



 RESEARCH SPOTLIGHT

EHS 4.0:

Transforming EHS Management in High-Risk Industries



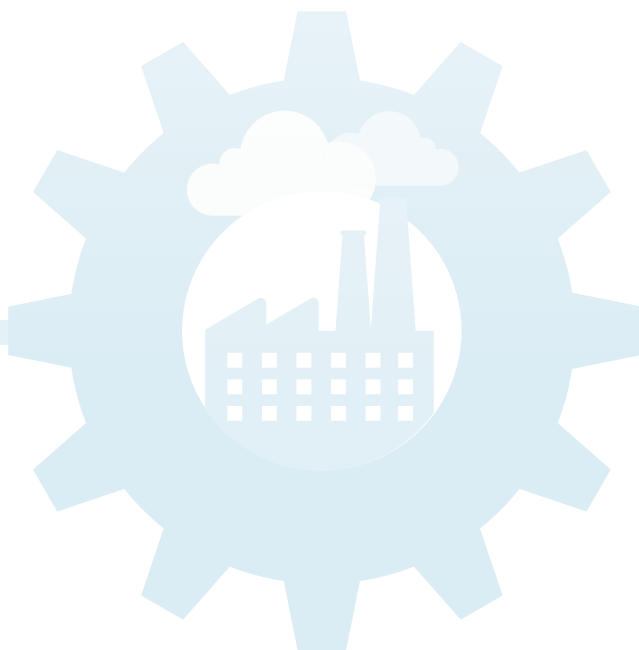
Executive Summary

When it comes to managing Environment, Health and Safety (EHS) risks, the high-risk industries (i.e., chemicals, oil and gas, utilities, metals, mining, etc.) face a special set of challenges. Companies in the high-risk, asset intensive industries were early leaders in the development and implementation of effective EHS management systems. Given the wide range of hazards in their operations and the potential consequences of not getting things right, leading the way in EHS was the only responsible course for enterprises and the entire sector.

While there are often advantages in being a pioneer, there are challenges that can come along with that. Followers have the advantage of learning from the frontrunners' experiences and being able to take a fresh approach that incorporates best practices and the latest technology into their initiatives.

Our research shows that while the high-risk industries are advanced in some aspects of EHS management, they also have significant opportunities to take advantage of new approaches, best practices and technologies to improve performance. This report will discuss the unique EHS-related objectives and challenges these industry sectors face, assess the strengths and weaknesses of current approaches, and explore opportunities to leverage ongoing Industrial Transformation (IX) initiatives to drive EHS and operational performance improvement.

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Research Survey Demographics

The research data presented in this report primarily comes from a global survey executed by LNS Research in Q1 2021 on the topic of Environment, Health and Safety Management 4.0 (EHS 4.0). We obtained valid survey responses from 300 EHS and operations executives and management personnel representing industrial organizations. The respondent pool was well-diversified by geographic region, industry, and company size.

The survey gathered data on the status and plans regarding EHS and sustainability programs, including objectives, challenges, strategic initiatives, deployment of enabling digital technologies, best practices, and business value. Analysis identified those organizations that realize greater business value from their EHS initiatives, and this report provides insights on the relative performance of such EHS Leaders versus EHS Followers.

