Evaluate the Required level of Software Reliability Using Reliability Prediction

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Abstract- **In the Software Industry. The reliability growth model is a model of "how the system reliability changes over time during the testing process". As system failures are discovered, the underlying faults causing these failures are repaired so that the reliability of the system should improve during system testing and debugging. To predict reliability, the conceptual reliability growth model must then be translated into a mathematical model. In this Paper We Proposed a concept as evaluate the required level of reliability for Predict the Reliability. Here also discussed about the role of Reliability Prediction (or) Mean Time Between Failures(MTBF) and the Overview of Reliability Software and its features.**

Index Terms- reliability, testing, debugging and prediction.

I. INTRODUCTION

Now a Days,The reliability growth modeling involves comparing measured reliability at a number of points of time with known functions that show possible changes in reliability. For example, an equal step function suggests that the reliability of a system increases linearly with each release. By matching observed reliability growth with one of these functions, it is possible to predict the reliability of the system at some future point in time. Reliability growth models can therefore be used to support project planning. I have simplified reliability growth modelling here to give you a basic understanding of the concept. If you wish to use these models, you have to go into much more depth and develop an understanding of the mathematics underlying these models and their practical problems. Littlewood and Musa have written extensively on reliability growth models and Kan has an excellent summary in his book.

II. USAGE OF RELIABILTY PRIDICTION

Different authors have described their practical experience of the use of reliability growth models. Here, We can predict reliability by matching the measured reliability data to a known reliability model

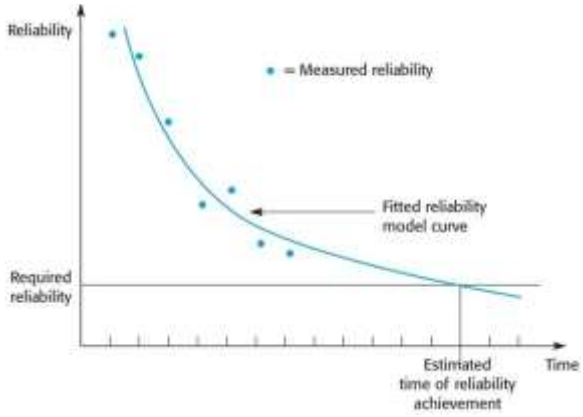

Figure 1 Reliability prediction

We then extrapolate the model to the required level of reliability and observe when the required level of reliability will be reached is shown in above Figure 1. Therefore, testing and debugging must continue until that time.

The Predicting system reliability from a reliability growth model has two main benefits:

- *Planning of testing:* In the given current testing schedule, We can predict when testing will be completed. If this is after the planned delivery date for the system then you may have to deploy additional resources for testing and debugging to accelerate the rate of reliability growth.
- *Customer negotiations:* In Some Situations the reliability model shows that the growth of reliability is very slow and that a disproportionate amount of testing effort is required for relatively little benefit. It may be worth renegotiating the reliability requirements with the customer. Alternatively, it may be that the model predicts that the required reliability

will probably never be reached. In this case, you will have to renegotiate the reliability requirements with the customer for the system.

III ROLE OF RELIABILTY PREDICTION (OR) MEAN TIME BETWEEN FAILURES

In the Duration of the reliability analysis or process, the reliability prediction or MTBF (Mean Time Between Failures) has many functions and is often the foundation for any analysis. Whether we are designing new or updating an existing system, The ITEM ToolKit is one of the concepts, it can assist in determining the impact of proposed design changes. It is also provides a deeper understanding of acceptable reliability levels under environmental extremes. You can evaluate acceptable limits of failure for your system, or meet overall design goals and the requirements of your clients as well.

Here, there are five ITEM ToolKit reliability prediction modules provide powerful and competitive advantages.

- Combine prediction methods for complex analysis
- Optimize designs to meet targeted goals
- Select components with regard to reliability and cost savings
- Be more accurate and efficient than with manual methods
- Take advantage of powerful "what if" analytical tools

The ITEM Toolkit offers the greatest flexibility and ease of use in 5 reliability prediction modules. The modules MIL-217, Telcordia , NSWC, IEC 62380 and China 299B all share a powerful set of features and capabilities for inputting and utilizing data in multiple operations. Now we can generate the most complete analysis for your purposes. Perfect for both military and commercial applications

The ITEM ToolKit reliability prediction modules can aid in locating areas for potential reliability improvement. The software offers the most advance and diverse Multi-Document Interface features allowing you to construct and analyze your system with accuracy and speed.

