BSI Standards Publication

Systems and software engineering — Systems resilience concepts

National foreword

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The UK participation in its preparation was entrusted to Technical Committee IST/15, Software and systems engineering.

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Published by BSI Standards Limited 2026

ISBN 978 0 539 20786 6

ICS 01.040.35; 35.080

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2026.

Amendments/corrigenda issued since publication

Date	Text affected

International

ISO/IEC 9837

Systems and software engineering — Systems resilience concepts

Ingénierie des systèmes et du logiciel — Concepts de résilience des systèmes

First edition
2026-06

Reference number
ISO/IEC 9837:2026(en)

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Published in Switzerland

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

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As the complexity of systems continues to increase and the list of capabilities required of those systems continues to grow, systems are expected to deliver those capabilities under various conditions, including adverse ones. Resilience is the quality characteristic that enables systems to achieve this. Broadly speaking, systems resilience involves the capabilities of systems to avoid, withstand, and recover from adversity. Resilience goals are realized through application of techniques during processes related to requirements, architecture, design or operations of a system.

This document focuses on establishing systems resilience concepts that form the basis for understanding, building and enhancing the resilience of systems. It also provides a resilience framework that includes fundamental objectives, means objectives and techniques for achieving systems resilience. It is compatible with a system engineering approach and with system life cycle processes.

This document serves as a foundation for other documents related to various aspects of systems resilience.

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1 Scope

This document establishes concepts for understanding and improving systems resilience. Systems resilience addresses the capabilities of systems under adversity.

This document is applicable to human-created systems that can be either physical or conceptual, or a combination of both. It applies to systems as defined in ISO/IEC/IEEE 15288, including services and products. It is not intended to apply to naturally occurring systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Systems resilience fundamentals

3.1.1
resilience
ability to provide required *capability* (3.1.2) in the face of *adversity* (3.1.3)

Note 1 to entry: Under adversity, what is required of a system can be distinct from the capability required during normal operation.

Note 2 to entry: Resilience includes the ability to anticipate and adapt to, resist or quickly recover from a potentially disruptive event.

[SOURCE: MITRE Technical Report MTR-190495, 2019,[23] modified — Notes to entry have been added.]

3.1.2
capability
ability to do something useful under a particular set of conditions

[SOURCE: ISO/IEC/IEEE 24641:2023, 3.1.3, modified — Note 1 to entry has been removed.]

3.1.3
adversity
anything that can degrade the required *capability* (3.1.2) of the system, directly or indirectly

Note 1 to entry: In contrast to risk, which is the effect of uncertainty on objectives (as defined in ISO/IEC/IEEE 15288:2023, 3.39), adversity can be anything actual or possible.