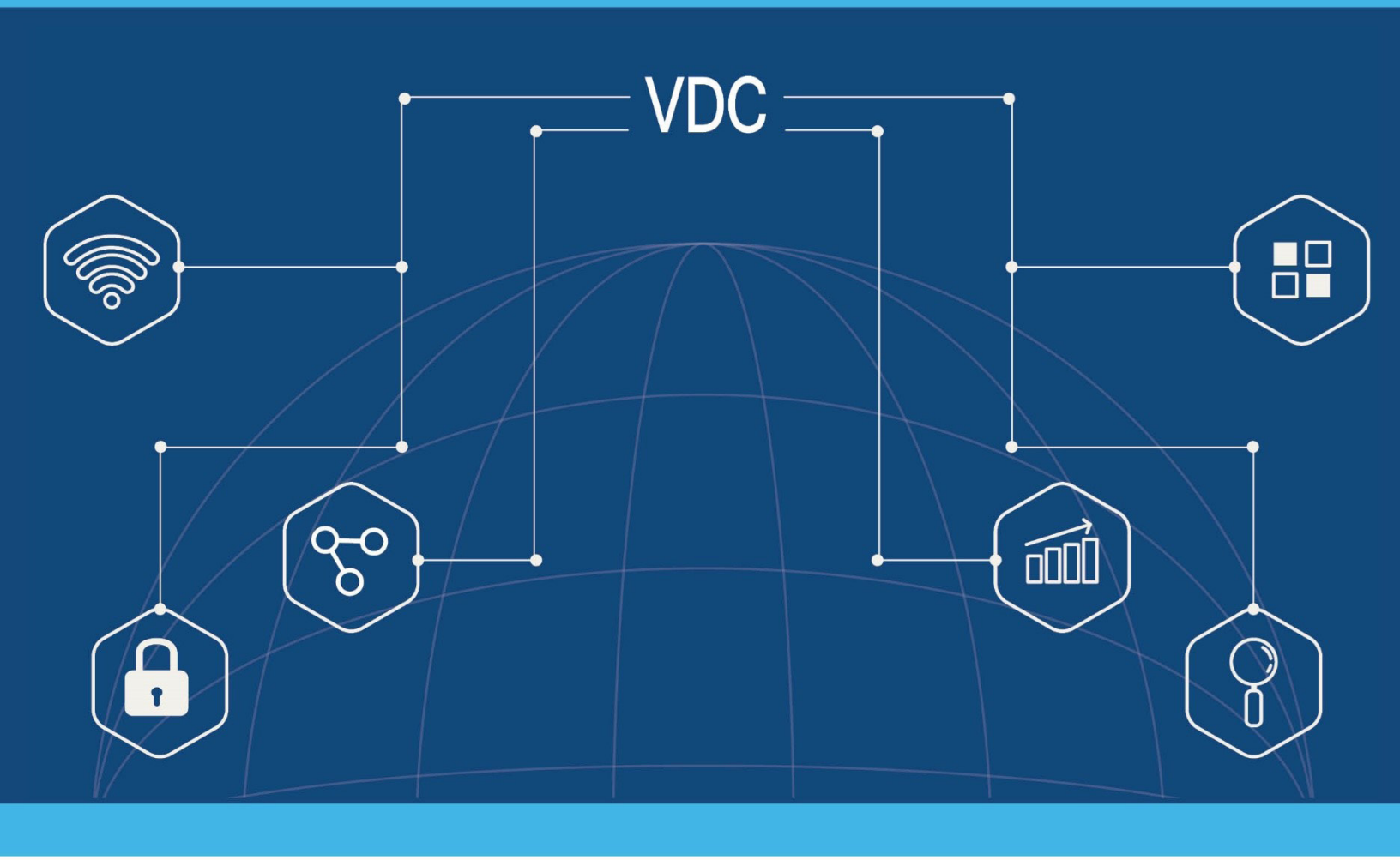
Industrial Supply Chain Operations 2022

Overarching Trend Toward Greater Automation, Connectivity And Intelligence



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VDC Research

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by David Krebs, Executive Vice President

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Industrial Supply Chain Operations 2022: Overarching Trend Toward Greater Automation, Connectivity And Intelligence

Though the depth and duration of the COVID-19 influenced economic downturn are not yet fully known, the eventual recovery of the industrial supply chain sector will be defined by the effectiveness of individual organizations in maximizing profitability under extremely challenging and unpredictable circumstances. Opportunities generated within a number of end-market segments and further supported by the overarching trend toward greater automation, connectivity, and intelligence in industrial environments. For industrial organizations, the Industrial Internet of Things (IIoT) offers significant promise to unlock new business models, deliver improved customer experiences, address the disruptive impact of downtime and ultimately provide greater operational resilience.

