

## Problem Statement

Many of the challenges that confront the Department of Defense (DoD) are characterized by the intersection of complex social, political, economic, and technical phenomena where conventional modeling techniques are inadequate. Human and organizational effects can dominate technical outcomes. For example:

- Combating the proliferation of counterfeit parts in military systems
- Managing joint and international acquisition programs
- Coordinating disaster and humanitarian responses involving governments, NGOs, and US agencies
- Sustaining the defense supplier base in the face of declining acquisition quantities

## Goals & Objectives

Enterprise problems challenge conventional modeling and simulation approaches because they involve the sometimes unpredictable behavior of humans and organizations as well many interacting elements with feedback and adaptation. Consequently, our objectives are to:

- Develop a modeling methodology that will allow analysts to study enterprise problems by intelligently scoping the problem space in a way that allows complex elements to be identified and mitigated
- Enable key stakeholders to “Drive the Future” before they commit to changes
- Providing means for experimentation and creation of response surfaces for key tradeoffs
- Creating an interactive environment for discussion and debate of strategies, policies & plans

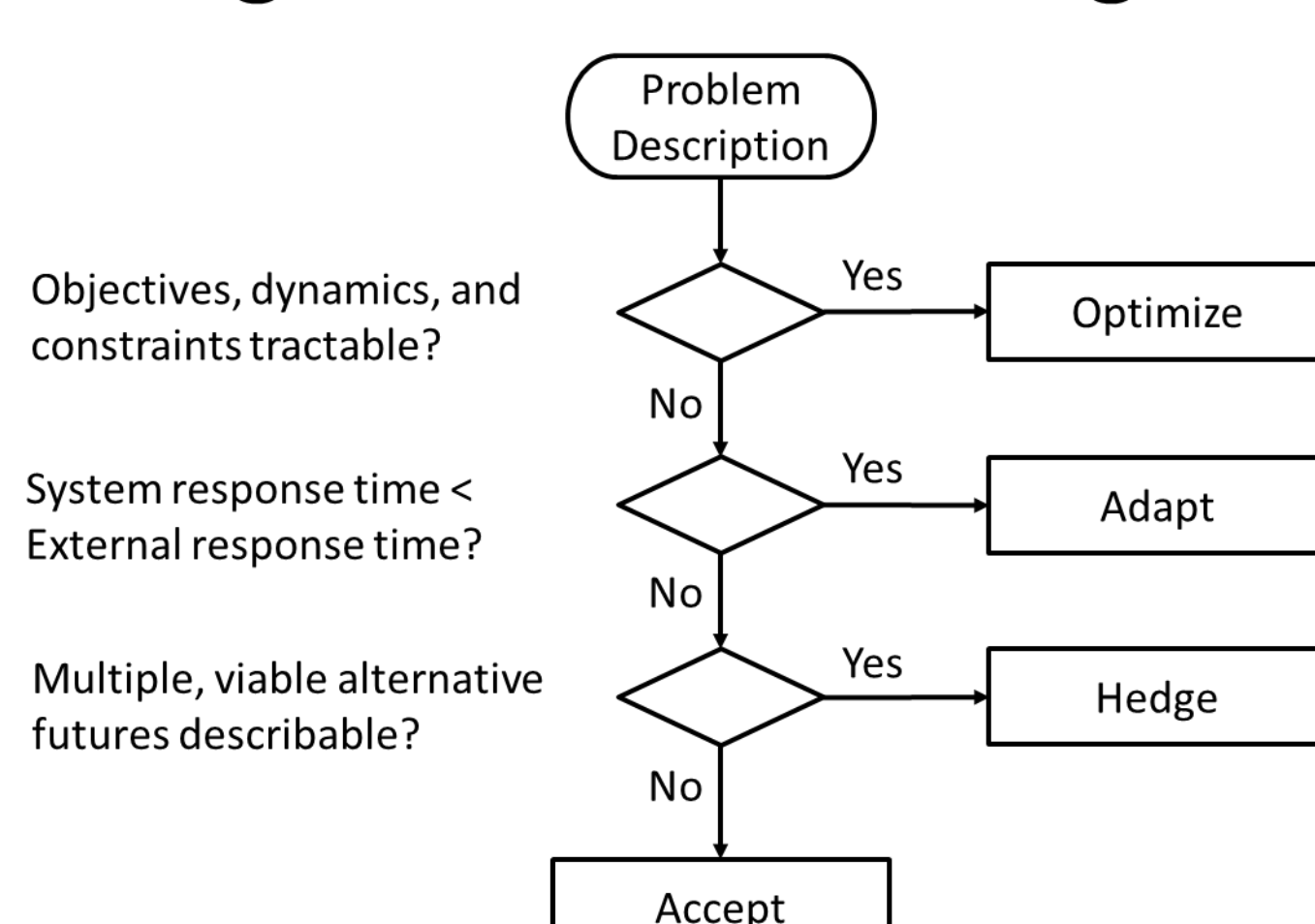
## Planned Outputs

- A ten-step modeling methodology to guide analysts through the enterprise modeling process, with a focus on the currently difficult problems of multi-perspective representations and model composition
- Methods for visualizing enterprise systems
- Guidelines for composing models from economics and other social science domains with traditional systems engineering models
- A case study that analyzes approaches to mitigating the risk of counterfeit parts in defense supply chains

## Approach

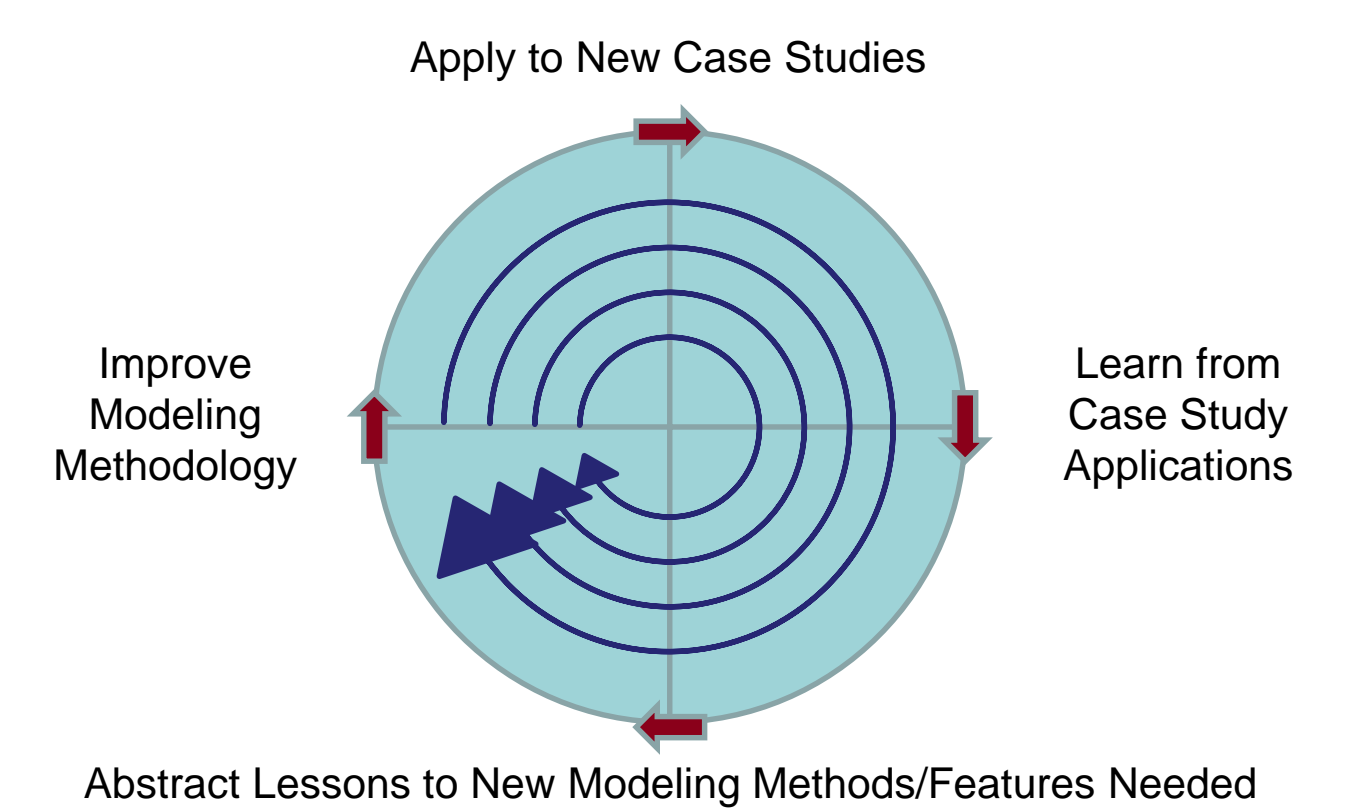
Enterprise problems often defy traditional approaches to modeling and simulation due to problems with model uncertainty. Consequently, any modeling approach must be coupled with and support organizational strategy development to mitigate the resulting risks.

