Oxy: AVEVA™ PI System™
Cygnet Provisioning Tool

Luis Vasquez - IT Advisor Industrial Controls

OXY
CYGNET PROVISIONING TOOL

AVEVA PI SYSTEM

Luis Vasquez – IT Advisor Industrial Controls
Luis_Vasquez2@oxy.com

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AGENDA

- About OXY
- OXY PI Journey
- Background
- Cygnet Overview
- AVEVA™ PI System™ Architecture
- Challenge
- Tool Design
- Workflow
- Benefits
- Q&A
Oxy is taking bold steps to innovate for a lower-carbon future. We’re forging new pathways to reduce emissions across our operations while providing products and services to help others do the same, with the ambition of achieving net zero.

U.S.-based international energy company with assets primarily in the United States, the Middle East and North Africa that safely and efficiently provide the world with reliable energy and essential chemicals.

Oxy is one of the largest oil and gas producers in the United States, and among the largest leaseholders, with primary operations in the Permian Basin, Rockies and the Gulf of Mexico.

Our wholly owned subsidiary OxyChem manufactures and markets basic chemicals and vinyls and is a top-tier producer, both domestically and globally, of all the chemicals that we manufacture and market.

Our Oxy Low Carbon Ventures subsidiary is advancing cutting-edge technologies and business solutions that sustainably grow our business while reducing emissions and helping others achieve the same goal.

We have an exemplary safety record in the oil and gas and chemicals industries and compared to any other industry sector.
OXY PI JOURNEY

- 2012 Oxy started with PI, ramping up its use in 2016
- 2018 Anadarko started PI
- 2019 Oxy acquires Anadarko
- Current PI implementation:
  - Over 7 MM PI points
  - 200+ PI servers (22 PI DA)
  - Used extensively company wide
BACKGROUND

- Cygnet is the SCADA system used by Anadarko assets
- Difficult manual process
  - Large number of field facilities (>7500)
  - High drilling activity
  - Limited resources
  - Automation (Operations) – PI team (IT) communication gaps
- New PI setup: How do we use it?
- Tested available solutions:
  - PI Cygnet connector AF
  - OSIsoft “AF Transformer” tool
- Developed a custom application
• Domain
• Site
• Services
CYGNET OVERVIEW - FACILITIES

- Facilities (FAC)
  - Metadata
  - Relationships between facilities

[Diagram of WELL, METER, PAD]
**CYGNET OVERVIEW - FACILITIES**

- Facilities (FAC)
  - Metadata
  - Relationships between facilities

---

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Value</th>
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<td>PBD Tank #</td>
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<td>facility_table5</td>
<td>Operator</td>
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</table>
CYGNET OVERVIEW - FACILITIES

- Facilities (FAC)
  - Metadata
  - Relationships between facilities
CYGNET OVERVIEW - POINTS

- Point (PNT)
  - Related to facility
  - Uniform Data Code (UDC)
  - Long Point ID

<table>
<thead>
<tr>
<th>Long Point ID</th>
<th>Facility</th>
<th>UDC</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>WELL1_PI_S</td>
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<td>PI_S</td>
<td>Well 1 Static Pressure</td>
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<td>PI_C</td>
<td>Well 1 Casing Pressure</td>
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<td>PI_T</td>
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<td>WELL1_TI</td>
<td>WELL1</td>
<td>TI</td>
<td>Well 1 Temperature</td>
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</tbody>
</table>
PI SYSTEM ARCHITECTURE

- Network separation
- Cygnet replication
- PI Connector for Cygnet
  - Local Collection
  - PI points created automatically
  - Naming convention: site.service:longPointID
- PI to PI
- AF applications

![Diagram of PI System Architecture](image-url)
**CHALLENGES**

- Update AF automatically
- Provide application specific configuration
- Use Cygnet facility relationship
- Include metadata attributes
- Filter facilities based on metadata
- Write calculation to test DA before going live
- Flexible template configuration
  - Multiple UDC per attribute
  - Show only populated attributes
- Manage SITE exceptions
TOOL DESIGN

• PI AF SDK (C#)
  ◦ Templates
  ◦ Cygnet Facilities
  ◦ AF update

• Configuration stored in MS-SQL
  ◦ Multiple related tables
  ◦ Track update with timestamp

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<tr>
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<thead>
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<th>Live Data</th>
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<tr>
<td>3</td>
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<td>4</td>
<td>PIHISTORIAN5</td>
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<td>5</td>
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</table>
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<table>
<thead>
<tr>
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<td>WELL</td>
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</table>
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<table>
<thead>
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<td>6</td>
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<table>
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<tr>
<th>Id</th>
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<th>facility_info</th>
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<td>9/5/2022</td>
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<td>OPCIS</td>
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</tbody>
</table>
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WORKFLOW

Start

- Get sites/templates (SQL)
  - For each site
    - For each template
      - Elements by template (AF)
      - Get Facility snapshot (SQL)
      - Get Facilities (Cygnet)
    - For each facility
      - Needs update?
        - Y: Generate commands (SQL)
        - N: Facilities done?
          - Y: Not in Cygnet?
            - Y: Delete Element (AF)
            - N: Templates done?
              - Y: Insert commands (SQL)
              - N: Update Facility?
                - Y: Execute bulk SQL
                - N: Sites done?
      - N: Execute bulk SQL

End
BENEFITS

• AF administration efficiency
  o Automatic updated
  o Mass changes made easily
  o Rapid and flexible deployment
  o Easy process to promote AF to production
  o Audit trail

• AF benefits
  o Updated model (hide unused attributes)
  o PI point agnostic

• Building block for applications
SUMMARY SLIDE

Challenge

• Update AF automatically
• Provide application specific configuration
• Include metadata attributes
• Flexible template configuration
• Manage SITE exceptions

Solution

• Develop custom solution
• MS-SQL configuration
• Use Cygnet relationship
• Take advantage of PI point naming convention

Benefits

• PI AF administration efficiency
• Updated AF model
• Building block for applications
Luis Vasquez

IT Advisor – Industrial Control Systems

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Questions?
Please wait for the microphone.
State your name and company.

Please remember to...
Navigate to this session in the mobile app to complete the survey.

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life’s essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world’s most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com