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Oxy: AVEVA™ PI System™ Cygnet Provisioning Tool

Luis Vasquez - IT Advisor Industrial Controls

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AVΞVA

CYGNET PROVISIONING TOOL

AVEVA PI SYSTEM

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

AGENDA

Cygnet PI Provisioning Tool

- **About OXY**
- **OXY PI Journey**
- **Background**
- **Cygnet Overview**
- **AVEVA™ PI System™ Architecture**
- **Challenge**
- **Tool Design**
- **Workflow**
- **Benefits**
- **Q&A**

BEST-IN-CLASS ASSETS AND EXPERTISE

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.

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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

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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

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CYGNET OVERVIEW – DOMAIN/SITE/SERVICES

- Domain
- Site
- Services

Domain ID	Description	Last ARS Address	Last ARS Service
xxxx	Field 1 region	0.0.0.0	server1.ARS
yyyy	Field 1 region replicated	1.1.1.1	houston.ARS

Domain [xxxx]	
+	Plant1
+	Plant2
+	Plant3
+	Plant4

Domain [xxxx]	
Plant1	
	FAC
	PNT

CYGNET OVERVIEW - FACILITIES

- Facilities (FAC)
  - Metadata
  - Relationships between facilities

WELL	METER	PAD

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CYGNET OVERVIEW - FACILITIES

- Facilities (FAC)
  - Metadata
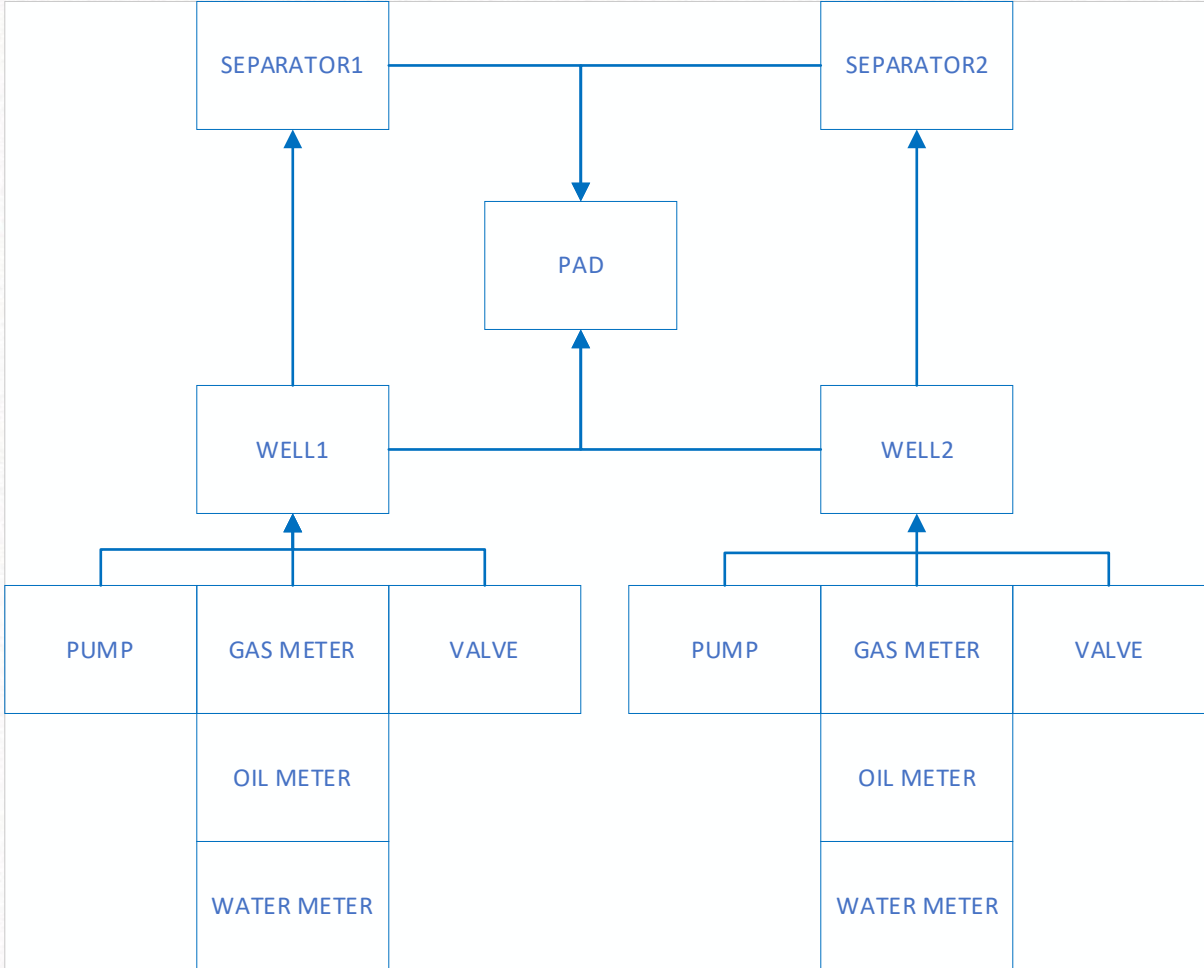 - Relationships between facilities