### Organizational Strategies



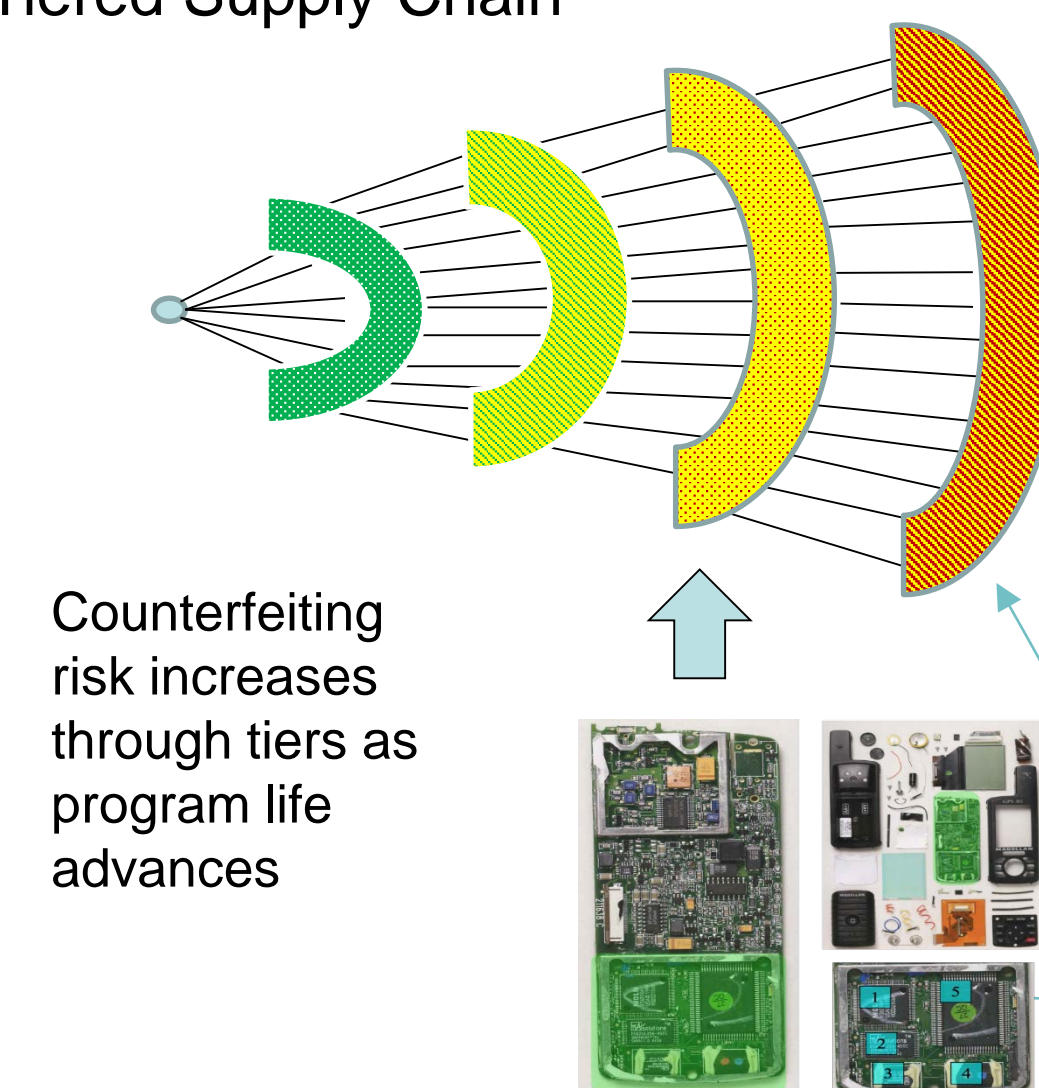
## Counterfeit Parts Case Study

- In tandem with methodology development, we are pursuing enterprise case study problems.
- Counterfeit parts in the DoD supply chain is an enterprise problem involving DoD agencies, services, programs, plus the industrial base and law enforcement.



- The objective is to allow policy makers to look for the right mix of economic and acquisition policies to combat the risk of counterfeit parts in the defense supply chain, understanding various trade-offs.

