Engineering Solutions
Government Services

NDIA Automatic Test Committee

Projects Report

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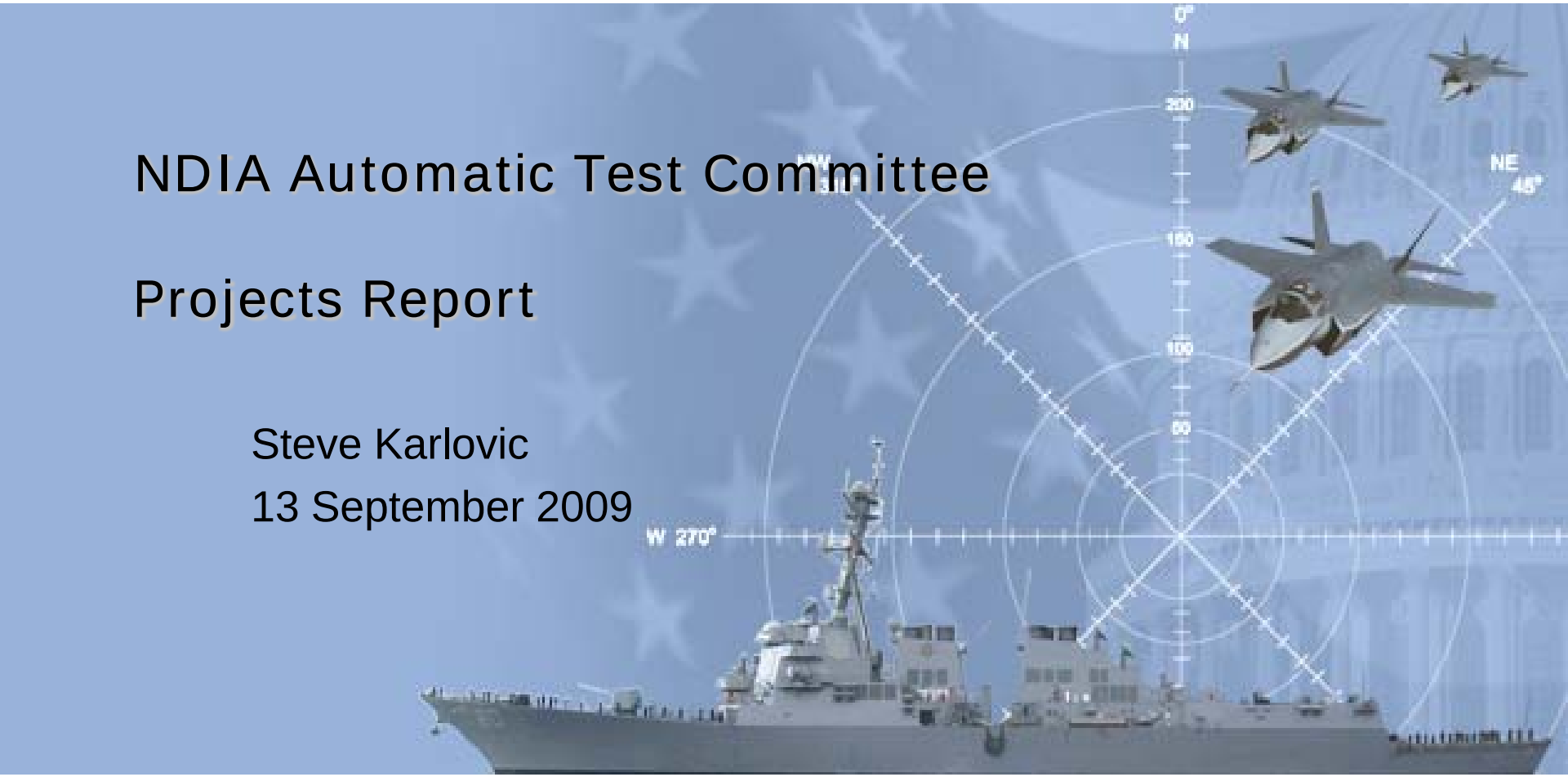

Active Projects

- MIL-PRF-32070 Tasker
  - Response approval and closeout
- .PDF Format Alternative
  - Bill Birurakis
- Board Test Technologies Tasker
  - Scott Brown, Boeing IDS, Project Team Lead

MIL-PRF-32070 Tasker

- DoD ATS Executive request for inputs on 25 March 2009 for potential cost, technical or schedule impact to the TPS development process.
- Comments received from two firms
- Preliminary input provided to DoD IPT on 23 August 2009
- Subsequent additional inputs received from two additional firms
- Revised final response to be discussed & approved

