Enabling Business Transformation with the PI System: The DCP 2.0 Journey

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DCP Midstream - Who We Are

• We provide the full range of midstream services
  • Gas gathering, compression, treating, and processing
  • Natural gas liquid (NGL) production and fractionation
  • Condensate recovery
  • Transportation, storage and sale of residue gas, NGL and propane

• One of the largest U.S. natural gas processing companies
• One of the largest U.S. producers of NGLs
• One of the largest NGL pipeline operators

Through our *DCP 2020* strategic framework, DCP is committed to being sustainable in any market environment
Who are DCP’s customers?

Strong Producer Customers in Key Basins
- DJ Basin (North)
- Midcontinent
- Permian
- South

NGL Pipeline Customers
- Front Range
  - Operated by Enterprise
  - Connected to DCP DJ Basin & third-party plants
- Sand Hills (Permian)
  - Connects to ~5 Bcf/d gas processing capacity
  - ~35/70% DCP/Third Party
- Southern Hills
  - Connects to ~2 Bcf/d gas processing capacity
- Texas Express
  - Operated by Enterprise
- Sand Hills (Gulf Coast)
  - Connects to ~1.5 Bcf/d gas processing capacity

Volume and margin portfolio supported by long-term agreements with diverse high-quality producers in key producing regions.

NGL pipelines backed by plant dedications from DCP and third parties with strong growth outlooks.
Recognition of **OT Data & Information** as Strategic Asset

**Genesis & Vision**
The initial conceptualization of DCP 2.0 and digital transformation emerges from the changing state of the industry.

**Transformation**
Achieve operational excellence through

- PEOPLE
- PROCESS
- TECHNOLOGY

Delivering business solutions and ROI

**Leadership & Innovation**
Industry leader and disruptor with the people, processes, and technologies needed for rapid innovation and adaptation.

**Foundation & Focus**
Set the foundation for transformation through learning, growth and a focus on people, process and technology.

**Acceleration**
Rapid refinement, integration, and extension of transformational solutions conceived, built and delivered.
Delivering Disruptive & Transformative Business Value

- $20MM-25MM investment in 2017
- ~1 year Payback!
- Projected incremental $20MM EBITDA in 2018
- Continuing to drive EBITDA impact 2020+
Developing Digital Solutions: Accomplishments

Experience Design Established
Customer Obsessed
Agile Methodology defined and adopted
Tech Stack architected, built and implemented
Data Foundations - Embracing the Challenge

We need a deep understanding of our operational data in context, transformed into information and knowledge, but:

• Our existing data architecture was focused on process control and operations, with analytics and reporting almost an after-thought

• There was no centralized and normalized set of operational data across the company

• Multiple versions of the “same data” emailed in spreadsheets to multiple parties

To get our operational data house in order, we deployed an enterprise-wide PI System
Why OSIsoft, the PI System, and the EA?

- **Key Considerations:**
  - Performance, Scalability, Reliability, and Security (cyber & data)
  - Integration with other systems
  - Rapid deployment
  - Keeping control systems (DCS and SCADA) focused on control
  - Keeping up with ever evolving technological changes
  - Empowerment & innovation
  - Self sufficiency

- **Strong OSIsoft and the PI System Value proposition:**
  - Enterprise OT infrastructure – agnostic, scalability, performance, reliability
  - Analytics platform
  - Cyber/data security & governance
  - World class support - Account manager, NOC, Tech Support, Company
  - PI System community – large E&P customer base

*To rapidly attain DCP2020 Strategy, Vision, & Value, we chose an Enterprise Agreement*
Our Approach to **Rapid Implementation & Value**

1. **Hybrid PI AF Jump Start & SME Training with EA KO Meeting:**
   - Naming conventions – Element, category, attributes, expression syntax, etc.
   - PI AF structure, architecture & integration with SCADA/DCS/IT Systems
   - PI AF governance - SMEs guide, product team implement, PI Team provides standardization & QA

2. **Leveraged Enterprise Agreement – COE, EPM, rapid stand up of PI System**

3. **Rapid, agile method, heavy use of PI AF/PI Vision Templates**
   - Deployment team worked on 2 parallel tracks: data connections/tag creation and product development

4. **Formation of in-house PI Team augmented with OSIsoft COE and SIs**

5. **EA Governance – Parallel Leadership teams, Executive Sponsors, KPIs, quarterly leadership team meetings**
PI System Enterprise Data Flow

