TRENDS IN ACCELERATING PERFORMANCE IMPROVEMENTS

With Modernized Operational Technology in the Industrial Sector

modernize
AUTOMATION
Eliminate Unplanned Downtime

THE NEED TO MODERNIZE OPERATIONAL TECHNOLOGY (OT)

The pursuit to reduce costs and avoid unplanned downtime remain primary operational goals in industrial plants. A convergence of factors has created an opportunity for industrial organizations such as manufacturing, oil and gas, chemicals and water treatment companies to aggressively pursue both. Although the pace of investment can be relatively slow in industrial automation (IA), technological advances, economic trends and market pressures have created an environment in which plants are compelled to modernize operational technology (OT) in order to ensure maximum efficiency and minimum process interruptions. With the right OT strategy and the right partner, industrial organizations can not only optimize their processes now but also prepare themselves for the rapid approach of the Industrial Internet of Things (IIoT).

Simply put, OT is getting old. The industrial sector is heavily capital-intensive and traditionally utilizes equipment with long lifecycles. The most recent prolonged economic downturn, coupled with the expectation of slower growth in many parts of the world, resulted in decreased levels of capital investment over the last five to seven years and delayed equipment upgrades. Many organizations now rely on automation systems that are reaching the end of their useful lives. The total global installed base of those systems adds up to $65 billion, according to ARC Advisory Group. Furthermore, the total installed base of automation systems that are more than 20 years old comes to $53 billion, according to ARC.

Organizations with such outdated automation systems are in dire need of OT modernization to keep up with the pace of change, customer demands and business priorities, and reduce the risk of critical failures and costly downtime. Furthermore, with the widespread adoption of technologies such as virtualization in the IA space, even companies with more modern equipment and technology should evaluate the adoption of newer availability technologies in order to protect against unplanned downtime and ensure maximum efficiency.

RESPONDING TO MARKET FORCES

There are a number of pressing market demands prompting plant operators to seek an upgrade to a solid operational foundation that can deliver increased productivity, flexibility, scalability and future-readiness:

- **Need to keep operations running and productive 24/7.** In today's fast-paced world, unplanned stoppages are both disruptive and costly. The good news is that given the advances in availability technology, they can easily become a thing of the past.
- **Capability to respond to increased global competition and cost pressures.** Industrial companies need to drive costs out of their operations to stay competitive as well as prevent unplanned cost overruns. Technologies exist now that ensure continuous operations and have a proven return-on-investment (ROI).
- **Regulatory compliance issues.** In the continuous-process segments, such as continuous production, pipelines and water treatment, the ongoing monitoring and recording of data allows organizations to optimize their processes and ensure compliance with various regulatory requirements.
- **Changing customer demands and shorter product lifecycles.** Flexible, discrete manufacturers – those that can quickly address fluctuations in customer demand by running smaller batches or quickly retooling their production lines – are positioned to develop major competitive advantages.

The RISK of data loss is avoidable

with updated automation and availability solutions

Virtualization technologies increase the need for high-availability systems

ALWAYS ON

PREPARING FOR AND BENEFITING FROM TECHNOLOGICAL ADVANCEMENTS

Big data, analytics, smart factories and the industrial internet of things (IIoT), sometimes referred to as Industrie 4.0, are being adopted in the industrial sector. The power of data and analytics — finding patterns in data to enable better, real-time decisions — delivers real benefits for industrial organizations. Complete data capture, secure storage and easy data retrieval for analytics are of utmost importance. And loss of data is a major risk that plant operators can mitigate with updated automation and availability solutions.

Modernized OT will deliver immediate benefits for industrial plants and will also help them prepare for the future. Smart factories and the IIoT are coming, together with the analytics and optimization capabilities that they provide. Even though many industrial organizations have been slow to adapt they need to ensure they will be ready when those technologies are mass-adopted. Similarly, wider use of virtualization technologies has only increased the need for high-availability systems to ensure that IA systems are always on.

