Panel Notes – Network Modeling

- Where do we get the data?
  - A common set of data is important (the data set can become richer over time)
- What use cases do stakeholders want to see?
- This is a system-of-systems (SoS) problem
  - Operational independence of component systems
  - Managerial independence of component systems
  - Geographically distributed
  - Evolutionary development processes
  - Emergent behavior
- SoS pain points: nobody is in charge, capabilities of constituents are complex and maybe unknown, autonomy of component system, …

Panel Notes – Network Modeling

- The SoS is collaborative – common objectives
  - Organizations and groups as constituents
  - Non-engineered
  - Evolution is based on dynamic interactions among constituents (building and eroding of trust fits in this category)
  - Individuals make changes based on local objectives and interactions with others
  - Changes in one constituents can affect actions of others
- Keeping coherence across the board

Panel Notes – Network Modeling

- Modeling challenges:
  - Previous Stevens simulation was good for articulating (communicating) the problem to non-experts, but the work did not seem to be very useful for detecting unintended policy consequences
  - Adaptive behavior has to be captured (counterfeiters adapt, policy has to too adapt)
  - Policy changes will restructure the supply chain
  - May need a model down to individual systems to generate the sort of results stakeholders want
  - Traditional validation approaches may be counterproductive
    - If you only collect data from SMEs then you get back exactly what the SMEs expected
  - If agents are really constrained, their behavior is easy to model, if they are not constrained, it is tough to model their behavior
  - How do we know if we have the right agents connected in the right way?
    - This is a big risk (we only model what we know about), continuous validation by using the model on lots of scenarios
  - What policies are bad doesn't necessarily shed light on which ones are good

Panel Notes – Network Modeling

- Opportunities
  - Exploratory instead of consolidative modeling (Bankes, 1993)
  - Employ a family of smaller models (snippets)
  - Validate pieces rather than the whole
  - Intentionally explore conflicting or counterfactual assumptions
  - What about refreshing faster, does that solve the problem (i.e., not a policy solution)
  - Solutions have to be robust (provide usable solutions when there is lots of uncertainty)