United States Marine Corps
Logistics Requirements Funding Summary (LRFS)
Cost Estimating Tool (CET)

A Quick Cost Estimator for Logisticians Part II

SCEA Conference – Orlando, FL
June 2012
Background
- What is an LRFS?
- Booz Allen Task Specifics
- Challenges in Developing an LRFS
- Why do you need the USMC LRFS CET?
- Requirements and Constrains

LRFS CET Overview
- Tool features
- User Interface
- Application of Result Uncertainty Calculation
- Example Outputs

Future Areas of Interests

Recognitions

Summary
- USMC LRFS CET Benefits
Background
Background – What is an LRFS?

- Definition: The Logistics Requirements Funding Summary (LRFS) is a breakdown of product support functions and sub-functions to establish a required level of product support. It identifies product support requirements and the funds available to meet those requirements. (source: Defense Acquisition University)
  - LRFS displays requirements versus funding for all IPS elements and related disciplines, by fiscal year and appropriation, and is traceable to logistics support plans.
  - LRFS supports Independent Logistics Assessment (ILA) review process to ensure support funding requirements for each IPS element are appropriately identified, funding is available, and shortfalls identified.
Background – LRFS Relationship to LCCE/POM

System and Support System Requirements

LRFS

ILA

LCCE

Milestone Assessment Team supporting MS Decision

Continued development, production & fielding of capabilities that Equip the Nation’s Expeditionary Force of Choice

LRFS/LCCE Output Transition to POM/Budget

PPBES

POM

Presented at the 2012 SCEA/ISPA Joint Annual Conference and Training Workshop - www.iceaaonline.com
Reviewed current DoD, Navy/USMC policies and guidance
Conducted a market survey of existing tools relating to LRFS development
Conducted data collection and cost estimating methodology development including compiling rates and factors from various sources
Conduct regular IPT meetings that helped define tool’s CES, key capabilities, testing and training requirements
Deployed full version 1.0 - June 2011
Provide post tool deployment support – June 2011 to June 2012: (training, maintenance & enhancement)

Background - USMC LRFS CET Task Specifics

- **Phase I** (May 2009 – June 2010)
  - Initial development of 9 logistics modules
  - Initial development of user interface
  - Initial development of help interface
  - Initial documentation

- **Phase II** (June 2010 – June 2011)
  - Continued development of 7 remaining logistics modules
  - Continued development of user interface
  - Inclusion of Risk analysis
  - Conduct initial testing

- **Phase III** (June 2011 – June 2012)
  - Continued testing
  - Cost element structure updates
  - Rates and factors, updates
  - Develop tool enhancements
  - Provide user support
  - Configuration management
  - Support SharePoint site
  - Develop and conduct training events
Logisticians are traditionally responsible for completing an LRFS. However, cost estimating skills often fall outside the logisticians’ domain of expertise.

- Lack of cost estimating knowledge in developing LRFSs
- Lack of familiarity of financial management standards by the logistician
- Lack of standardization in Cost Element Structure (CES) and lack of sufficient supporting details
- Lack of sufficient data in conducting estimate (i.e., actuals, cost estimating factors, CERs, etc.)
- Inconsistent allocation of costs to their appropriate cost element (recurring/nonrecurring or functional elements)
- Inaccurate use of phasing, escalation factors, and appropriations
- Inconsistent review process
Background – Why do you need the LRFS CET?

