UPTAKE

Liberate Your OT Data

Elevate It to the Cloud
to Scale Its Value

The Cloud Era of Industrial Intelligence

Operational technology (OT) data is trapped in the archives of data historians: siloed in individual departments, underleveraged because of licensing and network constraints, and undervalued as a result of pre-modeling. The core users of data from smart sensors and automation systems excel at distributed control, monitoring, and data collection. But the legacy on-premises systems in use today make the operationalization of industrial data by the enterprise both difficult and expensive. They were not designed for data to leave the plant after intake or built for the cloud era of industrial intelligence.

Operators have lacked a cost-effective method to unlock the value of their proprietary information at scale. A commercial application that is easy to deploy and configurable to specific analysis, reporting, and regulatory needs has not been available. Instead, that OT data — especially time-series data —is largely inaccessible or lacks integrity with the loss of metadata, compromising the transformative value possible through advanced analytics which supports improved decision-making.

Without visibility into conditions at the plant level with the right context, the enterprise today cannot manage with the operational excellence required to meet business objectives and regulatory requirements. Across asset-intensive industries, rising O&M costs, personnel shortages, and aging infrastructure are challenging operators.

The obstacles brought about by the COVID-19 pandemic have only compounded existing challenges. From remote plant monitoring and staggered technician scheduling to comply with social distancing measures to volatile demand and accelerated knowledge drain, these new market conditions touch every part of the enterprise. Digital transformation initiatives have taken on a new significance. Digital enablement, workflows, and innovation are mission-critical now — and essential to profitability.

In a McKinsey analysis of digital transformation initiatives across heavy industries, plants and companies with low digital maturity improved their EBITDA by 3-5 percent. More digitally-adept operations saw improvement of up to 1-3 percent. For some chemical processors, throughput increased by over 30 percent from the application of advanced analytics. Even organizations with extensive digitization experience, like one of Canada's largest integrated energy companies, stand to gain from using fewer resources to leverage data and optimize preventative maintenance strategies already in place.

The Traditional Gap Between OT & IT

With the aid of data prepared for operational applications like Industrial AI and advanced analytics, the operations of asset-intensive plants can be more predictable and productive. However, to date, in process-intensive industries like chemicals, oil and gas, and mining, operators have been unable to take advantage of the advances in information technology (IT) to streamline industrial intelligence from OT data. Production sites have the required instrumentation and connectivity. The OT hardware and IT infrastructure to support the management and distribution of data at edge sites are in place.

Despite all the industry talk about the convergence of OT and IT systems, the core problem with the OT infrastructure as it exists today is that it does not fully support the digital initiatives made possible by IT systems. This divergence in OT and IT dates back to their development as separate technology environments.

For decades, many organizations typically have relied on a few interoperable IT systems. Enterprise resource planning (ERP) and customer relationship management (CRM) software, for example, are fairly standardized — in part because they were designed as single sources of information for operational control. The ability to pass data between these systems has been critical for organizations looking to gain end-to-end visibility into business processes. And data from these systems, including specific financial metrics and KPIs, are far more simple, structured, and normalized than those from OT systems. IT systems have not required the technology workarounds to clean, structure, and process data for more advanced analytics. The capabilities already exist.

OT systems have traditionally been far less supportive of enterprise use. Automation systems like Distributed Control Systems (DCSs), Programmable Logic Controllers (PLCs), and Supervisory Control and Data Acquisition Systems (SCADA) are highly vendor-specific and specialized to collect vast amounts of unstructured and semi-structured data. These separate OT systems often do not communicate with each other by design, each with their own specific use and corresponding teams responsible for that function. Without that communication between systems, however, it is challenging for many OT organizations to aggregate all of the OT data already being collected, move it into an IT environment, and enrich it with contextual information.

The development of advanced data ingestion, integration, and contextualization capabilities have outpaced the ability of OT departments to elevate their data to the enterprise—much less use them to enhance decision support through advanced analytics. As the layer of aggregation for OT systems, legacy software like data historians have led to a patchwork approach to bring industrial asset data to the enterprise.

The Development of Data Historians as On-premises Systems

Data historians have been fundamental to asset management for at least the past thirty years. Known also as a process historian or operational historian, data historians are an OT software system to collect and store production and process data by time like temperature, pressure, and flow associated from SCADA or other automation systems. The compressed and stored time-series data can then be plotted to visualize trends on charts, graphs, and reports, or as the basis for data analysis.