60%

Of those in the IA space use software applications to log and preserve process data

60%

Of those in the IA space use MES and SCADA to oversee daily production activities

30%

Of those in the IA space use PLCs and control drives for safety & process efficiency

THE MANDATE TO MODERNIZE OT

All of those factors have converged to make modernizing OT a matter of urgency for industrial organizations. OT has historically been at the heart of modern industrial processes. It provides organizations with the ability to automate, control and monitor those processes — an acute need in a period of such rapid change and increased operational and business demands. OT in IA delivers the benefits of increased production and throughput, higher quality, and increased consistency of processes and accuracy of outputs.

Due to the business-critical nature of the processes the technology supports, modernizing and keeping OT running without interruptions is of paramount importance to industrial managers. As automation systems become more connected, technically complex, virtualized and interdependent, industrial managers need to find ways to ensure reliability and to simplify operational maintenance.

Automation systems are also the collectors and repositories of production-critical data. Modernizing OT enables plants to optimize traditional operations management data sources, which are widely in use today (LNS Research):

- **Data historians.** With greater than 60 percent adoption in the IA space, these software applications log and preserve time-based process data. They remain the most common way to enable operational decision making. Historians capture management information about industrial processes, status and performance of systems, and quality assurance for real-time analytics and root-cause analyses.
- **Manufacturing execution systems (MES) and SCADA**. These systems and other high-level software systems have close to a 60 percent adoption rate in IA. The enabler of the operator's everyday activities, MES delivers ongoing monitoring of production and capacity utilization, and identifies process irregularities.
- **Programmable logic controllers (PLCs).** PLCs and controlled drives have about a 30 percent adoption rate and provide safety and controlled operations for process efficiencies.

THE MANDATE TO MODERNIZE OT (continued)

The comprehensive recording of performance and operations data through those systems, made possible by modernized OT, enables predictive analytics for preventive maintenance, thereby reducing unplanned downtime. It also enables automated synchronization and the opportunity for instant adjustments. Those capabilities deliver improved equipment operation, faster retooling of machinery to new products and processes, and the application of programmable elements, allowing for greater flexibility and responsiveness.

Due to rapid technological progress, automation and control systems age much faster than structural equipment. Upgrading only those control systems and retrofitting components is cost-effective as it greatly extends the life of machinery and boosts operating capabilities. Extending the longevity of OT assets delivers higher RETURN ON ASSETS (ROA) and minimizes future capital expenditure. With trends such as big data and the IIoT advancing, communication and interoperability between systems is more important than ever. If data-transfer stops unexpectedly, for example, processes can come to a halt because one process is still waiting to receive data for the next step. Modernizing OT minimizes the chance of that happening.

Every industrial manager knows that poor diagnostics make identifying and addressing faults in the production process difficult, which tremendously increases the risk of downtime. This is why many modern OT solutions feature self-diagnostic functions that enable industrial organizations to precisely locate the source of failure. These solutions immediately share information on potential or actual failures with plant operators, thereby reducing reliance on service staff to locate, diagnose and fix problems. This rapid repair and recovery capability prevents costly stoppages. The ongoing capture and analysis of data and the continuous availability of the systems that enable it are therefore paramount to address the objectives of maximized efficiency and minimized downtime.

WHAT IS VIRTUALIZATION?

Prior to the advent of virtualization, a single server or PC ran a single application, which often left a large amount of performance capacity on the server unused. Virtualization essentially allows one physical server to do the work of many servers, thereby maximizing the use of capacity.

In a virtualized environment, each virtual machine (VM) on a physical server exists within its own container or partition. Each partition contains an application (or applications) and an instance of an operating system known as a guest operating system. A number of these partitions sit on a software layer called a hypervisor. The hypervisor is the thin, low-overhead layer that manages the basic services necessary to host the applications and their guest operating systems. So, virtualization makes it possible to run multiple VMs, and therefore many different applications and operating systems, on a single physical server. As a result, preventing downtime is even more important in a virtual environment than it was previously.

