

Multi-User Engineering Change Proposal (ECP) Automated Review System (MEARS)

1.0 Purpose

The MEARS application provides an automated ECP review process designed to eliminate the massive duplication of paper inherent in the current process throughout the Department of Defense (DoD). MEARS provides for electronic creation of ECPs, Requests for Waivers/Requests for Deviations (RFWs/RFDs), and Problem Change Reports (PCRs), as well as, on-line review, comment, and disposition (electronic Configuration Control Board [CCB]). MEARS was originally developed as a result of the Department of Defense CALS initiative, and was conceived from a set of CALS Cost Benefit Analysis Studies performed in FY90 by the MICOM CALS Office. These studies demonstrated potentially large savings in the area of ECP automation.

MEARS allows reviewers to review a complete document, including all engineering drawings, that are affected by the proposed change. It allows ECP reviewers to make comments on all aspects of the ECP and allows for these comments to be viewed by all other ECP reviewers. The tool also allows for automated voting.

Some of the benefits of MEARS include:

- Expedites the overall ECP review process by allowing ECPs to be received, entered in the system, reviewed, and voted on the same business day.
- Allows reviewers to return comments as soon as they are formed and allows for these comments to be viewed by other reviewers.
- Allows reviewers to automatically check the status of any ECP.
- Allows reviewers responses and comments, both intermediate and consolidated, to be entered and stored in MEARS digitally. These comments will become attached to the document and will be accessible (read only) to subsequent document reviewers.
- Allows for electronic voting, potentially eliminating the need for CCB Meetings for the majority of ECPs/RFWs/RFDs.

Current users have reported a return on their investment within 6 - 12 months, depending on the ECP traffic for their weapon system.

2.0 Functionality

The major function of MEARS is to allow Type I and Type II ECPs, developed outside and within the government, to be received by the government and entered and stored in an electronic format. The tool allows for electronic review of ECPs and for the acceptance and storage of ECP reviewers' comments and recommendations. The data flow in MEARS is identical to that of the typical paper ECP review process with the exception that the package is distributed, reviewed, and commented on in electronic format. This electronic format can greatly reduce the review process time.

The tool supports:

- MIL STD-973 and MIL-STD-480;
- Engineering Change Proposals (ECPs) (DD Form 1692);
- Request for Deviation/Request for Waiver (RFD/RFW) (DD Form 1694);
- Problem Change Reports (PCRs).

MEARS consists of three components:

- MEARS Create: an SGML document creation tool used to create change documents in the required MEARS format;
- MEARS Review: an SGML reader used by change document reviewers to view documents and drawings in a hypertext format; also allows users to register their votes, input comments, and view other's comments;
- MEARS System Utilities: provides an SGML Parser that allows the validation of change document text files in accordance with the MEARS Create Document Type Definition (DTD) and provides an automated tool to maintain the MEARS review hierarchy.

3.0 System Description

MEARS interfaces directly with the Configuration Management Information System (CMIS), which is a standard DoD system selected for configuration management by the Joint Logistics Systems Center (JLSC). MEARS was adopted by the JLSC as an integral part of CMIS - MEARS automatically populates the CMIS database with data contained in delivered change documents. Prospective MEARS installations are not required to use the whole CMIS package, however, all CMIS users have MEARS as a part of CMIS. When a site has MEARS without CMIS, the change documents are stored on a central server and inactive documents are archived, but information cannot be queried or sorted as it can be when CMIS or another relational database is used. MEARS by itself is not a database.

MEARS utilizes the CALS compliant text interchange format, Standard Generalized Markup Language (SGML), and CALS-compliant graphics. SGML enables automated relational database loading and also enables hypermedia review of engineering change documents. Contractors and other change document creators are required to deliver documents conforming to the MEARS Document Type Definition (DTD). The MEARS Create tool uses the Interactive Authoring and Display System (IADS) to create the SGML change documents in the correct format, and this tool is provided to the contractor along with training when MEARS is deployed.

