CIM and Project/Asset Management
@ CTDOT

William S. Pratt PE
Principal Engineer - AEC Applications
What is CIM:

“Civil Integrated Management (CIM) is the technology-enabled collection, organization, managed accessibility, and the use of accurate data and information throughout the life cycle of a transportation asset.

The concept may be used by all affected parties for a wide range of purposes, including planning, environmental assessment, surveying, construction, maintenance, asset management, and risk assessment.”

-FHWA, AASHTO, ARTBA (2012)
What is CIM:

– CIM is not just technology – it encompasses changes to the typical work processes supporting projects.
– Application of CIM can range from incremental improvement of functions to leaning out disruptive workflows
– CIM can enable fully digital workflow from project inception to asset management
– Use of CIM is not all or nothing – agencies can select tools for specific applications today, and increase use over time
Driving Forces for CIM:

- TED (Transportation Enterprise Data) a grass roots effort to establish data governance and stewardship involving representation from:
  - AEC Applications
  - Asset Management
  - Planning
  - Safety
  - OIS

- Better and Faster Asset/Safety Data Management through Integration

Beneficiaries

- Asset Management Group (TAMP)
- Network Safety Analysis (RDIP)
- Engineering
- Maintenance Operations
CIM
Civil Integrated Management

- **Authoritative Data**
  - Asset Management Systems
  - Composite Project Data

- **ATLAS (Asset/Project Tracking + Location) = GIS**
  - Tools Required
    - Proposed Project (PP) Location
    - Recommended Project (RP) Location
    - Asset Location
    - Points, Lines, Polygons & Extracted LRS Registration
    - Project/Asset Data joined with Location

- **Each Asset has a Steward/SME and an Authoritative Management System**
  - Geospatial Metadata Guidelines are being developed
  - CAD to GIS Applications are being developed
    - To Identify Assets for Decommissioning
    - To Identify New and Manage Existing Assets
CT DOT / Bentley Architecture Diagram
Current Architecture

CT DOT On Premise

CTDOT Firewall

Project Authoritative DB's
- OBL
  - Schedules
  - Estimates
  - Scope
- CORE
  - Gen Info
  - STIP Status
  - Expenditures
- SiteManager
  - Construction Info

Assets and Team

Project Assets

CTDOT Business
SQL Server

• Composite Project DB

CT DOT / Bentley Architecture Diagram
Current Architecture

Extract Transform Load Reporting Data
Copy or replicate Business Data
(Using ODATA web service or similar)
CT DOT / Bentley Architecture Diagram
Current Architecture

Bentley Cloud

- SUPERLOAD
  SQL Server
- ProjectWise
  SQL Server
- AssetWise ALIM
  Oracle
- InspectTech
  SQL Server

Bentley Firewall

CTDOT Firewall

Bentley Product Clients

CT DOT On Premise

- OBL
  Schedules
  Estimates
  Scope
- CORE
  Gen Info
  STIP Status
  Expenditures
- SiteManager
  Construction
  Info
- Editing Clients

CTDOT Business SQL Server

- Project Authoritative DB’s
- Project Assets

- Assets and Team
- Bridge Inventory Data

Extract Transform Load Reporting Data
Copy or replicate Business Data
(Using ODATA web service or similar)

- OBL
- CORE
- SiteManager
- Editing Clients

- Composite Project DB
- InspectTech Bridge DB
- Traffic Signal DB
CT DOT / Bentley Architecture Diagram
Current Architecture

- Bentley Cloud
  - SUPERLOAD
  - ProjectWise
  - AssetWise ALIM
  - InspectTech
  - Bentley Cloud

- Bentley Firewall
  - Bentley Firewall

- CT DOT Firewall
  - CT DOT Firewall

- CT DOT On Premise
  - CT DOT On Premise

- Bentley Product
  - Bentley Product

- CTDOT Product
  - CTDOT Product

- CT DOT Business SQL Server
  - CT DOT Business SQL Server

- Atlas Database
  - Atlas Database

- TED Database
  - TED Database

- Editing Clients
  - Editing Clients

- Schedules
  - Schedules

- Estimates
  - Estimates

- Scope
  - Scope

- Gen Info
  - Gen Info

- STIP Status
  - STIP Status

- Expenditures
  - Expenditures

- Construction Info
  - Construction Info

- OBL
  - OBL

- CORE
  - CORE

- SiteManager
  - SiteManager

- Project Assets
  - Project Assets

- Project Authoritative DB’s
  - Project Authoritative DB’s

- Project Assets
  - Project Assets

- Web Service joining info with Spatial Location
  - Web Service joining info with Spatial Location

- Extract Transform Load Reporting Data
  - Extract Transform Load Reporting Data

- Copy or replicate Business Data (Using ODATA web service or similar)
  - Copy or replicate Business Data (Using ODATA web service or similar)

- AssetWise Dashboard and Reporting Service
  - AssetWise Dashboard and Reporting Service

- AssetWise ALIM Publishing
  - AssetWise ALIM Publishing

- Maps
  - Maps

- WFS/WMS Services
  - WFS/WMS Services

- Atlas Database
  - Atlas Database

- SQL Server
  - SQL Server

- polygon locations
  - polygon locations

- Atlas Database
  - Atlas Database

- SQL Server
  - SQL Server

- OBL
  - OBL

- CORE
  - CORE

- SiteManager
  - SiteManager

- Project Assets
  - Project Assets

- CT DOT Business SQL Server
  - CT DOT Business SQL Server

- Web Service joining info with Spatial Location
  - Web Service joining info with Spatial Location

