# **Assessment Title**

Systems Thinking Scale (STS)

# **Assessment Description**

Systems thinking is the process of understanding how parts of a system work and influence each other as part of a greater whole (FM 5-0). Systems thinking requires individuals to consider the elements of a system, how they work, and what effect situational changes have.

### Who is the Army audience?

The Systems Thinking Scale (STS) is intended for personnel who primarily work at the organizational level of leadership. The assessment is included in the Leadership area for Athena.

### How does the Army benefit?

The STS provides students an assessment of how frequently they engage in behaviors related to systems thinking. The STS is administered online through the Army Enterprise Assessment System (AEAS).

Army leaders are increasingly asked to deal with an array of difficult and complex problems. Providing leaders with an ability to learn how to effectively deal with such situations is critical to their leader development and mission success. Systems thinking is the ability to recognize and synthesize patterns, interactions, and interdependencies in a system. To be successful, Army leaders need to look beyond surface aspects of problems to determine true root causes, identify connections and patterns, and consider unintended consequences of their decisions. Leaders who utilize systems thinking better determine how naturally occurring systems work. They can use it to build a systems representation of connected and/or seemingly unrelated elements or to clarify cause and effect relationships and assess risks. Additionally, they can create and test new effects by modifying the system's elements, structure, or processes. Systems thinking applies to a wide range of military tasks such as intelligence analysis, risk assessment, tactical planning, influence operations, and information flows. When leaders are faced with unfamiliar and complex problems, systems thinking can help discipline the response and provide a way to reach a solution. Improving systems thinking can positively influence leader decision making which benefits individual Army leaders and the Army as a whole.

#### What kind of feedback do students receive?

Personnel receive a confidential and personalized feedback report that provides information on whether their performance is indicative of high, moderate, or low systems thinking abilities. Students' scores are personalized based on their specific cohort (officer, NCO, warrant officer, civilian). Students are provided with a one-page lesson on improving systems thinking and further self-developmental resources linked to Athena and ARI.

# Why can the Army rely on this assessment?

The Systems Thinking Scale (STS) was developed to assess an individual's systems thinking—the ability to recognize and synthesize patterns, interactions, and interdependencies (Dolansky, Moore, Palmieri, & Singh, 2020). The authors of the scale surveyed 342 healthcare faculty across different disciplines and 224 students to establish the psychometric properties of the instrument. Though different in surface content, Army leaders use oversight and systemic evaluation thinking comparable to the individuals in the STS scale validation sample; therefore, the STS is seen as an applicable assessment of systems thinking.

For assessment internal reliability (i.e., how consistently a construct is measured by an assessment), the STS produces results considered acceptable for the unidimensional factor of system interdependencies.

Test-retest reliability, the stability of measurement over time, was supported through a significant correlation between STS scores at time points two weeks apart.

Concurrent construct-related validity, when scores on a measure are compared to another measure with similar constructs was supported by correlating Athena assessments scores that measured constructs related to STS.

# Fact Sheet Sources and Supporting Information Psychometrics-

# **Psychometrics—Internal Consistency Reliability**

STS	Full study sample <sup>A</sup>	
Omega Coefficient	0.89	

Assessment of internal consistency reliability for the STS was found to be acceptable.

### **Psychometrics—Test-Retest Reliability**

Correlations between STS scores over a two-week interval were found to be excellent.

Correlation	Time 2 STS Scores <sup>B</sup>	
Time 1 STS Scores	0.74	

### **Psychometrics—Construct-Related Validity**

Concurrent construct-related validity was established between scores on the STS, the Self-Awareness Individual Differences Inventory (SAID-I), and the Military Defense Critical Thinking Inventory (MDCTI). All three correlations are considered *excellent*.

Correlations	Detail Orientation	Mental Rigor	Foresight
	(SAID-I) <sup>B</sup>	(MDCTI) <sup>B</sup>	(MDCTI) <sup>B</sup>
STS Scores	0.33	0.38	.32

Notes

A: Reliability Metric Omega Coefficient: Acceptable ( $\omega > 0.70$ )

B: Validity Metric-Correlation Categories: Poor (r < 0.10), Acceptable (r = 0.11-0.30), and Excellent (r = 0.31-1.0)

References

Dolansky, M. A., Moore, S. M., Palmieri, P. A., & Singh, M. K. (2020). Development and validation of the Systems Thinking Scale. *Journal of General Internal Medicine*, 35, 2314-2320.

Viladrich, C., Angulo-Brunet, A., & Doval, E. (2017). A journey around alpha and omega to estimate internal consistency reliability. Annals of Psychology, 33(3), 755-782.

Insights Assessment, (2020). *Military and Defense Critical Thinking Inventory 2020 User Manual and Resource Guide*. The California Academic Press. San Jose, CA.