The Connected Worker

MOBILIZE AND EMPOWER PEOPLE TO REDUCE RISK AND IMPROVE SAFETY

CONNECT:

lnsresearch.com

LNS research

The Connected Worker

MOBILIZE AND EMPOWER PEOPLE TO REDUCE RISK AND IMPROVE SAFETY

TABLE OF CONTENTS

ACRONYM
QUICK REFERENCE
VIEW ON BLOG

lnsresearch.com

SECTION 1

Executive Summary

Executive Summary

Digital Transformation is a powerful, cross-industry trend disrupting business models, optimizing performance and creating competitive advantage for those companies that embrace it. The wave of digital disruption presents environment, health and safety (EHS) business leaders with an opportunity to leverage advanced technologies to lead and add business value with fresh approaches and new insights.

Companies that apply innovative digital technologies to solve EHS problems recognize the promise of predictive and prescriptive risk management, and achieve step-change performance improvement. To date, most companies have focused digitalization investments on using asset- and operations-related data to improve core operational processes such as asset reliability, energy management, and production efficiency.

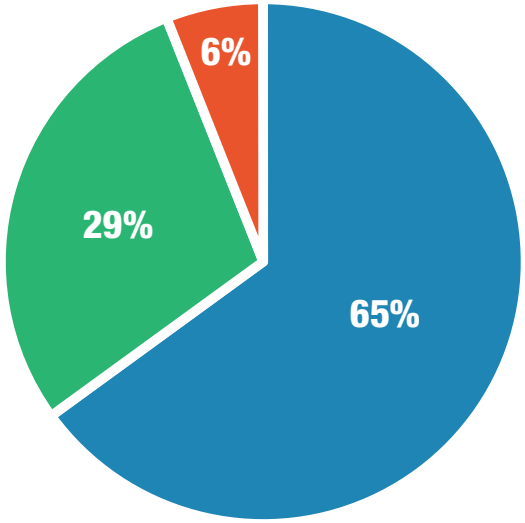
There is tremendous untapped potential to apply digital technologies to engage employees with their work environment and operational management systems. Technologies such as intelligent wearables, proximity beacons, and smart connected devices together with mobile applications enable the connected worker. This report focuses on how advanced technologies including the Industrial Internet of Things (IIoT) can improve risk management, EHS performance and workforce engagement. This ebook also provides recommendations for EHS business leaders to bring digital innovation to their organization with low risk and significant benefits.

SECTION 2

Demographics

Demographics

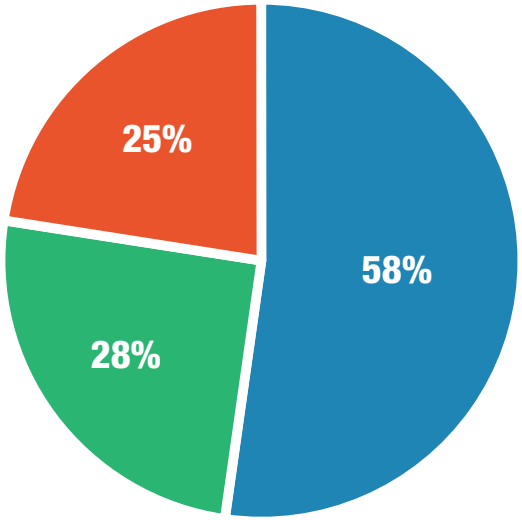
The data and information presented in this ebook is drawn from primary research conducted by LNS Research on the topic of safety and risk management best practices. Researchers gathered data via an online survey in the fall of 2017 from 300 respondents across a variety of geographic regions, industries, and company sizes. Respondents are mainly EHS and operations executives and professionals in industrial organizations. We selectively supplemented the data from this survey with data from the ongoing LNS Research surveys focused on EHS management and the Industrial Internet of Things, which have similar demographic profiles.



GEOGRAPHY

HQ Location

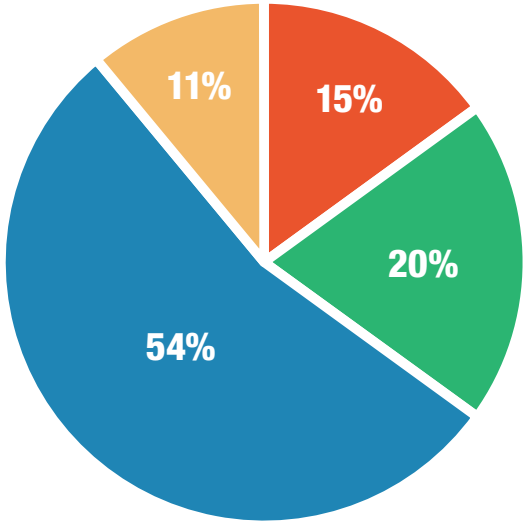
- North America
- Europe
- Rest of World



INDUSTRY

- Discrete Manufacturing
- Process Manufacturing
- Batch Manufacturing

Does not equal 100% as respondent organizations operate in multiple segments.



