Systems Engineering and Software Engineering

From SEBoK
Systems Engineering and Software Engineering

Software is prominent in most modern systems architectures and is often the primary means for integrating complex system components. Software engineering and systems engineering are not merely related disciplines; they are intimately intertwined. (See Systems Engineering and Other Disciplines.) Good systems engineering is a key factor in enabling good software engineering.

The SEBoK explicitly recognizes and embraces the intertwining between systems engineering and software engineering, as well as defining the relationship between the SEBoK and the Guide to the Software Engineering Body of Knowledge (SWEBOK) (Bourque, and Fairley, 2014).

This knowledge area describes the nature of software, provides an overview of the SWEBOK, describes the concepts that are shared by systems engineers and software engineers, and indicates the similarities and difference in how software engineers and systems engineers apply these concepts and use common terminology. It also describes the nature of the relationships between software engineering and systems engineering and describes some of the methods, models and tools used by software engineers.

Contents

- 1 Topics
- 2 Discussion
- 3 References
  - 3.1 Works Cited
  - 3.2 Primary References
  - 3.3 Additional References

Topics

Each part of the SEBoK is divided into knowledge areas (KAs), which are groupings of information with a related theme. The KAs in turn are divided into topics. This KA contains the following topics:

- Software Engineering in the Systems Engineering Life Cycle
- The Nature of Software
- An Overview of the SWEBOK Guide
- Key Points a Systems Engineer Needs to Know about Software Engineering
- Software Engineering Features - Models, Methods, Tools, Standards, and Metrics

Discussion

Software engineers, like systems engineers,
engages in analysis and design, allocation of requirements, oversight of component development, 
component integration, verification and validation, life cycle sustainment, and system retirement.
work with or as a component specialists (for example, user interface, database, computation, and 
communication specialists) who construct or otherwise obtain the needed software components.
adapts existing components and incorporates components supplied by customers and affiliated 
organizations.

These commonalities would make it appear that software engineering is merely an application of 
systems engineering, but this is only a superficial appearance. The differences between the two 
disciplines arise from two fundamental issues:

1. Differences in educational backgrounds (traditional engineering disciplines for SE and the 
computing disciplines for SWE) and work experiences that result in different approaches to 
problem solving, and
2. Different ways of applying shared concepts based on the contrasting natures of the software 
medium and the physical media of traditional engineering.

Table 1 itemizes some of the shared concepts that are applied in different ways by systems 
engineers and software engineers. Each discipline has made contributions to the other. Table 1 
indicates the methods and techniques developed by systems engineers adapted for use by software 
engineers and, conversely, those that have been adapted for use by systems engineers.

**Table 1. Adaptation of Methods Across SE and SWE** *

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stakeholder Analysis</td>
<td>• Model-Driven Development</td>
</tr>
<tr>
<td>• Requirements Engineering</td>
<td>• UML-SysML</td>
</tr>
<tr>
<td>• Functional Decomposition</td>
<td>• Use Cases</td>
</tr>
<tr>
<td>• Design Constraints</td>
<td>• Object-Oriented Design</td>
</tr>
<tr>
<td>• Architectural Design</td>
<td>• Iterative Development</td>
</tr>
<tr>
<td>• Design Criteria</td>
<td>• Agile Methods</td>
</tr>
<tr>
<td>• Design Tradeoffs</td>
<td>• Continuous Integration</td>
</tr>
<tr>
<td>• Interface Specification</td>
<td>• Process Modeling</td>
</tr>
<tr>
<td>• Traceability</td>
<td>• Process Improvement</td>
</tr>
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<td>• Configuration Management</td>
<td>• Incremental V&amp;V</td>
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<td>• Systematic Verification And Validation</td>
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The articles in this knowledge area give an overview of software and software engineering aimed at 
systems engineers. It also provides more details on the relationship between systems and software 
life cycles and some of the detailed tools used by software engineers. As systems become more 
dependent on software as a primary means of delivering stakeholder value the historical distinction 
between software and systems engineering may need to be challenged. This is a current area of joint 
discussion between the two communities which will affect the future knowledge in both SEBoK and 
SWEBoK.

**References**
Works Cited


Primary References


Additional References


< Previous Article | Parent Article | Next Article >
SEBoK v. 2.0, released 1 June 2019

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- This page was last edited on 21 August 2019, at 21:23.