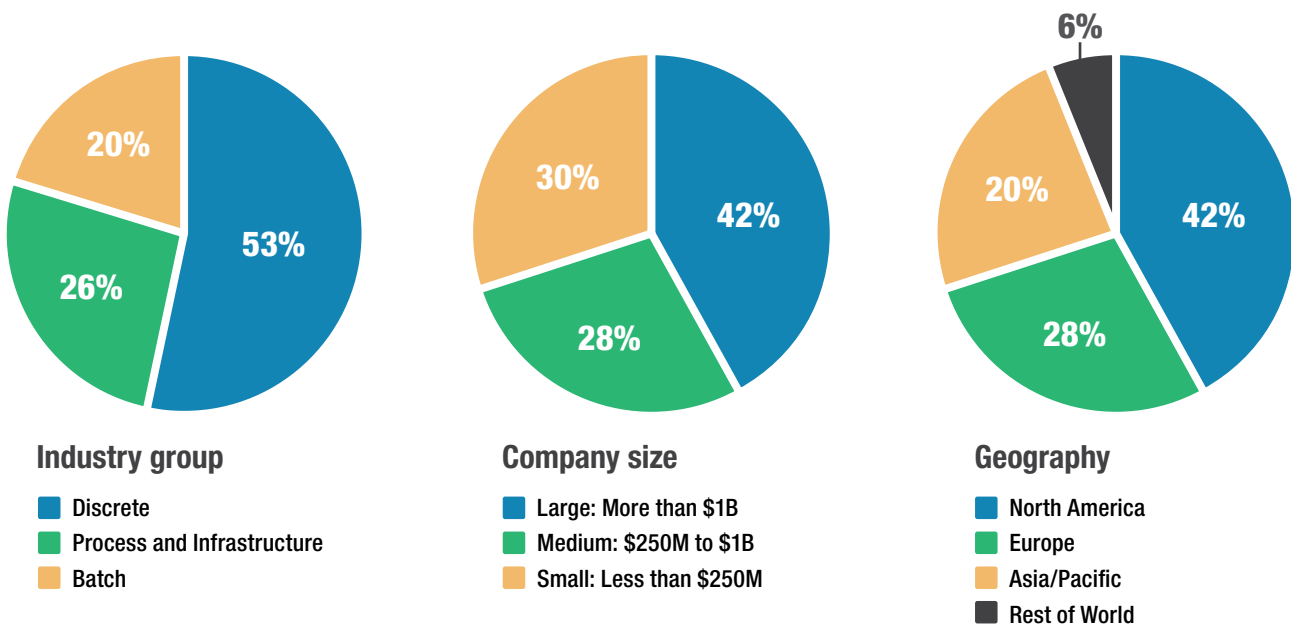


FIGURE 1 - Demographics



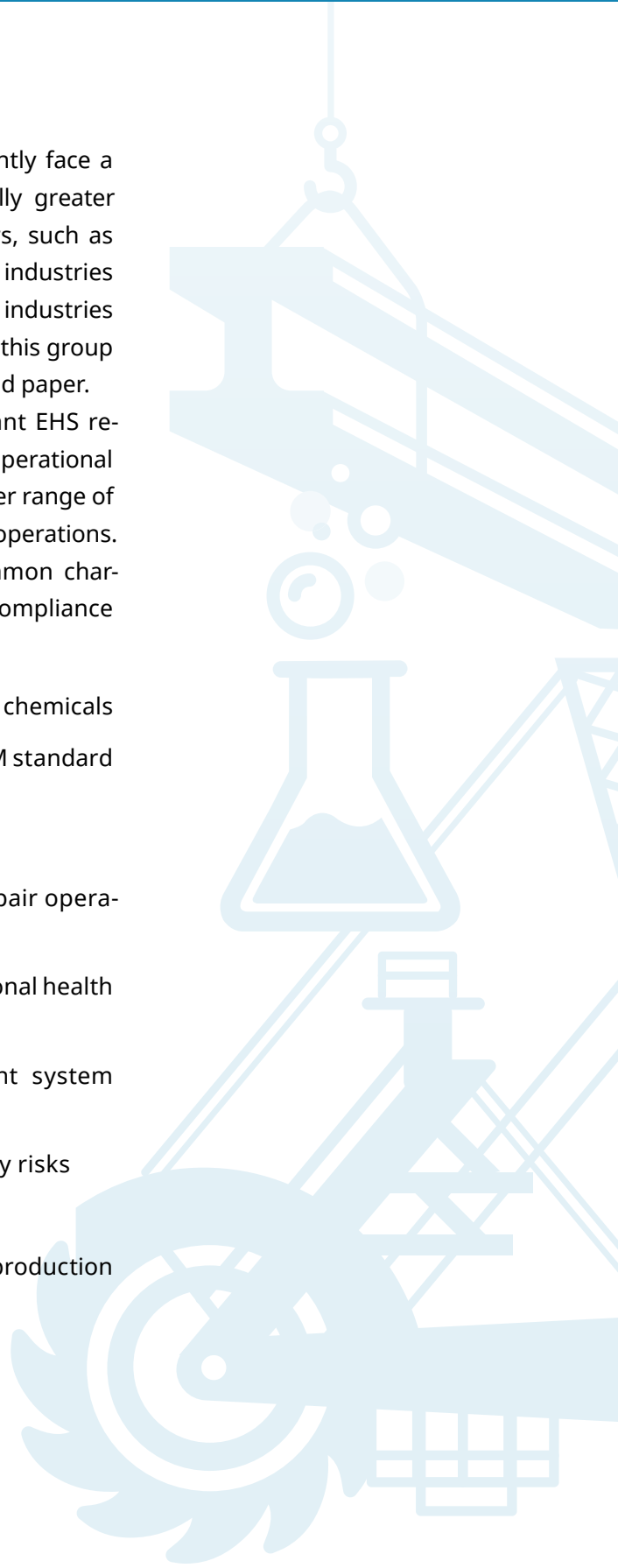
High-Risk Industry Overview

This report focuses on a subset of industries that inherently face a relatively wide range of EHS-related hazards, with potentially greater consequences for the enterprise than other industrial sectors, such as discrete manufacturing. For the purposes of this report, these industries are referred to as “high-risk industries”, and companies in these industries are referred to as “high-risk industrials.” Industries included in this group are chemicals, oil and gas, mining, metals, utilities, and pulp and paper.

This is not to say that other sectors don’t have significant EHS requirements, risks, and challenges that must be managed for Operational Excellence. However, high-risk industrials tend to have a broader range of hazards and a more intense risk profile due to the nature of the operations.

High-risk industrial operations tend to share some common characteristics that impact the scope and intensity of their EHS compliance obligations and operational risk profile:

1. Storage, use, production, or distribution of hazardous chemicals
2. Process safety hazards regulated under the OSHA PSM standard in U.S. operations
3. More highly regulated
4. Asset intensive with significant maintenance and repair operations
5. Diversity of hazards spanning environment, occupational health and safety, and process safety
6. Potentially major consequences from management system failures
7. Intense stakeholder scrutiny relative to sustainability risks
8. “License to operate” must be continuously renewed
9. Distributed workforces: remote operations centers, production sites, field locations, etc.





Industry Trends and Challenges

In executing their business strategies, high-risk industrials face increasing compliance obligations and risks related to EHS and Sustainability. The top trends directly impacting operations cited by companies in high-risk industries are:

1. Supply chain disruption and variability
2. Increasing EHS and Sustainability risks and requirements
3. Shortage of skilled labor
4. Workforce safety
5. Increased regulatory requirements