REVENUE

Company Revenue

- **Small:** less than $250 million
- **Medium:** $250 million to $1 billion
- **Large:** more than $1 billion
- **Not specified**

SECTION 3

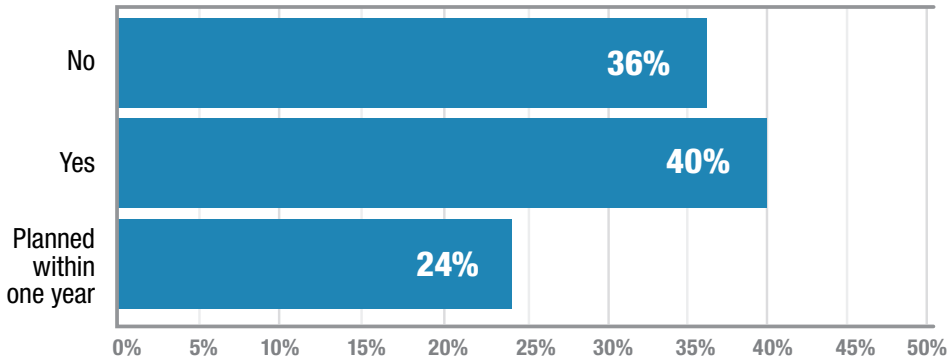
Digital Transformation of Environment, Health and Safety Management

Impact of Digital Transformation on Industry

Digital Transformation has had a profound impact on how businesses operate and the way people work, and the trend continues to accelerate. The Fourth Industrial Revolution is made possible by cyber-physical systems that connect people, machines, and data in new ways. With digitalization come new business models that disrupt entire industries, process optimization, and the potential for step-change improvements in business and operational performance.

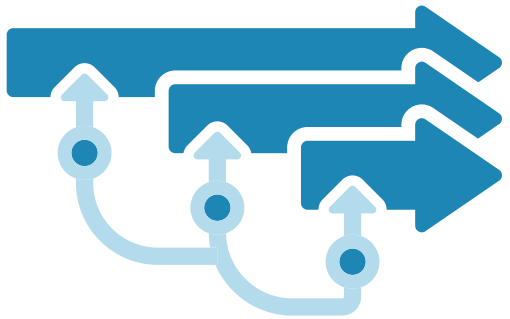
The use of advanced digital technologies is widespread as Cloud computing, mobile applications, advanced analytics, smart connected devices and Industrial Internet of Things (IIoT) solutions become mainstream. Our survey data show that 64% of industrial organizations have launched digitalization projects, or plan to in next 12 months.

Has your company started a Digital Transformation initiative (i.e. Smart Manufacturing, Industry 4.0, IIoT, etc.)?



% Total Respondents, n = 130

Companies should avoid the tendency to view Digital Transformation as strictly a technology project. For the greatest effect and to achieve maximum value, they should undertake digitalization as a business transformation initiative that requires orchestration across the many organizational dimensions and capabilities. The LNS Research Digital Transformation framework illustrates a strategic approach and prescribes a systematic methodology for digital initiatives to manage transformation across all levels and functions of an organization.



DIGITAL TRANSFORMATION FRAMEWORK

by LNS Research describes a systematic approach to simultaneous and interconnected digital initiatives, in order to manage transformation across all levels and functions of the organization.

