

AFRY — AN INTEGRATED SINGLE SOURCE OF TRUTH ACROSS IT, OT AND ET

The convergence of information technology (IT) with operational technology (OT) and engineering technology (ET) is a crucial enabler for digital transformation in companies, particularly asset-intensive industries such as mining and manufacturing. We can see this in the partnership between AFRY, a leader in engineering design and advisory services, and Infosys, a leader in next-generation digital services and consulting.

This article focuses on AFRY's process industry business and how the two companies partnered to deliver an IT-OT-ET integrated "single source of truth," assuring data integrity from the time of initial engineering and construction and across all the plant lifecycle stages, speeding the ability to ramp up to design capacity, eliminate delays due to engineering rework and costly design fixes, reduce unplanned downtime and improve overall plant performance and productivity.

AFRY is a trailblazer in a domain that has traditionally been slow in fully embracing the latest technological advances. As Kai Vikman, COO at AFRY, noted, "Successful IT-OT-ET integration is a clear prerequisite to reap the benefits of digital manufacturing at scale." He also believes that this will be an obligation with the new European Data Act calling for more harmonized rules on fair access to and use of data.



*Kai Vikman- chief operating officer at AFRY
Source: AFRY*

GETTING STARTED: THE HANDOVER FROM CONSTRUCTION TO OPERATIONS

The life span of a process plant in industries such as industrial chemical manufacturing is typically more than 50 years. Building such a plant is a complex multistep process, and its success will rely heavily on effective collaboration among all stakeholders

covering multiple disciplines from process engineering to mechanical engineering to architecture to electrical and instrumentation to piping and construction.

After the plant is complete, there is a handover of information from the builder to the plant operator. The handover may involve millions of documents from multiple engineering, procurement and construction (EPC) contractors. Transferring relevant data in a format usable by the plant's operations and maintenance is a challenge and a potential inhibitor that could add months or years to the schedule for making the plant fully operational.

The data involved in this process spans multiple disciplines. It might include the standard technical specifications, process and instrumentation and process flow diagrams, architectural designs and schematics, electrical circuit diagrams, instrumentation details or a 3-D model of the plan. Each of these elements adds to the complexity.

LEVERAGING GLOBAL STANDARDS FOR DATA SHARING AND INTEGRATION

IT-OT-ET integration plays a central role as a critical facilitator for many other systems and information integration. The key to success is information standardization, ensuring minimum effort to hand over information between parties. Infosys worked with AFRY to establish the standard guiding principles and class libraries from multiple industry standards and best practices, as no single standard could address the data integration challenges across the lifecycle. The approach uses [ISO 15926](#) ("Integration of lifecycle data for process plants, including oil and gas production facilities"), a globally recognized standard for data sharing and integrating complex plant and project information.

ISO 15926's Resource Description Framework (RDF) acts as a universal reference across disparate information systems, providing a neutral information layer with which any software application with an ISO 15926 adaptor can exchange data. It preserves the precise meaning of the data as it is being exchanged by referencing a data dictionary containing definitions of all objects and associated attributes within the plant. This ability for systems to exchange information with shared meaning by using universal standards is called *semantic interoperability*.

In a semantic implementation, data arrives pre-packaged with self-described context, and the receiving system can derive meaning from that data through a universal

vocabulary. In this case, Infosys added data about the data (i.e., metadata) and linked each element to a controlled, shared vocabulary defined by ISO 15926.

Other standards leveraged were the [Capital Facilities Information Handover Specification](#) (CFIHOS) and the [DEXPI Initiative](#), promoting general data exchange standards for the process industry, with a current focus on *Piping and Instrumentation diagrams*. Infosys also used the [OPC Unified Architecture](#) (OPC UA) standard for operational technology integration for machine-to-machine communications for industrial automation.

Together with Infosys, AFRY has set up a sandbox environment integrating Virtual Site, a plant engineering system, SAP, the enterprise business planning system, and the Simatic platform, a plant automation system, to demonstrate new use cases. The structured data is implemented in an application server that binds the semantics to data based on the chosen standards to retrieve information in subsequent applications efficiently. The environment is currently set up on the Microsoft Azure platform but can be implemented on any on-premise or public cloud platforms. The unique contribution of the AFRY-Infosys partnership is the standardization and harmonization of data using the interoperability layer aligning to global standards.

OVERALL BENEFITS OF A SINGLE INTEGRATED SOURCE OF TRUTH

By integrating plant lifecycle data across the IT, OT and ET domains, Infosys and AFRY were able to build a single source of truth across the plant lifecycle—a digital twin of the entire plant. The digital twin is an exact digital representation of the physical plant and accurately reflects the state of the plant, including all of the information about work processes for operations and maintenance and engineering information.

Sharing integrated plant engineering data in the correct format between EPC companies and the plant operator reduced delays, rework, conflicts and change orders during the construction phase. Multidisciplinary engineering data simplified conformance to regulatory, environmental, safety and compliance standards.

For operations, a single source of information available at the right time, place and format led to significant improvements in long-term lifecycle performance and optimization, maximizing plant yield and efficiency. Safety information management with standardized processes, augmented by safe working training, led to fewer safety accidents and less lost time due to injury.

Effective maintenance management reduced unplanned downtime and a significant reduction in maintenance costs thanks to well-organized maintenance data and procedures, easy-to-find technical data sheets and ready access to spare parts. Deploying engineering data management as a shared data source to support digital solutions such as predictive maintenance resulted in improved productivity per technician and reductions in mean time-to-repair.

WRAPPING UP

The challenges that AFRY is tackling are in a domain that has been hesitant and slow to embrace the latest technological advances fully. The result has been fragmentation, inadequate collaboration with suppliers and insufficient knowledge transfer information from project to project. For the longest time, plant engineering data has resided in silos.

When a problem occurs in the plant, it is hard for engineers, operations and maintenance people to access information and identify the cause. When changes occur, it takes way too long to update the other systems that need to know about the change. The result is that the systems people rely on don't have accurate or sufficient data. The industry needs a radical approach. If digitalization is the primary goal, interoperability is the means to achieve it, and interoperability requires standardization.

Transactional and business process information (from IT), the monitoring and analysis of industrial assets (OT) and the use of engineering design data (ET) are all essential for the proper day-to-day function of a process plant. The incremental value of the AFRY-Infosys partnership comes from creating interoperability among these domains when the IT-OT-ET data is brought together in a single source of truth as the foundation for a digital enterprise.

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