Agenda

- The Strategic Environment
- Mega-Systems
- Challenges For Acquiring 21\textsuperscript{st} 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

• 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.