

Organizations must understand the IT/OT convergence opportunities that are emerging and the potential pitfalls to avoid if they are to capitalize on their strategic potential.

Understanding the Strategic Opportunity for IT/OT Convergence in Intelligent Assets

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Questions posed by: Wind River Systems

Answers by: Jonathan Lang, Research Director, Worldwide IT/OT Convergence Strategies

Q. What is IT/operational technology (OT) convergence?

A. IT/OT convergence can mean a lot of things, but fundamentally, I think of it as the wider application of IT principles in operational technology environments. These include factories, utility operations, hospitals, and other operational settings where mechanical equipment and edge devices provide the core infrastructure for the business processes conducted there. Traditionally, these mechanical assets were built and managed through vertically integrated and proprietary systems. Increasingly, IT principles and practices, such as cloud computing, virtualization, unified management, open or common standards, data life-cycle management, and AI, are being leveraged in these environments to enhance the effectiveness of mechanical processes. As this happens, there is now a continuum across IT and OT that needs to be managed in a unified way. Think of edge devices that serve more direct functions in operational processes, or mechanical equipment that produces data and connects to the internet. The two asset categories become blurred, and it matters less what type of asset they are and more about how they are parts of a bigger whole. With IT/OT convergence, even the technology and mechanical systems are integrated directly and managed in a seamless way. It's a very different paradigm from how things have been run for decades.

Q. What are the business and technical benefits of IT/OT convergence?

A. Just from a technical perspective, OT environments have traditionally been managed in very inefficient ways. Proprietary management tools that each technology or equipment provider offers have managed different equipment, software, and processes. Each environment has a slightly different approach across this broken toolchain. With the implementation of IT/OT convergence practices, we start to see companies moving to open and interoperable standards, unifying their management capabilities across the landscape of technology and assets, and doing so from centralized remote functions rather than on a site-by-site basis. The business benefits of this shift drive great efficiency, but there are also benefits for IT and technical teams, such as a reduction of risk by expanding visibility, utilizing common approaches to different tasks, and implementing more rigorous cybersecurity best practices and capabilities. There is also a reduction in technical debt by easing the burden of integrations and a reduction in skills requirements by using common technologies.

In terms of business benefits, today we really see two strategic growth areas. The IT activities are advancing toward data collection, analysis, and the increasing use of AI to inform decisions. The OT activities focus on greater asset performance, greater flexibility in the mechanical capabilities of assets, and more autonomous systems, such as robotics. But the major business benefit of IT/OT convergence is the opportunity to converge these efforts so that AI- and analytics-driven information processes can directly interface with the real-time operation of an asset, offering real-time digital twins that self-optimize and self-heal asset parameters autonomously. The life-cycle management of an asset becomes continuous and closed loop: Data and context are brought to the cloud for analysis and real-time optimizations, and updates to the software and the way the asset performs are returned. IDC refers to this kind of IT/OT convergence as software-defined automation.

Q. What are the challenges and risks of trying to integrate IT and OT more closely?

A. When adopting any kind of new technology or approach, there are often issues sourcing the right talent, articulating the value proposition to encourage adoption, and untangling the legacy tools and approaches for solving some of the same issues. One of the greatest challenges inhibiting the evolution of OT capabilities is interoperability. Because legacy OT is so fraught with proprietary approaches, when companies want to do more advanced use cases, they really struggle. I think one of the primary reasons companies are pursuing IT/OT convergence is to overcome these interoperability challenges, but the up-front work can be a bit heavy. The historical separation of IT and OT and the ways they now work together to drive operational performance make it necessary to bring them into a unified view. This is not only an interoperability challenge but an organizational one because it requires change, and there aren't many technologies that support this type of single-pane-of-glass management.

When I think about risks and talk to industrial companies, cybersecurity is always at the top of the list. The OT environment has been air gapped from outside connections in the past to ensure the secure, safe, and reliable operation of assets. With the rise in connectivity and need to take advantage of remote operations, ecosystem services, and cloud-based analytics, the air-gap approach to cybersecurity is no longer viable. There was once a belief that if OT was air gapped, it was safe. Today, the realization is that you cannot secure and improve upon systems and processes you lack visibility into. Now that cloud computing, Internet of Things, and other connected technologies are so pervasive, companies are choosing to lean in and mitigate these risks rather than pretend they don't exist. The most effective way to manage cybersecurity in operations is with a unified approach to managing IT and OT cybersecurity requirements within a single environment.

Q. When you talk to companies, what are the key challenges they face in adopting and managing these new paradigms? What are some examples of companies doing this today?

A. Whether we're talking about utilizing AI, adopting software-defined automation, or dealing with any of the major strategic paradigms in industrial operations, interoperability and disparate management challenges at every layer of the stack are the biggest issues. One way of overcoming this issue is the use of a hybrid cloud architecture, which is software

that carries all of its own core infrastructure and can operate on a wide variety of devices. With hybrid cloud architecture, an asset can run a variety of software. The software is cloud connected, so it is possible to manage these multiple software domains all together. A great example of this is occurring in the automotive industry. Vehicles comprise an extraordinary number of individual systems, all of which are becoming increasingly software driven. By unifying the management of these individual systems into platforms that are interoperable with a wide range of software formats and deployment methodologies, a company can conduct system-level software management, irrespective of the source of the software running within that system.

Q. What do you see as the important capabilities of that unified management approach?

A. With unified standards absent across different types of software, the best way to achieve interoperability is with a control plane that can provide management and visibility into them all. In mechanical systems, such as OT assets today, both real-time operating systems and cloud- or hybrid cloud-based software are typically running in parallel. If a platform can accommodate the host of approaches within each of those categories, that's a great way to manage IT/OT convergence efficiently.

As AI and data play increasing roles in how assets and businesses operate, you will also need more thoughtful and embedded capabilities for the security, storage, and transport of data from these apps and systems in one consolidated data stream. There are large-scale activities today where companies conduct DataOps activities to try to reveal and engineer all these disparate data sources. If you can solve that issue at the source, it saves a lot of downstream headaches. Last, I want to reiterate the efficiency and risk reduction that comes with conducting these activities in a unified and vendor-agnostic environment. When I talk to companies about how many different systems they interact with to manage software they have deployed in OT environments, they say it's a real nightmare. Having one point of access into the entire software stack can vastly simplify the process, reducing risk and improving efficiency.

About the analyst



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Jonathan Lang is research director for IDC Industry Operations Insights, responsible for the IT/OT Convergence Strategies practice. Mr. Lang's research focuses on digital transformation strategies in environments where operations technologies are deployed, including manufacturing, utilities, oil and gas, and healthcare provider settings. As IT capabilities redefine and extend the core value drivers of operations technologies, Mr. Lang's research examines strategies, road maps, and governance models to drive this convergence and manage the new data and processes it requires.

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Learn more about how to unify IT and OT with Wind River: [Ushering in an Era of IT/OT Convergence | Wind River](#).

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