Disrupted supply chains are a top trend impacting operations. Aside from supply chain, the most frequently cited trend is increased environmental and sustainability risks and requirements. Workforce trends related to labor shortages and safety are also having a big impact, along with regulatory requirements. The management of EHS and Sustainability risks and requirements are critical in the high-risk industries.

What challenges do companies face in dealing with these trends? Among the top challenges are visibility and control of market forecasting, supply chain, and financial management. The ones most cited directly impacting day-to-day manufacturing operations are: leveraging and deploying technology, difficulty in improving operational excellence, and lack of operational flexibility. Improvement, if not transformation, of how EHS is managed can help the enterprise address these challenges.





Objectives of the EHS Business Function

Our research shows that the top business objectives for EHS management in high-risk industries are to improve operational and business performance, improve overall sustainability performance, and meet EHS metrics targets.

When compared to EHS Leaders across all industries, the high-risk group places more importance on meeting metrics targets and regulatory compliance assurance, and somewhat less on improving operational risk management (ORM). Both groups give high priority to strategic business-focused results, namely improving operational and sustainability performance.

These results are in-line with expectations. Companies in high-risk industries are inherently subject to stringent regulatory requirements, and meeting them is table stakes to maintain license to operate, let alone achieve high performance. A strong focus on metrics goes along with the operational discipline and management system execution needed for smooth-running, compliant operations. It's somewhat surprising to see the high-risk industries have ORM further down the list of objectives compared to the EHS Leader group. This could be the result of having well-established ORM systems that are viewed as "good enough" today, or perhaps that they tend to be owned more by Operations, Engineering, and Maintenance than EHS.