CYGNET OVERVIEW - FACILITIES

- Facilities (FAC)
  - Metadata
  - Relationships between facilities

CYGNET OVERVIEW - POINTS

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

Long Point ID	Facility	UDC	Description
WELL1_PI_S	WELL1	PI_S	Well 1 Static Pressure
WELL1_PI_C	WELL1	PI_C	Well 1 Casing Pressure
WELL1_PI_T	WELL1	PI_T	Well 1 Tubing Pressure
WELL1_TI	WELL1	TI	Well 1 Temperature

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

Automation Network

Business Network

Cygnet

PI Conn.

PI DA

PI2PI

PI DA

Replicated Cygnet

AF

AF
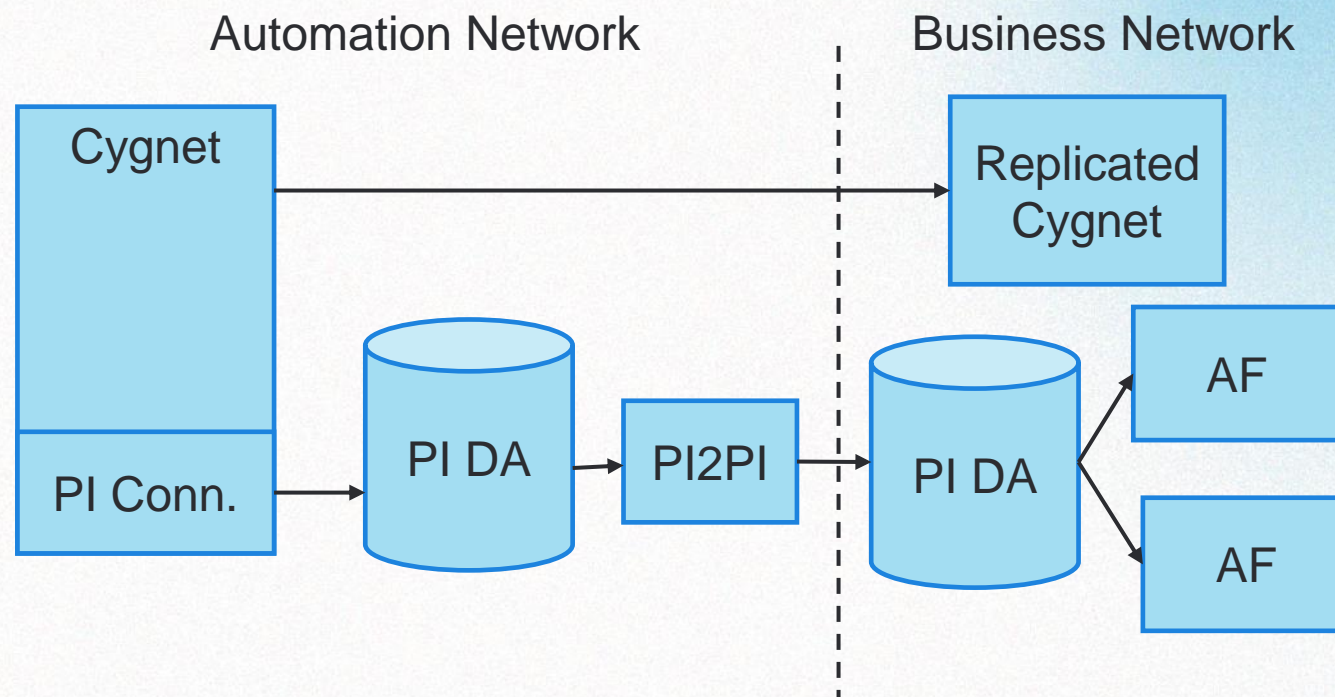
CHALLENGES

- 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

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TOOL DESIGN

- PI AF SDK (C#)
  - Templates
  - Cygnet Facilities
  - AF update
- Configuration stored in MS-SQL
  - Multiple related tables
  - Track update with timestamp

