Solving the Mystery of the US Army Corps of Engineers Research Labs

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ERDC-CERL
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Agenda

- CERL Overview
- MILCON Requirements & Standardization Integration (MRSI)
- Sustainment Management System (BUILDER™)
USACERL History

1966 – USACE Proposal for Construction Engineering Research Laboratory (Mil Con Only)
1967 – National Academy of Sciences Recommends Collocation With Major University
   * University of Illinois Selected - One of Top Three Engineering Programs in the Country
1969 – Dedication of Champaign-Urbana Facility
1972 – Environmental Quality Mission Added
1974 – Energy Conservation Mission Added
1999 – CERL was integrated into ERDC
A Full Service R&D Center Affiliated with

...a Premier Research University

USACERL

University of Illinois

Champaign Urbana

Innovative solutions for a safer, better world
Full Service R&D Excellence

Technology for Sustainable Installations

- Diurnal Cooling Storage System
- Heating, Ventilating and Air-Conditioning Test Facility
- Microbiology Lab
- Controlled Archaeological Test Site
- Paint Technology Center
- Environmental Processes Lab
- Structural Load Floor
- Synthetic Bio Lab
- Triaxial Earthquake and Shock Simulator
- Air Pollution Lab

BUILDING STRONG®
Innovative solutions for a safer, better world

BUILDING STRONG®

1. Military Lands & Ranges
2. Sustainable Installations
3. Resilient Facilities and Infrastructure
4. Smart, Sustainable Materials
5. Installation Decision Support
6. Urban and Stability Operations

Technical Program Areas

ERDC
Innovative solutions for a safer, better world
R&D Investment Strategy

R&D -- Unique DoD Problems

Threatened & Endangered Species: Protection Plans, Several Sites

Exploit Emerging Technologies

R&D -- Critical DoD Problems

HVAC Control Panels: Over 4000 In Use Gain 25% Eff.
Storage Cooling Systems Ft. Jackson, $500K/Yr Savings
Our People Make the Difference

Acoustical Engineers
Agronomists
Architects
Bioacousticians
Biologists
Civil Engineers
Chemical Engineers
Chemists
Community Planners
Computer Engineers
Computer Scientists
Ecologists
Electrical Engineers
Environmental Engineers
Environmental Scientists
Foresters
General Engineers
General Physical Scientists
Geographers
Industrial Engineers
IT Specialists
Materials Engineers
Mathematicians
Mechanical Engineers
Metallurgists
Microbiologists
Natural Resource Specialists
Operations Research Analysts
Physicists
Social Scientists
Sociologists
Structural Engineers

Total: 266 (206 Federal Employees; 4 Military; 56 Contractors)

ERDC-Champaign Campus: 316 (50 from ERDC CSD & Other Labs)
Our Customers, Soldiers, Families, and Civilians

Home to the Force

Power Projection

Work & Training

... are Army Customers!

BUILDING STRONG®

Innovative solutions for a safer, better world
Transferring Technology Beyond DoD

DENIX: More than 8,000 individual DoD users and 80,000 public users

PAVER
ASTM Standard/Worldwide Use

ProjNetSM: An “Engineer Ready” asset - 6 Federal, 3 State users
ERDC Partnership Role

- **Problem solvers** – provide customers with interdisciplinary, technical expertise, and institutional knowledge

- **Technology advisors** – know the state-of-the-science and help customers make the right technology choices

- **Technology developers** – can develop or modify existing technology to meet customer needs

- **Business improvement partners** – optimize resource efficiency and effectiveness via technology and access to ERDC personnel and its unique partnering authorities
MILCON REQUIREMENTS AND STANDARDIZATION INTEGRATION
MRSI

Umbrella site for providing the facility community with the tools and knowledge needed to build and maintain the Army’s facility infrastructure.

MRSI Modules:
- Model RFP
  - MILCON Wizard
  - SRM Wizard
- USACE Center of Standardization
- Parametric Design Report System
- MILCON Business Process
- E&C Sustainability
- Combat Readiness Support Team

MRSI Use:
- Over 2,420 User Accounts
- Over 2,818 page views per day
- Over 147 unique visitors per day

https://mrsi.erdc.dren.mil
Model RFP

- Provides a consistent format for Request for Proposals.
- Makes it easier for prospective contractors to submit accurate proposals.
- Ensures criteria and Army Standards compliance during design authoring and reviews, contract awards, and delivery of facilities.
- Supports new acquisition strategies, one change in model updates all future RFPs.
- Centers of Standardization provide standard facility design scopes of work.
- Criteria updates made by HQ and subject matter experts.
RFP Wizards

- Model RFP generated using web-based tool called RFP Wizard.
- RFP Wizard provides standardization while letting users define project and facility specific variables.
  - RFP Wizard for MILCON Design-Build Projects (FY08-FY15):
    - Over 534 RFPs locked and completed
    - Over $9 billion in DD 1391 program cost
    - Over 47 million square feet of programmed space
  - RFP Wizard for SRM Projects (FY12-FY15)
    - Uses standardized (UNIFORMAT II compliant) descriptions of systems and components as well as standard templates to create more consistent RFPs.
    - Allows import of work items, “deficiencies”, generated by BUILDER™.
    - Allows for development of non-BUILDER™ work items.
Website is used by the Centers of Standardization to disseminate all the necessary information related to MILCON Business Process and standard design development.