Top Business Objectives of the EHS Management Function

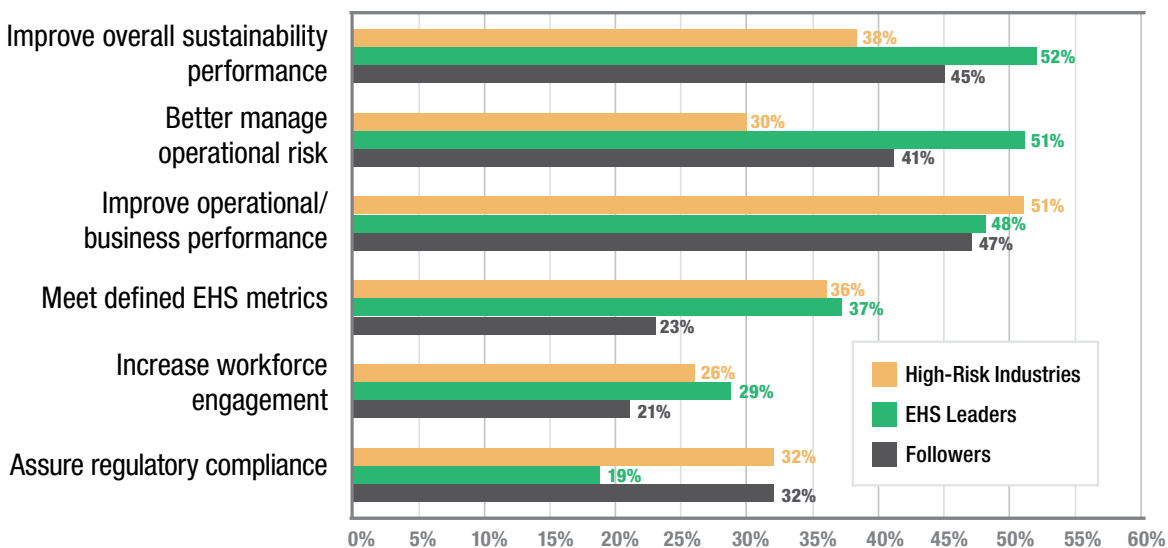


FIGURE 2 - Top Business Objectives of the EHS Management Function



Top Challenges to Meeting EHS Objectives

What barriers stand in the way of organizations meeting the EHS business objectives discussed above? It's a familiar list. The top five challenges are:

1. Insufficient cross-functional collaboration
2. Disparate systems and data sources
3. Immature or unstandardized business processes
4. Inadequate ROI justification for improvement
5. Ineffective metrics program

The top three challenges directly relate to People, Process, and Technology; overcoming these challenges requires a holistic approach spanning the three resource dimensions. We also note that no one challenge stands out as a much higher priority than the others, and that there is little difference in the responses of high-risk industries, EHS Leaders, and Followers. Across the board, organizations continue to face a diverse set of EHS management challenges, including EHS Leaders. Organizations in the high-risk industries might tend to struggle a bit more around unstandardized business processes; they are 33% more likely to cite that as a challenge than EHS Leaders.