AF
config

ServerName	DatabaseName
server1	db1
server1	db2
server2	testDb

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AF config

PI DA config

Live Data		Calculated Data Output	
HistorianID	HistorianName	CalcHistorianID	HistorianName
1	NONE	1	NONE
2	PIHISTORIAN6	2	TEST_HISTORIAN1
3	PIHISTORIAN2	3	TEST_HISTORIAN2
4	PIHISTORIAN5	4	PIHISTORIAN5
5	PIHISTORIAN1	5	PIHISTORIAN1

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AF config

Templates

PI DA config

TemplateName	FacilityType	Category	AdditionalFilter
WELL_ONSHORE	WELL	WELL	NULL
WELL_IAM_WTTNBERG	WELL	NULL	facility_yes_no5,N
WELL_SWD	WELL_SWD	WELL	NULL
WELL_BULK_SEP_IAM_WTTNBERG	BULK_SEP	NULL	NULL
WELL_IAM_PRBDEEP	WELL	NULL	NULL
WELL_ONSHORE_EF_DOWNTIME	WELL	WELL	facility_attr0,notblank

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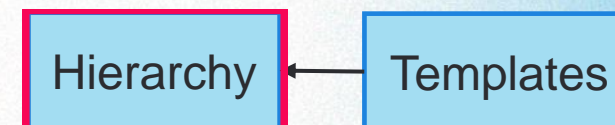 - Track update with timestamp

AF config

Hierarchy ← Templates

PI DA config

NodeID	NodeLevel	Name	ParentID	TemplateName
1	1	MAIN	1	NONE
2	2	SITE_NAME	1	NONE
3	3	METERS	2	NONE
4	4	FACILITY_ID.FACILITY_SERVICE	3	GAS_METER
5	3	WELLS	2	NONE
6	4	FACILITY_ID.FACILITY_SERVICE	5	WELL_ONSHORE

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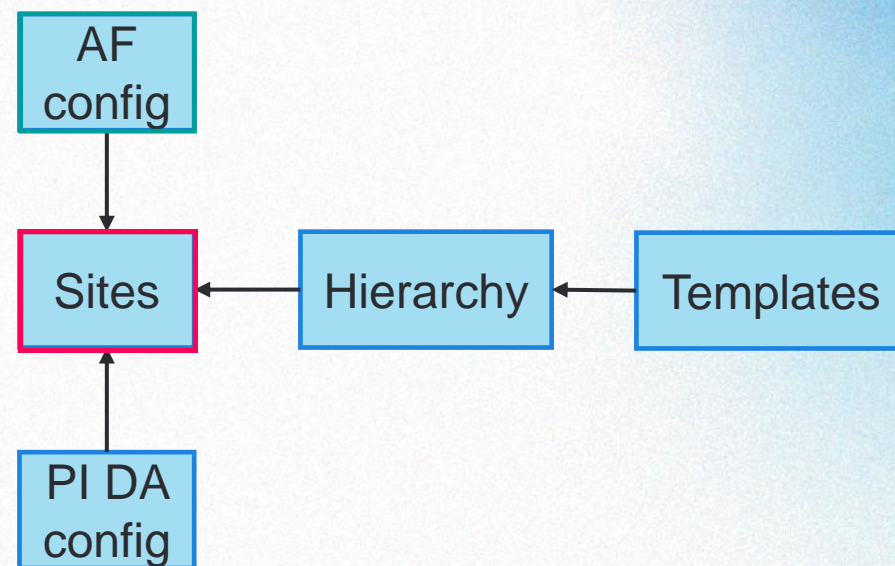
```
      ┌──────────┐
      │    AF    │
      │  config  │
      └────┬─────┘
           │
           ▼
  ┌────────┐    ┌───────────┐    ┌───────────┐
  │ Sites  │◄───│ Hierarchy │◄───│ Templates │
  └────────┘    └───────────┘    └───────────┘
       ▲
       │
  ┌────────┐
  │ PI DA  │
  │ config │
  └────────┘
```