THE MANDATE TO MODERNIZE OT (continued)

Furthermore, if automation systems go down due to computing infrastructure failure or server outages, plant operators are "flying blind." It is common for industrial organizations to run several systems and software implementations, which require multiple servers in a non-virtualized setup. More advanced industrial organizations, however, have realized the benefits of virtualization, allowing them to run multiple applications on the same server. In those situations, a server running multiple applications becomes extremely important in keeping critical OT components running. One failed server can have a negative impact on multiple processes. While virtualization can greatly increase efficiency and lower costs, it also makes unplanned downtime — the widely-feared "flying-blind" scenario — more damaging and expensive. That's why ensuring continuous availability with modernized OT is so critical in a virtual environment.

PREPARING FOR THE FUTURE

While modernizing OT delivers immediate benefits, industrial organizations need to also ensure that their modernization investments are future-proof with fault tolerance, virtualization-ready computing and easy upgrades in order to realize lasting RoA. With the IIoT advancing, future-proofing is not only a positive by-product of modernizing OT but also a necessity.

Estimates placed the IIoT investments worldwide at $20 billion in 2012, with spending expected to reach $500 billion by 2020. Some predictions of the value created by the IIoT range as high as $15 trillion of global GDP by 2030. (Accenture)

The IIoT spans industries representing 62 percent of gross domestic product (GDP) among G20 nations, according to Oxford Economics, including manufacturing, mining, agriculture, oil and gas, and utilities. (Accenture)

THE PILLARS OF MODERNIZING OT

The urgent need to modernize OT is clear, and plant operators should also consider the following factors when further investing in automation systems. If industrial leaders hope to keep pace with the new requirements of business and achieve the goals of modernized OT, their systems need to:

- Be software-driven. Modernized OT systems are controlled by software that dictates how the hardware operates. This leads to simpler management and more efficient use of hardware resources.
- Provide efficient computing resources and virtualization. Historically, each IA or other OT-related application has run on a separate server or even on a PC. With the adoption of virtualization, one server can perform multiple functions by running multiple applications. This cuts both CapEx, since there are fewer servers to purchase, as well as OpEx.
- Ensure redundancy and uptime in a virtualized world. Virtualization creates new critical points of failure. Managing server uptime is more important than ever, as a single server runs multiple or all OT functions. With all their eggs in one basket, plant operators absolutely cannot afford to have a server go down. That is why an automation system that provides redundancy is so critical.
- Provide a single view of operations. A modernized solution enables industrial companies to manage all OT operations across systems from a single point of control.
- Deliver resilience. Technology managing OT must be able to keep pace with the speed of change in modern industry, handle retooling for new products, enable lean manufacturing and deal with an increasing number of products and specifications.
- Be specifically built for the industrial sector. Solutions should be designed specifically for OT and an industrial environment, with all the requirements of that environment taken into account in solution design.
- Provide seamless integration. Servers and management systems should fit into a plant's existing environment with no need for cumbersome custom integrations and no risk of data loss in the implementation process.

Additionally, plant operators should not try to go it alone when modernizing OT. They need the right partner to provide expertise and solutions in order to generate maximum RoA. That partner must offer and support the pillars of modernized OT and needs to be a specialist in the industrial sector with a long history and a proven track record.

MODERNIZED INDUSTRIAL OPERATIONS AND OT DELIVER:

- **Increased productivity:** Greater efficiency and greater output.
- **Agility:** The ability to rapidly respond to customer demands without a loss in productivity, and to meet changes in demand without incurring extra costs.
- **Efficient operations:** Reduced scrappage, waste, sub-optimal operations and downtime.
- **Improved data capture:** Capture of process steps and costs in information systems for proper operations and production planning.
- **Increased uptime:** Automating diagnostic and problem resolution, resulting in reduced reliance on plant technicians or operators, whose expertise can vary.
- **Future readiness:** Increased value of investment and minimization of future CapEx.

Modernizing OT is the most effective course of action plant operators have to maximize efficiency, and keep up with customer demand and cost pressures. Industrial organizations need to carefully select their technology components. Optimized processes, higher productivity, agility and increased quality and consistency of output are the main benefits many industrial organizations have already achieved by modernizing their OT. Cost control, avoidance of unplanned costs, and prevention of system failures or downtime, are also critical considerations in selecting OT solutions on the path to modernization. In order to achieve modernized OT, industrial companies need a partner that has built its solutions for the task.

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