Top Challenges to Meeting EHS Business Objectives

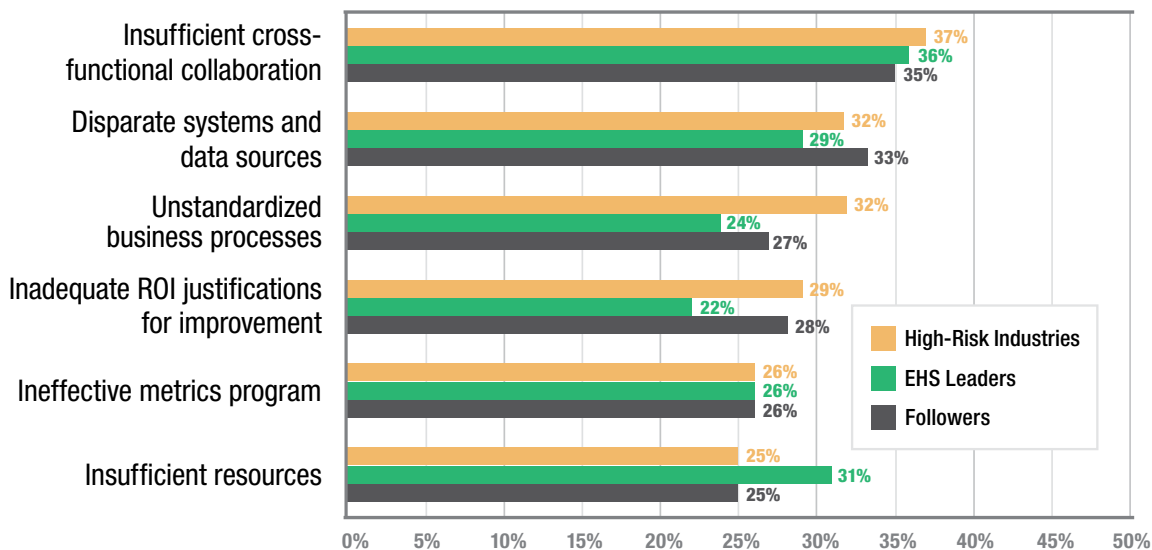


FIGURE 3 - Top Challenges to Meeting EHS Business Objectives



This list of barriers has remained substantially the same since 2014. The key operational challenges relate to silos of organization and information, disconnection, poor visibility into performance, lack of standardization, and inconsistent execution. These are pervasive challenges likely stemming from traditional enterprise-wide organizational and cultural factors, and are common in operations and peer business functions to EHS.

Key Opportunities to Improve EHS Capability Maturity

When it comes to EHS management, organizations in the high-risk industries have led the way in many respects, at least partly driven by the business necessity of effective safety, risk, and environmental management being a pre-requisite to sustainable operations and profitable growth.

Our research has identified a number of significant opportunities for companies in the high-risk industries to leverage the Industrial Transformation (IX) trend to increase EHS capability maturity for improved performance. Taking action to exploit these opportunities will help industrial organizations meet their business objectives for EHS by supporting the strategic business objectives of the enterprise. The remainder of this report explores five of the high potential opportunities:

1. Standardize Business Processes
2. Establish an EHS System of Record
3. Converge EHS and Operations
4. Leverage Data Analytics for Predictive Risk Management
5. Digitally Connect the Frontline Workforce



FIGURE 4 - LNS Research Maturity Model



OPPORTUNITY #1: Business Process Standardization

Efficient and effective business processes are a pre-requisite to Operational Excellence. A practical definition of business process is an activity or set of activities that will accomplish a specific organizational goal. Industrial organizations should have a set of core EHS business processes in place to support consistent, disciplined implementation of their EHS management system.

Core processes include incident management, risk assessment, management of change, action and task management, and audits and inspections, among others. Negative impacts from deficiencies in these processes range from tactical to strategic. For example: increased risk and cost of non-compliance; adverse events involving people, assets, and the environment; lost production; delayed innovation cycles; loss of brand value; and lack of business continuity.

Our research shows that high-risk industrial organizations have significant opportunity for EHS business process improvement. For a set of five core EHS processes, high-risk industrials reported having less enterprise standardization than the EHS Leader group for all processes, except for audits and inspections, with the gap averaging 21%.

High-risk industrials reported **21% less enterprise standardization of core EHS business processes** compared to the EHS Leader group.