The USMC LRFS Cost Estimating Tool (CET) is an Excel-based user-friendly tool designed to allow program managers and logisticians to quickly generate LRFSs for all types of Marine Corps programs. The LRFS CET includes a library of cost models for all the IPS elements and related disciplines and incorporate statutory and regulatory requirements. The USMC LRFS CET enables users to:

- Provide a more efficient, effective and accurate means of developing LRFSs
- Provide visibility of logistics support requirements
- Inform resource and assessment sponsors of logistics support requirements
- Serve as the format for presentation of support and associated funding requirements throughout program development at all acquisition milestone decision forums
- Can be tailored to meet the program’s support objectives
- Support LCCE, POM submission, and budgetary decisions
- Assist in evaluating a weapon system’s (or information system’s) logistics costs associated with different proposals in a source selection
**Background – Requirements and Constraints**

- **Tool Must Be Excel 2007-based**
  - Users are familiar with Excel applications
  - Tool needs to run on existing USMC computers and software
  - Excel is powerful and integrates with VBA well

- **Tool Must Be User-Friendly**
  - Visual Basic user interface will guide users through the LRFS development process
  - User interface supports “Turbo Tax™” approach for quick cost estimating
  - Tool will collect the information needed that is readily available to users

- **Tool Must Be Designed for Non-Cost Estimators**
  - Logisticians using the tool will have little or no cost estimating experience
  - Tool must have existing repository of cost models to develop estimate
  - Tool must provide documentation for cost models to allow users to defend estimates
  - Tool must provide a standard process for estimation within USMC

- **Tool Must Incorporate New Cost Element Structures (CES) for each USMC LRFS CET Module**
  - Previous CES does not include all logistic cost elements for a program
  - Previous CES is not standardized or defendable
  - CES must reflect the requirements included in the ILA Checklist
  - CES must be approved by SMEs and IPT members. Extensive SME/IPT participation is required
USMC LRFS CET Overview
USMC LRFS CET Overview – What is the USMC LRFS CET?

User Input Forms

Uncertainty Analysis

Cost Model Library

USMC LRFS Cost Estimating Tool Features

Standardized Cost Element Structure

Reports

Presented at the 2012 SCEA/ISPA Joint Annual Conference and Training Workshop - www.iceaaonline.com
USMC LRFS CET Overview –
How the USMC LRFS CET Functions

Step 1:
User provides data via interface forms

Step 2:
A Cost Model (equation) is selected from
a database for each cost element in each
module; an estimate is calculated

Step 3:
User reviews estimate by:
• Adding/Editing Costs
• Reviewing/Modifying Appropriations
• Reviewing/Modifying Cost Models (equations)

Step 4:
User inputs confidence in
data to allow simulations
of estimate to produce
results that account for
uncertainty

Step 5:
The USMC LRFS CET estimate is exported in
common arrangements for sharing, further
analysis, and inclusion in reports and briefs

Step 6:
Using the estimate the user is able to
organize, and display the data in
reports and briefs
USMC LRFS CET Overview – User Interface

Programmatic Inputs
- Gathers key inputs from user about the LRFS estimate being generated including:
  - Estimate Name
  - Mil-881 Category
  - Acquisition Category
  - Commodity Type
  - Program Schedule
  - LRFS Schedule
  - Support Strategy
  - Joint Program / Lead Service

Cost Element Inputs
- Allows the user to further review and refine the estimate for the module they have selected with key inputs and operations including:
  - Review Cost Elements by Roadmap Phase
  - Model Selection Customization
  - Additional Costs
  - User Review Status
  - Appropriations Customization
  - Cost Element Search

System Level Inputs
- Gathers key inputs from user about the program/system including:
  - Program Status
  - Variant Inputs
  - Fielding Schedules
  - System Costs

Module Selection Inputs
- Allows the user to select a specific logistic module and provide key inputs for that module including:
  - Module Interviews
  - Module Specific Information
  - Cost Element Search

Estimate Outputs
- Allows the user to save and/or export results in various configurations including:
  - Estimate Summary
  - Completion Statistics
  - Detailed Results
  - “Popular” Results (LCSP, PIB Input, etc)
  - Model Customization
  - User Inputs
  - Fielding Schedule
  - Module Questionnaire Responses
  - Appropriation Customization
  - Uncertainty Calculation of Results

Interactive Help Feature
- Provides assistance based on the user's current location in the tool including:
  - Tool Navigation Help
  - Definitions
  - Common Cost Estimating Procedures
  - Advanced Reference Material
Can be accessed from any form in the tool at any time without interrupting the estimate by clicking "help" button.