- **Plant DCS** (OPC, RDBMS, FXBAIS)
- **Wonderware SCADA** (OPC, RDBMS)
- **Allegro** – Market Prices (RDBMS)
- **Windrock Spotlight** (Connector for UFL)
- **VMGSim** (OPC – bidirectional data flow)
- **ACI Compression Modeling** (custom utility – bidirectional data flow)
- **Current local temperature** (custom utility)
- **FlowCal** - Volumes and GC (RDBMS)
- **SkyBitz** – remote tank monitoring (UFL)
- **ALS** – lab tests of oil samples (UFL)
- **SolarWinds** – network equipment status (Connector for UFL)
- **FieldSquared** – Operator rounds (custom utility and UFL)
DCP Midstream PI System Development

Building the Tools for Reliability

**PI Asset Framework (PI AF)**

- Develop Hierarchy of Gas Plant, Compressor Station, Pipeline Assets
- Organization of Data Into Useful Sets
- Templates for Scalability
- Translation/Integration With Other Business Systems

**PI Vision**

- Dashboards for Operational Monitoring
- Multiple Sources of Data Combined Into Single View
- Pair Analytics w/Real-Time Values
- Single Point Access Across Organization

**PI Alerts & PI Notification**

- 24/7 Monitoring & Communication of Anomalies
- Failure Detection, Efficiency Monitoring, Work Mgmt.
- Improve Operational Awareness
- Eliminate “Digging” for Issues
Business Transformation In Action: Operations of the Future - Now

- People, Process & Technology

- The PI System and PI AF underpins the ICC and associated apps & solutions

- Energy Lab rapidly develops digital solutions using PI System data and infrastructure as key technology stack component

Integrated Collaboration Center (ICC) the operations of the future

- ICC ties multiple data sources, including SCADA, engineering data, contracts, real-time market prices, financial systems, KPIs and daily theoretical margins
- Facilitates real-time decisions…driving asset optimization throughout the full business value chain
- 30 of 61 plants currently on the ICC platform…remaining by the end of 2018

Business Solutions

- Energy Lab rapidly develops digital solutions, including apps, to automate, streamline and digitize work streams
- Deployed 12 solutions to optimize workflow, automate processes, improve compliance, reduce costs and solve employee and customer pain points
- Now accelerating additional solutions throughout operations, commercial and corporate functions

~50 employees dedicated to DCP 2.0

Higher margins

Significant cost savings

Tens of thousands of reduced work hours

Better reliability and safety

Culturally transforming the way we work through process optimization and digitization
ICC Rapid Standup & Transition

- 2017: 1st ICC Coordinator hired
- Q1: 1st Full Regional Rollout
- Q2: Began Integrated Engineering support
- Q3: First of Month (FOM) Targeting Alignment coordination begins from ICC
- Q4: Begin Gas Control Standup
- 2018:
  - ICC moved to 23rd Floor in Denver HQ
  - Construction Begins for new ICC
  - Initial ICC begins 4 Gas Plants on-boarded in ICC
  - EA Kick Off Meeting & PI AF Jump start/SME training
  - Rapid Rollout of PI System Infrastructure
  - 6 ICC Coordinators driving integrated decisions
  - 35 Total Gas Plants supported by the ICC, includes 6 frac plants
- 2019:
  - Begin Super System Integration
  - 1st ICC Coordinator hired
  - 35 Total Gas Plants supported by the ICC, includes 6 frac plants

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The Integrated Collaboration Center (ICC)

*Business Transformation In Action: Not just Operations*
Integrated Landing Page to Navigate

Gas Routing Portal is Company Overview and Path to all Tools
Real Time Operational & Financial Targets
Using Operational, Process Simulation and Financial Data to Optimize Plant Performance

**CHALLENGE**
- Plant operation is dependent on many factors
  - Feed Composition,
  - Operating Mode
  - Plant and Equipment Design
- Optimized operating conditions were not readily available in real time
- Incremental value of operating at optimal conditions was unknown

**SOLUTION**
- Linking process simulations to PI data & layers of analytics to provide operating targets
- Financial info linked to current operating and theoretical data provides current and potential value
- Real time optimized operating and financial data provide definitive targets for operators

**RESULTS**
- More accurate, consistent and reliable plant operations provides significant margin improvement
- Quantifying impact of sub-optimal operation allows effective prioritization of plant maintenance and small capital projects
- Visibility to plant capability, current status and associated value is fundamental to ICC operation
Tracking Plant Downtime and Causes
Event Frames, Notifications and Reason Codes to Improve Plant Reliability
High Pressure Field Status

Violations of Set Points are Notes for Easy Identification
IIOT Enabled Advance Machinery Analytics

Spotlight Site Installation = 2 hrs
IIOT sensory inputs that augments existing SCADA/PLC inputs in the PI System

