

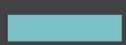
# BRIDGING THE OT/IT GAP IN AN OIL REFINERY PLANT



# CONTENTS

	<b>ABSTRACT</b>	<b>3</b>
	<b>TESTIMONIALS</b>	<b>4</b>
	<b>DIGITAL TRANSFORMATION IN OIL AND GAS</b>	<b>6</b>
	<b>OT/IT GAP</b>	<b>8</b>
	<b>IT IS ALL ABOUT DATA</b>	<b>12</b>
	<b>DATUMIZE INNOVATIVE APPROACH</b>	<b>15</b>
	<b>CEPSA REAL CASE</b>	<b>17</b>
	<b>ABOUT US</b>	<b>19</b>

# ABSTRACT



This whitepaper covers the modern challenges of digital transformation in oil and gas industries. Presented from three different perspectives, an innovative attempt has been made to provide the possible ways to connect operational technology and informational technology worlds in petrol refinery plants, therefore, bridging the existent gap between OT and IT sectors.

3



# TESTIMONIALS

---



## **LOUIS DESROCHES**

Director IoT Solutions for Process Industries  
at Intel Corporation

Louis is an accomplished Oil & Gas Executive with over 37 years of domestic and international experience in all aspects of strategy, planning, corporate business development, M&A, sales & marketing, and operation management.



## **NACHO LAFUENTE**

CEO and Co-Founder at Datumize

Nacho is a computer science engineer enjoying over 15 years in IT sector. He worked for companies including Siemens, BEA Systems, and Oracle, and demonstrates high expertise in software development, QA, consulting, presales, sales, and project management.



## **MIGUEL ÁNGEL GONZÁLEZ DOVAL**

Head of Digital Strategy and Ventures at CEPESA

Miguel enjoys vast experience in fields as diverse as IT quality and process, and customer support.





# INTRO



The era of globalization and topnotch technologies has been marked by constantly emerging challenges in various industries, including oil and gas industries. In order to improve efficiency, boost sales, and remain competitive, modern companies need to remain agile and flexible, as well as be ready to expand their operational and digital knowledge.

5



# DIGITAL TRANSFORMATION IN OIL AND GAS



Current landscape  
and challenges

6



By investigating the possible ways to connect operational technology and information technology worlds in petrol refinery plants, this research introduces the idea of data utilization locked in control operational system, allowing companies like CEPESA to generate new insights about its oil and gas plant operational efficiency. Stressing the relevance of industrial data and its governance, a unique overview of Datumize technology is offered to unlock and connect data with IT systems establishing new insights and analytic possibilities of leveraging hidden data.

Digital transformation actively takes shape in many companies all over the world. Louis Desroches (Intel), refers to the challenges in oil and gas sector as a “perfect storm” and defines its six components: price volatility, workforce challenges, climate change, energy efficiency, renewables, and regulation. Crucial changes and constantly emerging challenges in the industry are inevitable and they impact the companies’ capital and investment models, forcing to get more performance out of the assets. Apart from the significant climate changes and strict environmental regulations, renewables eventually convert into strong competitors and create even more vital challenges for oil and gas industries.

Taking into account the global trends towards diminishing margins and slower demand growth, downstream operators must look at the plant level for efficiency and productivity gains. While operators across the oil and gas industry seek greater stability, the best defense for refiners and petrochemical operators in the face of oil price volatility is agility. Even more, with the right

information and technical data, downstream operators not only will remain agile and improve their operational excellence and profits, but also will operate as efficiently, productively, and as safely as possible.

**Downstream operators must look at the plant level for efficiency and productivity gains.**

On the other hand, elimination of unplanned events and maintenance reduction, as well as prioritizing analytics, machine and cognitive learning are the ways to improve environmental performance and compliance processes. As for technological opportunities, they are correlated with the substitution of more digital capital for financial and physical capital (that includes more sensing and data collection). Moving key decisions and control process to real time is not the only step towards the pool of endless opportunities: it’s crucial to increase the application of deep analytics for improved quality of non-real-time decision-making. It’s worth mentioning that big vendors providing control and automation systems in hard-code industry keep their customers and entire factories captive on their systems, “by adding closed or proprietary protocols, or introducing very expensive software and hardware that requires upgrades for minor evolutions.” As a result, agility suffers a lot.



