Achieving Data Transformation
with Asset Framework

EXECUTIVE SUMMARY

Manufacturing enterprises are ushering in a new era of digital industrialization, but many organizations are still failing to maximize the benefits of operational data. Instead, companies are overwhelmed by the volume and complexity of their real-time data and vital process information that could deliver operational insights is landlocked in multiple systems without necessary context to make informed decisions.

OSIsoft's Asset Framework (AF) – part of the PI Server™ – accelerates digital transformation by unifying disparate sources of data so individuals and organizations can gain insights to take action. AF combines asset data such as pressure, temperature, last maintenance, ERP, LIMS, and other relevant external information into a digital replica of the physical asset that allows viewers to see its current operating state and trend lines. In addition, AF integrates peripheral data streams from outside sources, such as weather, CAD data, emissions, and plant-level KPIs that go beyond physical inspections.

AF assets can be an individual sensor, a piece of equipment, an industrial process, or a series of manufacturing plants. These assets can be joined together into a modular, scalable, digital replica of the enterprise, without programming or additional coding.

By enriching real-time data with multilayered context from inside and outside of the control system, AF acts as one-stop shop for all data streams, calculations, and analytics. Once data is in AF, anyone can create displays and reports with PI System™ visualization tools, or transmit analytics-ready data to business systems and analytics packages such as Esri® ArcGIS®, SAP HANA®, and Microsoft® Azure® Analytics. All this can be done without coding or requiring IT resources.

Ultimately, AF enables a comprehensive, dynamic, smart Operational Technologies (OT) data infrastructure to improve real-time operations and elevate overall performance.

Devon Energy deploys over 50 smart asset AF templates across its exploration and production (E&P) operations consisting of more than 50,000 assets.

TransCanada's AF powered platform has seen availability of their compression assets increase from 85% to 98% in just a few years, leading to savings in excess of $10 million.

MOL, one of Central Europe's largest oil and gas companies, uses AF to track over 80 billion data points a year. In all, MOL estimates it increased EBITDA earnings by $1 billion over a five year period.

THE DIGITAL TRANSFORMATION: CHALLENGES AND OPPORTUNITIES

Digital transformation will accelerate operational innovation and push manufacturing beyond traditional processes. The biggest opportunities lie in the analysis of operational data from geographically dispersed networks, transportation systems, and critical infrastructure of asset-centric industries, including utilities, energy, and mining. Operational data will also be critical to enabling new, often service-based, business models.

However, many digital transformation efforts have yet to realize full return on investment. Traditional integration approaches are expensive or too time consuming. Typically, data remains in silos because the enterprise lacks the overarching framework necessary to transform the influx of data into meaningful insights, making it difficult to achieve goals.

THE SOLUTION: PI SYSTEM WITH ASSET FRAMEWORK

Deployed at over 19,000 sites worldwide and across multiple industries, the OSIsoft PI System, an Industrial Internet of Things platform (IIoT), is widely used to achieve digital transformation goals. Over 65% of the Fortune 500 industrial companies use the PI System as their data infrastructure to gather, store, analyze, and visualize operational data for data-driven insights. Over 1.5 billion sensors worldwide stream data into the PI System, allowing companies to capture energy consumption, asset utilization, and complex process flow information.

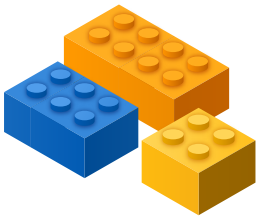
The PI System is backed by the twin-engine PI Server, which includes the Data Archive and AF. AF harmonizes and unifies PI System data with a comprehensive, contextual system of record, turning sensor-based data into a digital replica of facilities and equipment. The Data Archive collects and historizes millions of points of measurement across the enterprise.

Using the PI System with AF, a process and manufacturing enterprise can:

- **Define a consistent representation** of assets and build a unified structure around every point of measurement in the data stream.
- **Identify each component and process** of business, from pumps to generators to turbines and other equipment, and specify relationships or organizational structure.
- **Consolidate information from multiple systems** into a single, overarching structure to quickly generate actionable insights.
- **Reference external data** from outside the control system, such as last maintenance date (EHMS), financial data (ERP), LIMS, and environmental limits (CEMES), and combine it with asset operation details.
- **Empower subject matter experts** in a self-service, configuration-only environment that does not require any coding background.

With an asset-centric view of real-time data, organizations can utilize hundreds of pre-built asset templates to automatically replicate their operations into a smart OT data infrastructure that can be dynamically organized by any category.

Asset models can be easily created and are flexible and scalable without coding or development. Once AF is in place, time-series data is transformed into an analytics-ready representation of all operational processes and equipment. Calculations and analytics can be added to store calculation results and generate predictive forecast data into the future, create alerts and notifications, and track and investigate important events – such as downtime or out-of-spec performance – from any piece of equipment.



BENEFITS

Extract maximum value out of operational data.

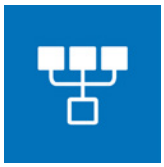
Reduce operating costs and downtime.

Enhance data comprehension by viewing data in the right context using PI System visualization tools.

Create comprehensive information sets.