Collect Raw IIOT Data
i.e. high frequency, pressure, Vibration and spectrum

Create Calculated Data
i.e. pressure vs volume

EDGE AI ANALYTICS
i.e. “this is how the valve is leaking”

Integrate with the PI System for Complete Cause and Effect Analytics via PI AF and PI Analytics
Embed Windrock specialized analytics displays into PI Vision

From Data to specialized Analytics (Cloud based)
Data & Trends for Condition Based Maintenance

**PI Trends & PI Analytics to Maximize Component Life & Value**

*Case Study:* Real-time Trending and Immediate Notification to Monitor and Respond to Equipment Condition

**CHALLENGE**

- Historically used a control system-based monitoring (i.e. alarms and shut downs on small set of parameters)
- Limited advanced warning capability

**SOLUTION**

- Compression Health Monitoring Team Developed Standardized Tools and Analyses using Operational Data to Monitor Equipment & Improve Reliability
- PI Vision & Notifications to Trend + Flag Abnormal Operating Conditions
- Groups use PI to expand + customize monitoring beyond initial “centralized” tools

**RESULTS**

- More quickly identify and troubleshoot issues
- Reduce Frequency of Equipment Failures and associated downtime
- Simple first steps toward condition-based monitoring

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Historically used a control system-based monitoring (i.e. alarms and shut downs on small set of parameters)

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Compression Health Monitoring Team Developed Standardized Tools and Analyses using Operational Data to Monitor Equipment & Improve Reliability

PI Vision & Notifications to Trend + Flag Abnormal Operating Conditions

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Real-Time Compression Optimization
Using PI AF & First Principles Models to Predict Compressor Operations

Case Study: Real-time Compressor Optimization using PI Data and First Principles Models

CHALLENGE

• Historically, we run compressor performance curves during design and then periodically to confirm proper performance

• Changes in gas volume, composition, field pressures can significantly change the optimal operating point

SOLUTION

• Compression Health Monitoring Team runs first principle models using real-time PI data. Model output is used to define optimal compressor settings for current operation.

• PI Vision displays provides operating conditions based on optimal load step

RESULTS

• More quickly identify optimal compressor operating parameters

• Reduced operating costs

• Improved equipment reliability
Linking Operational to Geographic Data

Using Operational and Geospatial Data to Optimize Gas Flow and Gathering Performance

**CHALLENGE**
- DCP’s assets are spread over a wide area, requiring lots of driving miles for operations and maintenance
- With its long distances and extensive interconnections, our gathering system operations must consider geography of our assets

**SOLUTION**
- Linking operating data with geospatial wellhead and gathering system information will allow rapid understanding of issues and responses to normal and upset conditions.

**RESULTS**
- Optimal gas routing
- Increased volumes
- Greater reliability
- Fewer miles driven
What is next.....

• People
  • Continue to integrate supporting groups into the ICC; Engineering, Finance, Commercial

• Process
  • Continue to develop new communication processes between Customers, Operations, Commercial, Finance, and ICC
  • Standardize workflow processes across all business units

• Technology
  • Real time, dynamic hydraulic models in all high pressure systems
  • Continued expansion of commercial data integration
One Solution
Deliver meaningful system views based on user needs and tasks

SYSTEM VISUALIZATION TYPES
- Schematic
- Tabular Data
- Map

END-TO-END FLOW

TECH STACK
- PI
- Flow Cal
- DCS
- SCADA

DATA LAYER
Connect, Complete, Organized/Structured Data – aka The Truth

RISK MANAGEMENT
RELIABILITY
EFFICIENCY
Enabling Business Transformation with the PI System

COMPANY AND GOAL
DCP Midstream provides a broad array of midstream services from the well head to market and wanted to use data and information as a strategic asset to enable a Business Transformation to deliver differentiated customer satisfaction, safety, & performance.

CHALLENGE
Disparate data from multiple operational and financial sources inhibiting ability to make timely, integrated business decisions
- Multiple data sources
- Lack of tag and asset naming stds
- Low level of collaboration
- Average asset reliability and margin performance

SOLUTION
Selected the PI System as a strategic enterprise OT infrastructure with an EA to underpin DCP2.0 Business Transformation and ICC
- Implemented multi-tiered PI System enterprise architecture in a rapid, agile method in 10 months
- Focus on PI AF-based OT data structure – abstraction, normalization, and context
- Enabled Business Transformation and Integrated Collaboration Center (ICC)

RESULTS
Saved $20MM-$25MM in EBITDA benefit in 2017 from improved gas plant operation and ICC coordination
- On track for additional $25MM in EBITDA in 2018
- Reduced O&M costs & growth momentum from new projects
- More proactive/predictive vs reactive…a culture of innovation
- Improved customer service, satisfaction and differentiation
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