DoD Military Standard for Configuration Management

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ARDEC Mission

Advanced Fuze Technologies

Artillery & Mortar Systems

R&D

SUPPORT TOTAL LIFE CYCLE

Conventional & Smart Munitions

DEMIL

FIELD SUPPORT

Combat Vehicle Armaments & Fire Control

PROD

Logistics R&D

Special Operations Weapons & Demolitions

Advanced Energetics & Warhead Development

Non-Lethal Technologies

Small Arms

Providing over 90% of the Army’s Lethality
ARDEC

- ARDEC has ~ 3500 employees, 85% engineers and scientists.
- Most products defined by Government owned and controlled TDPs (ordnance drawings).
- ~ 2 million documents in drawing repository.
- ~ 200K 3D (Pro/E) models in repository.
- ~700 active products.
MIL-STD-973 was the US Department of Defense (DOD) standard on Configuration Management cancelled in 2000 as part of acquisition reform.

EIA-649 Commercial Consensus Standard on Configuration Management was the official DOD replacement for MIL-STD-973. (EIA 649 is currently controlled by TechAmerica, a US trade association)

Despite its cancellation, MIL-STD-973 is still widely used in the DOD.
Why is MIL-STD-973 Still Used?

- EIA-649 is a high level, "best practices" document.

- The intent of EIA-649 was industry/company would create sub-tier standards to define their specific configuration management practices. DOD has not developed such a "sub-tier" standard.

- EIA 649 is not a "contractually implementable" standard.
  - Lacks “hard” definitions of terminology.
  - Lacks specific implementation guidelines.
  - Lacks forms for execution of configuration control.

- EIA 649 was written assuming a standard business process and is not specific to DODs method of conducting business.
Standard Business Process vs DOD Business Process

- Every product goes thru life cycle phases of:

- Standard Business Model to execute this life cycle:

  ![Diagram of Standard Business Model]

- Typical DOD Business Model to execute this life cycle:

  ![Diagram of Typical DOD Business Model]
Why does DOD need a MIL-STD?

- When MIL-STD-973 was cancelled, a variety of “workarounds” were implemented, i.e. local contract clauses, local SOPs, CM Plans, continued reference to cancelled -973, etc. As time progresses, these workarounds begin to deviate and a loss of standardization occurs.

- The cancelled version of MIL-STD-973 it is out of date with respect to EIA-649 terminology and best practices

- The cancelled version of MIL-STD-973 provides no guidance on configuration management of 3D model based TDPs as defined in MIL-STD-31000

- Configuration management forms do not contain needed data fields.
More Background

- Effort to update and reinstate MIL-STD-973 started (informally) March 2010.
- Multiple meetings held at NIST-Gaithersburg (2) and with TechAmerica (5) late 2010 and 2011.
- DOD recommended formal Gap Analysis be conducted to determine best path forward.
GAP Analysis Recommendation

- “Implement the approach to develop and publish a CM military standard based on MIL-HDBK-61A and consistent with TechAmerica EIA-649-B that is tailorable and coordinated with industry, and “
- “Task the Army (ARDEC) as the Preparing Activity to prepare a coordinated implementation plan for development of a military standard and provide status updates at Council meetings until completed.”
Additional Guidance from OSD

• Give the document a new number (i.e. not -973) (Rationale: so that everyone is clear that we are not just bringing back the old MIL-STD-973, but moving in new directions that include configuration management of 3D data and software).

• Keep options open to do “the right thing.” So if during the course of the standards development the working group concludes that a revised TechAmerica standard or a DoD addendum to the EIA 649B would be a better option, those options are still available.

• Advise several industry associations (NDIA, AIA, TechAmerica) of the DSC standards decisions and see whether they would care to participate.

• DIDs will also need to be updated or cancelled concurrently with this CM standard development effort.
Status of Standard

• The draft update to the MIL-STD revised multiple times since March 2010.
• Latest draft (with DIDs) baselined 29 June 2011 and sent out for comments.
• Approx 400 comments received.
• Currently working to more closely integrate draft MIL-STD with EIA-649B.
## Systems Eng/Tech Reviews Standards Being Developed

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# Mfg/QA Standards Under Consideration

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<tr>
<td>MIL-STD-1528</td>
<td>Manufacturing Management Program</td>
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<tr>
<td>MIL-STD-1535</td>
<td>Supplier Quality Assurance Program Requirements</td>
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<td>MIL-HDBK-896</td>
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# LSA Standards Under Consideration

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<td>MIL-HDBK-502</td>
<td>Acquisition Logistics</td>
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Specific Issues in MIL-STD Draft

1. RFD/RFW versus RFV.
2. Elimination of the Specification Change Notice (SCN).
3. Problem /Issue Reporting.
5. Classes of ECP: From two classes (i.e. Class I & II), to three classes (Major, Minor, Admin).
6. Definition of As-Designed, As-Built, As-Maintained baselines.
7. Forms of Product Configuration Documentation
   - Detailed TDP
   - Performance based TDP/Spec
   - Commercial Item
8. Update of DIDs
Request for Waiver and Request for Deviation are both request to depart from the approved configuration baseline.