Subsequent Inputs

- AAI
  - While a worthwhile goal, making the ambiguity size smaller will absolutely drive cost, schedule and put an unnecessary burden on both the TPS supplier and the Accepting Gov't Rep. The quality of a TPS is primarily determined by its ability to verify that the Unit-under-test operates sufficiently such that the "next higher level" assembly meets its expected peak performance (is RFI). Despite the fact that Isolation to a single assembly may becoming more likely … it should be viewed as a bonus that in many cases, simply is not affordable.
  - Add that the biggest driver to ID hardware reliability (the need for active circuitry) is tied to the capability of the host ATE. If the TPS designer needs to extend ATE capability, active hardware with reliability issues will have to be used. If the ATE is robust, passive IDs are more likely and the MTBF will be very high. This issue, like fault localization, is subjective, and I would recommend that the 10,000 hours should be a goal.

Subsequent Inputs

- Teradyne
  - Nothing significant has been done to improve functional test diagnostic ambiguity since the original document was created. New techniques such as boundary scan will dramatically improve diagnostics in new digital designs for purely structural faults, relieve the functional tests from having to diagnose simple faults, but do nothing for diagnosing the remaining functional faults. In addition, there are very few assemblies with boundary scan deployed in the fleet.
  - ITAs are becoming more complicated, therefore maintaining MTBF is becoming more difficult. In newer designs the current tendency is to have increasingly complex ITAs with active circuitry.

Recommended Final Version

- The NDIA Automatic Test Committee has reviewed the proposed changes to MIL-PRF-32070 as requested in the DoD ATS Executive Directorate letter dated 25 March 2009 for potential cost, technical or schedule impact to the TPS development process. We offered representatives from fifteen industry firms the opportunity to comment on the advisability of these changes. Several firms with extensive experience in test technology and test program set development provided inputs, which were consolidated and subjected to group review. This represents the consensus of the Automatic Test Committee.
- Specifically, we considered the following proposed changes:
  - LRU Fault Isolation to be changed from 3/2/1 SRAs 100/95/90% to 1 SRA 100%
  - SRU Fault Isolation to be changed from 7/5/3 Components 100/95/90% to 3/2/1 Components 100/95/90%
  - Test Program Hardware (TPH) MTBF to be changed from 5,000 operating hours to 10,000 operating hours

- With regards to the improvement in fault isolation ambiguity requirements (items 1 and 2), it should be noted that nothing significant has been accomplished towards reducing functional test diagnostic ambiguity since the original document was created. New design for test technologies, such as boundary scan, will dramatically improve diagnostics in new digital designs for purely structural faults and will relieve the functional tests from having to diagnose simple faults. However, boundary scan will do nothing for diagnosing the remaining functional faults. It should also be noted that technologies like boundary scan have not been widely deployed within the DoD's fleet/field electronics inventories, so the majority of UUTs do not have the benefit of these technologies.
- While reduced ambiguity group size would definitely provide benefits, we believe that the proposed requirements changes will absolutely drive cost and schedule, and put an unnecessary burden on both the TPS supplier and the accepting Government representatives (through increased waiver/deviation processing, etc.)

- However, it should be noted that this conclusion applies only to the “business as usual” approach of functional testing and TPS development implicit in MIL-PRF-32070. There are several alternative diagnostics technologies, which are nicely summarized in the attached document created by member company Lockheed Martin. These approaches may enable the Government to obtain the benefits of improved diagnostics accuracy sought in the proposed changes to MIL-PRF-32070, particularly for SRUs. We anticipate that changes to MIL-PRF-32070 would be required to permit and encourage use of these alternative technologies.
- In a related action, the NDIA Automatic Test Committee is also summarizing available Board Test technologies (which address many of these alternative techniques for SRUs) and will be providing a separate report that may be of use in this regard.
- In summary, we recommend that the fault isolation ambiguity requirements not be changed. Rather, the Government should consider a review of MIL-PRF-32070 to allow (and encourage) the use of alternative test and diagnostic technologies.

- With regards to the Test Program Hardware (TPH) MTBF requirement, it is generally possible to design passive TPH today for general purpose ATE systems that exceed a 10,000 hour MTBF. However, UUT characteristics often require signal conditioning to enable the UUT to be tested (or even to work when connected to TPH). In addition, limitations of fielded ATE often requires additional signal conditioning and/or stimulus and measurement circuitry to achieve test and diagnostics requirements.
- This circuitry comes in the form of active components that need to be located in the TPH, and which are typically the most common reliability degraders in TPH. There will likely be a large number of instances where the 10,000 hour requirement will impose a significant cost penalty.
- One approach might be to impose the 10,000 hour requirement for passive TPH, and a lower number, such as 5000 hours, when active components are required in the TPH. We recommend such an approach.