Browse or search capability.

Detailed information available down to the cost element level.

Automatically navigates user to appropriate topic based on location in the tool.

USMC LRFS CET Overview – Interactive Help Feature

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Interface allows user to create new data file or load existing data file.
Interface prompts user to provide basic program information

Throughout the tool, “Tool Tips” provide quick information to the user on each data field

LRFS schedule is automatically generated based on user provided start date and base year

Available throughout the tool, users can provide notes for future user reference in the tool and outputs

User is provided with on-screen explanation of the commodity selected

Tool allows user to provide program schedule dates and can accommodate omitted Milestones

User can specify support specifics including strategy, joint program status, and lead service

USMC LRFS CET Overview – Programmatic Inputs Interface

Interface prompts user to provide basic program information.

Throughout the tool, “Tool Tips” provide quick information to the user on each data field.

LRFS schedule is automatically generated based on user provided start date and base year.

Available throughout the tool, users can provide notes for future user reference in the tool and outputs.

User is provided with on-screen explanation of the commodity selected.

Tool allows user to provide program schedule dates and can accommodate omitted Milestones.

User can specify support specifics including strategy, joint program status, and lead service.
Interface prompts user to provide basic information on the system.

Can accommodate costs for multiple program variants within a family of systems.

Can calculate an automatically phased fielding schedule or user may enter a specific schedule manually.

User can specify the status of the program and view an on-screen explanation of the program type selected.

Although not required, the user may specify any or all of three types of system unit costs.
Interface allows user to provide input on commonality for each variant of the system.

Individual fielding rates and costs can be accommodated for each variant.
USMC LRFS CET Overview – System Level Inputs: Fielding

Interface allows user to provide various types of fielding information for the system.

Precise schedule inputs at the Fiscal Year provide enhanced accuracy.

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<table>
<thead>
<tr>
<th>Schedule Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Schedule Description</strong></td>
</tr>
<tr>
<td>1. Testing Schedule</td>
</tr>
<tr>
<td>2. Low Rate Initial Production</td>
</tr>
<tr>
<td>3. Full Rate Production</td>
</tr>
<tr>
<td>4. Fielding</td>
</tr>
<tr>
<td>5. MARFORSC Fielded</td>
</tr>
<tr>
<td>6. Formal School Houses Fielded</td>
</tr>
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</table>

**Instructions:**
- Enter the number of units associated with each Fiscal Year for applicable schedules.
- Enter the OPTEMPO associated with each of the five cumulative fielding designations.
- Units are acceptable for OPTEMPO (e.g., miles, hours, rounds, etc.).

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<th>Manual Schedule and OPTEMPO Input</th>
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<td>30</td>
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<table>
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<tr>
<th>Cumulative Fielded Schedules</th>
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<td><strong>OPTEMPO</strong></td>
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<td><strong>FY11</strong></td>
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<td><strong>FY13</strong></td>
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<td><strong>FY14</strong></td>
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<th>MARFORSC Fielded</th>
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<td><strong>TOTAL</strong></td>
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<tr>
<td><strong>FY09</strong></td>
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<td><strong>TOTAL</strong></td>
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</tr>
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<thead>
<tr>
<th>Total Units</th>
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Booz Allen Hamilton

Presented at the 2012 SCEA/ISPA Joint Annual Conference and Training Workshop - www.iceaonline.com
Interface allows user to review and refine module level information.

User is provided with an on-screen explanation of the cost module selected.

User has the opportunity to answer a module specific questionnaire to refine the estimate.

Keyword search identifies which modules contain specific cost elements.
Dynamic Interface displays a separate Module Interview for the cost module selected.

In addition to dynamic interview questions, capability of importing data from existing support tools is offered.