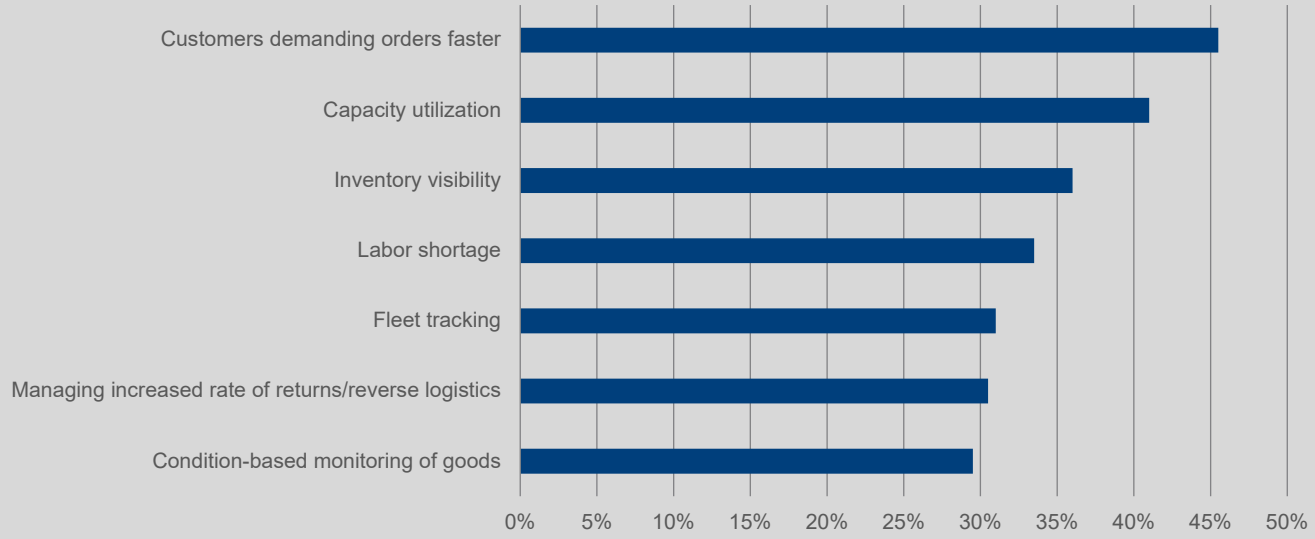
VDC Research worked with Ivanti to research the operational challenges faced by organizations and how IIoT solutions are being leveraged to enable companies to react to market changes faster and more efficiently. The research revealed that while many industrial organizations are underway with IIoT pilots, challenges exist with few organizations fully scaling up their IIoT-enabled solutions. Various technical and organizational factors are typically at the root of these issues. Technical headwinds range from dealing with heterogeneous systems, determining which functions are supported by which applications, how the systems should be deployed (at the edge, in the cloud, at the manufacturing plant, etc.) and how these solutions manage security requirements. Organizationally, IT vs. OT governance is an oft-cited source of conflict as is the challenge of failing to adjust business processes to encourage broader application and failing to fully realize the solution's value.

Over the last couple of years technology has evolved substantially with significant improvements around connectivity and especially integration with existing manufacturing and industrial supply infrastructure, avoiding costly system upgrades. IIoT platforms – which are an integrated suite of software capabilities to address asset management and provide operational visibility – have emerged as significant conduits to help organizations stich together systems to aggregate machine data and support IoT application development. According to the research the top three factors driving IIoT strategies include improving production output/efficiencies, reducing operational or production expenses and improving asset monitoring and maintenance.

Shifting to Advanced IIoT-Supported Industrial Supply Solutions Will Significantly Increase Resilience