Provides USACE Field Executioners and A/E Partners with:

- Army Standards
- USACE Standard Designs
- COS Points of Contact
- COS Facility Pages
- DD1391 Templates
- Legacy Studies
- Adapt-Build Models
- Misc. Documents
  - LEED Checklist
  - Animations
  - Utility Demand Estimates
  - Energy Models
  - RFP Wizard Input
  - COS Policy and Procedure
SUSTAINMENT MANAGEMENT SYSTEM
Facility Managers’ Needs

Lifecycle Management Tools

Provide investment guidance to:

- **Objectively** assess infrastructure across the enterprise
- **Consistently** analyze investment requirements and prioritize scarce resources
- **Track** investments to ensure key stakeholder requirements are addressed
- **Forecast** the investment requirements for budget defense and course of action analysis

Delivered as GOTS solution for agencies to own and operate
Process

**Inventory**
- Real Property Inventory
- Component Inventory

**Assessment**
- Condition Assessment
- Functionality Assessment

**Prediction**
- Component Degradation
- Remaining Service Life

**Investment Planning**
- Requirements Generation
- Prioritization
- Budgeting

**Forecasting**
- Course of Action (COA) Analysis

Integrate with CMMS (Maximo™, Tririga™, SAP™, Archibus™, etc.)
Component-Level Asset Management

- Uses industry-standard UNIFORMAT II hierarchy
- Populate data from existing systems, including CMMS, legacy data, BIM, and parametric models

Model connects behavior (degradation) with investment activity
Responsive Component Management

Adaptive model predicts performance of each unique component; identifies best time to invest.
Investment Approach

- Standards: Thresholds trigger investments for assets below performance requirements (CI)
- Policies: Rules apply different standards to different assets
- Investment Plan: Generate work items for assets failing assigned standards. Costs estimated and ROI optimized.
- Prioritization: Score each work item according to metrics for risk, impact, financial benefit, etc.
- Budget: Identify funding sources and fund work items according to budget rules

Enterprise-defined rules generate consistent requirements portfolio-wide
Supporting Investment Decisions from Site to HQ level

Investment is tied to specific assets; establishes **transparency, traceability** and **accountability**
What-If Analysis

Allows changing inventory, policies, prioritization, funding, and forecast period to determine different outcomes. Supports:

- Budget Creation
- Budget Defense
- Course Of Action Analysis
- Out-year strategic condition trends
  - Will levels meet current mission requirements?
  - Will levels meet future mission requirements?

Actionable intelligence built from the component up
Forecasting

Impact on Portfolio of Funding at 90%, 70% and 50% of the Requirement

Supports analysis at any and all levels of Enterprise
OUTCOMES

Engineering-based investment plan

✓ Provides decision support to all echelons of the organization
✓ Highlights investment opportunities to stretch limited SRM resources
✓ Balances mission and economic priorities based on mission requirements
✓ Provides course of action analysis
  • Avoidance of big ticket item failure (Future Shock)
  • Awareness of the consequences of today’s decisions (Law of Unintended Consequences)
✓ Provides a consistent [F]CI calculation based upon objective assessments and Enterprise-defined rules

All at costs 50-75% less than deficiency-based facility assessments
# Sustainment Management System Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>BUILDER</strong></td>
<td>for Building Components Program Management</td>
</tr>
<tr>
<td><strong>PAVER</strong></td>
<td>for Airfields and Roads</td>
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<tr>
<td><strong>RAILER</strong></td>
<td>for Track</td>
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<tr>
<td><strong>ROOFER</strong></td>
<td>for Roofing Project Management</td>
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New Fuels and Utilities modules are under development.
Nearly 1 Billion Square Feet implemented using a wide variety of In-House, USACE, and contracted resources; adaptable to organization’s requirements
Commercial interest and use of BUILDER is available from these distributors:

- Atkins Global
- Calibre
- Cardno
- FM Projects
- Inflection Network
- North Pacific Support Services
- TetraTech
More Information

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https://mrsi.erdc.dren.mil

- MRSI Resources

http://www.sms.erdc.dren.mil

- SMS Resources

http://www.erdc.usace.army.mil

- Installation Operations (more products and expertise from the Engineer Research & Development Center)