

CHAPTER 13

TEST, ANALYSE AND FIX

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1. INTRODUCTION

1.1 Test Analyse and Fix (TAAF) or more correctly Test Analyse Fix re-Test (TAFT) is an engineering activity that is incorporated into the Reliability Growth process (see Part C Chapter 15 and Part D Chapter 8). The term TAAF is often used to describe the sequence of activities by which the failure modes are identified, analysed and corrected, and the corrective action finally validated. It should be noted that ‘fix’ refers only to correction through re-design and modification to eliminate the cause of failure and does not imply repair.

1.2 Frequently development programmes pay lip service to growth and do not included appropriate TAAF methodology as part of the maturity process relying on reliability qualification testing and statistics analysis to support the contention of contractual compliance. This approach has been demonstrated to be both flawed and ineffective frequently resulting in programmes over-run and budgets to be exceeded.

2. PLANNING

Detailed TAAF planning should be addressed during the assessment phase of a project (see Part C Chapter 15) however because of the cost and time incurred by TAAF such constraints should be considered early in the projects concept phase to ensure that resources are made available where necessary and that the options for TAAF form part of any trade-off studies.

3. APPLICATION

3.1 Reliability growth and the process of TAAF as previously stated are both expensive and time consuming. Much can be gained on the drawing board and the implementation of engineering best practice during the early design development process however while the component and assembly may function adequately in one application they may fail in another and it is the well designed TAAF that should be employed to identify the shortfalls and resolve the weaknesses.

3.2 TAAF can be implemented at any stage of the development process but to be effective the timing of its implementation needs to be appropriate to the maturity of the development. In the early stages of a project it may be advantageous to develop the reliability of components and sub-assemblies then as the project matures and these items are integrated into larger assemblies, complete equipments and systems to develop the reliability of that complete solution. The application of TAAF should not however be limited to new design but considered as an option to development whenever change is likely to occur including, modification, enhancements, upgrades, etc.

4. TAAF PROCESS

4.1 The TAAF process needs to be a closed loop methodology of test, analyse, fix, re-test and where necessary analyse, fix, re-test and so on until the required objective have been obtained. The process should consider that:

Testing: is conducted under the some operating and environmental condition whether they are practical or simulated, as the item or system will experience in usage.

Systems designed for use in harsh conditions are unlikely to demonstrate their failure modes when tested under a benign environment. Conversely harshly testing systems to be employed in a benign environment is courting failure and unwarranted development and additional costs.

Analyse: needs to compliment the usage and the failure modes underpinned by an effective DRACAS and reporting system. There is little point in resolving a failure mode using design and engineering best practice when the failure was caused by human error and should have been avoided. Effective analysis can only be achieved with a sound and appropriate data-set obtained from staff that are trained, well briefed and feel part of the end to end development process.

Fix: should resolve the weaknesses and address all aspects of the failure mode including engineering, human and interface. Care needs to be taken to ensure that while resolving one shortfall others are not created. Where human error is likely to reoccur an engineered option may provide the better long term solution however a simple instruction or improved training may equally prove adequate in other circumstances.

Re-test: needs to be under the same conditions and duration to those when the original failure occurred to ensure that the shortfall has been resolved without introducing additional failures.

4.2 When systems do not fail or do not fail in a predictable manner the test scenario should be examined to ensure that it is appropriate for the application and that failure modes are not being exploited due to inadequate testing.

4.3 Where the system under test fails after fix and re-test then the cycle of TAFT should be repeated until the objectives have been achieved.

5. RISK MANAGEMENT

Appropriate risk management is an ongoing project activity which is frequently overlooked during the process of developing solutions and resolving problems. The very nature of TAAF is to encourage systems to fail and in turn address their weaknesses. Proactive risk management provides one of the forums to keep participating stakeholders informed of the systems development and its potential to achieve future compliance.