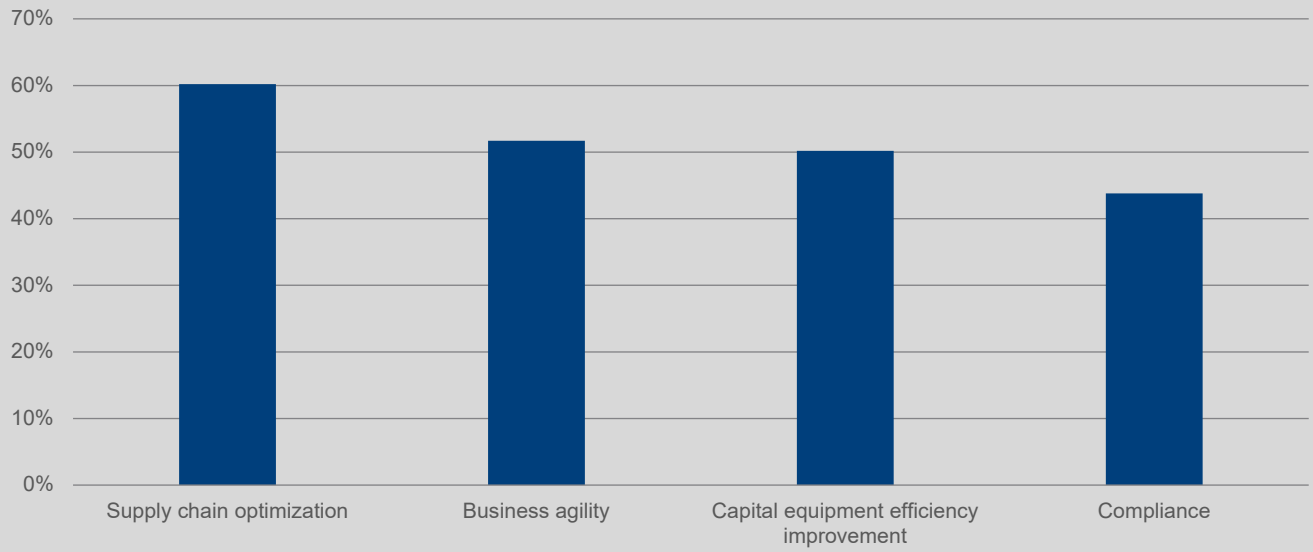
Global footprint, reduced response times, cost and demand volatility, regulatory pressures, and a constantly changing supplier landscape continue to impact logistics complexity. Along with the increased complexity, there is increasing pressure on financial metrics like distribution costs, asset utilization, working capital, cash flow, and transportation spending as a percent of sales. Among the greatest supply chain challenges faced by organizations include increasing customer pressures demanding faster delivery, optimizing capacity utilization and improving inventory visibility to make informed decisions in real time and at scale. As complexity increases, manufacturers and distributors are seeking new ways to optimize customer service requirements with rising labor costs. Today's warehouses are more complex than they were 10 years ago. Products and channels have proliferated, late-stage customization requirements have increased, the number of temperature environments has grown (e.g., cold chain, frozen etc.), and warehouse employee turnover remains high while access to labor is at an all-time low.

Greatest Supply Chain Callenges Faced



Supply chain disruptions such as those experienced during the Covid-19 pandemic illustrate the significance of investing and in many cases accelerating investments in advanced connectivity solutions to facilitate real-time decision making and provide greater operational visibility. Data generated by IIoT infrastructure is expected particularly to bring greater transparency to the global supply chain, allowing businesses to automate processes, reduce operational waste and speed up rate of production, leading to higher revenues and lower costs. During COVID-19 it was clear that industrial organizations with high degrees of digitization contributed to resilience in their operations. Organizations with "digitized" operations are able to react faster to changes and adjust operations quickly. According to industrial organizations, the greatest efficiency improvements realized by IIoT investments included supply chain optimization, improvements to business agility and overall capital equipment efficiency improvements. Sensors can potentially be placed on every tool, part and asset within a manufacturing supply chain, creating operational visibility and providing insights that can significantly improve performance and reduce inefficiencies.

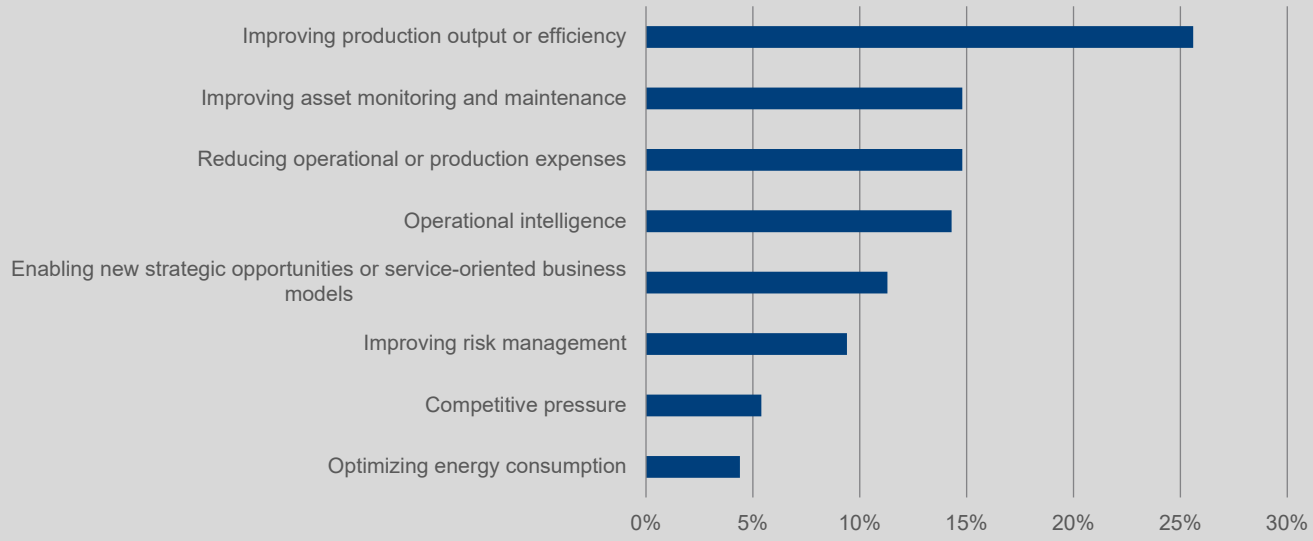
Leading IIoT Efficiency Improvements



IIoT Deployment Becoming Easier. However, No Single Use Case Will Dominate

While the specific operational challenges do vary significantly from industry to industry, many of the most valuable IIoT use cases are applicable to many industrial operators. Asset tracking, for example, allows operators to locate or track equipment, parts, and people as they move throughout the production facility. Considering that virtually every industrial organization possesses each of these assets to varying degrees, the benefits of asset monitoring are clearly not unique to any single industry. Predictive maintenance—which enables operators to actively monitor and analyze the health of their equipment in order to proactively schedule maintenance and avoid unplanned downtimes—offers benefits that are similarly universal. However, no single use case or applications will dominate so selecting multiple and getting them to scale over time will be critical.