AC ALPS Tech Manual Estimator

AC ALPS Facilities Impact Report Response
USMC LRFS CET Overview – Cost Element Interface

- **Dynamic Interface** displays specific information for the cost module selected.
- **User selected organization of cost elements by AC ALPS Roadmap phase** allows focus on specific elements at any given time.
- **Cost element list** allows users to quickly navigate and identify reviewed and overridden cost elements.
- **Model override feature** allows advanced users to control cost models.
- **Confirmation feature** allows users to flag reviewed cost elements.
- **Appropriation feature** allows users to customize the appropriation for each cost element.
- **Additional cost feature** allows advanced users to add specific costs.
- **Summary row** displays phased costs for each cost element.
- **User is provided with an on-screen explanation of the cost element selected.**
Dynamic Interface allows the input of four types of additional costs without leaving the form.

Embedded databases allow user identify cost factors including Travel location, Per diem rates, Facility location, labor rates, and more.
Interface allows user to select specific results to output for specific cost modules.

Completion statistics illustrate percentage of estimate reviewed by user.

Selections allow the output of the estimate by appropriation quickly and easily.

User provided information can be outputted for future reference.

Selections allow the output of any model adjustments made.

Results can be exported for use in other documents or saved.
USMC LRFS CET Overview – Uncertainty: Confidence Interface

Form is accessed from Uncertainty Calculation button located on LRFS CET Outputs Form

User is provided with inputs for confidence level for each module

Customization for each module available coefficient of variation input

Calculation of 10,000 trials (maximum trials) for all modules estimated to be less than 10 minutes

Separate tab for each appropriation
# USMC LRFS CET Overview – Uncertainty: Outputs

Uncertainty output for each module is replicated for each appropriation.

<table>
<thead>
<tr>
<th>Element</th>
<th>Mean</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
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<td>LRFS USMC</td>
<td>$49,095</td>
<td>$7,776</td>
<td>$1,741</td>
<td>$8,875</td>
<td>$1,602</td>
<td>$1,319</td>
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<td>$0</td>
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<td>Maintenance Planning</td>
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<td>$0</td>
<td>$0</td>
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Cost values for all CES elements stored at multiple confidence levels by APPN.

Customizable cumulative probability charts generated for each estimate for each appropriation.

Table of popular data point values provided for each appropriation.
Once the LRFS CET output options have been selected, corresponding data is exported to a separate workbook for use in further calculations, briefs, and documents.

<table>
<thead>
<tr>
<th>Q.5</th>
<th>Element</th>
<th>ADG/USMC Estimate</th>
<th>FY08</th>
<th>FY09</th>
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<tr>
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<td>$4,596,300</td>
<td>$5,930,900</td>
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</table>
Future Areas of Interests
Future Areas of Interests

**USMC LRFS CET Training/Support Sustainment**
- Training
  - Initial Training (New Hire/First Time User)
  - Legacy Training (Current Users)
  - Advanced Training (Seasoned Users)
- Support
  - Demonstrations
  - User Assistance
  - SharePoint Site

**USMC LRFS CET Cost Analysis Sustainment**
- Rates and factors updates
- What-if Scenario Analysis
- Statute and Policy Alignment Issues
- Increased Sensitivity of Methodology

**USMC LRFS CET Tool Sustainment**
- Administration and Visual Basic maintenance
- Platform / Application environment issues
- Outputs
- Module updates

**USMC LRFS CET Enhancements**
- Ad hoc enhancements to fit emerging needs
- Additional Risk Features
- Total Ownership Costs
- Average Operations and Support Costs in a “Typical” Mid-Life Year
- Expand the tool to other services
- Upgrade platform (.NET, SharePoint, Etc.)
Recognition
USMC LRFS CET: Recognition

Acquisition Excellence Day
June 8, 2011
MCSC Commander’s Excellence in Operations
Research Systems Analysis Award

I am very confident this will greatly enhance our ability to plan, justify and defend our future POM efforts.

- Logistics Chief PM NV/RSTA, PEO IEW&S

Society of Cost Estimating and Analysis (SCEA) – Washington Area Chapter
January 25, 2012
2011 Technical Team Achievement Award

The tool will reap a lot of goodwill and create efficiencies that Defense Secretary has been looking for in the Acquisition community.