Real-time values represent just a fraction of the operational data available to historians. Most organizations have decades of historical data within their data historians, in addition to metadata in complex data models.

In looking at the state of data historians in 2015, LNS Research concluded:

> *Despite the best efforts of many leading data historian vendors, the main users of these systems have not significantly expanded beyond the process engineers that the systems were originally designed for. In essence, those that care about and are responsible for the associated processes are the ones using the system. As these systems have rolled up from asset or plant specific applications to enterprise applications, the main use cases have slightly expanded but generally remained the same.*

Six years on, the story has largely remained the same.

Because of the OT development of data historians without parallel improvements in scalability, data historians are still primarily on-premises intake systems which inhibit the operationalization of data beyond the site of productivity.

Many vendors of data historians have placed proprietary restrictions on the number of users and tags, making it more expensive for organizations to retrieve value from their own information. That data sits stagnant in closed formats in onsite systems, wasting its real-time potential to unlock the value of that data across the enterprise through analytics. To move that data to the enterprise cloud often requires that it undergoes modeling, in which case the data loses its context and future utility through preprocessing for one particular use case.

With data now flowing from everywhere, including from cloud to cloud, historians cannot manage enterprise data with the degree of required complexity or flexibility. At fracking sites, for example, software monitoring offset wells helps companies meet regulatory requirements. That well data can support many analytics initiatives like production and maintenance optimization. However, as often happens, that data filtered through the on-premises historian limits possible end uses. Adaptable ingestion from multiple sources of data — including smart sensors and clouds — is critical to future-proof investments in industrial intelligence.

For time-series data to be useful, it needs to be accessible in an open format so that it can be shared and used for reporting, diagnosis, analytics, and optimization — not just within the data historian, but across the OT and IT software portfolio. Because of legacy historians, data acquisition, movement, and preparation have proven cost-prohibitive.

To more fully take advantage of their sensor data and unlock greater productivity through the operationalization of OT data, many companies have turned to data migration services. However, these projects are often themselves stepwise, expensive, and lengthy, dependent also on modeling data that limits its future usability and value. In addition, the primary limitations of data historians as on-premises systems remain unaddressed.

OT Data: The Most Undervalued and Underleveraged Asset

As instrumentation improves and the volume of data coming off smart sensors increases, the loss from untapped industrial asset data will only increase. By 2025, IDC estimates that the world's volume of data will have grown by 61 percent from 2018 to 175 zettabytes. An average-sized refinery, for instance, produces millions of data points. By some estimates, just about 5 percent of that data is used. Of that fraction of used data, even less of it is consistent, accurate, and contextualized. Only about 3 percent of companies met basic data quality and readiness standards for advanced analytics, hampering the generation of value from that ever-increasing volume of data.

As a result, many companies spend considerable resources just to wrangle their data — that is, cleaning, structuring, and enriching raw data through tasks like list verification, removing commas, and debugging databases. Forty-five percent of data scientists reported spending most of their time engaged in such activities according to a 2020 survey from the data science platform Anaconda. While necessary to prepare data for industrial intelligence, data wrangling detracts from more valuable opportunities like data visualization or the deployment of data science models. The time- and labor-intensive ingestion of data is, in part, also a legacy of the on-premises design of data historians.

So even as data becomes the differentiator — the commodity critical to the productivity, profitability, and sustainability of heavy industries, it remains the most undervalued and underleveraged asset. It's past time to liberate that data and uncover the value hidden in legacy historians and plant systems.

