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Software Tool Qualification Considerations

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FOREWORD

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide tool qualification guidance. Additionally, clarification material is provided in the form of Frequently Asked Questions (FAQs).

1.2 Scope

Software tools are widely used in multiple domains, to assist in developing, verifying, and controlling other software. In the context of this document a tool is a computer program or a functional part thereof, used to help develop, transform, test, analyze, produce, or modify another program, its data, or its documentation. Examples are automated code generators, compilers, test tools, and modification management tools. This document explains the process and objectives for qualifying tools.

This document was developed for the following reasons:

a. Tools are different from the software using the tools and form a unique domain; therefore, tool-specific guidance for both tool developers and tool users is needed.

b. Tools are often developed by teams other than those who use the tools to develop software. These tool development teams frequently do not have software guidance background (examples of guidance include DO-178C or DO-278A). This tool-specific document benefits tool development teams and helps them avoid confusion and misinterpretation.

c. This document provides guidance for airborne and ground-based software. It may also be used by other domains, such as automotive, space, systems, electronic hardware, aeronautical databases, and safety assessment processes.

1.3 How to Use This Document

When a domain or a project desires to use this document, the following should be considered.

a. To offer maximum applicability and flexibility, five tool qualification levels (TQLs) are defined; however, not all levels may be applicable for every domain. Each domain should determine the applicability of the TQLs for their particular needs. Please reference the appropriate domain-specific document (such as an RTCA, SAE, or EUROCAE document) to determine if, and to what level, a specific tool needs to be qualified. As an example, Appendix B shows how the DO-278A domain defines the tool qualification criteria and the applicable TQL for ground-based communication, navigation, surveillance, and air traffic management (CNS/ATM) software. However, each domain may use different criteria. For example, they may not use all TQLs; they may have different tool criteria which map to the used TQLs; or they may adapt some of the objectives of this document for their particular applicability.

b. Throughout this document terms such as “software life cycle”, “software processes”, “software plans”, and “software” are used to refer to the product life cycle, processes, plans, and domain where the tool will be used (that is, a software domain is used instead of a generic domain). For other domains the word “software” may be replaced

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by the appropriate domain, such as, “electronic hardware”, “system”, “aeronautical database”, “aviation software”, etc.

c. The term “certification authority” is used as a generic term to identify the entity in charge of the approval of the tool qualification data. Likewise, the term “certification” is used generically to refer to the approval of the product using the tool by the applicable authorities. The term “applicant” is also used to identify the entity seeking software approval and/or tool qualification.

d. Possible intentions, interpretations, and adaptations of this document should be included in the appropriate plans in order to obtain approval by the appropriate certification authority.

e. Coordination between the tool life cycle and the software life cycle should be executed and documented in the following software life cycle data:

- A plan identifying the tools and their need for qualification. This data is named “Plan for Software Aspects of Certification” (PSAC) throughout this document.

- A summary and status of all activities performed, including the status of the tools to be qualified. This data is named “Software Accomplishment Summary” (SAS) throughout this document.

- A configuration index of the software environment, including the identification of the tools and the tool qualification data. This data is named “Software Life Cycle Environment Configuration Index” (SECI) throughout this document.

Regardless of the domain, equivalent data (which may have different titles) are expected to be produced.

f. In this document, it is assumed that the tool is used to eliminate, reduce, or automate a software life cycle process without the tool’s output being verified, and that these processes are defined in the form of a set of objectives. Therefore, the certification credit of the tool is associated with one or several objectives. It is possible that the guidance for a domain is not defined in the form of “processes” and “objectives”. In this case, the definition of certification credit should be adapted to the domain terminology.

g. For a domain where no guidance exists to define the tool qualification criteria and applicable TQL, a project in this domain may propose to use this document. The applicable TQL and its rationale should be defined in the project’s PSAC or equivalent document.

h. Users of this document should reference Annex A in order to determine applicability of objectives for each TQL.

1.4 Document Overview

Figure 1-1 provides an overview of this document. It should be noted that sections 1, 2, and 3, as well as the appendices contain explanatory information to aid the reader in understanding this document’s purpose (these sections are not considered to be guidance).

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