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Reliability of systems, equipment and components –

Part 24: Guide to the integration of risk techniques in the inspection and testing of complex systems

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2014. It was prepared by Technical Committee DS/1, *Dependability*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

The following parts of BS 5760 have been published or are in preparation:

- Part 0: *Guide to reliability and maintainability*;
- Part 2: *Guide to the assessment of reliability*;
- Part 8: *Guide to assessment of reliability of systems containing software*;
- Part 10: *Guide to reliability testing*;
- Part 12: *Guide to the presentation of reliability, maintainability and availability predictions*;
- Part 13: *Guide to reliability test conditions for consumer equipment*;
- Part 18: *Guide to the demonstration of dependability requirements – The dependability case*;
- Part 24: *Guide to the integration of risk techniques in the inspection and testing of complex systems*.

Information about this document

This part of BS 5760 provides a methodology for applying risk-based techniques to optimizing the inspection and testing of complex systems.

Use of this document

As a guide, this part of BS 5760 takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

There is no universal definition of a complex system, but from a dependability standpoint its most important feature is that it is composed of interconnected parts that as a whole exhibit properties that are not easily discernible from the explicit properties of the individual parts. This includes most systems containing software.

Common features of a complex system include:

a) difficulty in determining the boundaries of the system;

b) complex systems within the system that make up the complex system; and

c) reuse of system elements from other complex systems.

As projects and acquisitions become increasingly complex, companies and governments are challenged to find effective ways to manage them. As programmes become more network-centric and complex, businesses are forced to find ways to manage complexity while governments are challenged to provide effective governance to ensure flexibility and resiliency.

The systems of the 1970s were largely stand-alone, analogue and mechanically controlled. In contrast the new systems address problems with more accurate, reliable, interoperable and maintainable systems. Current systems are often software intensive and network enabled with on-board complex sub-systems. The arising complexities are often the result of interactions among the systems and sub-systems and therefore cannot be tested and evaluated in isolation.

The live testing of complex systems is becoming increasingly expensive, particularly as many impacts and interactions result in the addition of new equipment or of complementary or adversary systems and performance. Testing regimes which seek to test every function of a system are also becoming increasingly time-consuming due to the complexity and nature of the systems. These challenges can be mitigated, however, by the careful incorporation of risk techniques in the development, assessment and testing of complex systems, which are covered in this standard.

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1 Scope

This British Standard gives guidance on defining complex system requirements and focuses on the important aspects that are needed to establish an efficient testing regime.

It also gives guidance on the inspection and testing of complex systems, including the integration of risk management techniques.

This British Standard applies to managers involved in the early development of a complex system, such as project managers, requirement managers, test managers and financial controllers.

NOTE This British Standard only makes reference to aspects such as risk management, project management and requirements management where such explanations aid this guide. Full details on these subjects are not the intent of this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4778-3.2 (IEC 60050-191), *Quality vocabulary – Availability, reliability and maintainability terms – Part 3.2: Glossary of international terms*

3 Terms and definitions

For the purposes of this part of BS 5760, the terms and definitions given in BS 4778-3.2 and the following apply.

3.1 business analyst
person who analyses the needs of a company for the future development of systems by defining its requirements

NOTE A business analyst is often referred to as a requirement analyst.

3.2 complex system
any type of system that is composed of interconnected parts

3.3 complex system requirement
desired technical or business outcome of a complex system, as defined internally within a company or externally by a customer

NOTE This is also referred to within the standard as a requirement.

3.4 customer
party requiring the complex system for implementation and use

3.5 designer
party responsible for the design of a complex system

3.6 developer
party responsible for developing the complex system

3.7 end-user
person from the target user group of the complex system

NOTE An end-user might be required for testing of the complex system while in development.