

# System Engineering Approach to Space-Cyber Situational Awareness

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*Abstract*— Recent advances in decision support methodologies and system engineering approaches offer new insights into system design. Some of these approaches are inspired by biological evolutionary systems, that seek to optimize designs over time. This paper is focused on the application of such approaches to Cyber-Physical Systems (CPSs). CPSs are systems that integrate computational and physical processes. Such systems represent a number of challenges, due to the inherent differences in how the physical and cyber portions of the system operate. Space-Cyber is a subset of CPSs, and we will focus the detailed discussion on Space-Cyber.

The increasing trend in the sophistication and targeting of various types of cyber attacks affects all aspects of CPSs. The

characterized by complex, interacting issues that are ill-defined, ambiguous, and most importantly, *evolving in time*. CPS defense extends beyond the protection of infrastructure, and includes related domains, such as terrorism, and the collection of and tampering with critical tactical and strategic information vital to national security. Solutions for such problems must be able to handle the complexities inherent in these and related domains as well as operate well when unexpected actions are encountered.

A summary of the approach and future research directions will be offered in order to address enabling science and technology capabilities.

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