Title: Dynamic Evolution of Enterprise and System Architectures

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Summary Description: Enterprises and their associated technical systems–the products and systems they design and build--can be viewed as complex coupled systems. Tracking and observing temporal changes in enterprise and technical architectures may yield insights to their evolutionary dynamics that could help increase enterprise efficiency and effectiveness by illuminating underlying causal mechanisms. Recent advances in network theory can be used as a powerful analytical method for understanding these causal mechanisms, yielding new measures of enterprise-system structures and dynamics. Aided by deep qualitative analysis aimed at connecting quantitative measures with causal mechanisms, research is expected to generate new insights and principles for developing adaptive future enterprises.

Key Points:

1. Enterprises and technical systems are shaped by, and must respond to, a diverse array of internal and external stakeholders as well as other factors in a changing environment. This generates potential for development of inefficient and ineffective enterprise as well as technical system architectures.

2. There currently exist proven tools (e.g., Design Structure Matrices – DSMs) for rationalizing and visualizing product, process and organizational interactions.

3. Recent advances in network theory enable extension of DSM and similar methods to address analyses of more dynamic problems.

4. Application of these analytical methods may help uncover the underlying nature and evolutionary dynamics of the interplay between enterprise and system architectures.

5. Armed with such analytical information, principles for effective enterprise architecting may be identified.

Linkage with Research: Supports Enterprise Architecting thrust through case study of enterprises involving the design and development of complex engineering systems that exhibit varying levels of stability and instability.