SE Workforce Development and the Systems Engineering Body of Knowledge

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Agenda

1. Workforce Development Use Case
2. Enabling Systems Engineering
3. Enabling Individuals
4. Enabling Teams
5. Enabling Businesses and Enterprises
6. Q&A
How SEBoK Can be Used to Support Workforce Development

- Systems engineering activities are enabled by a high-performing workforce
- A high-performing workforce is influenced by many factors at the individual, team, and business/enterprise level
- There are many ways to enable SE performance and each organization’s approach is unique
- SEBoK is structured to provide pointers to common practices, methods, and considerations organizations use for workforce development
# SEBoK Purpose

To provide the boundaries, terminology, content, and structure needed to systematically and consistently *support* the following:

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Description</th>
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<tbody>
<tr>
<td>Inform Practice</td>
<td>Inform systems engineers about the boundaries, terminology, and structure of their discipline and point them to useful information needed to practice SE in any application domain</td>
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<tr>
<td>Inform Research</td>
<td>Inform researchers about the limitations and gaps in current SE knowledge that should help guide their research agenda</td>
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<td>Inform Interactors</td>
<td>Inform performers in interacting disciplines (system implementation, project and enterprise management, other disciplines) of the nature and value of SE</td>
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<td>Inform Curriculum Developers</td>
<td>Inform organizations defining the content that should be common in undergraduate and graduate programs in SE</td>
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<tr>
<td>Inform Certifiers</td>
<td>Inform organizations certifying individuals as qualified to practice systems engineering</td>
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<tr>
<td>Inform SE Staffing</td>
<td>Inform organizations and managers deciding which competencies that practicing systems engineers should possess in various roles ranging from apprentice to expert</td>
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Guide to the literature, not all the content of the literature
Part 5 – Enabling of Systems Engineering (When, Who)

• Part 1: Introduction
• Part 2: Systems
• Part 3: Systems Engineering and Management
• Part 4: Applications of Systems Engineering

• Part 5: Enabling Systems Engineering

• Part 6: Related Disciplines
• Part 7: Examples

• SE Organizational Strategy
• Enabling Individuals to perform SE
• Enabling Teams to perform SE
• Enabling Businesses and Enterprises to perform SE

Strategies for individuals, teams, and the business/enterprise;
Determining Competencies/Capabilities, Organizing for, Assessing, Developing
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SEBoK Part 5 Structure

Part 5

- Part 5: Enabling Systems Engineering
  - Knowledge Area: Systems Engineering Organizational Strategy
    - Topic: Organizational Purpose
    - Topic: Value Proposition for Systems Engineering
    - Topic: Systems Engineering Governance
  - Knowledge Area: Enabling Businesses and Enterprises to Perform Systems Engineering
    - Topic: Deciding on Desired Systems Engineering Capabilities within Businesses and Enterprises
    - Topic: Organizing Business and Enterprises to Perform Systems Engineering
    - Topic: Assessing Systems Engineering Performance of Business and Enterprises
    - Topic: Developing Systems Engineering Capabilities within Businesses and Enterprises
    - Topic: Culture
  - Knowledge Area: Enabling Teams to Perform Systems Engineering
    - Topic: Determining Needed Systems Engineering Capabilities in Teams
    - Topic: Organizing Teams to Perform Systems Engineering
    - Topic: Assessing Systems Engineering Performance of Teams
    - Topic: Developing Systems Engineering Capabilities within Teams
    - Topic: Team Dynamics
  - Knowledge Area: Enabling Individuals to Perform Systems Engineering
    - Topic: Roles and Competencies
    - Topic: Assessing Individuals
    - Topic: Developing Individuals
    - Topic: Ethical Behavior
Key Relationships

- **Strategy**
  - Set by (at level above)
  - Sets (at level below)
  - Context
  - Scope
  - Purpose
  - responsibilities
  - accountabilities

- **Business or Enterprise**
  - includes Teams

- **Teams**
  - includes Roles

- **Roles**
  - in Individuals
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Enabling Individuals to Perform Systems Engineering (1 of 2)

