

# Implementing and Proving a Solution

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This topic is part of the Systems Approach Applied to Engineered Systems knowledge area (KA). It describes knowledge related to the implementation and proving of a preferred solution that may have been selected by activities described in the Analysis and Selection between Alternative Solutions topic. The activities that apply to an implemented solution during its operational life are described in Deploying, Using, and Sustaining Systems to Solve Problems topic, and how systems fit into commercial and acquisition relationships is discussed in the Introduction to System Fundamentals topic. Any of the activities described below may also need to be considered concurrently with other activities in the systems approach at a particular point in the life of a system-of-interest (SoI).

The activities described below should be considered in the context of the Overview of the Systems Approach topic at the start of this KA. The final topic in this KA, Applying the Systems Approach, considers the dynamic aspects of how these activities are used as part of the systems approach and how this relates in detail to elements of systems engineering (SE).



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## **Proving the System Overview**

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This topic covers both the sub-topics of verification and validation.

### **Verification**

Verification is the determination that each element of the system meets the requirements of a documented specification (see principle of elements). Verification is performed at each level of the system hierarchy. In the systems approach, this topic pertains to the more abstract level of providing evidence that the system will accomplish what it was meant to do. In SE, this topic pertains to providing quantitative evidence from tests and other methods for verifying the performance of the system.

### **Validation**

Validation is the determination that the entire system meets the needs of the stakeholders. Validation only occurs at the top level of the system hierarchy. In the systems approach, this topic pertains to the more abstract level of ensuring the system meets the needs of the stakeholders. In SE, this topic pertains to the detailed demonstrations and other methods that are used to promote stakeholder satisfaction.

In a SE context, Wasson provides a comprehensive guide to the methods of both system verification and system validation (Wasson 2006, 691-709).

## **References**

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### **Works Cited**

Wasson, C. S. 2006. *System Analysis, Design, and Development*. Hoboken, NJ, USA: John Wiley & Sons.

## Primary References

Jackson, S., D. Hitchins and H. Eisner. 2010. "What is the systems approach?" *INCOSE Insight*, vol. 13, no. 1, April, pp. 41-43.

## Additional References

MITRE. 2012. "Verification and validation," in *Systems Engineering Guide*. Available at: [http://mitre.org/work/systems\\_engineering/guide/se\\_lifecycle\\_building\\_blocks/test\\_evaluation/verification\\_validation.html](http://mitre.org/work/systems_engineering/guide/se_lifecycle_building_blocks/test_evaluation/verification_validation.html). Accessed September 11, 2012.

Wasson, C. S. 2006. *System Analysis, Design, and Development*. Hoboken, NJ, USA: John Wiley & Sons.

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**SEBoK v. 2.5, released 15 October 2021**

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This page was last edited on 11 October 2021, at 08:00.