Enterprise Standardization of Core EHS Processes

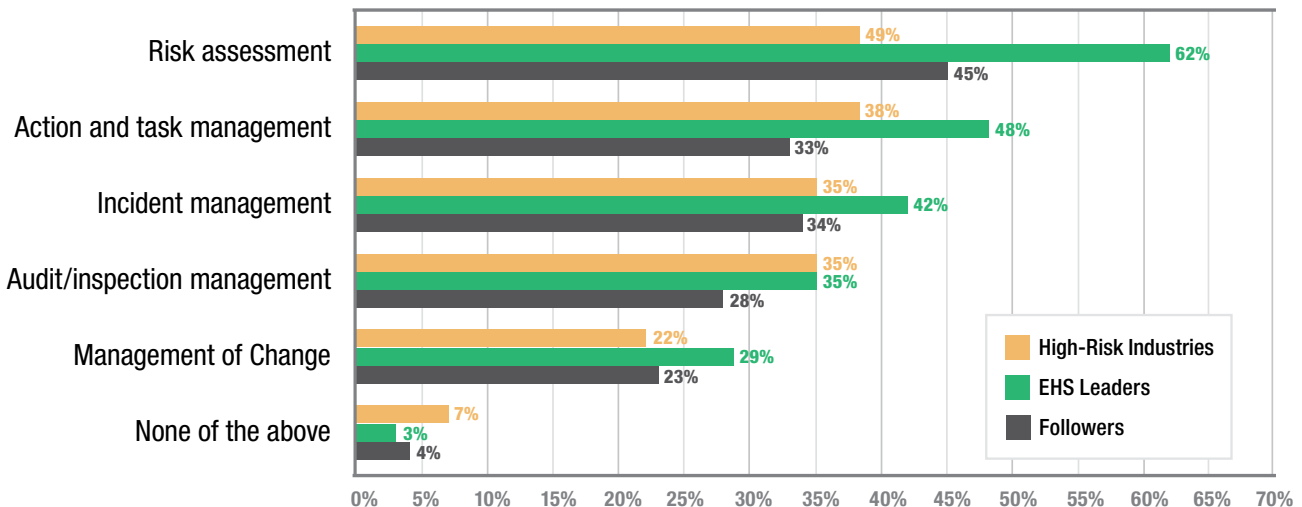


FIGURE 5 - Enterprise Standardization of Core EHS Processes



OPPORTUNITY #2: Solidify the EHS Information Management Foundation

Most industrial organizations have one or more formal EHS management systems to guide their efforts. High-risk industrials have been leaders in this regard, including the development of industry-specific EHS management systems, such as the chemical industry's Responsible Care program. Management systems define what an organization intends to do within a certain business scope, who will do what, and how the work will get done. This takes the form of policies, procedures, process standards, and programs. Defining and documenting a management system is the relatively easy part, consistently executing it day in and day out across the enterprise is much harder.

In theory, a management system could (and often does) exist on pieces of paper in a binder, with people using email, spreadsheets and PowerPoint slides to implement it. In practice, modern information technology is required for effective, disciplined execution. A fundamental capability to enable effective and efficient EHS management is an enterprise EHS software platform. Such a system provides a foundation for standardized and consistent data management, workflows and business process execution, reporting, analytics and performance management. As with other business function-specific enterprise software, these capabilities are commonly provided by cloud-based commercial off-the-shelf software that is configurable and extensible, rather than customized, homegrown systems which are costly to develop, maintain, and improve.

High-risk industrials are behind the curve in the adoption of commercially available, enterprise EHS software. Over half of EHS Leaders report having already implemented such an enterprise system, while only 18% of high-risk industrials have. If pilot projects are included, the gap closes somewhat with 59% of high-risk industrials implemented or piloting, versus 67% for EHS leaders. Noteworthy is that 18% of high-risk industrials indicate they have no plans to adopt a commercial EHS software solution, versus only 2% of EHS Leaders. Although these findings seem to indicate the high-risk industrials are laggards in this regard, we surmise that the gaps seen may be due to their early and innovative adoption of homegrown EHS IT systems that are just now being replaced. Moreover, many of these companies may have early on implemented various commercial EHS software solutions across operating locations, and it will take more time for strategic consolidation into fewer vendor solutions.



Only 18% of high-risk industrials have implemented a commercial enterprise EHS software system vs. 51% of EHS Leader organizations.

– Peter Bussey
Principal Research Analyst



OPPORTUNITY #3: Converge EHS and Operations

It's long been a goal to achieve broader and deeper of integration EHS into operations. Our EHS 4.0 research shows this to be a worthwhile quest. Organizations that have effectively integrated EHS with multiple functions and domains (most notably Production, Maintenance, Quality, and Plant Engineering) report significantly better performance on core operational metrics like profit margin, OEE, throughput, and first pass yield.