# OT/IT GAP

- Highly isolated OT and IT environments appear to be inefficient and costly and with the increase of the volume of the information generated in production plants, this intelligence gap is becoming more evident. Moreover, there is not only 20 years delay in software capabilities for OT, but also the huge cost of upgrading a factory to receive deep data for every sensor.



In line with the research carried out in Oil & Gas Industry, the delays in rendering data are inhibiting savings of 3,6% on the overall investment. Hence, to demonstrate this alarming issue, Nacho Lafuente (Datumize) exemplifies on the organization of technology layers in a traditional oil refinery. As a rule, oil refinery plants have a highly hierarchical organization structure where departments work in silos with information exchanged on a need to know basis. So, there's immense lack of integration between different levels, due to various technical and semantic challenges, mostly caused by vendor lock-in strategies. They operate in different contexts across levels and information coming from one application lacks the context required for other applications to understand the message.

Throughout the years, IT and OT systems were designed to meet different requirements, to use different operating systems, and to use different standards and protocols. Even today, in numerous oil and gas companies IT and OT tend to have different 'owners' within an organization: IT platforms and processes are typically 'owned' by the CIO, and OT is 'owned' by business unit or production managers, often at COO level.

At the same time, the main advantages of IT/OT integration for a manufacturing company are as follows: cost reduction, improved governance, improved bottom line, risk reduction, enhanced performance, and flexibility gains. When talking about oil refinery sector, the main opportunity from this convergence directly relates to "smart manufacturing." Therefore, visibility and insights into data, real-time events, and business operations enable an

improved decision-making capability based on enhanced information quality and availability extracted from a mass of data points. Overall, managing OT and IT as separate organizational silos have generated unreliable outputs over the past few decades, so the existing gap between Operational Technology and Information Technologies is one of the main obstacles for this connected landscape where data flows.

**The main opportunity for the OT/IT convergence directly relates to "smart manufacturing".**

OT/IT gap is still prevalent in the oil and gas industry, slowing down significantly the overall performance of the company. In the case of CEPSA, OT has not evolved as an organizational structure as much as IT, which makes it less powerful to implement new developments. The company is working to overcome this gap, since digital technology is the third pillar to balance the company. In terms of opportunities for OT/IT integration for CEPSA, the company must be able to become a solid leader in both technologies and to have separate specialists in both sectors. As for the main digital challenges for the oil and gas production sector, they include elimination of the information silos and proprietary systems, availability of generated data, as well as leveraging of all digital equipment models available in the plants (e.g., 3D models). The company is looking for new opportunities in virtual reality sector and sensors to be able to meet the high-level requirements of a challenging transformation process.





CEPSA is a company that operates across all phases of oil and gas value chain, in manufacturing plant-based raw materials, as well as in the renewables sector. Driven by the ideas of continuous improvement, safety, sustainability, leadership and solidarity, the company's mission is to provide energy for every reality. With CEPSA's domestic and external presence virtually in every industry sector, from chemical industry to gas stations, the company operates in over 20 countries where it provides energy solutions to customers due to the work of over 10,000 professionals (with the chemical plants in Shanghai, Canada, Brazil, Spain, Colombia, etc.). CEPSA is the only global producer of LAB, the main raw material used to make biodegradable detergents and defines that "company's philosophy rests on three components: global energy, mobility, and technology." In addition, Miguel Ángel González Doval (CEPSA), manifests that they are a data-driven energy delivering company that pulls valuable insights out of the data that is focused on production, operations in maintenance, and green energy.

Within the industry context, the company holds extreme focus on cost management, increase of the efficiency of existent capital, and improvement of investment returns on new capital expenditures. Moreover, CEPSA specialists in this field stress on the improvement of the operational asset performance, reliability and integrity in the company. At the same time, the data is seen as "digital capital", with oil and gas technical opportunities lying in data use, as well as in the ability to unlock and capture the data that penetrates all company levels.





