



IEEE Standard Framework for Reliability Prediction of Hardware

IEEE Reliability Society

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IEEE Reliability Standards Committee

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IEEE Reliability Society

Approved 25 March 2010

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

The Institute of Electrical and Electronics Engineers, Inc.
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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 standardization 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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Michael Pecht, *Chair*

Louis J. Gullo, IEEE RS Standards Committee Chair and Liaison to IEEE-SA

Diganta Das, IEEE RS Standards Committee Vice Chair and Final Editor

Michael H. Azarian
Lori Bechtold
Joseph Childs
Robert Deppe

Jon Elerath
Harold Hart
Tyrone Jackson

Aridaman Jain
Fred Schenkelberg
Jack Sherman
Alan Wood

Others contributors who aided in the development of this standard by providing direction and attending meetings were as follows:

Michael Cushing
Ken Dalton

Dick Doyle
Dennis Hoffman

Jim McLeish
Paul S. ...

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Ali Al Awazi
Chris Bagge
Bakul Banerjee
Hugh Barrass
Lori Bechtold
H. Stephen Berger
Chris Brooks
Antonio Cardoso
Juan Carreon
Joseph Childs
Keith Chow
Charles Cook
Michael Cushing
Thomas Dineen
Carlo Donati
Douglas Dorr
Neal Dowling
David Fuschi
Ron Greenthaler
Randall Groves

Louis J. Gullo
C. Guy
Ajit Gwal
John Harauz
Michael Henry
Werner Hoelzl
Dennis Hoffman
Robert H. ...
Akio Ise
Atsushi Ito
Piotr Krocki
Kameshchandra Ketharaju
Yuri Khersonsky
Marc Lacroix
Susan Land
William Lumpkins
Edward McCall
Jerry Murphy
Michael S. Newman

William Petit
Ulrich Pohl
Iulian Profir
Annette Reilly
Robert Resuali
Michael Roberts
Robert Robinson
Bartien Sayogo
Fred Schenkelberg
Stephen Schwarm
Gil Shultz
James E. Smith
Thomas Starai
Walter Struppler
Marcy Stutzman
Thomas Tullia
Sterling Vaden
M. Karen Woolf
Oren Yuen
Janusz Zalewski

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Richard H. Hulett, *Vice Chair*
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Judith Gorman, *Secretary*

Karen Bartleson
Victor Berman
Ted Burse
Clint Chaplin
Andy Drozd
Alexander Gelman
Jim Hughes

Young Kyun Kim
Joseph L. Koepfinger*
John Kulick
David J. Law
Hung Ling
Oleg Logvinov
Ted Olsen

Ronald C. Petersen
Thomas Prevost
Jon Walter Rosdahl
Sam Sciacca
Mike Seavey
Curtis Siller
Don Wright

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Satish Aggarwal, *NRC Representative*
Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Lorraine Patsco
IEEE Standards Program Manager, Document Development

Matthew J. Concha
IEEE Standards Program Manager, Technical Program Development

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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 1413.1TM¹, 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.