Enterprise Data Stores in the Cloud Era of Industrial Intelligence

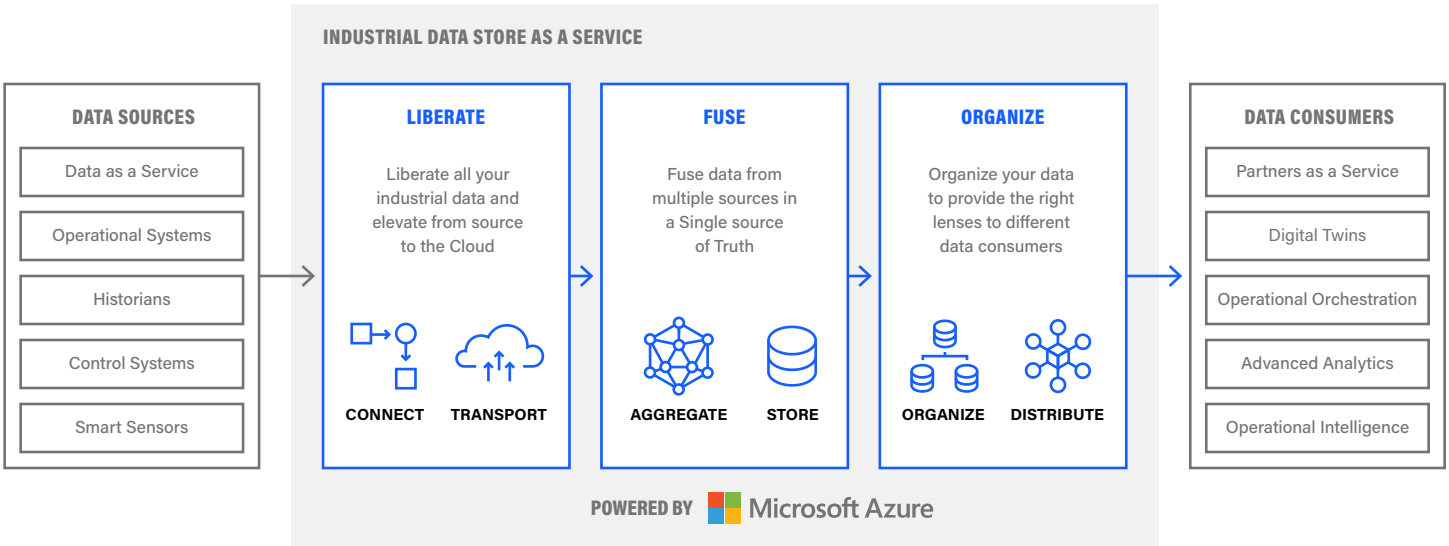
Data historians do not have adequate capabilities to support the extraction, processing, and integration needs of asset-intensive operators. With the rise of cloud computing and industrial connectivity, and the ever-increasing volume of data from plant systems, a new solution has emerged to operationalize real-time, historical, and metadata. Known as an Industrial or Operational or Enterprise Data Store, these applications leverage the advances in scale and interoperability of IT infrastructure to distribute access to data and analytics across the enterprise — no limits by tags or number of users.

Enterprise data stores are based on a SaaS (Software-as-a-Service) model. Users are able to extract and transport streaming operational events from multiple sources at the site of productivity, regardless of data type or technology. Unlike data historians, data stores allow operators to bypass pre-enterprise data modeling and retain context for future use.

One of the key differentiators that sold us on [Uptake Fusion Powered by ShookIOT] was that the platform was built with Microsoft Azure cloud technology which allowed us to leverage our existing Azure infrastructure without increasing costs or compromising performance quality.

Manish Neupane
Director, Applications & Business Intelligence
Capital Power

The store then automates the ingestion, cleaning, and structuring of data into an integrated, single source of industrial intelligence in the cloud. Once aggregated in the cloud, operators are able to grant access to the processed datasets to different data consumers throughout the organization or to preferred third-parties. Working within a familiar and secure cloud environment, that data is then prepared for high-value, multipurpose operational applications, including advanced analytics and Industrial AI.



Five Principles of Industrial Data Management for the Cloud Era

End-to-end industrial intelligence requires data from both OT and IT systems to equip industrial operators with augmented decision-making. Despite the complications within OT systems and the historical divergence between IT and OT environments, organizations already have the technology in place to support the adoption of advanced industrial data management solutions.

Standard models of corporate data governance, like the Data Management Association's Guide to the Data Management Body of Knowledge, give asset-intensive operators sustainable management practices to generate the most value from their operational data. In this data governance framework, enterprise data stores are guided by five fundamental principles which ensure that data processed from plants are ready for more advanced analytics.

