IEPD Factory Overview

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DHS/DNDO/CIO Support
• Background
  • IEPD Factory Objectives
  • Model Driven Architecture Approach
  • Integrated Design/Build/Maintain Concept
  • Features
Background

• IEPD Factory created to support DHS NIEM Domain & IEPD development/maintenance
  • Initiated for N.25 IEPD Development Project (interoperability messaging) and NIEM CBRN Domain
  • Started Jan 2008 by DNDO; Tool developed ‘just-in-time’ as needed during the project
  • Captured NIEM development knowledge learned during the project to enable reuse on next project
  • Focused on process improvement, reduction of labor, time, and breadth of knowledge needed to produce high quality IEPDs
  • Used for development of the ANSI N42.42 standard
  • Enhanced to support Schematron and Codelist management
  • Upgraded to support NIEM 3.0
IEPD Factory Objectives

• Eliminate Process Stovepiping
  • Reduce labor effort
    ■ Eliminate multiple manual entry for each artifact
    ■ Enable changes to ripple effect thru multiple artifacts
  • Improve artifact quality by eliminating error-prone manual entry/update
  • Accelerate artifact development schedule
  • Reduce cost/schedule/quality risks

• Reduce XML & NIEM level of expertise required – broaden resource pool for IEPD work

• Improve standardization of NIEM conformance
  • Consistent application of rules by incorporating many into the tool
MDA Approach

• **Master Source Data Model for an IEPD**
  - Single Source of data
  - Configuration Management (CM) is applied to single source, not artifacts
  - Continuous enhancement to the single source thru each process step; each process step adds value
  - IEPD Artifacts are generated from the single source
  - All processes/tools interact with the single source
  - Facilitates incorporation of additional NIEM standard schemas, leveraging the work of others

• Concept is analogous to OMG’s MDA
• Well proven in industry
• NIEM rules incorporated into modeling and artifact generation software – “IEPD Factory”
• Combines commercial tool (Troux Architect) with existing NIEM tools where applicable
Design/Build/Maintain Concept

Process 1

Process 2

Process 3

Process n

Iterate & Revise

Continuously Enhance Master Source Data

Generate Artifacts/Revisions

Artifact A

Artifact B

Artifact C

Configuration Manage

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IEPD Process

Business Modeling
Charter
Work-Group

Exchange Model

Mapping Artifact

XML Schemas

Project Inception
Exchange Modeling
Mapping
Schema Building
Packaging

Business Model
Modeling/ Diagraming Tools
Searching Tools
Subset Schema Tool
XML Editor

Local Requirements

Excel Spreadsheet

Generated from Master Source Model
- WantList
- Subset Schema
- Extension Schema
- Exchange Schema
- Constraint Schema

Generated from Master Source Model
- Catalog
- Metadata
- Schema outline
- Sample Message template

www.niem.gov
Example: N.25 IEPD Artifacts

**IEPD consists of 54 messages**

<table>
<thead>
<tr>
<th>Artifact</th>
<th>Manually Created</th>
<th>IEPD Factory Auto Generated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Mapping Spreadsheet</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Visual Model</td>
<td>9</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Exchange Schema</td>
<td></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Constraint Schema</td>
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<td>8</td>
</tr>
<tr>
<td>Extension Schema</td>
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<td>1</td>
</tr>
<tr>
<td>Extension Constraint Schema</td>
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</tr>
<tr>
<td>Code List Schema</td>
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<tr>
<td>Want List</td>
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<td>1</td>
</tr>
<tr>
<td>Subset Schema</td>
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<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Catalog</td>
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<td>1</td>
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</tr>
<tr>
<td>Metadata</td>
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</tr>
<tr>
<td>Schema Outline</td>
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<td>8</td>
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</tr>
<tr>
<td>Sample Message</td>
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</tr>
<tr>
<td>Master Document (Volumes)</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>51</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>
IEPD Factory has been built using the Troux Architect (TA) software platform.

Troux enables building visual object models using object parts:
- Includes a pre-defined set of parts (aka metamodel)
- Models represent data objects in visual form
- Models provide handles for using the data in multiple ways

TA enables building new sets of parts for new kinds of models:
- IEPD Factory required building a new set of parts; i.e., xml schema components
Troux Architect

• Troux provides an ideal combination:
  • Built-in capability and extensibility unmatched by any other tool
  • Capability to both develop new metamodels and build new kinds of models using them

• We can adapt the tool to address new requirements without touching the internal software of the tool itself – outstanding flexibility

• Modules built in other tools may also be integrated
IEPD Factory

- **Supports building & maintaining:**
  - Domain schemas
  - Extension schemas, i.e., common structures for message families
  - Exchange schemas, i.e., message structures
  - Constraint Schemas
  - BIEMs (Business Information Exchange Models)
  - Catalogs & Wantlists
  - Schematron schemas (business rules for messages)

- **Supports modeling of reference schemas for subset generation**
  - Leveraging standards & work of others, e.g., NIEM, DOJ, International Trade, ANSI, Intelligence, Units of Measure, etc.

- **Provides codelist management**
- **Generates XML Schema and NIEM-required documentation artifacts**
IEPD Factory

- Implements a NIEM-conformant subset of W3C XML Schema
  - Reduces complexity
  - Reduces requirement for NIEM expertise
  - Embeds NIEM rules to the extent possible

- Supports NIEM 3.0

- Not limited to NIEM-conformant development
  - IEPD Factory enabled building of ANSI N42.42 schema

- Includes an Online Users Guide