Click to learn more about the
Digital Transformation Framework

Mission: Drive Operational Performance with Effective Risk Management

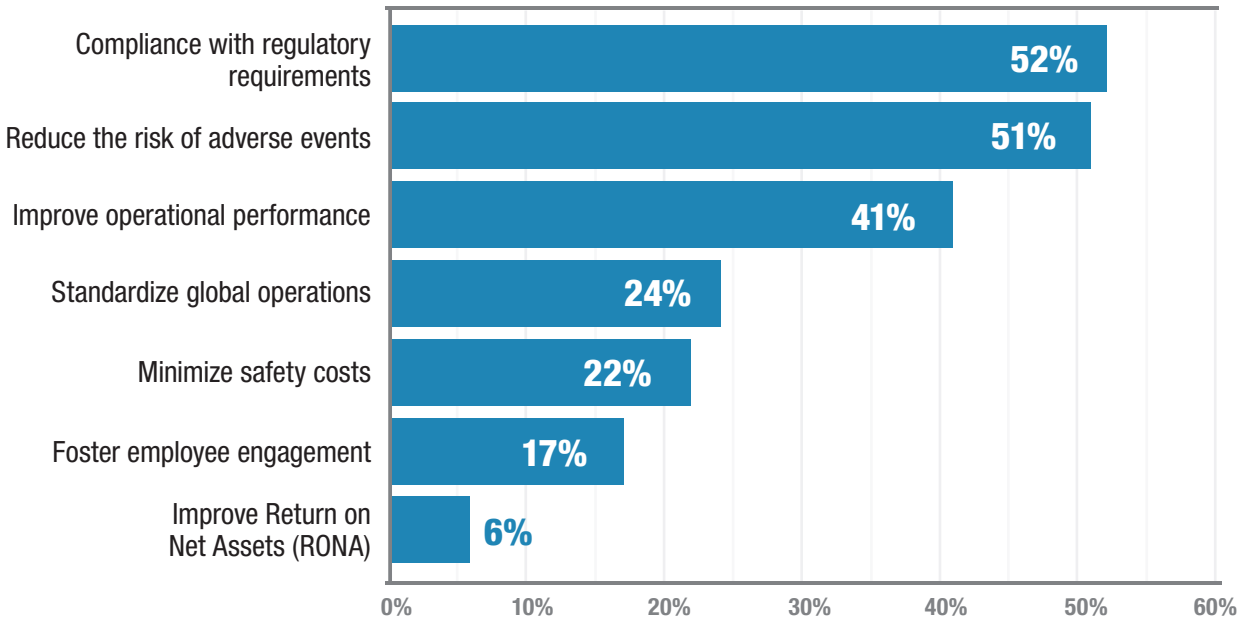
Achieving compliance with regulatory requirements has long been one of the top objectives of environment, health and safety (EHS) initiatives, and it remains so. Compliance has become increasingly challenging as the scope of obligations has expanded beyond legal requirements to include those imposed by external stakeholders such as customers, business partners, and the business itself.

In recent years the focus of the EHS business function shifted significantly from compliance to proactively managing operational risks to prevent incidents that negatively impact people, production or the environment. This shift is evident since "improve operational performance" is among the top three strategic objectives of safety initiatives, along with compliance and risk mitigation.

When companies view compliance (or the lack thereof) as part of the overall risk portfolio rather than the main objective, the core mission of the safety or EHS leader shifts to managing risk to improve operational performance. Yet, only 28% of industrial organizations use a lifecycle approach to risk management, and less than a third of those use integrated software to enable holistic risk management.

As noted above, industrial organizations are increasingly investing in digitalization as the principal means to drive performance improvement. Likewise, EHS business leaders will benefit from the use of technology to shore up risk management processes and to deliver the business value expected of them.

Top Strategic Objectives for Safety Initiatives



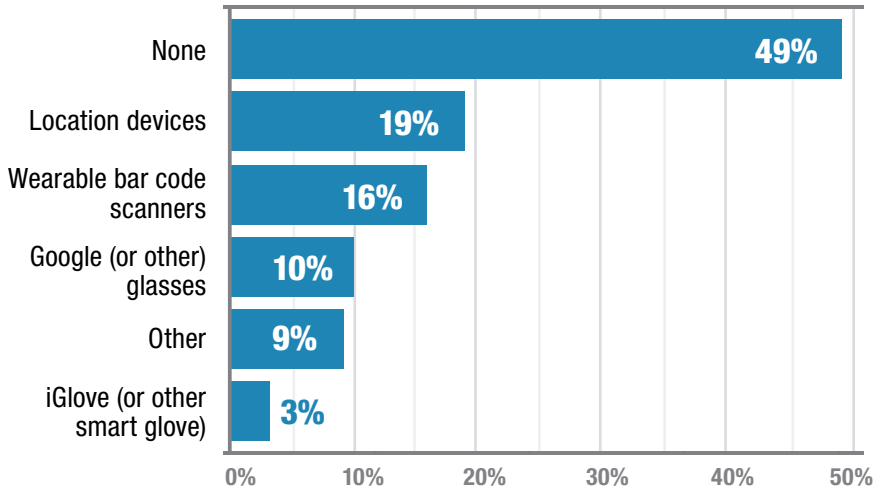
Improve Worker Safety with Digital Innovations

Most Digital Transformation initiatives thus far have focused on fundamental operational improvements such as asset reliability, energy management, manufacturing efficiency and product quality. Leading organizations are already applying these same technologies to improve risk management and workplace safety. Research reveals that 13% of Digital Transformation initiatives zero in on safety and environmental use cases.