Integrity:
the completeness, accuracy, and consistency of industrial asset data as part of enterprise-wide governance; enabled by the continuous monitoring of these aspects through the lifecycle of data across the organization to improve business decisions, enterprise reporting, and regulatory compliance

Cyber Resilience:
the security of industrial asset data from unauthorized access or use; to ensure the safety of operations and protect proprietary information

Enrichment:
the enhancement of industrial asset data through aggregation, contextualization, cloud computing, and operationalization for various uses, among them to assure productivity, optimize maintenance, mitigate risk, improve safety, and streamline compliance reporting

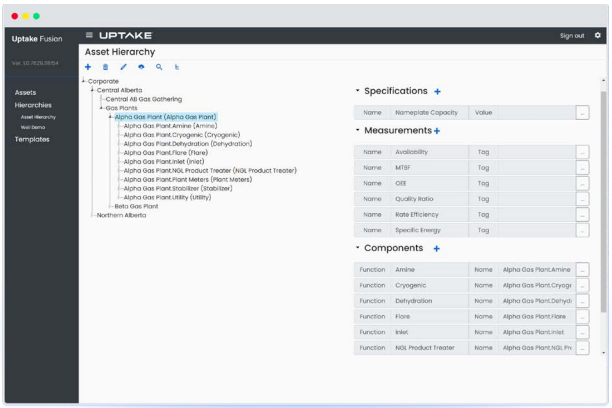
Portability:
the cost-effective movement of industrial data from the plant to the enterprise cloud for use within the organization or by third-party data consumers; enabled by interoperability with current OT and IT systems as well as through future-proofing for digital transformative initiatives

Simplicity:
the ease of time and money with which operators can effectively do all of the above

The Path to OT Data Liberation

OT teams recognize the power of data and have witnessed the high-value impact of its scaled use elsewhere in their organizations. Operational and financial teams have harnessed the computing power of a mature and interoperable IT infrastructure to track and improve decision-making across the enterprise. Data historians and their licensing requirements, pre-modeling, and implementation services have largely kept OT data on-premises, or have made centralized use cost-prohibitive. No longer is that the case.

Asset-intensive organizations today are able to capitalize on the power of OT data with the instrumentation and cloud environment they already have in place. Enterprise data stores are empowering operators, whether in the cloud tenancy of their organization or that of a third party, to leverage their OT data, retain its context, and enrich it in a secure environment. Prepared for operational applications like Industrial AI, OT data filtered through enterprise data stores are helping operators to turn corporate cost centers into sites of revenue assurance.



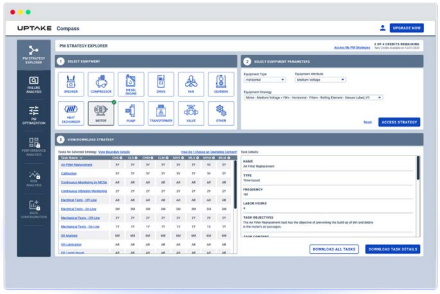
Uptake Fusion Powered by ShookIOT

A scalable and robust enterprise data store built upon the Microsoft Azure® platform providing safe and secure cloud historian capabilities

To learn more about Uptake Fusion Powered by ShookIOT, contact:

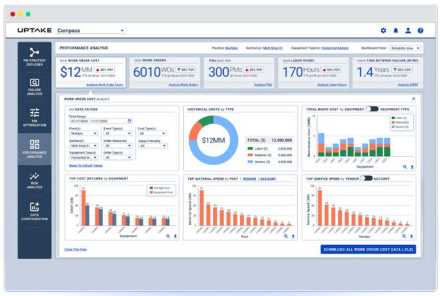
Fusion@Uptake.com or 780-862-9699

Uptake Cross-industry Products:



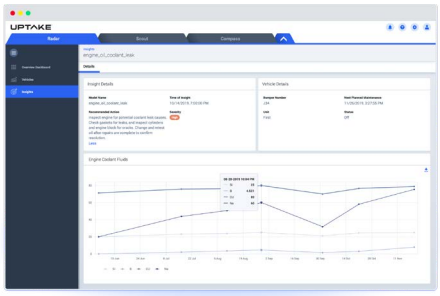
Uptake PM Strategy Explorer

Powered by the Asset Strategy Library®, delivers best-practice preventative maintenance strategies — no data required



Uptake Compass

Powered by the Asset Strategy Library®, the world's largest knowledge base of failure information, offers maintenance optimization and analysis



Uptake Radar

Advanced analytics app that leverages Industrial AI to improve asset performance, optimize maintenance costs, and mitigate risk