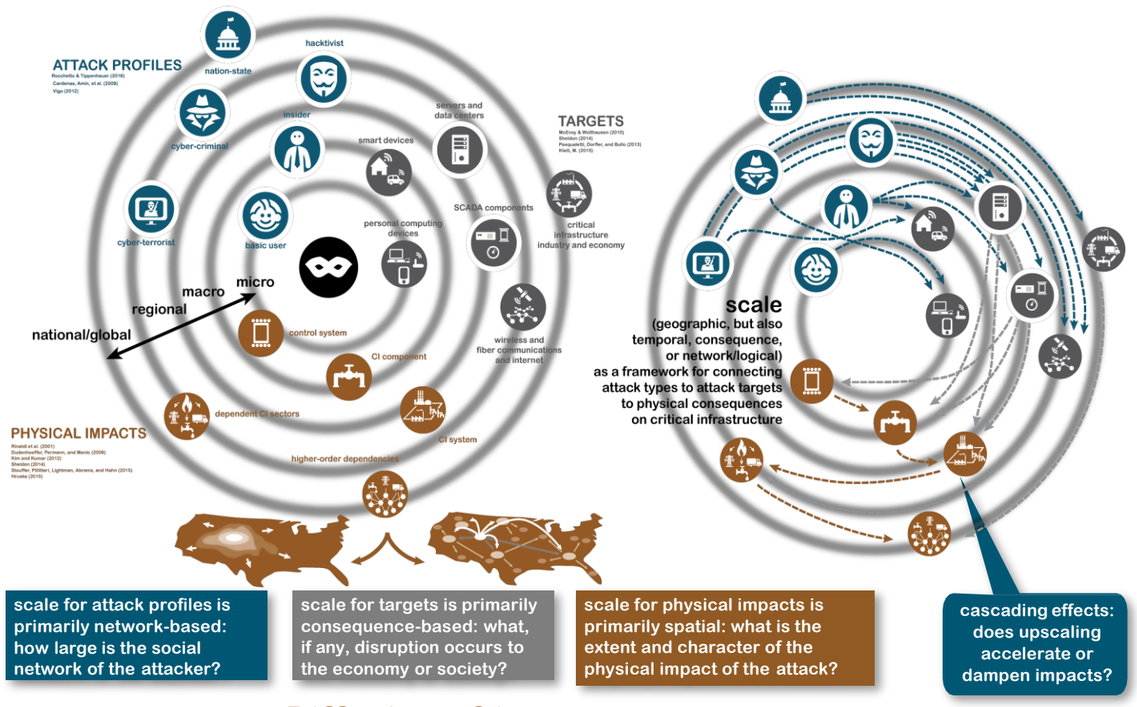
National Significance

- Cyber attacks on physical systems exemplify a new and growing threat to the Nation's critical infrastructure.
- Multiple U.S. government departments and offices assigned critical infrastructure security missions need methods and tools to understand fully the extent and nature of this threat.
- Current research will establish the science-based foundation for methods and tools that optimize the value of effects-analyses through: credible linkages among critical infrastructure assets and their interdependencies, targeted industrial control systems; and cyber attack capabilities.