- EIA-649 uses single term Request for Variance.
- Current plan is to proceed with single term RFV.
Elimination of Specification Change Notice

- Rationale for elimination: A Specification is no different than any other document. It can be changed via ECP/NOR like other documents.

- Statement from Para 6.4 of MIL-HNDK-61

  “Note: Requirements for SCNs should be eliminated because of their administrative complexity and because in the digital environment, it is preferable to maintain the specification current at all times and to archive each proceeding version. Furthermore, paragraph rather than page control of specifications is feasible and desired. Revised paragraphs can be inserted into the ECP, and be approved as part of the ECP, or where that is not practical, submitted to the approving authority during ECP implementation.”
Problem/Issue Report

- ECPs and RFVs generally start as a problem, improvement request, manufacturing stoppage, etc.

- Problem/Issue Reports are widely used in many different capacities to address these issues. Also known as Feature Change Request, Quality Deficiency Reports, Improvement Reports, etc.

- Problem/Issue reporting is “built in” to many configuration status accounting systems such as Windchill and CM-PRO.

- Not intended to create a new Configuration Management “rice bowl”. Just establish terminology and linkage with CM.
Alternate Change Process

1. Changes the order the document gets revised from post change approval to pre-change approval.
2. Eliminates “hanging paper” issue.
3. Could be more costly if changes are disapproved/modified.
4. Requires access to master document and native CAD environment.
Classes of ECP

- Recommended change from two classes to three.

- **Rationale:** Design changes naturally fall in three categories:
  1. Class A - Major design changes (improvements/changes which will impact the end user or maintainer)
  2. Class B - Minor design changes
  3. Class C - Administrative (typos, clarifications, etc)

- **Benefit:** Provide more granularity in assignment of class and gives flexibility in process/approval authority

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<tr>
<td>CLASS I</td>
<td>MAJOR</td>
<td>CLASS-A MAJOR</td>
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<td>CLASS II</td>
<td>MINOR</td>
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<td>CLASS-C ADMINISTRATIVE</td>
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ECP CLASS DEFINITIONS

Class A-Major. An ECP which affects safety, substantially alters end use form, fit or function, or significantly impacts any following requirements:

1. Performance.
2. Reliability, maintainability, durability or survivability.
3. Weight, balance, moment of inertia.
4. Interface characteristics.
5. Electromagnetic characteristics.
6. Other technical requirements in the specifications.
7. Impact to logistical support requirements, such as training, technical or operational manuals, spares, maintenance procedures or equipment, etc.
8. Cost.
9. Re-qualification of the item.
10. Need to retrofit existing items.

Class A-Major changes are generally changes that are significant to the degree that the end user or maintainer of the equipment will perceive changes in performance, operational characteristics, operational or maintenance documentation or other means.

Class B-Minor. An ECP which does not meet the definition of Class A-Major; and affects or potentially affects form, fit or function, producibility, material, visual characteristics, marking, packaging, etc. Class B-Minor ECPs are generally additions, deletions or changes to minor physical features; minor changes to requirements which do not impact end use functionality; changes to dimensions, tolerances, materials, quality assurance requirements, packaging, marking, etc.

Class C-Administrative. An ECP which does not meet the definition of a Class A or B. Class C-Admin ECPs affect the configuration documentation only, not the configuration of the item, and therefore do not affect, or have the potential to affect, end item use, form, fit or function, interface or any other performance characteristics. Class C-Admin ECPs are generally changes such as correction of typographical errors, addition of information for clarification, changes to title block information or distribution legends, changes to MBD datasets which do not affect the design, minor format changes, changes to reference documents, etc.
As-Design/ Built /Maintained

A product configuration exist in several forms:

- **As-Designed.** Exists only in the form of documentation (the documented product baseline at the time of manufacture).

- **As-Built.** The instantiation of the As-Designed in actual product at the time of manufacture.

- **As-Maintained.** The As-Built as it changes over time while in-service.
COMPARISON OF AS-DESIGNED:AS-BUILT:AS MAINTAINED CONFIGURATIONS

TIME

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<th>MONTH 1</th>
<th>MONTH 2</th>
<th>MONTH 3</th>
<th>MONTH 4</th>
<th>MONTH 5</th>
<th>MONTH 6</th>
<th>MONTH 7</th>
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AS-DESIGNED

AS-BUILT

AS-BUILT

AS-BUILT

FIELD MOD ADD HOLE

FIELD MOD ADD HOLE

AS-MAINTAINED

AS-MAINTAINED
Forms of Product Configuration Documentation

From the perspective of the Acquiring Activity, the Product Configuration can exist in one of three forms (or a mixture of these three):

1. **Detailed Design TDP** (the product is defined in detail-materials, dimensions tolerances, etc.)
2. **Performance Based TDP/Specification** (the product is defined via performance, without detail design requirements)
3. **Commercial Item Definition** (the product is defined with a commercial name and part number)

Every product, and component within a product, must use one or more of these formats to define the item.
## DID Review

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<td>DI-CMAN-81248</td>
<td>Interface Control Document (ICD)</td>
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<td>DI-MGMT-81453</td>
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• QUESTIONS?