IX and its enabling digital technologies give EHS business leaders a much better toolbox for breaking down organizational silos and driving cross-functional process improvement. But the real breakthrough with IX is vertical integration of business processes, systems, and data (IT) with manufacturing technology, automation, and control systems (OT). Increased collaboration between the formerly disparate worlds of IT and OT, and the application of advanced analytics to combined Big Data facilitates true Operational Convergence, of which EHS should be a key part. The shift to autonomous operations is also a major opportunity for EHS integration, especially in the high-risk industries.

EHS Leaders do a much better job of cross-functional collaboration, especially with Production/Operations, Maintenance, Quality, and Plant Engineering. They also more often integrate EHS with plant and Operational Technology/Automation systems to take advantage of increased

Integration of EHS Management with Operations

% Fully integrated with EHS business function

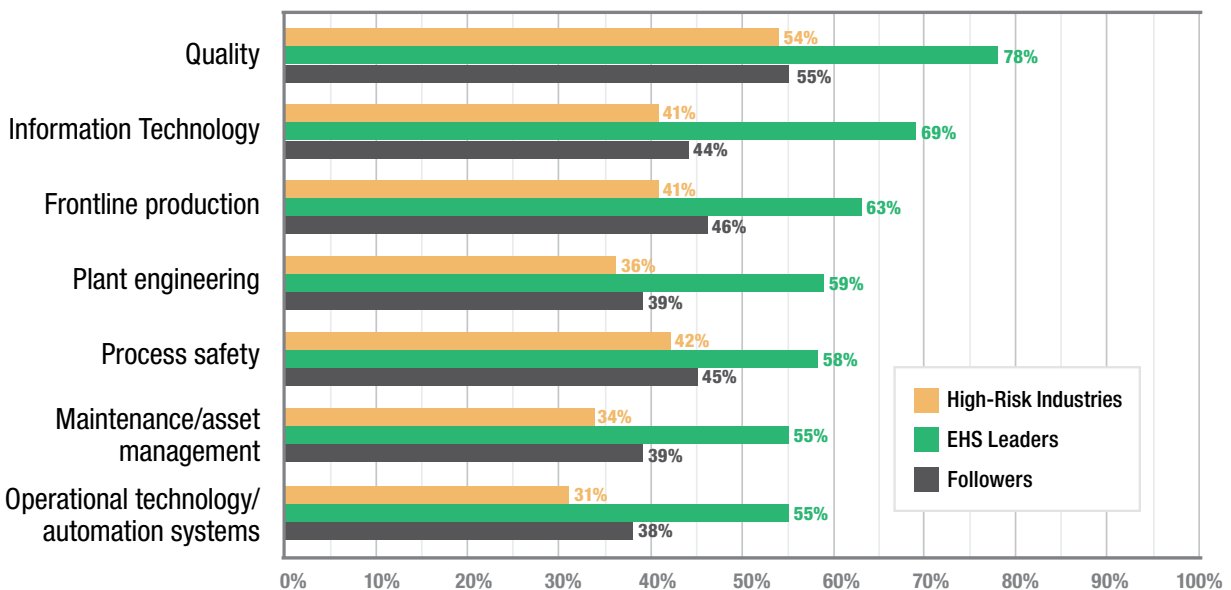


FIGURE 6 - Integration of EHS Management with Operations



connectivity, including using real-time and historical Big Data to extract data-driven insights to drive next actions and improvement. Once again, the high-risk industries are somewhat behind the curve in operational convergence compared to EHS Leaders, presenting a significant opportunity for improvement.

OPPORTUNITY #4: Leverage Data Analytics for Predictive Risk Management

One of the toughest business challenges faced by high-risk industrial organizations is effective management of operational risks. This is in large part due to the prevalence of process safety hazards which can lead to catastrophic operational impacts.

The promise of IX is largely based on use of novel methods and tools to collect and analyze operations-related data. Likewise, data analytics is the most powerful and practical means of realizing the promise of EHS 4.0, including real-time risk management. Digitalization of operations is resulting in massive amounts of Big Data from smart connected devices and sensors. This creates the potential for unprecedented visibility into operational risk factors related to assets, people, and the work environment. The challenge is to organize the myriad sources and types of data and convert them into actionable insights to improve EHS and operational performance. Advanced analytics tools and methods, including Artificial Intelligence (AI) and Machine Learning (ML), are key to getting this capability.