IV OVERVIEW OF RELIABILTY SOFTWARE

The Reliability Software modules of ITEM ToolKit provide a user-friendly interface that allows you to construct, analyze, and display system models using the interactive facilities. Building a hierarchies and adding new components could not be easier. ToolKit calculates the failure rates, including mean time between failure (MTBF), associated with new components as they are added to the system, along with the overall system failure rate. Project data may be viewed both via grid view or dialog view simultaneously, allowing predictions to be performed with a minimum of effort.

Each reliability prediction module is designed to analyze and calculate component, sub system and system failure rates in accordance with the appropriate standard. After the analysis is complete, ITEM ToolKit's integrated environment comes into its own with powerful conversion facilities to transfer data to other reliability software modules of the program. For example, transfer your MIL-217 project data to FMECA or your Bellcore project to RBD. These powerful facilities transfer as much of the available information as possible, saving you valuable time and effort.

Features:

a) Hierarchy Diagrams

The Users can interactively construct" hierarchy diagrams" that represent the structure of a system at various hierarchical levels. As new components are added to the system, each module automatically calculates and updates all dependent and overall failure rates.

b) Parts Count & Parts Stress Analysis

When adding components to your system, ITEM ToolKit automatically employs the applicable default values (Parts Count). The Parts Count generally requires less information such as part quantities, quality levels and the application environment. It is the most applicable early in the design phase and proposal formulation. You have the option of modifying these values to meet specific system or project requirements (Parts Stress). The Part Stress Analysis requires more detailed information and is usually applicable later in the design phase.

c) MTBF & Failure Rate Calculations

MTBF and Failure rates are automatically computed and displayed for all levels of systems and projects.

d) Redundancy and Repairable Calculations
Each reliability software module of ITEM ToolKit includes redundancy and repairable options for calculations of availability and failure rates at block and system levels.

e)User Defined Linked Blocks
The Linked Block is a graphical representation of an existing block that assumes the exact characteristics of another block in your System. Linked Blocks enable you to reduce repetitive data entry. Changes made to the source block will automatically update in the Linked Block.

f) Pi Factors
Each module calculates and makes visible the various Pi Factors used to calculate the Failure Rates for the Component categories per the ap g)"What If" Study
"What-if" studies allow you to preview and evaluate the feasibility and quality of your design and the selection of your components. This allows you model the system, change components, and see the effects without having to construct an actual system.

h) External Arrhenius Temperature Model for User Defined Failure Rates
For some designs you use a component which cannot be modeled using a Component Category known to the standard, or you have a failure rate from a manufacturer of a subassembly. By using the External component and the Arrhenius temperature model, you can introduce a non-standard component into you analysis, and vary the failure rate with temperature via the Arrhenius temperature formula

i)Reliability Allocation
The Allocation models logically apportion the product design reliability into lower level design criteria, such that the cumulative reliability still meets the requirements. ITEM ToolKit performs allocation analysis at two levels, project and system level.

ITEM ToolKit contains the following five allocation models:

- Equal Allocation
- AGREE Allocation
- Feasibility of Objective Allocation
- Repairable Systems Allocation

j) Derating
The Derating is the selection and application of parts and materials. So that the applied stress is less than rated for a specific application. For example, derating is the negative slope of a power-versus-temperature graph. It shows that as the operating ambient temperature increases, the output power of a particular component drops to ensure reliable system operation. Derating curves provide a quick way to estimate the maximum output power of a device at a given temperature.

Following are the commonly used derating standards that are included within ITEM ToolKit :

- NAVSEA TE000-AB-GTP-010
- MIL-HDBK-1547
- MIL-STD-975M (NASA)
- NAVAIR-AS-4613 Class A
- NAVAIR-AS-4613 Class B
- NAVAIR-AS-4613 Class C
- User Defined Derating Files

V. CONCLUSION

In the Software Engineering. A reliability growth model is a model of how the system reliability changes over time during the testing process. As system failures are discovered, the underlying faults causing these failures are repaired so that the reliability of the system should improve during system testing and debugging. To predict reliability, the conceptual reliability growth model must then be translated into a mathematical model. . . In this Paper We Proposed a concept as evaluate the required level of reliability for Predict the Reliability. Here also discussed about the role of Reliability Prediction (or) Mean Time Between Failures(MTBF) and the Overview of Reliability Software and its features. In this features of Reliability Software, we use ITEM ToolKit. The ITEM ToolKit is contains some allocation Models and standards. This ITEM ToolKit is used for more Reliability Concepts in the Future

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