- Log Ops Spt Tm Lead, AC ALPS, MCSC

The LRFS tool has a lot of great benefits and will become a very valuable tool for all logisticians.

- PEO Integrated Warfare Systems, IWS, U.S. Navy
Summary
Generates LRFS Cost Estimates Automatically

The USMC LRFS Cost Estimating Tool produces quick cost estimates and provides results ready for POM input and the ILA process
- Automatically generates a complete estimate based on provided input
- Override capabilities allow for estimates to be tailored to specific program requirements
- Exported data organized to support quick discovery of results for inclusion in other processes, briefs, and documents (LCSP, CARD, LCCE, PIB, etc)

Uses Built-in Cost Methodologies

The USMC LRFS Cost Estimating Tool does all the calculations for the user with accuracy
- Interface designed to input appropriate data for the estimate
- Uses a repository of documented cost model data
- Provides uncertainty analysis capabilities
- A review indication helps keep track of progress and cost elements that have been checked for inaccuracies
- Automatically adjusts estimates with latest rates and factors

Provides Cost Estimating Capability to Logisticians

The USMC LRFS Cost Estimating Tool prompts the user for data and compiles the inputs directly into relevant cost models
- Minimal training required to get started
- Step-by-step interface guides logisticians though cost estimating processes with fields designed specifically for users unfamiliar with LRFS Cost Estimating
- Searchable Cost Element Structure identifies logistics elements
- Programmatic information requested is often readily available
- Context-sensitive, interactive help features allow for browsing or searching for answers effectively

Conforms to USMC Acquisition and Logistics Best Practices

The USMC LRFS Cost Estimating Tool supports MARCORSYSCOM / PEO LS initiatives
- Standardized LRFS Cost Element Structure (CES) and process
- Utilizes latest AC ALPS Logistics Roadmap
- Compatible with the IPS Elements
- Facilitates the inclusion of LRFS results in the LCCE
- Logistics requirements identified for POM submission (PIB)
Questions?

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Backups
Background – LRFS Relationship to LCCE

Related events:
- IOC
- FOC
- Disposal
- Full Rate Production & Deployment
- Production Readiness, LRIP & IOT&E
- System Capability & Manufacturing Demonstration
- Integrated System Design
- Engineering & Manufacturing Development
- Materiel Solution Analysis
- Technology Development
- User Needs & Technology Opportunities

Legend:
- (LRFS) – an LRFS may or may not occur
- LRFS – LRFS Required
- LCCE – LCCE Required
The LRFS feeds into the LCCE but the two do not merge precisely.

- The timeframe of interest for the LCCE tends to be longer than the LRFS
- Some LRFS elements crosswalk directly to the LCCE (e.g.; Initial Spares)
- Other LRFS elements are only a portion of the costs seen in a LCCE element (e.g. Costs of Conducting Initial PBL BCA and Detailed PBL BCA is part of the SEPM Cost)
Training, Demonstration and Testing
Mine Resistant Ambush Protected Vehicle (MRAP) Program - Cougar Variant was chosen to test the capability of the tool to accommodate unique programs

- Test objectives included:
  - Create a USMC LRFS for the MRAP program Cougar variant
  - Validate and document the LRFS CET as dictated by the Test Plan to determine if the LRFS CET suitable for deployment

- The MRAP Program is unique from other urgent needs ACAT I-D program in two ways:
  - The MRAP Program Office conducted an open competition which required a review of several designs from various contractors in a short period of time to accommodate the aggressive and accelerated program schedule. The review allowed the program to determine the final design of the Cougar vehicles which are grouped into two vehicle categories (CAT I and CAT II) each represented by several variants
  - The MRAP Program Office continued to redesign the vehicles through a series of Engineering Change Proposals (ECPs) within a year of the Full Rate Production Decision (FRPD which significantly deviated from the normal acquisition process
The LRFS CET produced an estimate that identifies a more comprehensive set of requirements than the Baseline in FY11.
USMC LRFS CET Testing – Usability and Performance (1 of 3)

The primary purpose of testing was to ensure that the USMC LRFS CET accommodates users of varying computer, logistics, technical, and cost estimating expertise and provides them with the functionality to develop cost estimates.