Leading IIoT Efficiency Improvements



Among the leading factors driving investments in IIoT solutions are improvements to production output, asset monitoring and maintenance, reducing operational expenses and improving operational intelligence. These efforts can be summarized around key productivity, sustainability, business agility and speed to market efforts and initiatives.

IIoT Projects Would Like to See Implemented

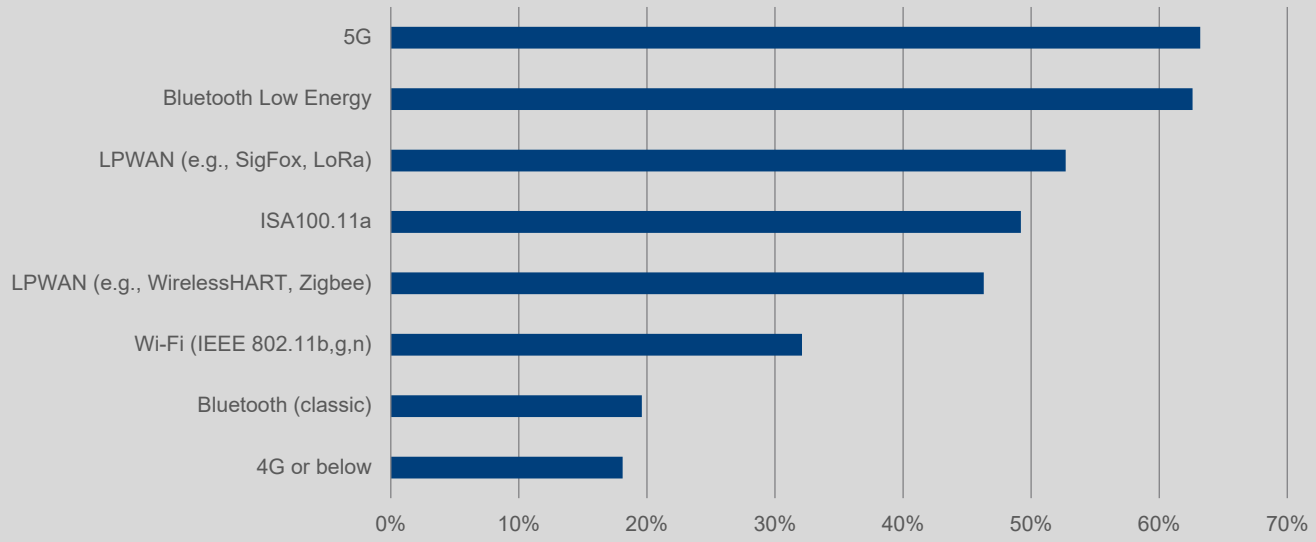
Temporary Worker Safety Mandates Will Have Long-Term Effects

Aside from the global economic repercussions caused by the coronavirus outbreak, this pandemic is also likely to have long-lasting effects on the operations, procedures, and protocols of many industrial organizations. Even after the eventual loosening of restrictions imposed by local and national governments to slow the spread of the virus, many organizations will continue to operate at reduced staffing levels or under otherwise altered physical working environments to maintain the safety of their workers over the long term. With the workforce reduced, working in staggered shifts, or physically distanced, these operators will need to rely more heavily on the automation and intelligence of their OT systems to maintain efficient operations. Some organizations may even consider making automation investments as a way to minimize the effects of any similar workforce-related emergencies that may take place in the future, providing the IIoT platforms space with a growth driver that had not been anticipated prior to the coronavirus pandemic.

IIoT Connectivity Options Aplenty, with 5G Opening Application Opportunities

Connectivity and data services for organizations in process manufacturing industries is already well developed with a high degree of sensors, hard wiring with distributed control systems and supervisory control and data acquisition (SCADA) systems deployed to support heavy equipment processes. Conversely in segments like discrete manufacturing and supply chain/logistics environments (warehouses and distribution centers, for example) the instrumentation of physical assets is only beginning. It is in these environments that decision makers are addressing connectivity requirements for IIoT applications. While many IIoT applications may require lower bandwidth solutions, others require transmission of larger datasets more frequently.