As Mr. Desroches (Intel) maintains, deployment of advanced field automation technologies will facilitate the convergence of IT and OT systems to support end-to-end visibility and the ways the data is captured and utilized. Information and system security undergo some changes too. In the light of the recent innovations, a company obtains more data, more real-time processes, and a higher level of system integration. Yet, the company still needs to tackle complexity, technology dependence, as well as cyber risks. The complex cycle of oil and gas exploration, drilling and development stages clearly demonstrates the vital role of self-aware and self-organized system in the oil and gas industry. There is still a long way to get to this perfectly-tuned system, but Intel's objective is to get to a "zero-touch" refinery field that would operate by itself. The opportunities unveiled by data revolution are literally endless and include upstream exploration and drilling (HPC in the cloud), upstream production (wellhead monitoring and control), downstream (refining, software-defined industrial systems), initiatives with ExxonMobil, operations structure (advanced analytics and AL, self-organized systems, asset optimization), just to name a few.

Unlocking hidden data and the necessity to develop a system that would connect all main devices of the company on all levels are among the crucial elements for digital success.

**A company obtains more data,  
more real-time processes,  
and higher level of system  
integration.**

# IS ALL ABOUT DATA

— Managing OT and IT as separate organizational silos have generated unreliable outputs over the past few decades. IT technology has completely outpaced OT technology and nowadays OT is becoming an obstacle for realizing the Smart Refinery

12



A vivid example is a new OPC-UA Publish/Subscribe messaging model that has been present in IT since the early nineties, when IBM developed MQ Series, and later with Java Messaging System (JMS). In the past, that might have some sense for reliability and security purposes. However, IT technology has completely outpaced OT technology and nowadays OT is becoming an obstacle for realizing the Smart Refinery.

In case with Operational Intelligence, O&G downstream sector clearly demonstrates the current problems of the sector. It's not possible to build a safety (OT)-oriented real-time dashboard (IT) for the CEO that aggregates all data coming from each refinery and weighing the risks at a company level, for example. Mr. Lafuente (Datumize) believes that "many companies make the mistake of only focusing on the alignment of technology, both hardware and software, when considering IT/OT convergence." It's not about integrating assets, it's about integrating data. Plus, seamless data flow is of extreme importance. The Supervisory control and data acquisition (SCADA) deals with programmable logic controllers (PLCs) or remote terminal units (RTUs). Born in early 1950s as computers for industrial control purposes, telemetry was established for monitoring, and the term "SCADA" was coined in the early 1970s. While SCADA systems have undergone substantial evolutionary changes, it's critical to implement the operational procedures that require sub-second

reaction and eventually human interaction. It is a mandatory technology to ensure a secure and operational factory. Yet, many industrial organizations still struggle with industrial data access based on the SCADA (if the enterprise level data is considered). OPC is

**OT/IT convergence is not about integrating assets, it's about integrating data.**

the original standard (1996) under the name OLE for Process Control, based on the OLE, COM, and DCOM technologies developed by Microsoft. It's a series of standards and specifications for industrial telecommunication that represent a major change in controlling and monitoring industrial devices using more affordable technology. Microsoft operating systems dominate the industrial automation landscape. Automation vendors begin using Microsoft's COM and DCOM in their product offerings. However, it follows the standards like COM/DCOM from Microsoft and Windows and did not evolve at the right pace. The OPC standard was eventually overridden by OPC-UA, the OPC Unified Architecture, a machine to machine communication protocol for industrial automation developed by the OPC Foundation, that is beyond Microsoft and reflects the thoughts from other players in the industry.



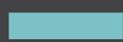


Datumize claims that data lies at the heart of the 4th industrial revolution. Automation, connectivity, smart technology, and efficiency, and all the promises behind this new paradigm include data and analytics. As a result, in the current landscape, with an increasing number of sensors, embedded systems, and connected devices, as well as the uprising horizontal and vertical networking of value chains, we observe continuous data flow. The industry sector requires to have control over data analytic capabilities to successfully drive digital transformation. However, there is still a long way to go before we reach the level of sophistication needed to drive industry 4.0 applications. Hence, by the year 2020, 83% of the companies will definitely think that data analytics is of extreme importance.

