Enabling Success in Enterprise Asset Management
A Case Study for Developing and Integrating GIS and CMMS for a Large WWTP

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Matthew Jalbert, PE, Trinity River Authority
Trinity River Authority

- Located in Texas
- Conservation and Reclamation District
- 5 Wastewater Treatment Facilities
- 4 Water Treatment Facilities

Central Regional Wastewater System (CRWS)
162 MGD AADF Facility
Asset Management Program

• The Institute of Asset Management (IAM) conceptual model
  • Organization’s strategic plan and goals should be incorporated into the asset management program

• Ten Attributes of Effectively Managed Utilities

<table>
<thead>
<tr>
<th>TRA’s Strategic Plan</th>
<th>Ten Attributes of Effectively Managed Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service Excellence</td>
<td>Customer Satisfaction</td>
</tr>
<tr>
<td>Human Capital Development</td>
<td>Employee and Leadership Development</td>
</tr>
<tr>
<td>Efficient and Effective Operations</td>
<td>Operational Optimization</td>
</tr>
</tbody>
</table>
Linking Asset Management to GIS

FILLING NEEDS OF TRAs
- Management
- Operations
- Maintenance

Geographic Information System (GIS)
- Location Info:
  - Knowledge
  - Bad Actors
  - Work Orders

- Design & Review Effectiveness
- Training
- Barcodes
- Risk Management Process
- Rehabilitation Assessment
- Failure Codes
- Reliability Centered Maintenance (RCM)
- Documentation
- Operator Based Optimization
- Performance Data
- Check Lists
- Measures
- Reliability Centered Operations (RCO)
Project Workflow

- Data Inventory & Assessment Workshops
- Strategic Visioning Workshops
- Geodatabase Design
- GIS/CMMS Integration
- Data Capture Plan
- Project in Action
**Vision**

Workshops to determine vision for GIS

**Met with key staff and departments**

<table>
<thead>
<tr>
<th>Short Vision Statement</th>
</tr>
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<tbody>
<tr>
<td><strong>To provide a reliable map that is a window to our plant data.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long Vision Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A good map:</strong></td>
</tr>
<tr>
<td>Depict good relative positional accuracy (horizontal and vertical) to support proper identification of assets in the field, and provide access to surveyed coordinates to facilitate location of buried assets.</td>
</tr>
<tr>
<td><strong>A good window:</strong></td>
</tr>
<tr>
<td>Further support asset identification and troubleshooting by providing map-based access to electrical drawings, CAD files and surveys, and provide a map of project boundaries and links between project data and the assets installed under the project.</td>
</tr>
<tr>
<td>Connect the assets to support hydraulic and process modeling.</td>
</tr>
</tbody>
</table>
## Business Requirements

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Business Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rapid and reliable access to asset record information</td>
</tr>
<tr>
<td>2</td>
<td>Overall CRWS Plant map with footprints and piping</td>
</tr>
<tr>
<td>3</td>
<td>Locating plant features</td>
</tr>
<tr>
<td>4</td>
<td>Identifying plant features</td>
</tr>
<tr>
<td>5</td>
<td>Map-based viewing of asset status throughout the plant</td>
</tr>
<tr>
<td>6</td>
<td>Map-based viewing of project boundaries and information associated with active projects and affected assets</td>
</tr>
<tr>
<td>7</td>
<td>Map-based access to condition assessment scoring data</td>
</tr>
<tr>
<td>8</td>
<td>Map-based access to as-built drawings</td>
</tr>
<tr>
<td>9</td>
<td>Map-based access to electrical drawings (one-line diagrams)</td>
</tr>
<tr>
<td>10</td>
<td>Hydraulic modeling capability</td>
</tr>
<tr>
<td>11</td>
<td>Asset isolation tracing to determine impacts on plant system</td>
</tr>
</tbody>
</table>
GIS to CMMS Integration

- Sync Tool synchronizes common data stored and managed by CMMS and GIS.

<table>
<thead>
<tr>
<th>Feature and Function</th>
<th>Tool A</th>
<th>Tool B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Records in GIS from Maximo Records</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support for Maximo Classifications and Specification Records</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support for Default Values</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support Value List Translation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support Calculated Values</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Scheduled Synchronization</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support Reading from ArcGIS Server Map Services</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Data integration relies on cross-reference between the geodatabase design and the Maximo data design (including classification structures).
Data Collection

Step 1: Engineering and GIS Managers Determine Data Capture Extents

Step 2: GIS Manager Compares Data Capture GDB to CRWS GDB, Updates as Needed

Step 3: GIS Manager Provides Data Capture GDB to Surveyor

Step 4: Surveyor Performs GPS Survey utilizing the Data Capture GDB

Step 5: Surveyor Completes GPS Survey and Submits GIS Data to GIS Manager

Step 6: GIS Analyst Researches Connectivity / Data Issues and Updates Geodatabase

Step 7: GIS Manager Sends E-mail Confirmation of Completion to Engineering Manager