### Tiered Supply Chain



### Potential Anti-Counterfeiting Policies

- Supplier qualification
- Lifetime buys
- Re-engineering of obsolete sub-systems
- Testing and detection
- Reporting and information-sharing (GIDEP/PRDEP)
- Traceability of components
- Penalties for counterfeits/pass-throughs

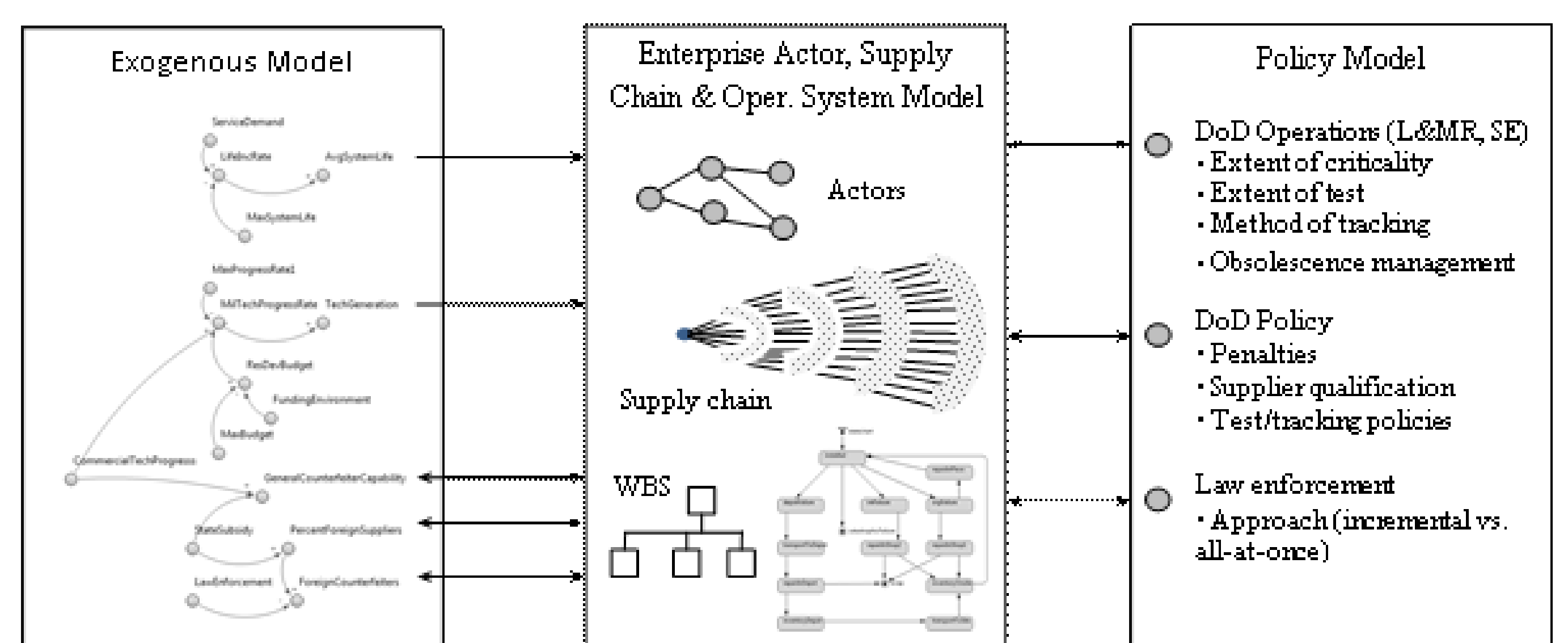
Counterfeit parts typically are ICT components embedded in sub-systems, sourced through multiple supply chain tiers (often from overseas)

### Selected Potential Trade-Offs

- Lifetime buys vs. re-engineering sub-systems vs. obsolescence acceptance
- Reduced counterfeiting via supplier penalties (including pass-throughs) vs. vulnerabilities created by supplier diminishment
- Reduced counterfeiting via trusted suppliers vs. vulnerabilities due to limited supply sources
- Scope of component inspections: cost vs. counterfeit reduction (detection effectiveness)

- A model has been developed with sub-models for: systems & constituents, supply chain operations, operational decision-makers (e.g., suppliers & programs), policy-makers, and the exogenous environment.

- Next steps involve investigation of transition to use in DoD policy analysis.



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