

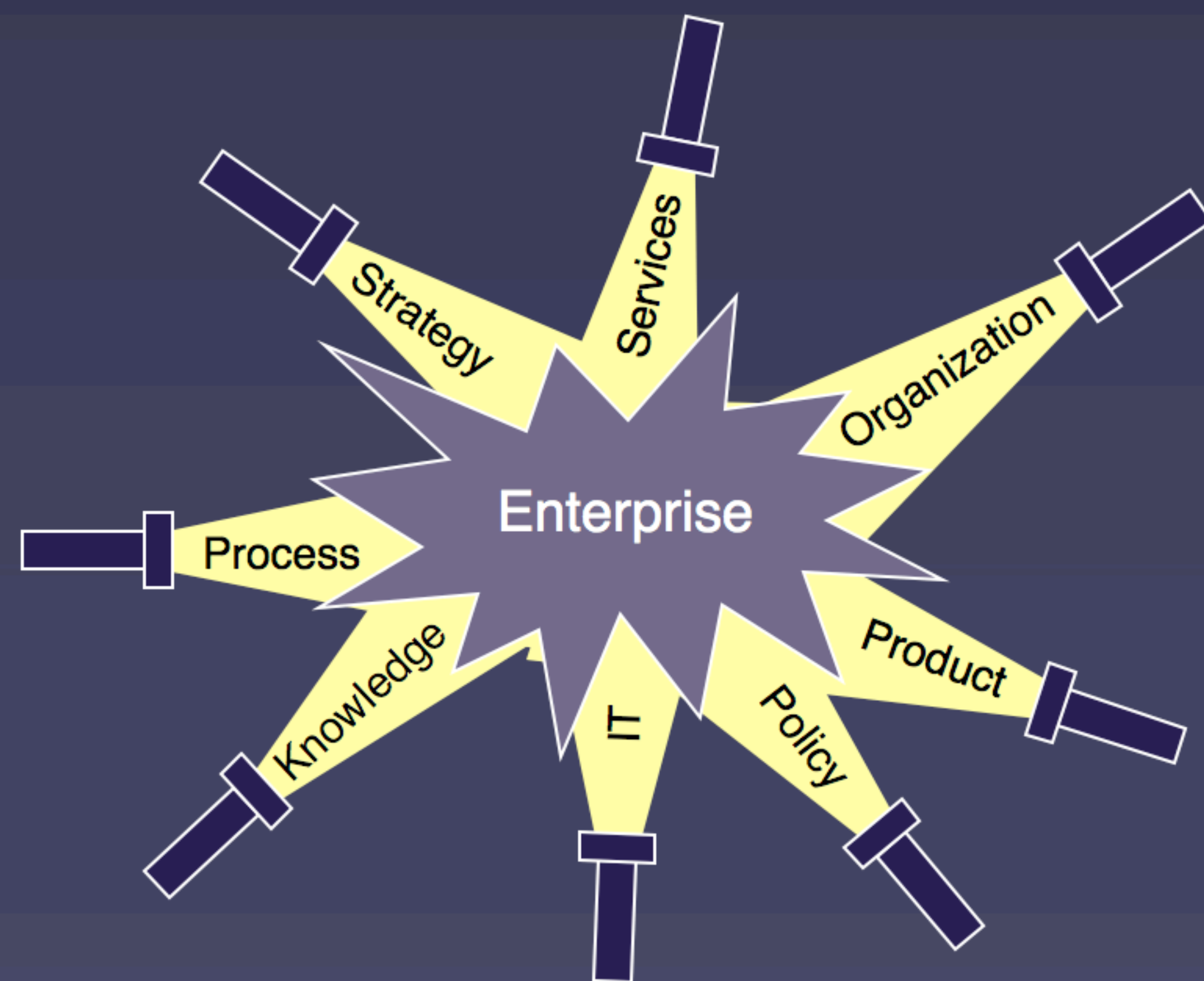
Understanding and Modeling Interaction Effects in Complex Engineering Enterprises

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Background

- The many interactions across the highest-levels of an enterprise can give rise to behavioral complexity
- The enterprise can be viewed in several domains, or *views*: *strategy*, *information*, *organization*, and *process* are common views used in enterprise architecting
- Many of the most vexing problems an enterprise faces occur at the boundary of these views:
 - The IT architecture may not reflect organizational realities
 - Strategic concerns could drive partnering arrangements that affect the design process which is then encumbered by security constraints
- An enterprise-level approach is needed to understand the behavioral effects of these interactions on enterprises



Hypotheses

- The interdependencies across the many contextual boundaries (views) of the enterprise can give rise to unanticipated behaviors
- This behavior is best understood and modeled using hybrid, multi-scale modeling techniques;
- These modeling efforts can aid enterprise leaders in anticipating behavior due to design of these interactions and help them modify this architecture to suit their needs.

Doctoral Committee:
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What does this research accomplish?