HIGH-RISK INDUSTRIALS are 50% less likely to apply digital tech for predictive risk management than EHS Leaders

Top Challenges to Effective Risk Management

Our research shows that for high-risk industrials, the top challenges to effective Operational Risk Management (ORM) are related to people, organization, and change management:

1. Adaptation of workforce skills and competencies
2. Transitioning from reactive to proactive risk management
3. Siloed information, data management, and software systems
4. Rapid pace of operational change
5. Lack of advanced analytics tools
6. Non-standardized risk management processes

Lack of business process standardization and enabling technology systems are also significant barriers. Although these are essential to a holistic risk management solution, the toughest challenges are ensuring the right people with the right skills and knowledge are in place and managing organizational change in dynamic operations. Technology is necessary but not sufficient for effective ORM.



OPPORTUNITY #5: Digitally Connect the Frontline Workforce

Digitally connecting the frontline industrial workforce is one of the most active areas of IX investment. Connected Frontline Workforce (CFW) initiatives had been gaining traction for several years before the COVID-19 pandemic. The crisis accelerated the trend considerably as it demanded new ways of working, safeguarding employees, and ensuring business continuity. CFW solutions came to the fore to help provide the operational agility needed to adapt to rapidly changing conditions, e.g., to enable physical distancing, remote work, quick upskilling, etc.

Connected workforce transformation initiatives leverage digital technologies such as mobile devices, augmented reality, sensor-equipped wearables, IIoT systems, and advanced analytics, with the goal of a front-line workforce capable of faster, better decisions; communicating and collaborating more effectively; and executing work with more consistency and quality. EHS business leaders have a prime opportunity to proactively engage in ongoing Connected Frontline Workforce initiatives to implement solutions focused on safety and EHS problems. There is an even bigger opportunity from incorporating EHS and sustainability improvements into all CFW use cases across the value chain, such as inspections and audits, complex assembly, maintenance and repair, and service.



FIGURE 7 - Connected Workforce Characteristics



Summary and Recommendations

- 1. Increase alignment of EHS initiatives with business strategy.** Organizations with higher EHS capability maturity are much more likely to align their initiatives with enterprise business objectives. With the COVID-19 crisis as a catalyst, this is the ideal time for EHS leaders to gain approval of investments that support corporate strategic objectives and enable capabilities needed for resiliency, operational agility, and business continuity.
- 2. Incorporate EHS into Industrial Transformation (IX) initiatives.** Industrial companies that are most successful with digital transformation (IX Leaders) take a broad, inclusive approach that brings in a wide swath of the organization, including EHS management. They are 2.4 times more likely to embed EHS into their IX program than IX Followers. EHS 4.0 should be a key initiative of the overall IX program, not an organizational or technology island.
- 3. Leverage Sustainability and ESG initiatives.** One of the best opportunities for EHS to align with business objectives is sustainability, which has undergone a resurgence as a key part of corporate strategy. The opportunity for EHS is clear: many if not most sustainability initiatives and metrics are in the realm of traditional EHS management, including climate risk and environmental performance; people, health, safety, and wellness; product and supply chain stewardship; and critical risk management. The EHS business function is and will be a key part of ESG initiatives.
- 4. Align with data analytics capabilities.** The promise of Industrial Transformation (IX) is largely based on use of novel methods and tools to collect and analyze operations-related data. Likewise, data analytics is the most powerful and practical means of realizing the promise of EHS 4.0, including real-time risk management. Most industrial organizations have formal analytics programs as part of their overall IX efforts. EHS business leaders have much



to gain by aligning with these initiatives and having a basic working knowledge of data science and governance to collaborate with corporate resources and potentially build data science capabilities within the EHS function.

- 5. Put people at the center.** The ongoing digitalization of industrial operations will continue to change the nature of work for the frontline workforce. New processes, technologies, risks, and a faster pace of change call for new skills and a high degree of versatility and agility. Regardless of how much or how fast high-risk industrials increase automation and implement autonomous operations, business and operational results will be determined by the decisions and actions of people. Connected Frontline Workforce (CFW) solutions can help enable the collaboration, knowledge management, and decision support needed for an engaged, competent workforce and associated improvements in productivity, safety, and quality.





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