Expected Wireless Networks Used to Support Operations in Three Years



The emergence of viable and reliable wireless connectivity options has shed a significant adoption hurdle for IIoT solutions. For example, low power solutions such as LoRa or Zigbee represent attractive options for a variety of IIoT applications. In addition, the emergence of 5G networks offers operators substantial performance enhancements over legacy options. Through this performance improvement, operators can overcome the high connectivity interference common in industrial environments. For example, 5G networks could provide improved connectivity with the edge or the cloud with IIoT applications such as autonomous mobile robots (AMRs) to enable them to operate more autonomously in dynamic logistics environments. 5G network performance also enable more seamless roaming across large industrial environments.

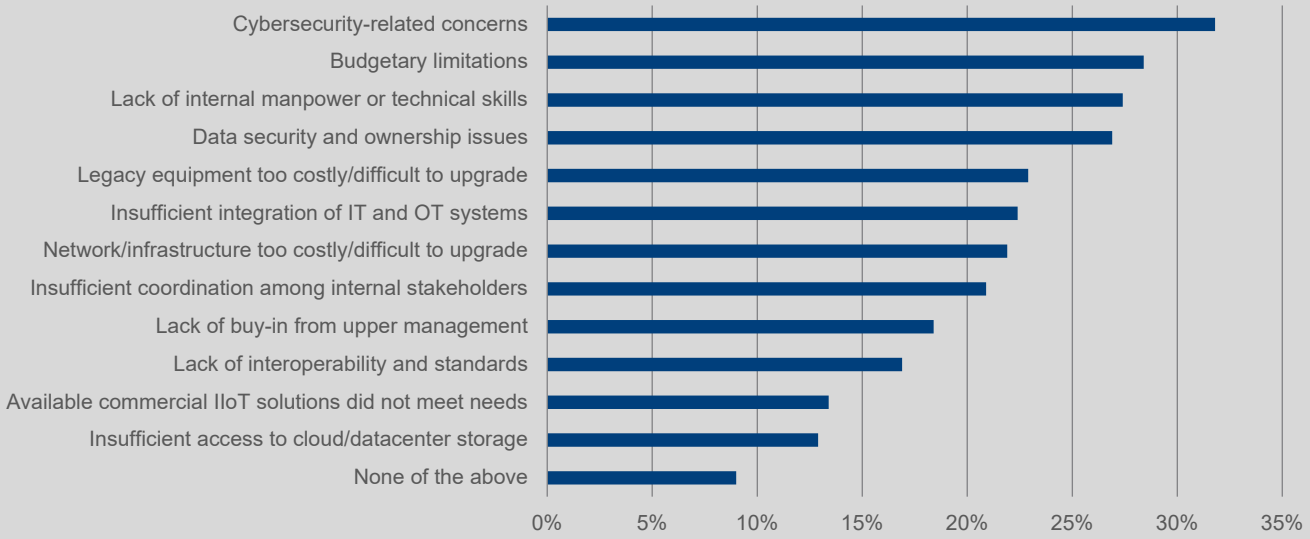
IIoT Platform Openness and Interoperability Can Offset the Heterogeneity Challenge

Among the greatest challenges faced by industrial operators and suppliers alike is the heterogeneous nature of most industrial operating environments. Industrial organizations must contend with the complexities of managing and connecting systems featuring equipment of significantly varied ages, brands, and capabilities, while the suppliers serving these organizations are challenged to integrate their solutions within these tremendously disparate environments. It is for these reasons that many operators prefer to minimize the number of industrial technology suppliers with whom they work, in many cases prioritizing ease-of-integration over functionality when evaluating potential technology solutions. However, many others prefer the opposite, fearful that sourcing industrial technology solutions from a single vendor (or a select few) will ultimately constrain their long-term technology growth. The platform design is focused primarily on creating the future target architecture for IIoT. Central to this architecture is IT–OT integration.

Industrial Cybersecurity Considerations Remain Critical

The security concerns of IIoT stem from an increased attack surface and the need for remote access. As more devices and sensors come online, they create more communication channels, data stores, ports, and endpoints. This increased interconnectivity represents more vulnerabilities if left unprotected. As high-profile breaches make headlines and raise awareness across all areas of industry, industrial organizations have become increasingly proactive in addressing OT security, mindful of the potentially catastrophic consequences of a breach. In order to ensure zero downtime on plant floors, OEMs and industrial control centers are wise to integrate secure remote access software into their networks.