- To ensure tool quality, the test ensured that the test objectives were met by answering:
  - Does the tool exist on the MS Excel 2007 Platform within the MS Windows XP Operating System?
  - Does the USMC LRFS CET verify ease of learning and understanding of the tool with testers that have varying computer experience?
  - Can the tool be considered as “user-friendly” and intuitive for Logistics Requirements Funding Summary Cost Estimating?
  - Does the tool provide the capability to address programs’ costs, schedules, and factors with USMC participation to provide a sufficiently accurate cost estimate given minimal information and expertise?
  - Was the user able to use the tool with the training provided in order to develop the cost estimate? In other words, was the training adequate?
  - Was the user able to navigate the tool easily using the help menu?
  - Does the tool meet the functional needs of the user in developing the cost estimate?
  - Does the user feel confident that they will be able to use the tool in the future?
USMC LRFS CET Testing – Usability and Performance (2 of 3)

Test Event Details:

- Test conducted on 1-31-11 through 2-2-11
- LRFSs created for four test programs
- Briefs created for each test program and presented to mock ILA review panel
- Continuous learning points awarded to participants
20 completed Test Participant Surveys were collected for the test
39 completed Test Incident Report Forms were collected for the test

Overview of Usability and Performance Test Survey Results

- **Future Use**
  - Responders Disagreed or Strongly Disagreed: 4%
  - Responders Neutral: 12%
  - Responders Agreed or Strongly Agreed: 84%

- **Help Functionality**
  - Responders Disagreed or Strongly Disagreed: 12%
  - Responders Neutral: 60%
  - Responders Agreed or Strongly Agreed: 28%

- **Functionality**
  - Responders Disagreed or Strongly Disagreed: 9%
  - Responders Neutral: 27%
  - Responders Agreed or Strongly Agreed: 64%

- **Learning**
  - Responders Disagreed or Strongly Disagreed: 16%
  - Responders Neutral: 29%
  - Responders Agreed or Strongly Agreed: 49%

- **Training**
  - Responders Disagreed or Strongly Disagreed: 16%
  - Responders Neutral: 22%
  - Responders Agreed or Strongly Agreed: 62%
Hands-On Training Demonstrations

Objectives:
• Generate and LRFS with the USMC LRFS CET
• Perform basic navigation throughout the tool
• Use support resources for the USMC LRFS CET
• Perform basic risk analysis of results
• Introduction to concepts of inflation, the AC ALPS Roadmap, Acquisition Logistics

Hands-On Training provided to:
• MRAP (Pilot)
• PEO LS
• PM TRASYS
• PG10
• GCSS
• PG16

Navy
• NAVSEA
• NAVAIR
• NCCA

Other Organizations
• I&L (TLCM)
• Expeditionary Energy Office
• LOGCOM
• CD&I
• MORS
• SCEA
• SOLE

Army
• CECOM
• ODASA-CE
• PEO IEW&S
• PEO Soldier
• NV/RSTA

MARCORSYSCOM
• MRAP
• AC PROG
• GCSS-MC
• PEO Land Systems
• All Product Groups
• PM TRASYS, et al

Demonstrations provided to:

Hands-On Training

Provide users with experience to utilize the USMC LRFS CET in MCSC for current and future programs.

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Demonstrations provided to:
USMC LRFS CET – Demonstration and Training

USMC LRFS CET Users
(Sample Taken March 2012)

- Contractor: 32%
- Government: 63%
- Military: 5%

Total Users: 489

USMC LRFS CET Training Participants
(Sample Taken March 2012)

- Contractor: 43%
- Government: 56%
- Military: 1%

Total Training Participants: 166