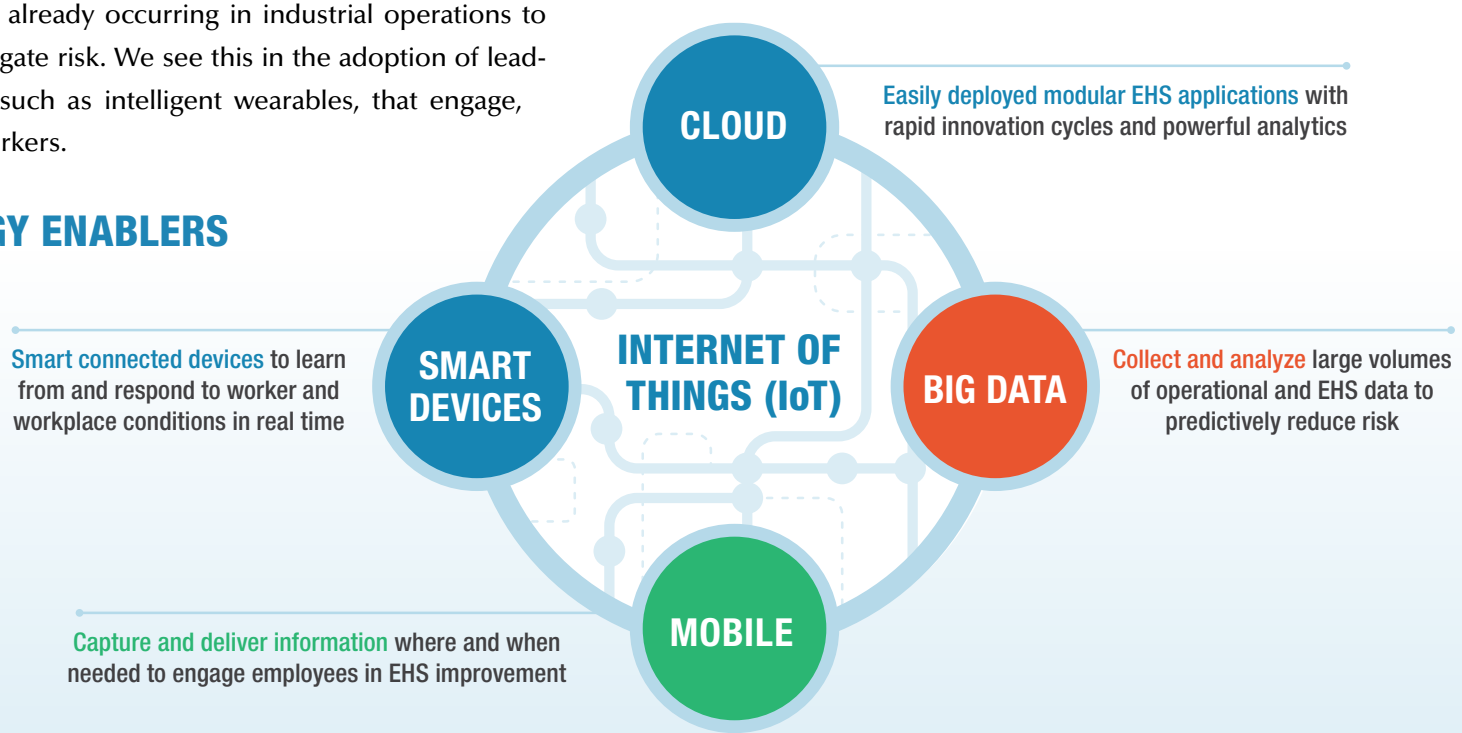
We see considerable adoption of Cloud-based software, mobile applications, and advanced analytics as the core technology platform for environment, health and safety management, and that trend is accelerating. However, the use of smart connected devices and sensor-generated data for EHS use cases is at an earlier phase of market adoption. The convergence of these technologies for Industrial Internet of Things (IIoT) applications holds tremendous potential for safety and EHS performance improvement.

Digital innovation is already occurring in industrial operations to improve safety and mitigate risk. We see this in the adoption of leading-edge technologies such as intelligent wearables, that engage, connect, and inform workers.

