Design for Harmony:
An Exploration of Enterprise and Product Architecture Tradespace Dynamics

LEAN ADVANCEMENT INITIATIVE ™

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Motivation / Problem Statement

Enterprise Architecting is the proactive process of designing and evolving the desired future state of the enterprise. It encompasses choices about the fundamental business models employed and the strategic responses available to dynamic changes in context. Similarly, product architectures govern the design and evolution of products.

Product development enterprises experience dynamic coupling between their enterprise and product architectures that leads to emergent behaviors often manifested as “ility” properties (flexibility, rigidity, etc.), for better or worse. Better understanding of enterprise-product architectural coupling and interactions with the dynamic context in which they are embedded will allow the design of symbiotic enterprise-product architectures that deliver sustainable stakeholder value.

The goals of this research are to develop core theory & methodology, create a robust dataset, apply innovative modeling & analysis, and impact the policy & practice of enterprise and product architecting in dynamic contexts.

Key Questions

1. What are the dominant enterprise & product variables that give rise to dynamic coupling and emergent behavior?
2. What are the dominant contextual factors (i.e. political, market, etc.) that influence architectural co-evolution?
3. How can the dynamic relationships between the enterprise-product architectures and contextual factors be managed?

Candidate Methods

Qualitative Methods

- Enterprise Architecting[1]
- Enterprise Value Stream Mapping Analysis[2]
- Complex, Large-scale, Interconnected, Open, Socio-technical (CLIOS) Process[3]
- Case studies & analysis
- Field interviews & ethnography

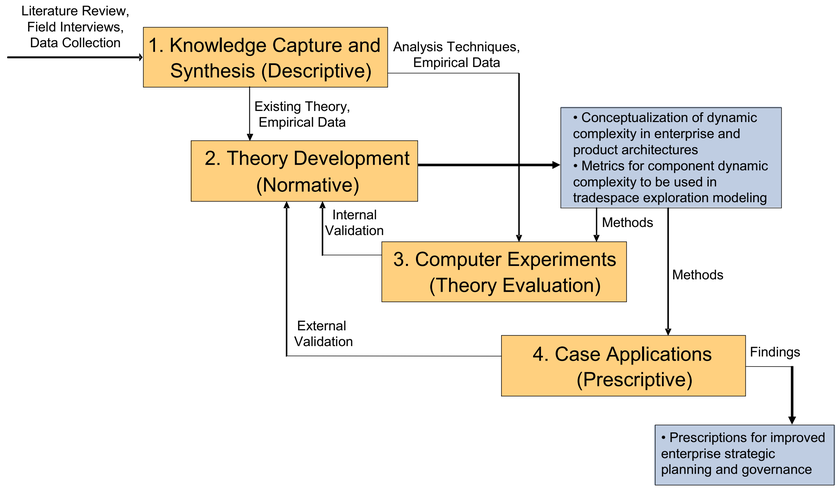
Quantitative Methods

- Dynamic Multi-Attribute Tradespace Exploration (MATE)[4]
- Statistical inference from empirical datasets
- System Dynamics
- Complexity methods championed at the Santa Fe Institute, including non-equilibrium statistical physics and network & scaling theories

[1] Nightingale, Deborah and Donna Rhodes. (2008). ESD.38 Enterprise Architecting Graduate Course. MIT ESD.
[2] MIT Lean Advancement Initiative. Lean.mit.edu
[3] Sussman, Joseph et al. (2008). “The ‘CLIOS Process:’ A Users Guide.”
[4] Ross, A. (2006). "Managing Unarticulated Value: Changeability in Multi-Attribute Tradespace Exploration." Doctoral dissertation, MIT ESD. Available at seari.mit.edu
[5] Santa Fe Institute. www.santafe.edu

Research Design

This research is conducted with an iterative concurrent process using qualitative and quantitative methods



Dynamic Tradespace Exploration

Enterprise and Product Architectures are Dynamically Coupled

Enterprise Architecting[1] is used to provide a data gathering and modeling framework to capture the dynamic complexity of the enterprise component interactions

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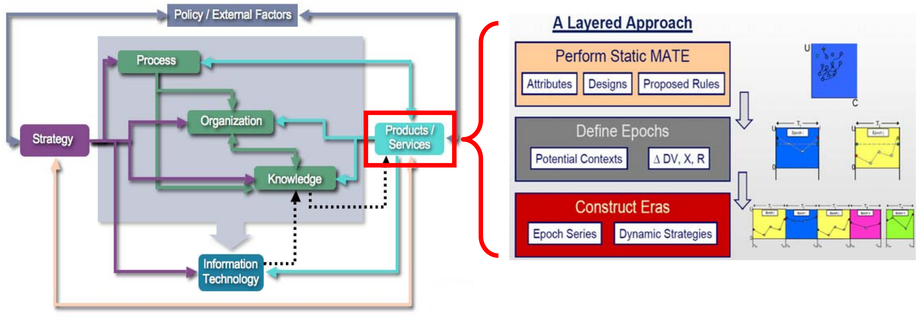
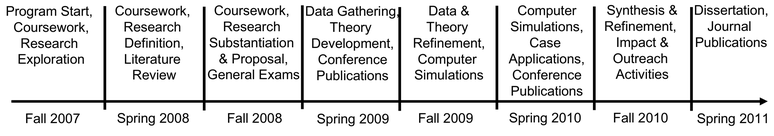
Dynamic MATE[4] is used to explore the dynamic complexity of the joint enterprise-product architecture tradespace under variable contextual scenarios and time scales



Tradespace analysis allows identification of symbiotic enterprise-product architectures with desirable “ility” properties

Literature Review

Timeline



Expected Contributions

Advancement of enterprise and product architecting core theory

- Extension of dynamic tradespace exploration to include enterprise architecture and contextual factors
- Development of dynamic complexity metrics

Systematic Observation and Documentation

- Collection of a robust empirical dataset through case studies, field work, probabilistic modeling and statistical analysis

Innovative modeling and analysis

- New engineering system representation and visualization schemas

Impact to policy and practice

- Enable more effective enterprise and technology strategic planning and governance

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