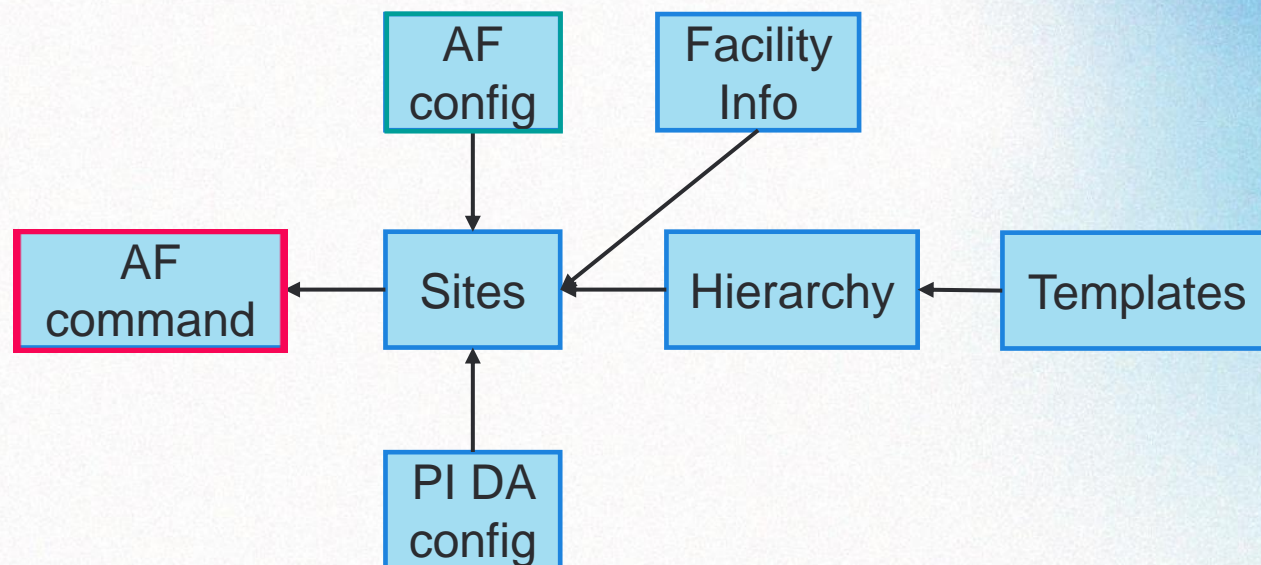| CygnetDomain	SiteName	CygnetSiteName	Hierarchy	Historian	CalcHistorian	LastUpdate
xxxx	Plant1	Plant1	Plant	PIHISTORIAN6	PIHISTORIAN	9/25/2023 21:00
xxxx	Plant1_meters	Plant1	PlantMeters	PIHISTORIAN6	TEST_HISTORIAN	9/26/2023 21:30
yyyy	Plant2	Plant2	Plant	PIHISTORIAN2	PIHISTORIAN2	9/27/2023 22:00

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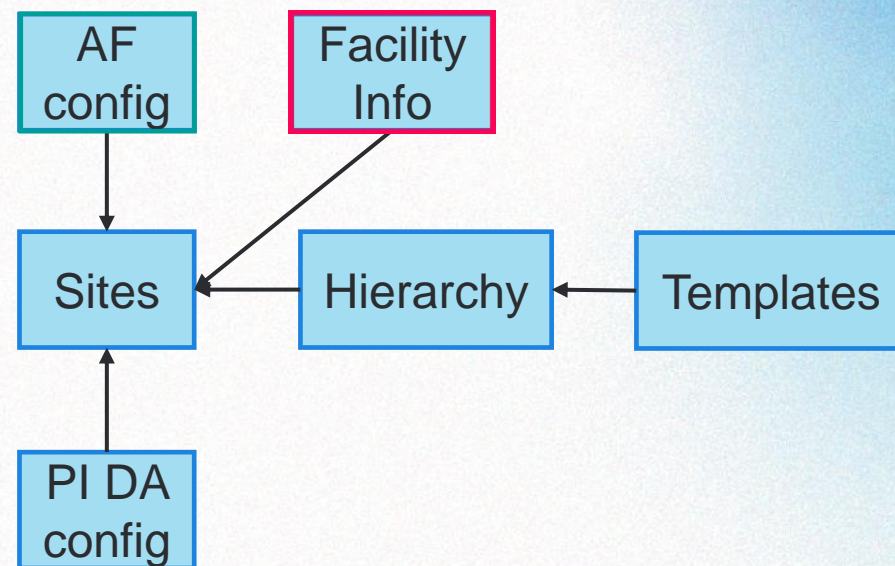
Id	Site	update_datetim	facility_info0	facility_site	facility_service	facility_desc	facility_id	facility_type
PLANT1.OPCIS:WELL1	Plant1	9/1/2022		PLANT1	OPCIS	ATLAS.OPCIS	WELL1	WELL
PLANT1.OPCIS:WELL2	Plant1	9/2/2022		PLANT1	OPCIS		WELL2	WELL
PLANT1.OPCIS:VALVE1	Plant1	9/3/2022		PLANT1	OPCIS	ATLAS.OPCIS01	VALVE1	VALVE
PLANT1.OPCIS:METER_GAS	Plant1	9/4/2022	PLANT1.OPCIS::WELL1	PLANT1	OPCIS	ATLAS CGF	METER_GAS	METER
PLANT1.OPCIS:METER_OIL	Plant1	9/5/2022	PLANT1.OPCIS::WELL1	PLANT1	OPCIS	ATLAS CGF T1 Tr	METER_OIL	METERO

