Resilience as an Engineered System Property

Does it Make Sense?
What Sense does it Make?

DRAFT WORKING PAPER

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Abstract

The concept of resilience as a property of engineered systems has garnered considerable attention in recent years. Yet the status of the concept remains unsettled and our ability to specify, realize, and assure resilience properties remains weak. We have conflicting conceptions of the origins of resilience, as either an engineered or merely a hard-to-anticipate emergent property. The relationship of resilience to other recognized properties, such as survivability, is unclear. We have numerous but informal and inconsistent definitions of resilience. We have various *mechanisms* that support particular, often narrow conceptions of resilience. At the same time, the resilience literature is sparse; there is little in the way of a broadly shared, precise understanding of resilience; we lack resilience specification languages and assurance techniques. This paper presents a survey and analysis of concepts of resilience as a system property, distinct from mechanisms, and assesses the status of the concept and needs for future research and development.

1 Definitions

The International Council on Systems Engineering (INCOSE) defines resilience as "the ability of organizational, hardware and software systems to mitigate the severity and likelihood of failures or losses, to adapt to changing conditions, and to respond appropriately after the fact [**?**]."

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