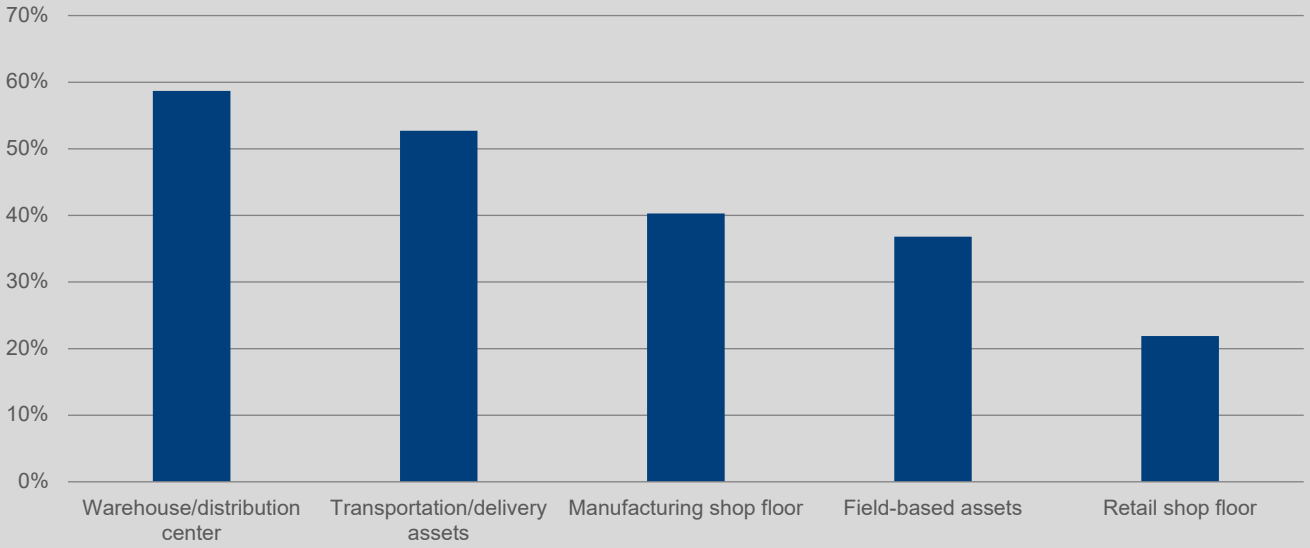
Leading Factors Limiting Organization's Ability to Implement IIoT Strategy or Project



Integrated Approach to IIoT Key to Success

In many cases, collaboration—often with players that have high levels of expertise in areas such as analytics, IIoT, and cloud platforms within the industrial software stack—can be a competitive advantage. Beyond the necessity of collaboration, the complexity of the emerging ecosystems prompts questions concerning investment, leadership, and governance. Mastering these complexities requires overcoming the integration challenge between business operations, organization, and technology. Besides boosting efficiency and driving innovation, IIoT transformations in manufacturing are also critical because integration and ecosystems require manufacturers to join in and catch up.

Target Environments for IIoT Solutions



IIoT Adoption Barriers are Declining

Organizations are taking advantage of key technology trends that have significantly lowered the adoption barrier of IIoT solutions. Included are improvements IIoT platform functionality and ease of use, simplified development of IIoT applications through access to APIs and established communications protocols, lowering costs of sensors and data storage and the development of edge computing that shift computation from the cloud to the shop floor.

	IIoT Enabling Technology Trends	
	2000-2010	Current State
Cost of sensors	$1.00+ per sensor	<$0.50 per sensor
Data storage cost (500MB)	>$300	<$0.50
Data storage cost (500MB)	>$300	<$0.50
Connectivity	WiFi and Bluetooth nascent/emerging. Cellular data rates of 50 kbps.	WiFi and Bluetooth ubiquitous. 5G cellular data rates of 20 GBps. Specialized low power connectivity options for IIoT (LoRa, for example)

The Bottom Line:

The Sign of a Modern Industrial Operator is Visibility

The market's true technology leaders are driven by the singular goal of a unified, digitized supply chain. This segment is tech-savvy, features hungry and fully committed to achieving the greater agility, visibility and customer experiences through actionable data collection. Their biggest draw to any given deployment type is the flexibly to rapidly add new capabilities because their vision is not limited to what's currently available. This segment is leveraging connected frontline mobile solutions to a greater extent than the rest of the market; they are also more aggressively deploying elements of robotics and automation generally, and it is important that these work safely in sync with their human workforces.

Industrial supply chain operations overall are moving forward on the IIoT technology maturity curve. The cumulative effort likely places the industry somewhere close to the early majority; still, the full picture is not as cut-and-dry as that. Some organizations are incorporating advanced elements of automation and effectively utilizing data analytics to optimize their workflows, others have just abandoned pen and paper processes and have put mobile devices in the hands of their frontline workers for the first time. In order to maximize IIoT's value, people and processes must also shift to capture the benefits of those data-driven insights by receiving insights in real time to react faster or by gaining better information to drive more targeted action. This requires the commitment of leadership to ensure that IIoT is not just an IT initiative but an organization-wide effort.

