IEEE Standard Framework for Reliability Prediction of Hardware

IEEE Reliability Society

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IEEE Reliability Standards Committee

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IEEE-SA Standards Board

Acknowledgment

The Reliability Prediction Standards Development Working Group is saddened at the loss of one of the driving forces behind this standard's coordination committee. Jerry Cartwright, an IEEE member of the Minnesota Section who served on many IEEE Standards Working Groups, passed away in 2009. We acknowledge his contribution to the development of the first publication of IEEE Std 1413 and dedicate this revision to his memory.

Abstract: The framework for the reliability prediction for electronic hardware is covered in this standard. This standard identifies required elements for an understandable and credible reliability prediction with information to evaluate the effective use of the prediction results. A reliability prediction generated according to this standard shall have sufficient information concerning inputs, assumptions, data sources, methodology(ies), and uncertainties so that the risk associated with using the prediction results can be considered. This document does not provide instructions for how to perform reliability prediction and does not judge methodologies.

Keywords: assessment of reliability prediction, reliability, reliability prediction

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Introduction

This introduction is not part of IEEE Std 1413-2010, IEEE Standard Framework for Reliability Prediction of Hardware.

In May 1992, the U.S. Army Material Systems Acquisition Activity (AMSAA) and the Center for Advanced Life Cycle Engineering (CALCE)—Electronic Products and System Consortium (EPSC), University of Maryland, briefed the Army Standardization Executive, Mr. Darold Griffen, on the problems with the current reliability standards. The development of dual-use, nongovernment reliability standards, in lieu of revising Military Standards or Military Handbooks, was proposed as a means to satisfy industry and Department of Defense (DoD) administration policy. Reducing reliance on military specifications and standards later became a priority of Secretary of Defense Dr. William J. Perry. In 1993, a Process Action Team (PAT) was chartered by Deputy Under Secretary of Defense (Acquisition Reform), Ms. Colleen Preston, to address the transition of defense suppliers and contractors to commercial practices, processes, and products. The DoD PAT placed emphasis on participating with nongovernment standards bodies to jointly develop and use their standards.

AMSAA and CALCE EPSC began working with the IEEE Reliability Society to initiate an IEEE reliability prediction standard. A Reliability Prediction Standards Development Working Group was formed, consisting of participants from various commercial and government agencies, both from within and outside the United States. Written approval for the Project Authorization Request (PAR) from the IEEE Standards Board was obtained 13 December 1994.

The Reliability Prediction Standards Development Working Group began coordinating with the IEEE Standards Review Committee (RevCom) on developing and formatting the draft. The Working Group has been gathering and maintaining current information on the following areas:

— The best electronics reliability technologies and practices

— Recommendations from industry, government, and academia

— The dual-use nongovernment standards initiative

The Reliability Prediction Standards Development Working Group had interacted with other organizations that focus on reliability and produce nongovernment standards, including the Information Technology Association of America (ITAA) [formerly the Electronic Industries Association (EIA)], the Society of Automotive Engineers (SAE), the American Society for Quality Control (ASQC), Telcordia (formerly Bellcore), and the Institute for Environmental Sciences (IES). The Reliability Prediction Standards Development Working Group participated in meetings with these organizations and discussed the conversion of military standards to commercial national and international standards. The standardization organizations were supportive of the development of an IEEE reliability prediction standard, and participated in the development of this standard. Organizations outside the United States such as the British Telecom, Nippon Telephone and Telegraph, and CNET were also contacted and their opinions sought on the standard. In addition, personnel from these organizations participated in this development and reviewed the working documents. Their comments and contributions helped improve this standard.

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IEEE Standard Framework for Reliability Prediction of Hardware

1. Overview

The goal of this standard is to provide a framework for the reliability prediction of hardware for the disclosure of reliability analysis methods, and for all necessary information within a reliability prediction report. This standard can be used by the developer of the prediction for planning (e.g., gathering input information) and performing predictions, and by the user of the prediction to assess the value of the predictions. The usefulness of a reliability prediction is dependent on the accuracy and completeness of the information utilized as input to the prediction, and the analysis method(s) used to create the prediction. This standard has a supporting document, IEEE Std 1413.1™[1], which provides introductions to various methods of reliability prediction and offers guidance on how to assess a methodology as per this standard.

1.1 Scope

This standard provides the framework for performing and reporting reliability predictions. It applies to hardware products including electronic, electrical, and mechanical devices and assemblies.

[1] Information on references can be found in Clause 2.