- CT DOT Cloud
  - CT DOT Cloud

- Web Reporting Client (Web-GIS pages)
  - Web Reporting Client (Web-GIS pages)
CTDOT GIS Data

CTDOT – TED (Transportation Enterprise Data)

Spatially Based Data - ATLAS/ESRI
- Projects Work Areas
  - Facilities
  - OSTA Permits
- Assets
  - Bridge Deck Areas
  - Traffic Signal Areas
- Orthoimagery
- Hydraulics
- Soil Borings
- ROW
- Town, County, Regional Boundaries

LRS Based Data - EXOR
- Road Network
  - Inventory
  - NHS, Func Class
- Projects:
  - Capital
  - Maintenance VIP
- Assets:
  - Bridges
  - Pavements
  - Traffic Signals
- Traffic Monitoring:
  - AADT
  - Accidents
- Public Transportation
Locating and Tracking Capital Projects

PPI/Project Location:
- Geospatial Polygons representing Work Area Limits

Benefits for Designer:
- Underlying Road Network Sections and their characteristics (Route/Road ID, State/Local, MP start/end, ADT, Interstate, FC, NHS, Towns, MPO, COG, Urban Area, Population & CTCore FC)

**Project Timeline**
Connecticut Department of Transportation

**Project Initiation**
- Recommended Project Memo

**Design Approval**
- Update Project Location
- POC - Query road assets within Project Work Area

**FDP Submittal**
- Contract Plans
  - Specs and Estimates
- 2D/3D Models
- POC - Decommissioned Asset Inventories
- POC - New and Managed Asset Inventories

**Contract Award**
- POC - Asset Field Validation and As-Builts

**Construction Completed**
- Addenda Plans/Specs
- Construction Order Plans/Specs
- As-Built Recording By Inspector

**Construction Completed**
## Demonstration

### Proposed Work Areas:

<table>
<thead>
<tr>
<th>Work Area ID</th>
<th>Total Area</th>
<th>Towns</th>
<th>District</th>
<th>MPO</th>
<th>COG</th>
<th>Urban Area</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2753</td>
<td>235034 Sq.Ft</td>
<td>Newington</td>
<td>1</td>
<td>Capital Region</td>
<td>Capital Region</td>
<td>Hartford, CT Urbanized Area</td>
<td>924859</td>
</tr>
</tbody>
</table>

### Proposed Road Sections:

<table>
<thead>
<tr>
<th>Route/Road</th>
<th>State</th>
<th>Local</th>
<th>Start MP</th>
<th>End MP</th>
<th>Miles</th>
<th>ADT</th>
<th>Interstate</th>
<th>Func Class</th>
<th>NHS</th>
<th>Towns</th>
<th>MPO</th>
<th>COG</th>
<th>Urban Area</th>
<th>Population</th>
<th>CTC Core Func Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select 15-N</td>
<td>State</td>
<td>74</td>
<td>74 337</td>
<td>74 301</td>
<td>3</td>
<td>21</td>
<td>N</td>
<td>3</td>
<td>Y</td>
<td>Newington</td>
<td>Capital Region</td>
<td>Capital Region</td>
<td>Hartford, CT Urbanized Area</td>
<td>924859</td>
<td>414 - Urbanized Other Principal Arterial, over 200k</td>
</tr>
<tr>
<td>Select 15-S</td>
<td>State</td>
<td>74</td>
<td>74 337</td>
<td>74 307</td>
<td>3</td>
<td>027</td>
<td>N</td>
<td>7</td>
<td>Y</td>
<td>Newington</td>
<td>Capital Region</td>
<td>Capital Region</td>
<td>Hartford, CT Urbanized Area</td>
<td>924859</td>
<td>499 - Urbanized Local, over 200k</td>
</tr>
<tr>
<td>Select 5-N</td>
<td>State</td>
<td>26</td>
<td>27 345</td>
<td>27 315</td>
<td>3</td>
<td>021</td>
<td>N</td>
<td>3</td>
<td>Y</td>
<td>Newington</td>
<td>Capital Region</td>
<td>Capital Region</td>
<td>Hartford, CT Urbanized Area</td>
<td>924859</td>
<td>414 - Urbanized Other Principal Arterial, over 200k</td>
</tr>
<tr>
<td>Select PASCOME PL</td>
<td>Local</td>
<td>0.344</td>
<td>0.35</td>
<td>0.006</td>
<td>N</td>
<td>7</td>
<td>Y</td>
<td>Newington</td>
<td>Capital Region</td>
<td>Capital Region</td>
<td>Hartford, CT Urbanized Area</td>
<td>924859</td>
<td>499 - Urbanized Local, over 200k</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Engineering Data Summary:
- **Towns:** Newington
- **State Routes:** 15-N, 15-S, 5-N
- **Local Roads:** PASCOME PL
- **AADT:** 33700
- **Interstate:** No
- **NHS:** Yes
- **State Miles:** 0.27
- **Local Miles:** 0.006

### Planning Data Summary:
- **CTCore Functional Class:** 414 - Urbanized Other Principal Arterial, over 200k
- **MPO:** Capital Region
- **COG:** Capital Region
Demonstration

- **Pyramid of Geo-Spatial Data Consumption Options**
  - AWP (AssetWise Publisher)
    - Assets - Road Network and MP’s, Bridges, Signals
    - Active Projects - Project Information, Project 0017-0182