Acquiring War Fighting Capabilities in the 21st Century: The Challenge of Mega-Systems




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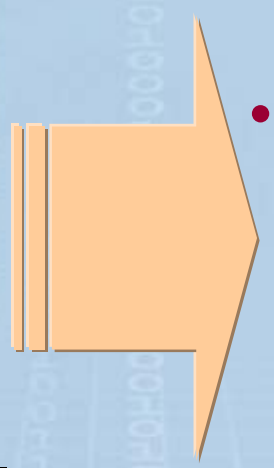
Agenda

- The Strategic Environment
- Mega-Systems
- Challenges For Acquiring 21st Century Capability
- Implications for Spiral Development

A Trend Towards Larger, More Complex Systems

- **Uncertain strategic environment demands agile/adaptive responses**
- **Information as competitive source of power**
- **Information revolution provides common tools**
- **Demand for enterprise and extended enterprise-wide solutions**



- **Richly *interconnected*; increasingly *interdependent***
- ***Cross traditional boundaries… functional, organizational, programmatic***
- ***Increasing scale/scope***
- ***Increasing complexity***

A Working Definition

- **Mega-Systems defined as "*large scale, potentially complex systems that cross traditional boundaries to provide capability beyond that achievable by their component elements*"**
  - **Composed – Formed "after the fact" from the integration of previously developed systems**
  - **Designed – Structured as formal acquisition programs**
  - **Dynamically assembled – Respond to immediate operational need or opportunity**
- **Often a significant *human and social dimension* that contributes to complexity of behavior and evolution of the Mega-System**

… Demands Different Approach

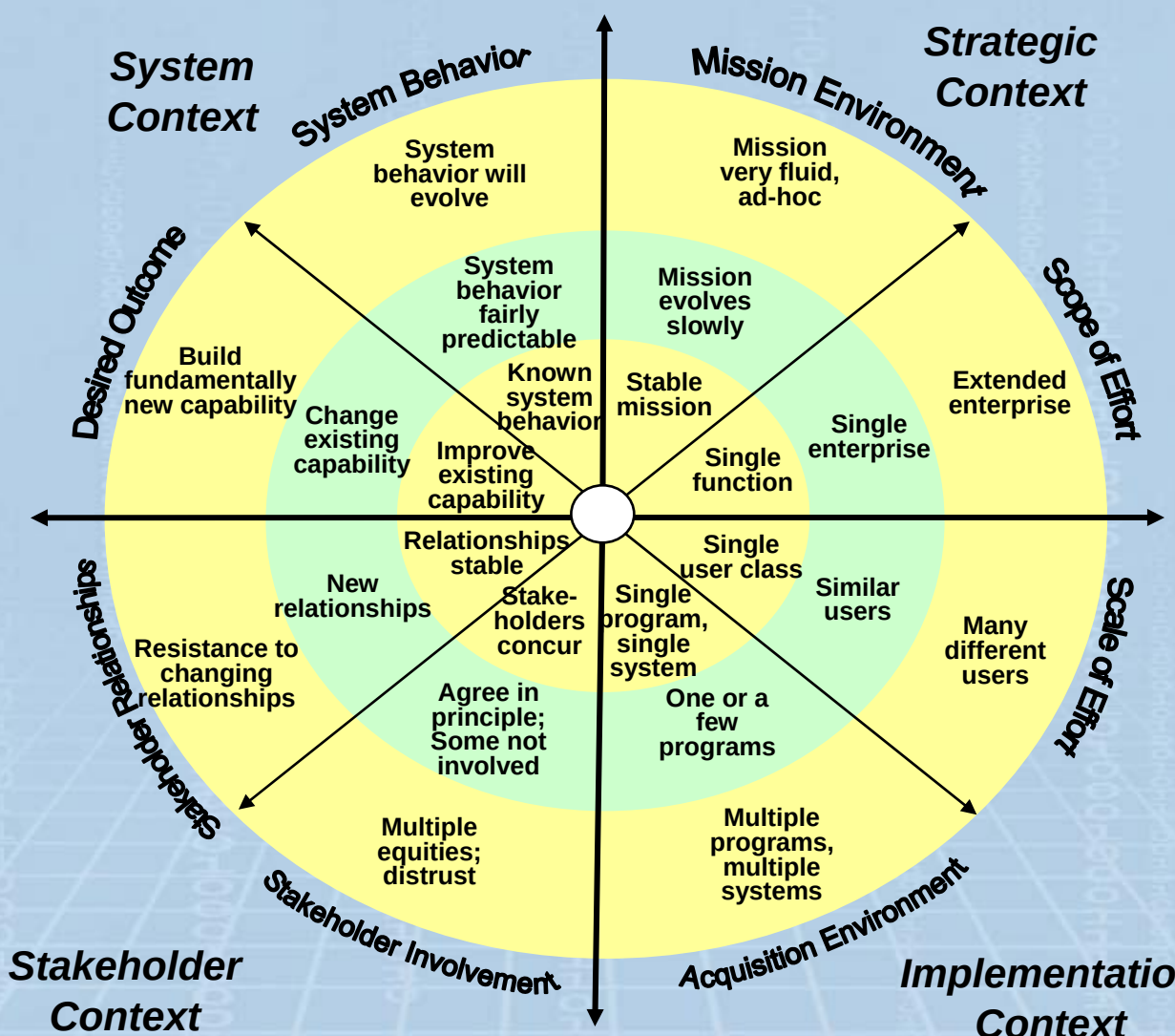
Traditional Program

- Predicated on well defined, precise and stable requirements
- Assumes that overall functions can be decomposed and allocated
- Manage execution risk
- Applies best within a single program and when there is agreement as to goals and objectives and a well-understood mission space

Mega-System or Enterprise Network

- Requirements often stated as vision statements or broad architectures. *Evolve opportunistically*.
- Some functionality will emerge from interaction of components without specific direction
- Manage uncertainty – both risk and unanticipated opportunities
- Often cross program boundaries; must deal with competition for resources and alternative solutions

Emerging Framework



WORK IN PROGRESS

Emerging Framework

- **Typical program domain**
  - ***Traditional systems engineering***
  - ***Chief Engineer inside the program; reports to program manager***
- **Transitional domain**
  - ***Systems engineering across boundaries***
  - ***Influence vs authority***
- **Messy frontier**
  - ***Political engineering (power, control…)***
  - ***High risk, potentially high reward***
  - ***Foster cooperative behavior***

What Needs To Change

- **More flexible, less prescriptive requirements lead to risks in programming & budgeting in out-years. So?**
  - **Services, osd, congress, & defense industry must accept risk.**
  - **Keepers of "ility" keys – users (services & joint), testers, log community, etc., Must accept risk.**
- **More "truly" joint programs managed from a "real" joint program office.**
- **The entire defense industry. Why?**
  - **Fewer, more expensive programs.**
  - **Need to better leverage commercial vice military-unique.**
  - **Need hardware/software commonality to ensure affordability.**