Specialized Digital Innovation in the Plant (implemented or experimenting with)



EHS TECHNOLOGY ENABLERS

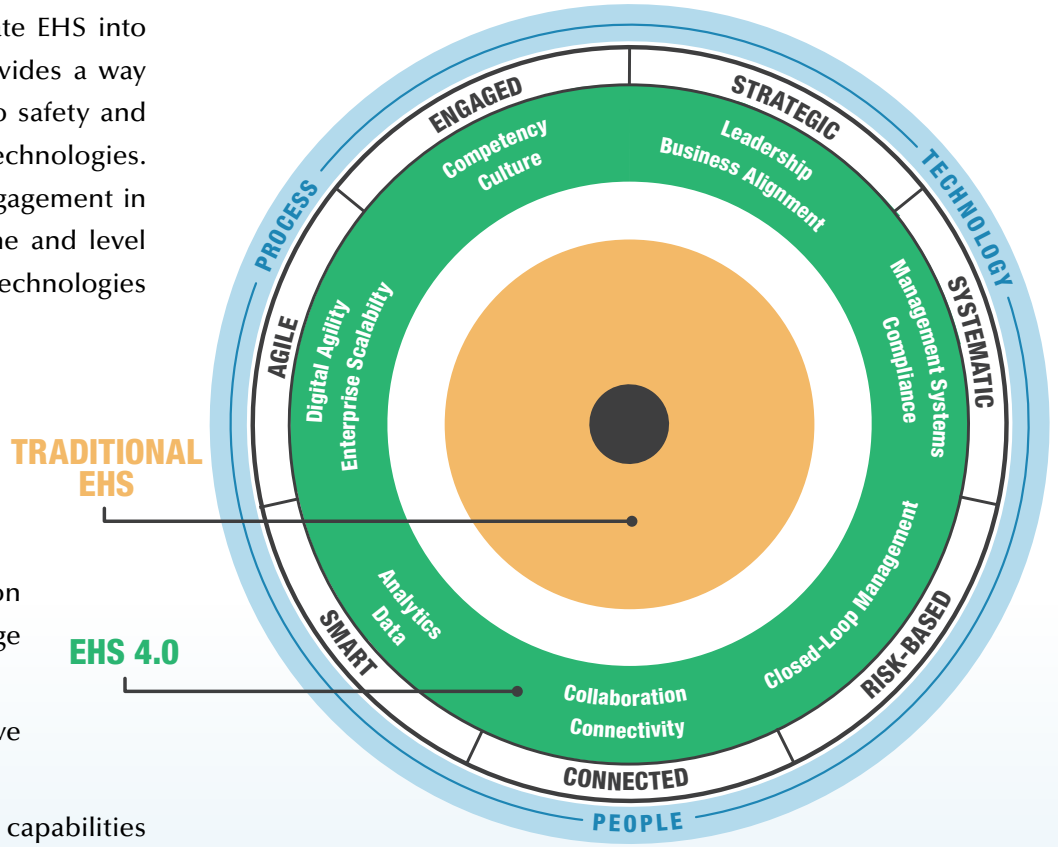


Using Technology to Engage Workers in EHS Improvement

While the potential for digital technologies to impact safety and EHS management is great, that is only one piece of the puzzle. Digital Transformation isn't about technology per se, but how it can impact people, processes, and organizational culture. It is the alignment and interaction of capabilities that drive Operational Excellence and business performance.

The LNS Research EHS 4.0 framework describes the seven attributes and underlying capabilities needed to integrate EHS into business strategy and operations. The framework provides a way for organizations to overcome longstanding barriers to safety and EHS performance improvement using advanced digital technologies. It addresses the critical need for greater employee engagement in safety improvement efforts throughout every discipline and level of the organization. Some examples of how digital technologies promote greater employee engagement:

- **Leadership** | Provide executive team with real-time dashboards on leading and lagging indicators for management review and decision support.
- **Systematic** | Enable management system execution with Cloud-based enterprise software to manage data and workflows.
- **Risk-based** | Use advanced analytics for predictive and preventive risk management.
- **Engaged** | Mobile solutions extend and expand capabilities to the workforce.



