Mapping Systems Engineering Tools with Effective Leadership Behaviors

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Agenda

• Systems Engineering and Leadership
• Leadership
  • Theme
  • Competencies
  • Behaviors
• Mapping Systems Engineering Tools with Leadership Behaviors
Expectations and Facts

- Growing expectations that effective Systems Engineers must be able to lead, starting on Day 1, without necessarily holding a position of authority.
- Younger engineers without much experience are being put into leadership positions sooner due to Baby-Boomer retirements and other attrition.
- Corporations and government agencies who can afford it have developed their own engineering leadership programs - shows their need and value.
- Need for better technical leadership discussed at professional societies - International Council on SE, National Defense Industrial Association, etc.
- Leadership should be learned and appreciated early in one’s career - too late to first learn leadership as an executive.
- Leadership should be practiced and improved in the context of and throughout one’s career - value-added life-long learning is key.
You cannot manage men into battle. You manage things; you lead people.

Grace Hopper
NASA Systems Engineering Behavior Study (2008)

• Accelerate Critical Behaviors
• Assure Mission Success
• Guide Coaching and Mentoring Program
• Human Capital Development
Major Theme: Leadership

- Appreciate / Recognize Others
- Builds Team Cohesion
- Understands the Human Dynamics of a Team
- Creates Vision and Direction
- Ensures System Integrity
- Possesses Influencing Skills
- Sees Situations Objectively
- Coaches and Mentors
- Delegates
- Ensures Resources are Available
Appreciate/ Recognizes Others

• Articulates Team Work
• Recognizes Individual and Team Contribution

SE Tool Mapping

• Integrated Product and Process Design
• Integrated Product Teams
Builds Team Cohesion

- Resolving Differing Opinions
- Foster Team Cohesions
- Open, Non-Defensive Behaviors with Others
- Relaxed Inquiry by Positive Encouraging Comments

SE Tool Mapping
- Nominal Group Technic
- Ishikawa Diagrams
- Affinity Diagrams
- Context Diagrams
- Benchmarking
Understands the Human Dynamics of a Team

• Motivating Teams by Communicating Progress and Understanding Challenges
• Supporting Teams with Resources
• Interdisciplinary Team Interactions

SE Tool Mapping

• N2 Analysis
• Value Stream Mapping
• View Point Analysis
Creates Vision and Direction

• Big Picture View of Mission Requirements
• Understands and Interpret Different Opinion, Concerns
• Articulates the System, Mission Success and Team Roles and Responsibilities

SE Tool Mapping
• Holistic Requirements Model
• Failure Modes and Effects Analysis
• Systemigram
Ensures System Integrity

- Planning, Reporting and Managing System Risk
- Accepts Responsibility for System Performance << Character Trait>>

SE Tool Mapping

- Risk Cubes
- Cost-Risk-Benefit Analysis
- Pugh Matrix
Possesses Influencing Skills

• Understand the Affect of Political Forces and its affects on Projects
• Creates Synergy Among and with People
• Builds a Resource Network

SE Tool Mapping
• Positive Interdependence
• Teaming
Sees Situations Objectively

• Takes Responsibility for Own Actions
• Understands Wisdom of Teams
• Understands Biases and Outside Influences

SE Tool Mapping
• Concept Mapping
• Teaming
Coaches and Mentors

• Develops Breath and Depth of Team Competencies
• Recognizes High Potential Individuals
• Challenges Individuals to do their Best Work

SE Tool Mapping

• Empowering Teams and Individuals
Delegates and Ensures Resources are Available

- Builds Confidence Among Teams by Delegating Responsibility
- Keeps Abreast with Analytical Tools and Models
- Organize, Simplify and Distribute Information Effectively

SE Tool Mapping

- Multi-Criteria Decision Making Tools
- PERT/CPM
- Gantt Chart
- Data Driven Decision Making
How Can a Systems Engineer Lead?

• Start leading on day one, don’t wait for a position of authority to come your way, you have the tools use them

• Be proactive, help the person in charge, relieve some of their burden

• Be a team player, help facilitate meetings and working sessions, encourage others to excel, share the credit, help others learn how to lead

• Try to understand the problem before you try to solve it, help others to understand

• Try to understand the issues before you speak

• Sometimes, all you have to do is “Show Up!”
The Final Word...

• Systems Engineering Leadership Institute at WPI Incorporates Systems Engineering Leadership Tools and Behaviors Across Entire SE Curriculum

• The SE community is beginning to understand the importance of systems engineers who can lead and influence others from Day 1, without being in a position of authority

• Traditionally, SE and Leadership have been treated as separate capabilities to be learned only through separate stove-piped development programs with no collaboration or cross-pollination

• Future Research to develop Empirical Evidence
Thank You!