Flexible Cradle to Grave Data Management Tools for Complex Tasks Including Data Visualization, Data Evaluation, Optimization, and Site Closeout

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Projects without a full featured Data Management System

Fast

Perfect

Defensible

Cheap

Reproducible
Projects with a full featured Data Management System

Perfect
Defensible
Reproducible

Fast
Cheap
Typical Data Flow

- **Field Sample Management**
- **Laboratory**
- **Electronic Data Deliverable (EDD)**
- **Survey**
- **Data Validation**
- **Chain of Custody Forms**
- **GIS Spatial Database**
- **Existing Network (LAN, WAN or Internet)**
- **Data Management using Site Environmental Evaluation (SEE) Software**
- **Electronic Transfer to Client (ERPIMS, ERIS, etc)**
- **Visualization**
- **Simulation**
- **Risk Assessment**
- **Document Production using Direct Links to Word Processing**
- **Tables & Figures**
- **Full Size 2D & 3D Figures**
All Data should originate from a single source

- Avoid duplicate data entry/corrections
- Identify Owner/Administrator and be realistic
- If master version of data is another database, then update information frequently
Database information exchange approach

Source Database

Temp Table

Destination Database
Case Study: Database Information Exchange at MMR

- USACE EDMS (2 Mil Records)
  - Weekly update
  - Submission of completed data

- Jacobs SEE MMR Working Database (4.5 Mil records)
  - Weekly update

- AFCEE MMR Data Warehouse (2 Mil records)
  - Weekly update

- AFCEE HQ ERPIMS
  - Submission of completed data
Populate as much data as possible

- The sum of the QA/QC benefit is greater than the sum of the effort
- The QA/QC benefit is especially good for dates, depths, and measurements that have relationships
- Possibly required for project closeout exports to ERPIMS, ERIS etc
Data Defensibility

• Automated QA/QC at each step
• Automated log of edit history
• Restricted Edit Privileges
• Processed on a Proven System
Automated QA/QC is essential on large projects

Example:

At MMR, the working database Site Environmental Evaluation (SEE) that Jacobs uses contains over 300 million data values. This would take someone 417 years of work to make even a single pass through the database to manually check the values if they check one value every 10 seconds.
Project Configurable System
Flexibility

• Needs to be compatible with USACE, AFCEE, EPA, DOE, Navy using look up lists and configuration files
• Data driven edit screens and report modules allowing new fields to all tables
• User configurable reports
• User configurable browse/edit screens
• Data review and auto-flagging tools based on project validation criteria
Capacity Issues

- More than just the back end database
- Interface limits (i.e. lists of 32K+ locations, 128K+ samples, auto spanning of Excel sheets, etc.)
- 2 GB output limit on Windows PCs
- Transfer speed over the web for large queries
Users should be able to choose locations out of thousands using a variety of methods.
"On the fly" Compression Performance Gains

Example:
Approximate time to query 1 million records over the Internet with a 512KB connection

<table>
<thead>
<tr>
<th>File Type</th>
<th>Uncompressed transfer time</th>
<th>Compressed Transfer Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>.CSV</td>
<td>40 Min</td>
<td>3 Min</td>
</tr>
<tr>
<td>XML</td>
<td>3 Hrs</td>
<td>12 Minutes</td>
</tr>
</tbody>
</table>
Innovative Technologies developed by Jacobs Engineering

- Relational Browse/Edit data windows joined directly to instant map windows
- Remote Internet users have the same features as local users and “On the fly compression” for fast performance
- Data Review and Flagging Tools (DRAFT)
- Automatic links with other software to create maps and figures
Browse/Edit data windows are linked directly to instant map windows.
Maps can include both Vector and Raster spatial layers such as Aerial Photos.
Here are examples of direct links to contouring and boring log software.
Automating Spider diagrams to query database results and compare to risk criteria
History of Operations & Modeling Evaluations (HOME)

Trichloroethane (TCE) Mass Removal vs Time for 03EW2174
CS-10 Sandwich Road

![Graph of Mass Removal vs Time](image)

Trichloroethane (TCE) Total Efficiency vs Time for 03EW2174
CS-10 Sandwich Road

![Graph of Total Efficiency vs Time](image)