SECTION 4

Enable the Mobile Workforce, Mitigate Safety Risk

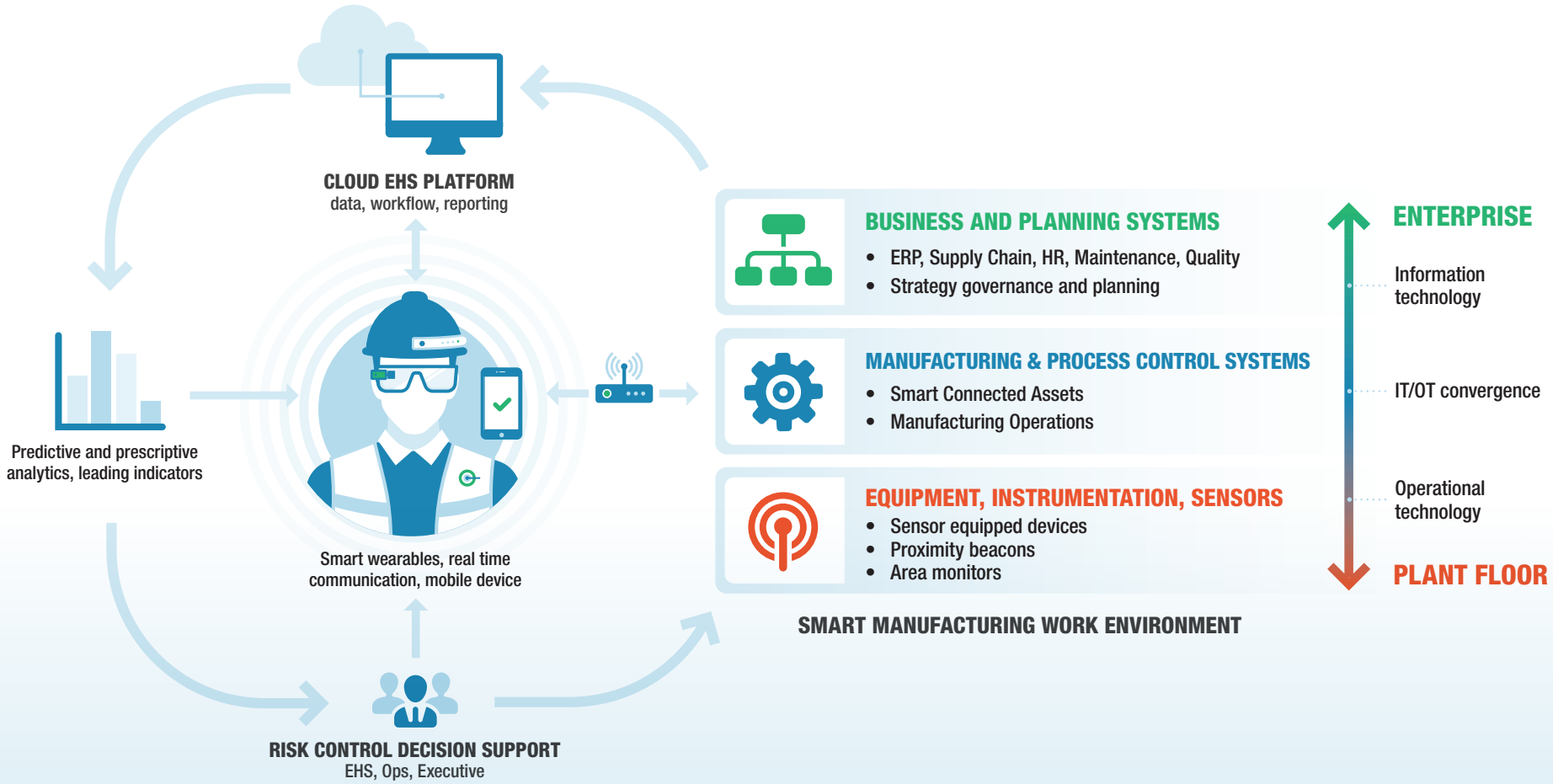
The Connected Worker

The potential for digital innovation to improve safety and operational performance is great. But merely applying technology is not inherently useful. The real value is the interaction of technology with the total organizational system and the people and processes comprising it.

Mobility is a technology game-changer because it affects how people interact with their work environment. Mobile applications extend critical information and workflows to wherever work gets done, from the plant floor to remote field locations. Mobile devices help people:

- More actively engage with work processes and systems
- Perform tasks with greater efficiency and safety
- Access business applications such as maintenance, quality, and EHS management, where and when needed

THE CONNECTED WORKER: SMART RISK MANAGEMENT



Better Information Flow = Decisions That Mitigate Risk

Digital innovations take mobile solutions to the next level by enabling the connected worker. Advanced technologies such as sensor-equipped wearables, Bluetooth beacons, and virtual assistants provide real-time interaction for workers with the work environment and safety/risk management system processes and procedures. Sensor-generated data and signals combined with mobile applications and advanced analytics dramatically improve the flow of information and management system feedback loops.

As a result, connected workers can make better, faster decisions that improve safety and productivity. They also benefit from more interaction with and automation of risk processes, including control measures such as proximity-based hazard communication.