Empower subject matter experts with operational data to improve productivity.

Standardize data with modular, scalable templates to create KPIs and executive dashboards.



Consolidation of all data requests into a single data clearinghouse to remove IT burden of handling requests.

AF democratizes data and empowers users to leverage information that leads to operational intelligence and continuous improvement.

Case Study

Devon Energy

Devon Energy is one of North America's leading independent producers of oil and natural gas. The company utilized AF to deploy over 50 smart asset templates across its exploration and production (E&P) operations consisting of more than 92,000 assets. Now, the company has visibility into all of its equipment and processes, from "smart rigs" for drilling optimization, flow back, and well completions for adjacent well monitoring, to coiled tubing for plug removal optimization

With almost 4 million data tags streaming from drilling and production operations, Devon Energy has transformed its real-time operational data into fast, actionable insights. Breaking the barriers between Operational Technologies (OT) and IT with AF, Devon Energy now relies on self-service Business Intelligence (BI) and web-based visualization tools like PI Coresight™ and PI Integrators, which support a variety of advanced, higher-level analytics tools such as Spotfire, Harmony, MySQL, Microsoft Azure, and Esri ArcGIS.

After signing an Enterprise Agreement (EA) with OSIsoft, Devon Energy quickly became one of the most efficient drillers in the US, having significantly reduced their cost and time to first oil. Currently, the company is focusing on decline curve analysis to improve reservoir production optimization.

Case Study

TransCanada

TransCanada Corporation is one of the largest natural gas transmission companies in North America, with nearly 91,000 kilometers (56,900 miles) of natural gas pipelines – enough to circle the earth twice. TransCanada wanted to implement real-time analytics to prevent asset failures among its 1.2 million horsepower compression fleet. To meet this goal, TransCanada utilized the PI System to develop an Enterprise Analytics platform, a real-time solution designed to transform operational efficiency and maintenance strategies for compressors.

To build the Enterprise Analytics platform, TransCanada leveraged AF and Event Frames for advanced analytics, including anomaly detection and failure prediction. The company developed smart compressor object templates and anomaly detection on measurements such as vibration, temperature, pressure, and RPMs.

By feeding data organized by the AF into the Enterprise Analytics platform, TransCanada can now perform fleet-wide commercial risk analysis. Advanced statistical methods are combined with real-time anomaly detection, downtime/up-time analysis, failure analysis, and asset health analysis to mitigate unplanned failures across over 7000 critical data streams.

After transforming its data infrastructure with AF, TransCanada has seen availability of its compression fleet increase from 85% to 98%, and has saved in excess of $10 million from the initial implementation on 400 of the 900 compressors.

Case Study

MOL Group

MOL, one of Central Europe's largest refiners, wanted to apply advanced analytics to develop processing techniques for opportunity crudes that minimize negative effects on its plants. In 2010, the company's Information Integration and Automation team spearheaded an effort towards digital transformation. As a first step, MOL adopted AF to create a replica of different processes and equipment sets across their facilities. Using AF, MOL created a configurable, dynamic, smart OT data infrastructure with over 300 smart asset object templates, 21,000 elements, and over 61,000 Event Frames designed to signal the occurrence of key parameters or events.

AF allowed MOL to build a self-serve analytics and business intelligence environment where operators and engineers could configure their own smart asset objects, experiment with potential improvements, and then execute changes across the MOL enterprise with governance.

MOL used AF to develop techniques for processing opportunity crudes while minimizing corrosion and operational issues related to cokers and yields. With a smart OT infrastructure in place, they implemented advanced corrosion analytics for High Temperature Hydrogen Attack (HTHA) and other forms of predictive corrosion analyses across multiple sites.

By studying the relevant operational data, MOL was able to pinpoint the temperature and pressure parameters that increased the risk of HTHA. In less than a week, they developed a smart asset HTHA application template and, following a successful test, the company quickly rolled out the template across the entire enterprise to over 50 pipe nodes. MOL estimates that the implementation has increased earnings by $1 billion over a five-year period.

CONCLUSION

Heavy industry will be fundamentally transformed by digital technologies over the coming decades. Not only will companies achieve new levels of efficiency through digitization, they will develop new ways of delivering goods and services. This transformation, however, will ultimately rely on being able to capture and structure machine data so that it can be used by people. OSIsoft's PI System and Asset Framework constitute a foundation for giving individuals across companies deep, impactful insight into their organizations. For more information, please visit us at www.osisoft.com.

ABOUT OSISOFT

OSIsoft, a global leader in operational intelligence, delivers an open enterprise infrastructure to connect sensor-based data, operations, and people to enable real-time and actionable insights. As the maker of the PI System, OSIsoft empowers companies across a range of industries in activities such as exploration, extraction, production, generation, process and discrete manufacturing, distribution, and services to leverage streaming data to optimize and enrich their businesses. For over thirty years, OSIsoft customers have embraced the PI System to deliver process, quality, energy, regulatory compliance, safety, security, and asset health improvements across their operations. Founded in 1980, OSIsoft is a privately-held company, headquartered in San Leandro, California, U.S.A., with offices around the world. For more information visit www.osisoft.com.

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