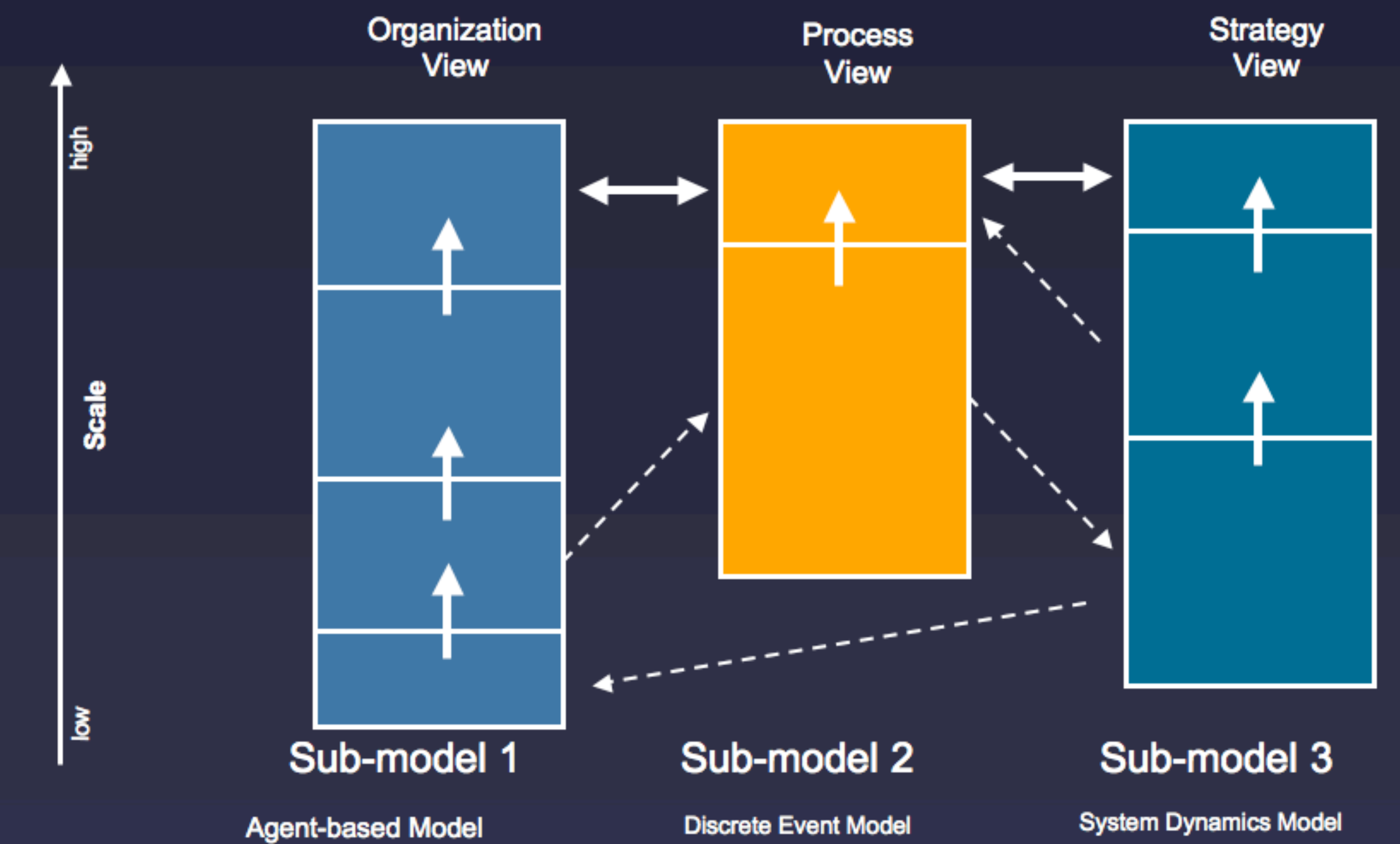
This research will present a deeper understanding of dynamic, cross-domain interactions that can drive behavior in complex enterprises. This work will extend current organizational design theory with regard to high-level interaction effects, and develop an integrative approach to enterprise modeling that can be used for decision-making, theory-development and testing.

Who should use it?

This research should be used by those involved in enterprise architecting and high level enterprise decision-making to better understand enterprise structure and alignment and possible effects of decisions across the enterprise.

What are the benefits?

Using this approach, LAI consortium members will be able to gain insight into behaviorally complex problems at the enterprise-level due to interactions between their processes, organization, strategy, and more. This insight allows members to refine architecture to capture positive behaviors and minimize undesirable enterprise behaviors.



Using Hybrid Modeling

Behavior at the scale of the enterprise is often unanticipated, arising from the interactions across the views and across scales. The behaviors within one of the enterprise views at a certain scale often fits neatly within one context, but these behaviors interact with others that do not. There is no one modeling approach that can capture all of these behaviors and their interaction appropriately.

The idea is to use a modeling approach that is best tuned to each context (bottom-up, top-down, sequential, event-based, contingent-based, etc) for each sub-model. Modeling approaches currently used: *Agent-based models*, *System Dynamics*, *Discrete Event Models*, *Contingency Fit Models*

By linking together the multiple contexts/sub-models, complex behavior can emerge within the model, allowing a user to explore ways to affect changes to these behaviors through changes in the architecture.

Timeline