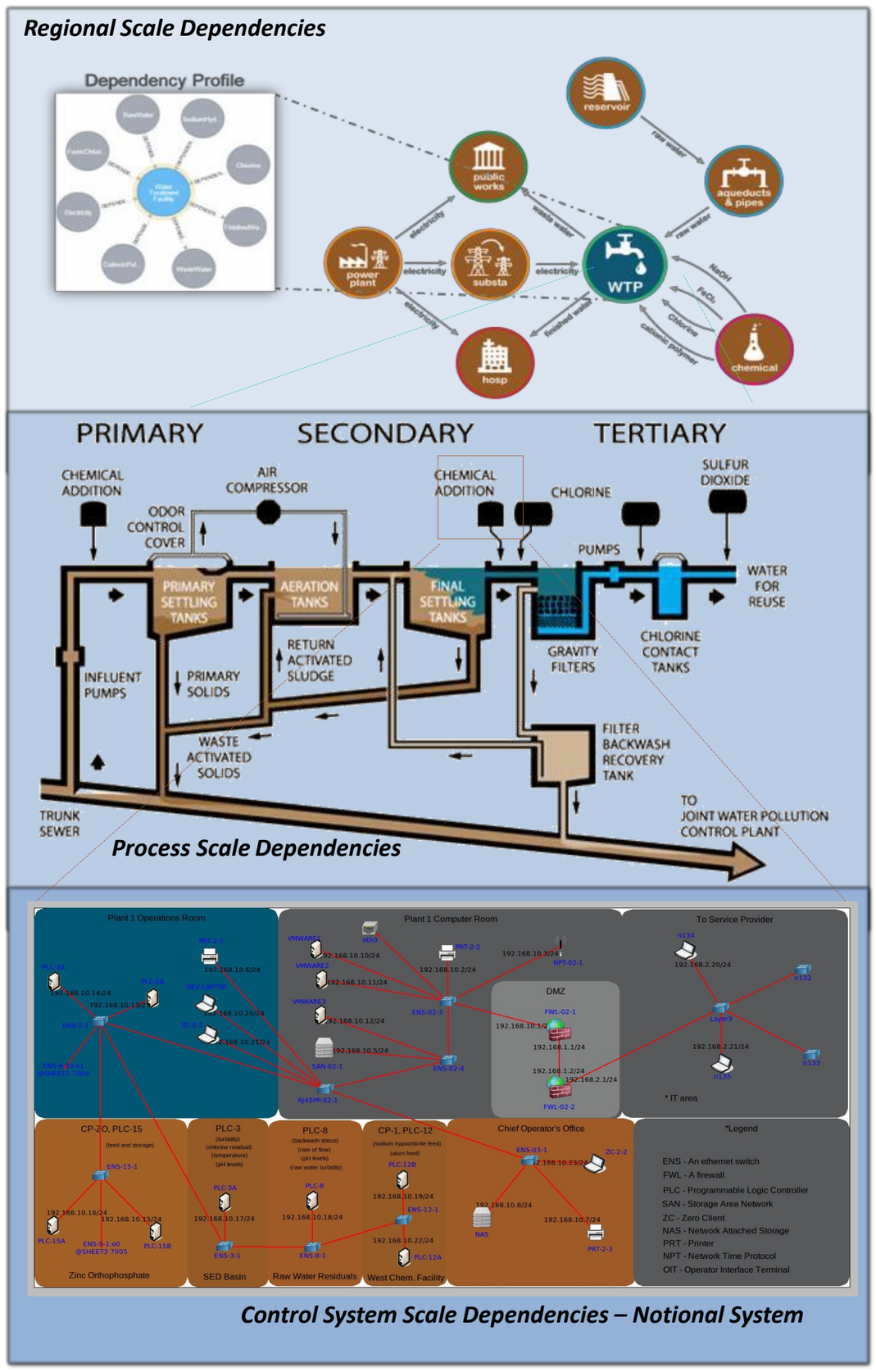
Research Significance:

- Discovers, articulates and accentuates poorly understood crucial cyber and physical security connections
- Provides original, theoretical, and methodological frameworks for critical infrastructure resilience planning
- Allows for predictions of the impacts of a variety of cyber attacks as they propagate over time and space
- Enables preparations for and rapid strategic response to cyber attacks on physical infrastructure

SCALE AND CYBER-SECURITY



Diffusion of impacts across space: contagious, hierarchical, or both



Approach and Outcomes

- Integrate proposed cyber attack model to cyber-component model established in the Industrial Control Systems –Cyber Attacks and their Physical Effects LDRD (#16-106).
- Integrate innovative effects analysis tools developed within the All Hazards Critical Infrastructure Knowledge Framework LDRD (#14-093).
- Model control system networks of different infrastructure types to allow for the simulation of various cyber attack scenarios.
- Research conducted under this project has led to direct funding from the DHS National Risk Management Center (NRMC).

University of Idaho

Research supports INL employee's pursuit of PhD from the University of Idaho

ESRI

Collaboration with geospatial industry leader ESRI

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