Step 8: GIS Manager Sends E-mail Confirmation of Completion to Engineering Manager
Data Collection

*How asset data was collected:*

- Stripped down geodatabase
- Surveyor and field engineer populated preliminary data
- Photo captured
Data Collection

3,600 assets surveyed
9/2016 – 1/2017
Post-Process

Populate and QC Asset Data

- Type of Asset
- Size
- Material
- Access
- Project Name & Date of Installation
- Link to Record Drawings
- Create Geometric Networks

<table>
<thead>
<tr>
<th>Types of Assets</th>
<th>No. of Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULightingPole</td>
<td>374</td>
</tr>
<tr>
<td>USafetyPoint</td>
<td>22</td>
</tr>
<tr>
<td>UWaterHydrant</td>
<td>224</td>
</tr>
<tr>
<td>UWaterValve</td>
<td>596</td>
</tr>
<tr>
<td>UWaterFitting</td>
<td>2886</td>
</tr>
<tr>
<td>UWaterPipe</td>
<td>3341</td>
</tr>
<tr>
<td>UElectricalEquipment</td>
<td>532</td>
</tr>
<tr>
<td>UElectricalPoint</td>
<td>350</td>
</tr>
<tr>
<td>UElectricalLine</td>
<td>403</td>
</tr>
<tr>
<td>USEwerFitting</td>
<td>791</td>
</tr>
<tr>
<td>USEwerPoint</td>
<td>288</td>
</tr>
<tr>
<td>USEwerPipe</td>
<td>959</td>
</tr>
<tr>
<td>UStormFitting</td>
<td>11</td>
</tr>
<tr>
<td>UStormPoint</td>
<td>130</td>
</tr>
<tr>
<td>UStormPipe</td>
<td>528</td>
</tr>
<tr>
<td>LProcessValve</td>
<td>248</td>
</tr>
<tr>
<td>LProcessInstrument</td>
<td>412</td>
</tr>
<tr>
<td>LProcessFitting</td>
<td>1160</td>
</tr>
<tr>
<td>LProcessPipe</td>
<td>825</td>
</tr>
<tr>
<td>SProcessValve</td>
<td>10</td>
</tr>
<tr>
<td>SProcessInstrument</td>
<td>4</td>
</tr>
<tr>
<td>SProcessFitting</td>
<td>197</td>
</tr>
<tr>
<td>SProcessPipe</td>
<td>123</td>
</tr>
</tbody>
</table>
Post-Process

UWaterValve

**SUBTYPE DESCRIPTION:** Plant Service Water

**PROCESS ABBREVIATION:** W3 - Plant Service Water

**VALVE TYPE:** Gate Valve

**VALVE STRUCTURE TYPE:** Valve Box

**ACTUATOR TYPE:** Manual

**DIAMETER:** 4"

**SPATIAL SOURCE:** Field Surveyed

**SURVEYOR:** SPOONER AND ASSOCIATES

**SURVEY DATE:** 12/09/2016

**EASTING:** 2449060.84109

**NORTHING:** 6968886.031063

**ELEVATION:** 425.5843

**LIFECYCLE STATUS:** ACTIVE
UWaterValve

ASSET NUM: UWV0000007
(W3, 6-inch, Manual, Gate Valve)
Maximo Workorders: Scott Hampton

Work Order Number: 2249591
Work Description: Valve Stuck
Work Type: CM
Failure Class:
Problem Code:
Location Code:
Location Description:
Asset Number: UWV000000006
Asset Description: GIS UTILITY DATASET, Water Valve, UWV
Work Group: 110-152
Lead Person ID: FLUARYW
Lead Person Name: Scott Hampton
Supervisor Person ID: Scott Hampton
Supervisor Person Name:
Work Order Status: WAPPR
Status Date: 12/5/2017, 4:08 AM
Reported Date: 12/5/2017, 4:08 AM
Scheduled Start:
Actual Start Date and Time:
Scheduled Finish:
Actual Finish Date and Time:
Site ID: 110
Asset X Coordinate: 2,449,305.15
Asset Y Coordinate: 6,968,345.09
Location X Coordinate:
Location Y Coordinate:
Priority: 4.00
In History?
Lessons Learned

• Start with latest as-builts
• Collaborate
• QC Process
• Prioritize Assets for Data Collection
• Duplicate Assets (GIS/CMMS)
• Streamlined Data Capture through GIS Tools
Results

• System that aligns with TRA’s Strategic Plan
• Assets that can be viewed in maps and accurately located in the field
• Optimized workflow and maintenance
• Training tool for new employees
• Process to create new assets in CMMS
• Taking this approach and lessons learned to other plants at TRA
Acknowledgements

Trinity River Authority
Julie Hunt
Bob Ayensu
John Rice
Monique Nava
Jay Shannon
David Brewster

Freese and Nichols
Jessica Brown
David Jackson
Mazen Kawasmi

Brio Consulting
Nancy Lerner
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