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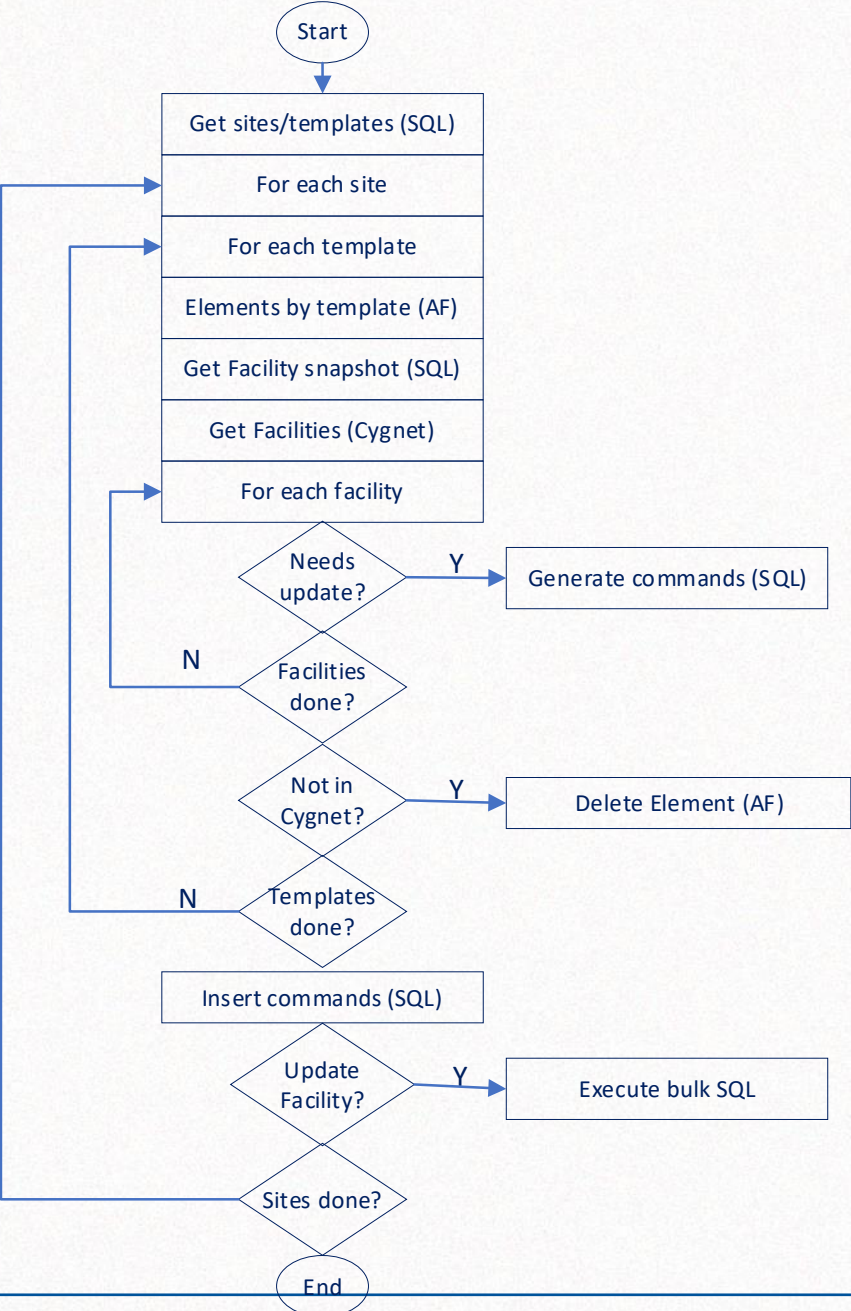 - Track update with timestamp

WORKFLOW

BENEFITS

- AF administration efficiency
    - Automatic updated
    - Mass changes made easily
    - Rapid and flexible deployment
    - Easy process to promote AF to production
    - Audit trail
- AF benefits
    - Updated model (hide unused attributes)
    - PI point agnostic
- Building block for applications

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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

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Luis Vasquez

IT Advisor – Industrial Control Systems

- Oxy
- Luis_Vasquez2@oxy.com

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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.

Thank you!

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AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

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.

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