ARC Database Webinar
Training for ARC Consortium Members

February 25, 2011
10:00 am to 12:00 pm PST
University of Nevada Reno
Session Overview

• Summarize the application
  – Michael V. Ekedahl (ekedahl@unr.edu)

• Application demonstration
  – Dr. Elie Hajj (elieh@unr.edu)

• Discuss new features and demonstration
  – Jeremy Tweet (jhtweet@gmail.com)
Overall Introduction

- **Work element TT1d and TT1e: Development of materials and research database**
  
  - Store information related to sources & properties of materials used in various consortium research activities.
  
  - Includes results update in form of reports, white papers or any other type of documents for each research task...
Overall Introduction

• **Challenges:**
  – No software installation
  – Flexibility (No hard-coded data)
  – central database
  – Multiple users
    ▪ Add/Delete/Edit materials information
    ▪ Retrieve information (Public interface)
  – Different users’ roles
  – Common materials use
  – Multiple measures for the same material
  – Ability to relate material(s) to validation sections
  – …
Overall Introduction

General Users’ Diagram

ARC Materials/Research Database

Consortium Users (Read/Write)
- WRI
  - Harnsberger (Super-user)
  - Sub-user(s) (Ordinary user)
- TA&M
  - kassem (Super-user)
  - Sub-user(s) (Ordinary user)
- UWM
  - Miller (Super-user)
  - Sub-user(s) (Ordinary user)
- UNR
  - Hajj (Admin)
  - Sub-user(s) (Ordinary user)
- AAT
  - Bonaquist (Super-user)
  - Sub-user(s) (Ordinary user)
- FHWA
  - Weaver (Super-user)
  - Sub-user(s) (Ordinary user)

Public Users (Read Only)
- Agencies
- Researchers
- Consultants
- Contractors
- Students
- ...
Application Summary

- Technologies used
- Design goals
- Role management infrastructure
- Software model
Getting to the Application

- Using Internet Explorer, visit http://www.business.unr.edu/arc

- Click the **Login** button and enter credentials
Technologies Used

- Database backend is SQL Server 2008
- ASP.NET was chosen as the Web development platform
- Hardware and software platforms were chosen based on well-known and supported technologies
Key Design Goals

• Create the *most flexible* system possible eliminating “hard-coded” data types

• Create a *role-based infrastructure* granting privileges to categories of users

• Create an entirely *Web-based* system
  – No software installed on client computers
Role Management Infrastructure

- Users belong to an ARC organization
  - FHWA, UNR, etc...

- Users belong to one or more roles
  - Roles dictate the actions a user can perform
  - New roles can be created as needed
  - Roles are not mutually exclusive
Role Management Infrastructure

- Users are categorized into ordinary users and organizational super users
  - Ordinary users can only edit data they created
  - Organizational super users can edit data created by an ordinary user in the same organization

- There is a “special” administrative role
  - Administrators can create and edit anything
  - Some forms require administrative access
Software Model
Software Model (Materials)

- All materials have a type
  - (Aggregate, binder, etc.)
  - Material types belong to a category
- Materials have a supplier
- Materials can be created from other materials (Components)
- Materials may be associated with
  - work tasks
  - validation sections
  - other component materials
Software Model (Properties)

- Materials have properties
  - Properties are categorized into groups
  - Properties can be configured to have a valid range of values
    - Hard and soft limits are supported
    - Properties are categorized as qualitative or quantitative
  - Different units of measure can be applied to a property
Software Model (Properties)

• Edit several properties of a material simultaneously
• Support for “multi-dimensional” properties was added
  – Data are edited via a grid
• It’s possible to copy groups of properties from one material to another to simplify editing
Multi-dimensional Property (Creating)
Software Model (Validation Sites)

• Validation sites are used for material field tests
  – Validation sites are divided into validation sections, which are further divided into validation layers

• A contractor is responsible for a validation site
• A validation site has a contact
User Interface (Introduction)

Application menu appears along the left site of Web site
User Interface (Forms)
Selection and Filtering

- Materials (and other elements) can be selected and filtered by
  - Material type
  - Material category
  - Organization
  - Supplier
  - Work tasks
  - Validation section
  - Component materials
Selection and Filtering
Support Files (Introduction)

• Support files include reports, scanned document, picture, and just about anything related to the ARC project

• The initial implementation was just a flat list of files that could be uploaded and downloaded
Support Files (Revised Implementation)

- Support files are uploaded to a user-defined hierarchical file system
- Users can create folders as needed and upload files
- Support files can be filtered by work items (program area, category, work element, subtask)
Support Files (Implementation)

- A semantic grouping of files is now possible (under construction)
- Any number of semantic groupings can be created
  - Materials, validation sites, etc... can point to one or more of these semantic groupings.
Test Runs

- There might be multiple tests performed on the same material and properties
- Test runs allow for tests to be performed by different users at different times
- Any number of test runs can be created
Work in Progress

• Update final Help system items to reflect changes
• Continue bug fixes resulting from broad user testing
• Develop read-only user interface for non-consortium users
  – Define public user authentication requirements
• Plan for deployment to other server(s)
Application Demonstration

- Materials
- Property
- Validation Sites
- ...

Asphalt Research Consortium
Materials

Material Types

- ADDITIVE
  - Antistrip (AS)
  - Chemical (AM)
  - Filler (FI)
  - Polymer (PM)
  - Warm-mix (WA)

- AGGREGATE
  - Aggregate (AG)

- BINDER
  - Binder (BI)

- MIX
  - Lab Mix Lab Compacted (LL)
  - Plant Mix Lab Compacted (PL)
  - Plant Mix Field Compacted (PF)
Application Demo

Property

- Create Property Group
- Assign Property(ies) to Material(s)
- Create Property Attributes
- Sort Property Attributes Order
- Copy Property(ies)
Property

Property Groups and Attributes

Property Groups
- MI_DESIGN
  - NMAS
  - ESALS
  - N_INIT
  - N_DES
  - N_MAX
  - AC_OPTIMUM
  - VMA
  - VFA
  - ...
- MI_ESTAR
  - E_STAR_MOD_0FT
  - E_STAR_MOD_1FT
  - E_STAR_MOD_3FT
  - E_STAR_MOD_6FT
  - PHASE_ANGLE_0FT
  - PHASE_ANGLE_1FT
  - PHASE_ANGLE_3FT
  - PHASE_ANGLE_6FT
  - ...
- BI_GRADE_PG
  - PG_TRUE_HIGH
  - PG_TRUE_LOW
  - PG_HIGH
  - PG_LOW
  - FP_COC
  - ROT_VISC
  - MASS_LOSS
  - ORIG_G*/sin(delta)
  - ...
- AG_COARSE_BSG
  - BSG_SSD
  - BSG_DRY
  - BSG_APP
  - ABS
  - ...

...
Application Demo

Validation Site

- Create/Edit Validation Site
- Create/Edit Validation Section
- Create/Edit Validation Layer
- Assign Material(s) to Validation Layer(s)
- Create Field Sample
Next Step.....

• Start using database and provide feedback
• Provide Materials Details (type, source, description, task, ...) to elieh@unr.edu
• Provide Property Groups and Attributes to elieh@unr.edu
• Validation sections