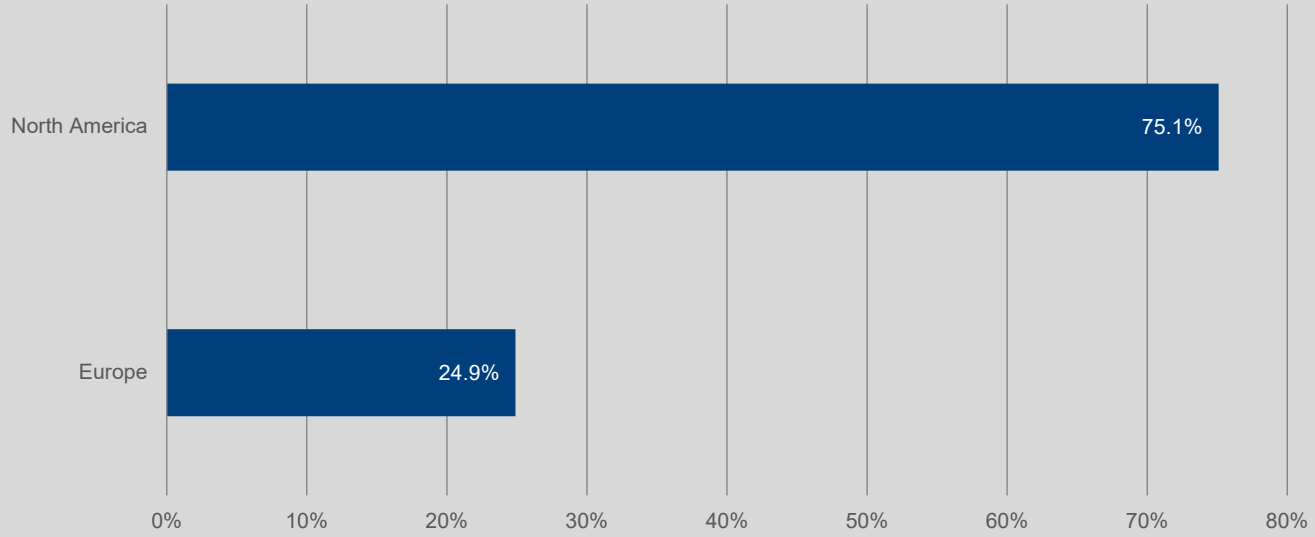
Appendix:

Research Methodology & Survey Demographics

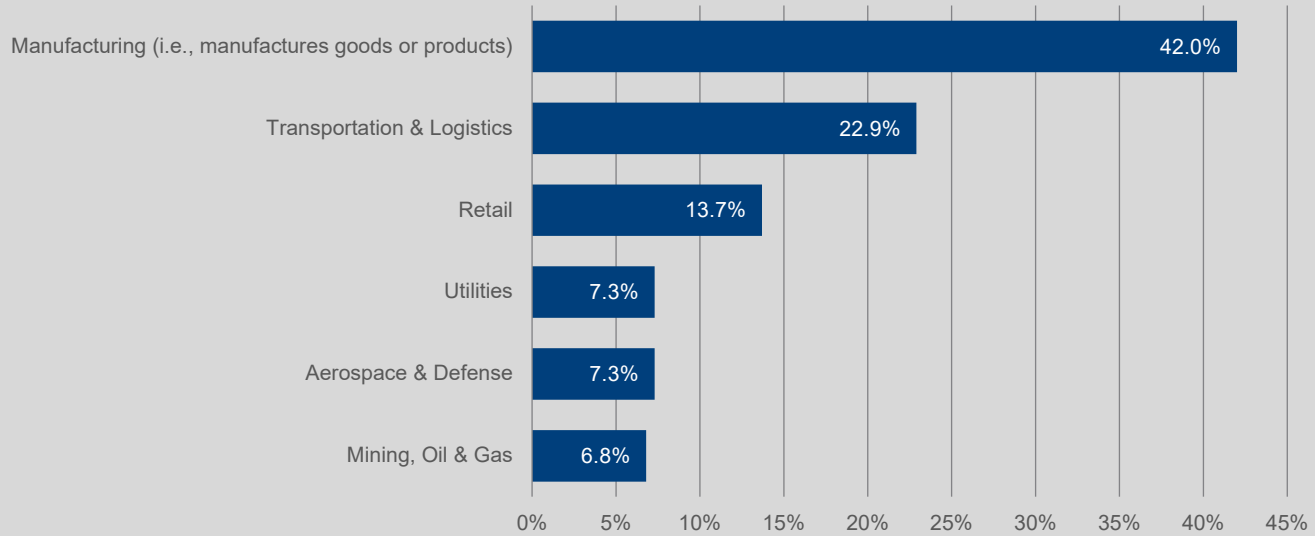
VDC fielded a global survey among operations technology decision makers spanning multiple industries including retail, manufacturing, transportation/logistics, aerospace & defense, utilities and mining, oil & gas organizations. The survey was fielded during Q3/Q4 2021 and included 205 qualified respondents.