**Data lies at the hearth  
of the 4th industrial  
revolution.**



# DATUMIZE INNOVATIVE APPROACH



Datumize provides innovative solution aimed at bridging the gap between OT and IT

15



Since these two sectors are frequently unfamiliar with the protocols used in each other's domain, the main challenge is to adapt existing systems without replacing every device in a plant. The factory systems are critical for smooth operation and due to potential risks and high cost it is highly undesirable to upgrade them unless there is an accurate need to do it. The main problem is to find the way to take governance over the industrial data that is currently under the control system vendor's control (Siemens, Honeywell, etc.). Through an appliance powered by Intel IoT technology, the company introduces Datumize Machine Data solution that opens a perfect opportunity for those, who want to overcome this gap without any critical system or infrastructure modification.

Overall, Datumize Machine Data solution is a hardware appliance connected to the industrial network, the router or switch on premises, that transforms closed and proprietary communications from protocols like FieldBus into smart events. Later on, these events are securely transmitted into modern IT equipment like Data Warehouse or Big Data, and are integrated with Business Intelligence or IOT solutions for predictive maintenance or anomaly detection, among others.

Datumize Machine Data Appliance consists of the award-winning Datumize Data Collector (DDC) software, an enterprise software for data collection, transformation and integration. This software runs on selected industrial Intel's IoT gateways to fit a number of mission-critical deployments. In the same fashion, Datumize captures in-flight data that is being exchanged

between industrial devices. As a rule, the appliance is connected to a level 2 router or switch with a port mirroring used to allow the appliance to

**Datumize Machine Data solution opens a perfect opportunity for those who want to overcome the OT/IT gap without any infrastructure modification.**

receive a flow of network packets for the interesting streams. It should be mentioned that the product supports standard industrial protocols (i.e. Field-Bus) and proprietary/closed protocols typically used by old machinery, that is, protocols can be added. Captured data is processed to make it usable by modern analytical systems by cleansing and enriching the exchanged messages, as well as by changing the old format to a new and modern XML/JSON format. Consequently, transformed information is stored as events on an analytical platform for it to be cured, analyzed, and reported for useful insights. Multiple platforms and vendors are supported, including but not limited to Amazon Web Services (AWS), SQL and NoSql databases. Integration with the third-party visualization and analytical tools, such as Kibana or MicroStrategy, are widely supported.



# CEPSA REAL CASE



By and large, the way Datumize applies Machine Data solution in companies like CEPSA is by undertaking pilot projects that swift realization, offer tangible and sustainable benefits and represent a comparably low risk for the company. The team involved in these pilot projects consists of IT and OT resources that measure the pilot success and define the scaling plan in collaboration with the client. So, in terms of technology, Datumize provides technology capability and the client (CEPSA) provides industry knowledge. In the long run, it yields a new product, Datumize Machine Data. As a result, when being deployed to oil and gas customers this new product works at industrial protocol level and is not limited to the specific verticals or protocols. OT and IT values can be achieved by combining three components: reduced risk, open architecture, and cost-efficiency. Reduced risk means that data is not intrusively captured by tapping the network and no infrastructure upgrade is needed. Also, the company features plug-and-play appliances enabling its partners to remotely deploy all technological components. As for open architecture, Datumize unlocks things for all the messages to be exchanged. Then, the info is converted into events where everything flows smoothly. The company allows open access to structured data in a modern storage. Data privacy and ownership are among crucial elements of the company's policy, for the data always belongs to a client. Finally, it is really cost-effective solution, since no investment in upgrading operation infrastructure is needed and it is very competitive to the existent alternatives on the market.





# CONCLUSION

Industrial data is an extremely valuable asset for oil and gas producers, but being able to utilize that data effectively is significantly limited by the companies' inability to integrate operational technology (OT) and information technology (IT) systems. The costs associated with upgrading OT systems are prohibitive for deploying new business models, workflows, and services. At the same time, upgrading software and hardware systems to the level necessary to innovate IT limits the ability to interoperate and integrate disparate systems, creating technology siloes. So, the time has come to apply innovative, agile solutions to unlock, analyze, and leverage data in order to explore new breathtaking opportunities and to achieve more sustainability.



# ABOUT

— Datumize is a technology company based in Barcelona. With a vision “to make simple a complex world full of data”, this company created innovative software and hardware products to capture the most unknown data sources in enterprises — dark data not captured and not analyzed before. Today, Datumize makes this hidden data visible to companies via different products.