• Understand why competency models are used
  – Recruitment and Selection
  – Human Resources Planning and Placements
  – Education, Training, and Development

• Review existing SE competency models as reference in developing your list of desired competencies
  – International Council on Systems Engineering (INCOSE) UK Advisory Board
  – SPRDE-SE/PSE model
  – NASA Academy of Program/Project & Engineering Leadership (APPEL)
  – Citations for other competency models and lists

• Understand how SE competencies compare to other competencies

• Perform External benchmarking
Enabling Individuals to Perform Systems Engineering (2 of 2)

- Identify common strategies to close competency gaps
- Use SE Competency Development Framework to map development objective to method
- Understand the importance of maintaining competency plans
- Decide, Organize, Develop, Assess
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Enabling Teams to Perform Systems Engineering

• Understand the main team concepts:
  – Team capability requires both competency and capacity to accomplish assigned tasks
    • Team competency requires the needed collective set of aptitudes, intelligence, and skills distributed among the team members
    • Team capacity relates to the number of team members and the time within in their schedules to perform their assigned tasks
  – Team capability depends on morale and attitudes at both the individual and team levels

• Acknowledge and accommodate team constraints (time, money, resources)

• Build cohesive teams that have a common vision and work in a cooperative manner to achieve shared objectives

• Understand approaches to enable teams to perform systems engineering efficiently and effectively

• Decide, Organize, Develop, Assess
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Enabling Businesses and Enterprises to Perform Systems Engineering

• Understand the Organizational Purpose
• Determine the value of systems engineering in achieving that purpose.
• Capability at this level includes:
  – Competent personnel
  – Adequate time
  – Sufficient resources
  – Appropriate policies and procedures
  – Social Dynamics
  – Culture
• Decide, Organize, Develop, Assess
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Example: Planning, Overseeing, Performing Across the System Life Cycle

- **System Definition**
  - Mission Analysis and Stakeholder Requirements
  - System Requirements
  - Architectural Design
  - Systems Analysis

- **System Realization**
  - Implementation
  - System Integration
  - System Verification
  - System Validation

- **System Deployment and Use**
  - System Deployment
  - Operation of the System
  - System Maintenance
  - Logistics

- **Product and Service Life Management**
  - Service Life Extension
  - Capability Updates, Upgrades and Modernization
  - Disposal and Retirement
BKCASE Project Schedule

Project Milestones

- Project/SEBoK Kick-Off (Sept/Dec 09)
- SEBoK 0.25 (Sep 10)
- SEBoK 0.5 (Sep 11)
- SEBoK 0.75 (Apr 12)
- SEBoK 1.0 (Sep 12)

Project Workshops

- SEBoK Kick-Off Workshop (Dec 09, Monterey, USA)
- GRCSE Kick-Off Workshop (Mar 10)
- Workshop III (IS 10, July 10, Chicago, USA)
- Workshop V (IW 11, Jan 11, Phoenix, USA)
- Workshop VII (IS 11, June 11, Denver, USA)
- Workshop IX (IW 12, Jan 12, Daytona, USA)
- Workshop XI (IS 12, July 12, Roma, Italy)
- Workshop II (Mar 10, Daytona, USA)
- Workshop IV (Oct 10, Toulouse, France)
- Workshop VI (April 11, Los Angeles, USA)
- Workshop VIII (Oct 11, London, UK)
- Workshop X (April 12, Monterey, USA)
- Workshop XII (Oct 12, Hoboken, USA)
SEBoK 0.5 Wiki Outreach Sessions

• Access the SEBoK: sebokwiki.org
• To help orient the community to the wiki delivery of the SEBoK, the BKCASE team has planned 3 outreach sessions
• Sessions will provide participants with:
  – An overview of the SEBoK
  – Instructions on the spirit and mechanics of review
  – An opportunity to ask general questions regarding the SEBoK
• Sessions to be held Nov 7-9
• For additional details or to register for a session, please email bkcase@stevens.edu
Questions?

[Links to website and email]