In most industrial organizations, management systems are the engines that drive safety and operational performance improvement. These systems are based on standards such as ISO 45001, ISO 14001, and ISO 9001, and define the processes and procedures by which the organizations will manage performance to achieve objectives in areas such as safety, environmental, and quality management.

If the management system is the engine, information is the lubricant that keeps all the parts working together smoothly. Information is the essential enabler of the plan-do-check-act (PDCA) continuous improvement cycle. Information is the basis for planning. Implementation activities generate information that in turn feeds the check/review cycle. And the act/improve step requires information to support decision-making. The more accurate and timely information is, and the better it flows throughout the system, the more quality output the PDCA cycle will produce.

Better Information Flow = Decisions That Mitigate Risk *(Cont.)*

Digital technologies arm the connected worker with the right information at the right time to make better, faster decisions that enable safe work, and real-time risk control. Information access at the point of work is indispensable. The greatest potential for performance improvement however is the improved flow of information into and throughout the entire system enabled by connected worker technologies. Consider these examples of information flow to the worker, and back into the system from the workplace:

- **Hazard communication** | Bluetooth beacons detect worker proximity to hazardous operations, automatically deliver context-sensitive safety information and instructions to a mobile device, and verify that the worker has the mandatory competencies to perform the work.
- **Predictive risk control** | Sensor-equipped smart wearable vests generate large volumes of data on worker biomechanical parameters during material handling, which is captured for advanced predictive analytics to identify patterns and preventive measures to mitigate ergonomic risks.

Faster Feedback for Incident Prevention and Continuous Improvement

Continuous improvement requires a feedback loop, whether it's applied to safety, operational, environmental, or some other type of performance. At a high level, a management system or an overall improvement program such as Lean or Six Sigma is a closed-loop process of assessment, implementation, monitoring, and improvement.

There are usually many sub-feedback loops operating at a granular level within an overall system. For example, risk assessment is a closed-loop continuous cycle of identification, analysis, control measures, and effectiveness monitoring. Other specialized processes like incident management, management of change, hazard communication, training, and auditing, among many others, closely relate to risk management. The output of each feedback loop optimizes the sub-process and feeds into overall management system performance.

Connected worker technologies provide new ways of enabling and optimizing closed-loop processes and feedback loops. Consider these scenarios:

- **Risk management with mobile inspections and observations** Front-line workers equipped with mobile devices can quickly and easily access applications to conduct inspections and record safety observations. This practice engages more people in risk mitigation while making the process more effective and efficient.
- **Permit to Work** | When a maintenance worker receives a work order and proceeds to the repair location, a mobile device can communicate with a proximity beacon to trigger an alert that a permit to work is required, and trigger a workflow for the necessary permit. During repair work, sensor-equipped area monitors, and smart wearables can gather and analyze environmental conditions and worker status in real-time. Deviations outside acceptable parameters automatically trigger alerts and corrective actions to mitigate the risk.

The connected worker has more interaction points with the management system and processes, and is thus more engaged.