Survey Demographics

Research Respondents by Regional Market

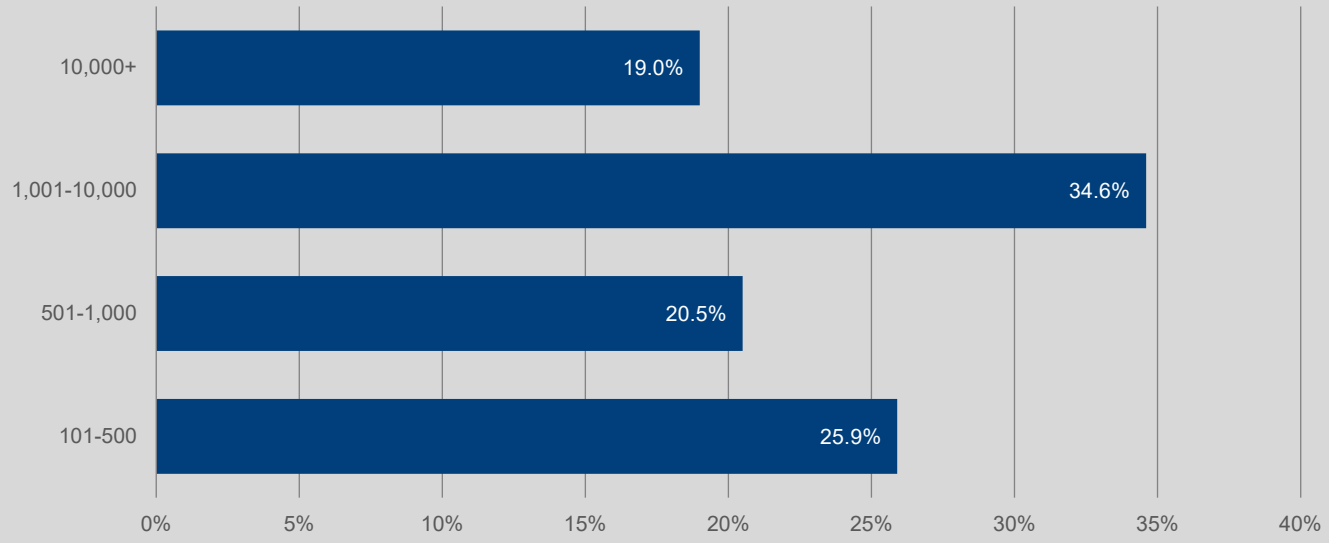


Research Respondents by Industry

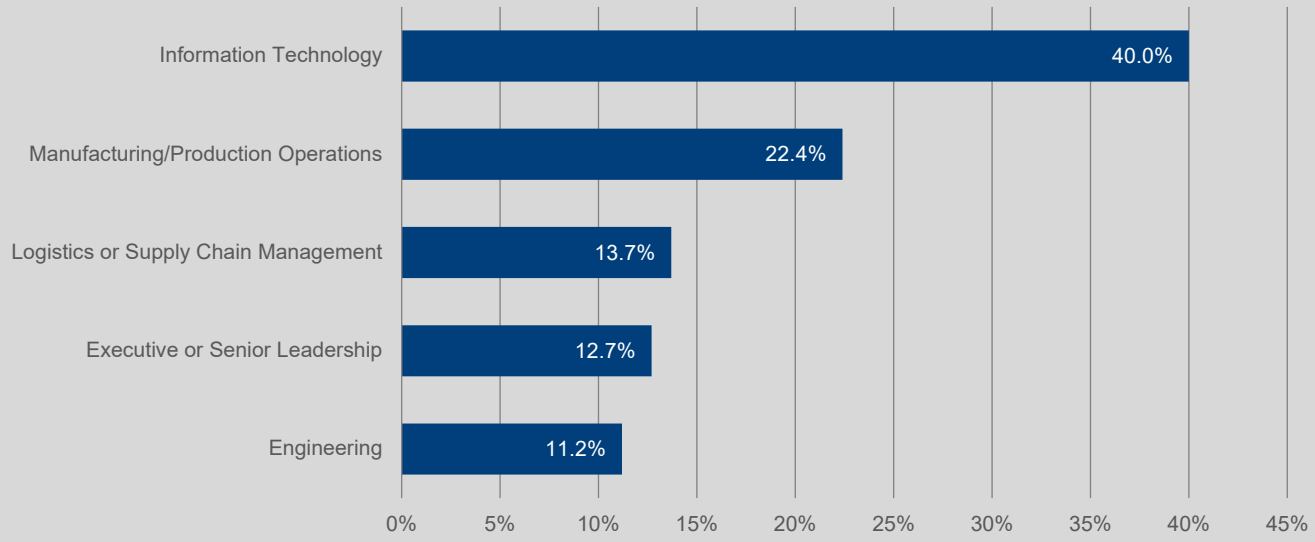


Research Respondents by Organization Size

(Employees)



Research Respondents by Responsibility



About The Authors

David Krebs

David has more than twenty years' experience covering enterprise and government mobility solutions, wireless infrastructure and automatic identification and data capture technologies. David's research focuses on the intersection of digital and mobile solutions with today's business and mission critical frontline mobile workforce and how organizations are leveraging mobile solutions to improve workforce productivity and enhance customer engagement. David's consulting and strategic advisory experience is far reaching and includes technology and market opportunity assessments, technology penetration and adoption analysis, product and service development and M&A due diligence support. David has extensive primary market research management and execution experience to support market sizing and forecasting, total cost of ownership (TCO), comparative product performance evaluation, competitive benchmarking and end user requirements analysis. David is a graduate of Boston University (BSBA).

Email David at davidk@vdcresearch.com

About VDC Research

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