The infrastructure required for MEARS includes:

Architecture:	Client/Server
Operating Systems:	Windows 3.1 or higher (PC) Unix (Usually high-end workstations)
Databases supported:	N/A

Client Hardware (min.): Hard Disk Space: 40 MB minimum, 150 MB recommended.
 Memory: 8 MB
 Processor: 80486 (or higher)

Client Software: Windows 3.1 or higher (PC), Unix (Usually high end workstations)
 MEARS utilizes Faxview but it is distributed with the software so
 there is no cost to the user.

Development Environment: C/C++ (Windows), C (Unix)

An X-Windows version of MEARS, MEARSx, was released in March 1995. MEARSx supports the Sun, HP, and Dec Alpha platforms.

4.0 Future Upgrades

The current version of MEARS is 5.1, which was released in September 1996. The most important feature in this release is the incorporation of an SGML Editor. Enclosures/ attachments can now be created in MEARS Create without the difficulty of memorizing SGML tags and their placement. The editor has interactive checking that will not allow users to type invalid tags. Also included is a spell checker. Some other minor changes in this version include:

- The user has the option to "Review from Fileserver", which does not download the document to the local system. This option will be very helpful for large documents that would take a long time to download.
- The user can view the document status without downloading it.
- Incorporated IADS 2.2 (upgrade from 2.0).
- The option to "clear" your vote from the screen was added.
- The system accepts longer weapon system names (54 characters vs. 8).
- A Problem Change Report (PCR) form was added to the list of supported DoD forms.
- On-line MIL-STD-973 help in MEARS Create component.

Version 6.0 is currently under development, and anticipated release is in May '97. This release will add a new document to MEARS, the Notice of Revision (NORs). The NORs will be SGML tagged, same as ECPs/RFDs/RFWs/PCRs. This version will also include a "generic" database feature, meaning MEARS will populate any database (CMIS, CMstat, TD/CMS, etc.) with ECP data. A Government owned/developed graphics package is also being evaluated which would allow for red-lining capability on graphics.

A World Wide Web version of MEARS is currently being developed that should be released in Dec '97. A prototype of the www version was demonstrated at CALS Expo (Oct 96) and the feedback was extremely positive.

5.0 Deployment Schedule

Although the software is free, there is a \$20,000 fee to implement MEARS for a weapon system. This fee covers guidance for successfully implementing MEARS, travel, labor, training, and documentation. In addition, the user will receive all software and documentation upgrades as well as access to the MEARS Help Line.

The following list includes the current and planned MEARS installations:

- PATRIOT Program Office, U.S. Army Missile Command, Redstone Arsenal, AL
 - Paperless ECP review process since March 1994
 - 124 electronic ECPs dispositioned
 - 150 reviewers on-line
 - 5 international reviewers
 - First year paper savings \$250,000
- Multiple Launch Rocket System (MLRS) Program Office, U.S. Army Missile
 - No paper since October 1995
 - 45 ECPs dispositioned
 - 120 reviewers on-line
 - 6 international reviewers
- Army TACMS/BAT Program Office, Redstone Arsenal, AL (in progress)
- TMDE, Redstone Arsenal, AL (in progress)
- Air To Ground Missile System (AGMS) Program Office, Redstone Arsenal, AL
 - First electronic ECP due from contractor on 4 June 1996
- Also planned for Redstone Arsenal: Hellfire and Javelin programs
- Watervliet Arsenal, New York (full production)
- AMRAM Program, Eglin Air Force Base, FL (partial production)
- Combat Mobility Systems Program Office, TACOM, Warren, MI
 - Electronic ECP from contractor expected early June
- CECOM, Ft. Monmouth, NJ
- STRICOM, Orlando, FL
- Naval Air Warfare Center, Pt. Mugu, CA
- Marine Corps Logistics Center, Albany, GA
- NAVAIR H60 Program, Washington, DC (in progress)
- NAMSA, Luxemburg
- PATRIOT, Germany
- Naval Surface Warfare Center, CA

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