Establishing Systems Competency in Enterprises: Recent Studies

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Competency and Collaboration Models

Many organizations developing competency models to enable growth of systems workforce
  • Models typically based on expert opinion of skills and abilities needed at engineering position levels
  • Lack data on impact of competencies on programs

Systems competency also resides in teams who collaborate -- often across geographies, cultures, and time zones
  • Models are needed for self-assessment of team collaboration readiness and effectiveness
  • Includes both social and technical factors

EMPIRICAL RESEARCH NEEDED TO BETTER INFORM MODELS
  Factors underlying systems competency in workforce
  Understanding of impact of knowledge, skills, abilities
  Enablers and barriers to developing systems competency
  Systems thinking at multiple levels – individual, team, enterprise
  Socio-technical factors for collaborative distributed engineering
General systems thinking has been studied empirically, but engineering systems thinking largely unexplored.

Frank (2000) characterized engineering systems thinking as unique.

Davidz (2006) performed study of 200 engineers in aerospace industry to identify enablers, barriers, precursors.


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Current environment increasingly requires collaboration of geographically distributed teams.

Utter (2007) performed empirical studies to identify successful practices/lessons learned.

Social and technical factors studied: collaboration scenarios, tools, knowledge and decision management, culture, motivations, others.

Preliminary set of success factors toward collaboration model.

**Success Factor:** Invest in Up-front Planning Activities.

Spending more time on the front-end activities and gaining team consensus shortens the implementation cycle. It avoids pitfalls as related to team mistrust, conflict, and mistakes that surface during implementation.

Collaborative Systems Thinking: Promoting higher level systems thinking in aerospace teams

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Motivation

Industry demographics suggest upwards of 50% of the aerospace will be eligible for retirement within the next 5 years. This impending ‘grey tsunami’ places urgent emphasis on transferring systems-level skills to the next generation of leadership. However, systems skills such as systems thinking take years to develop. This research looks at teams as a unit to leverage collective experience towards team level, or collaborative, systems thinking.

Synopsis:

Started in 2005, this research uses a series of interviews and case studies to first identify the greatest enablers and barriers to collaborative systems thinking and then validate these observations. By leveraging social science methods, a rich description of collaborative systems thinking is generated.

Outcomes

1. Characterize collaborative systems thinking
2. Identify the major enablers and barriers to collaborative systems thinking development
3. Identify common team archetypes for systems thinking
5. Multiple conference papers and a journal paper

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Future Research Directions

Additional research related to development of systems competencies in the workforce to inform competency models and frameworks for model integration

More extensive and rigorous studies to understand collaborative distributed systems engineering to inform collaboration models

Research to understand cultural differences impacting competencies and collaboration factors

Case studies of enterprises using competency and collaboration models to understand impacts and benefits

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