Migrating CoRe Element Data To The New AASHTO Specification

Designing and Implementing An Automated Tool
Overview

- Chronology
- Issues
- Considerations
- Solution
- Next Steps
Chronology

• Pontis CoRe Elements Specified for Pontis 2.0
  – Over 10 years ago
• Covered An Expected Standard Set Of Structural Elements
  – Accessible, maintainable, easy to quantify
  – Intended to be interpreted and applied consistently across agencies
• Elements Specifications Were Not Always Followed
• Agencies Defined A Host Of Custom Elements And Flags
  – Physical and operational

Chronology (continued)

- Measurement Units Have Been A Continuing Issue
  - Training, rounding problems and operational obstacles
- ‘Whole’ Elements Have Been Partitioned In Some Inventories
  - Decks
- Minor Adjustments To CoRe Language Has Been Made By T-18 In Past
- Element Actions Often Associated With Agency Maintenance Management Systems
Chronology (continued)

- Pontis Software Has Followed CoRe Specification Throughout
- New Pontis Version (5.1.2) Will Support The New AASHTO Specification
  - Display-only access to previous history
Issues

- Consistency Of Data Collection And Reporting
- Disagreement On Condition State Language
- Conflation Of Protective System And Actual Element Condition
- Inability To Track Both Separately
- Single Path Of Deterioration Implied By The State Definitions
- Unnecessary Differentiation Of Condition States Between Classes Of Elements
  - Some with 3, some 4, some 5 – reasons now unclear
Problem Statement

- Implement The New AASHTO Element Specification Nationwide
  - Preserve the substantial inspection data collection investment
  - Implement protective systems separate from elements themselves
  - Implement effective measurement of defect flags and associate with specific elements
  - Enforce a consistent # of 4 condition states
  - Support the ability to report National Bridge Elements reliably (NBE)
  - Support bridge management activities (BME)
  - Provide for customized agency defined elements (ADE)
Problem Statement (continued)

• States Now Manage A Huge Array Of Element Condition Data
  – Probably More Than 20M Rows Of Data
  – Represents Millions Of Inspection Program Hours
• Individual State Agencies Do Not Have The Resources To Migrate These Data
• An Automated Tool Is Required To Support The Conversion And Strengthen Adoption Nationwide
Key Considerations

- Each Agency Has Collected Data To Its Own Standards
- Any Data Migration Must Be Flexible To Accommodate Individual Agency Practice
  - Particularly agency defined elements and variations for CoRe specification
- Migration Logic Should Be Configurable
- Migration Process Must Be Testable And Repeatable
- Migration Results Must Be Understandable And Believable
- Migration Process Should Establish The Initial Relationship Of Elements To Protective Systems And Defect Flags
Key Considerations (continued)

• System Must
  – Be Interactive
  – Permit What-If Development Of Migration Rules
  – Run In Windows (XP and Win7)
  – Have A Minimal Installation Process
  – Be Configurable And Extensible

• System Must NOT
  – Be A Black-Box Closed Application
    • The Engineer’s Judgment Must Be Central
  – Require Agencies To Hold A Pontis License
  – Even Require A Database
Solution

- Separate User Interface And Migration Engines
- Program Runs In Batch And Interactive Modes
- All Migration Processes Controlled Through Logic Rules
  - Rules are accessible for user adjustment and extension to other elements/situations
- Assumes Configurable Set Of CoRe Element Information Is Used For Input
- Assumes Configurable Set of AASHTO Element Information Will Be Generated
Interfaces

• Command-Line
  – Runs From Command Prompt (DOS Prompt)
  – Classic batch utility approach

• Interactive Windows Program
  – Tabbed Organization
  – Specific activities on each tab
  – Settings accessible from user interface
  – On screen help and diagnostic messages
  – Selective processing of elements and rules for What-If analysis

• Both Interfaces Use The Exact Same Migration Engine.
Command-Line Program

- All Input As Part Of The Command
  - Or
- Program Controlled Through Parameter Files
- Not Interactive
- All Results Available In Xml And Text Files
- Diagnostic Messages Written To Log Files
- Rudimentary Help
- Suitable For Automating Mass Migration
Interactive User Interface

Rule Selections

Individual Rule Syntax

Rule Actions
Interactive User Interface

CoRe Element Data Review

Data Management Actions

Migration Actions
Interactive User Interface

Migration Actions
TRANSFORM("D.1.3.1", "D.1.3.1, Timber, Example Deck 6 - Grid Deck Elements Only");
SCOPE (ELEM_LIST, 31, 54);
EXCEPTION(101,"Runtime exception when trying to apply rule D.1.3.1");
//RAE - 7/21/11 - checked
CASE WHEN (THIS=31)
    THEN
        ASSIGN_QUANT(31) = QUANTITY(THIS);
        ASSIGN_PCT(31, 1) = PCT(THIS, 1);
        ASSIGN_PCT(31, 2) = PCT(THIS, 2);
        ASSIGN_PCT(31, 3) = PCT(THIS, 3);
        ASSIGN_PCT(31, 4) = PCT(THIS, 4);
    ELSE
        ASSIGN_QUANT(54) = QUANTITY(THIS);
        ASSIGN_PCT(54, 1) = PCT(THIS, 1);
        ASSIGN_PCT(54, 2) = PCT(THIS, 2);
        ASSIGN_PCT(54, 3) = PCT(THIS, 3);
        ASSIGN_PCT(54, 4) = PCT(THIS, 4);
END;
Next Steps

- Integrate NBE Rollup Logic
- Integrate Automated Defect Flag And Protective System Element Generation
- Finalize Rules
  - Consensus Decision
- Distribute To Community
Thank You!

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