SECTION 5

Technology in Action: Connected Worker Use Cases

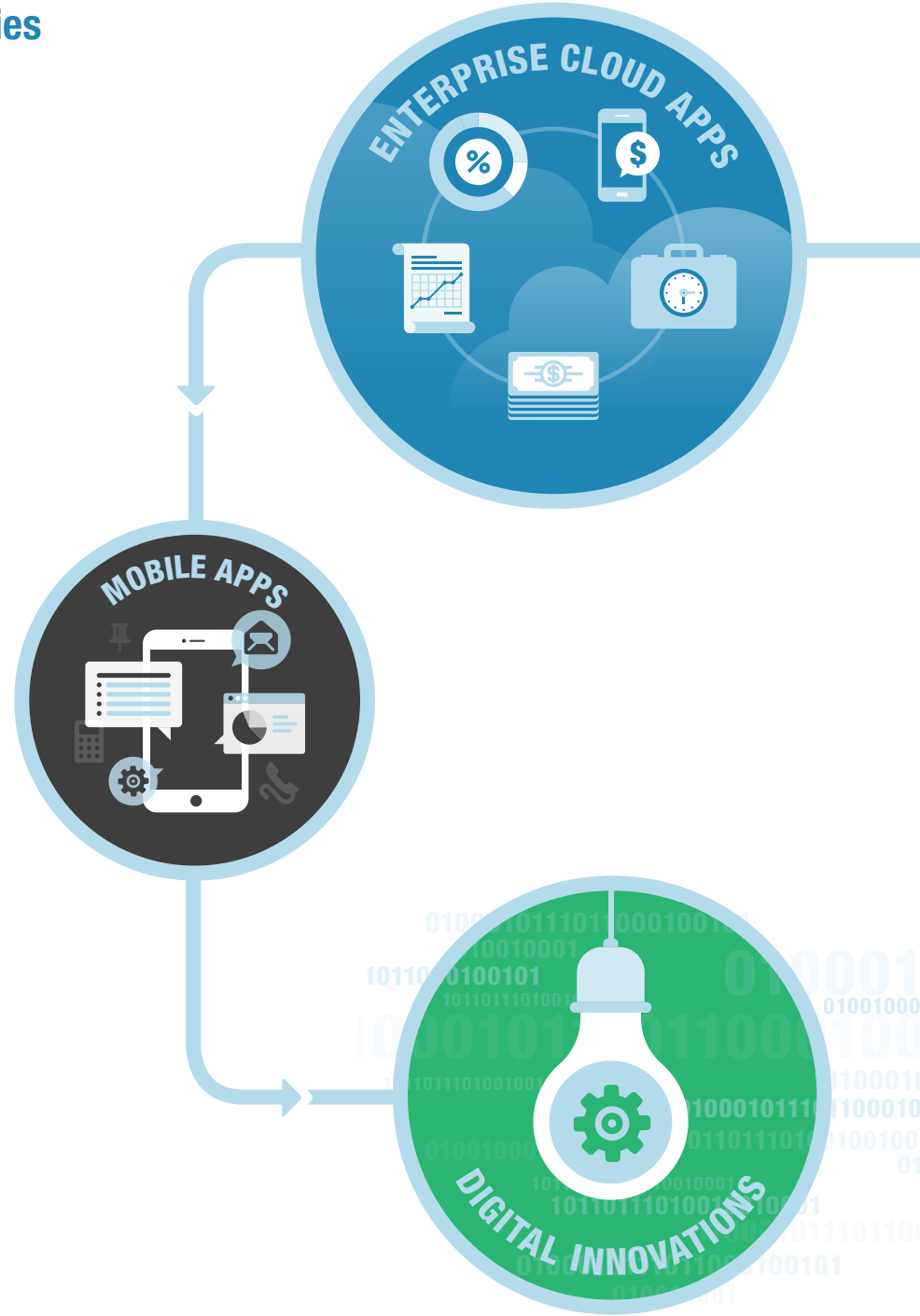
Digital Technologies to Extend Mobile Capabilities

There are three main technology adoption phases organizations typical go through in their EHS Digital Transformation journey. First is establishing a foundation by replacing spreadsheets and point solutions with Cloud-based enterprise software to manage data, workflows and reporting. Next is extending those capabilities further into the enterprise with mobile applications that enable and engage more of the workforce. Third is enhancing mobile capabilities with advanced digital technologies, enabling the truly connected worker.

Mobile applications put critical capabilities and information such as incident reporting, inspections, audits, action management, and risk and hazard information into the hands of more employees. With mobile apps, the right information is available at the right time to do the job safely, and take action to reduce risk. Capabilities such as intuitive interfaces, QR code scanning, and offline forms make mobile apps easy to adopt and drive value.

Advanced digital technologies can help make mobile applications even easier to use, further automate workflows and information delivery, and capture more data that can be analyzed to predict and prevent incidents and accidents. Industrial organizations are already benefitting from these technologies, as evidenced by the 51% of organizations that report that they use intelligent wearables in plant operations.

Many of these advanced technologies are suitable for low-cost proof of concept and pilot projects, with fast time to value. Technology to enable the following use cases is readily available today. They illustrate how forward-thinking safety, and health leaders take advantage of digitalization in practical, low-risk ways.

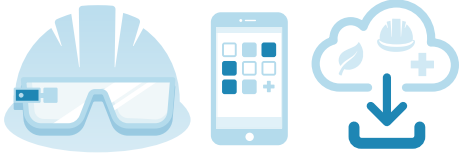


USE CASE #1 | Interactive Hazard Info with Augmented Reality

Every company that wants safe, profitable operations must equip the workforce with the right competencies and ready access to information needed to perform work safely and efficiently. This includes information on workplace hazards and safe work procedures. A mobile, dynamic workforce makes it challenging to ensure required competencies and access to hazard information when and where workers need it throughout operations. Outdated training systems and fragmented knowledge repositories add complexity.

Augmented reality (AR) solutions address the challenge. A hardhat with an integrated AR headset provides industrial workers the ability to interact with the work environment and access context-relevant information in real-time. Operating guidelines, safe work procedures, and hazard communication information needed to do the job safely and efficiently are readily available, along with access to applications and data. Two-way voice communication and live video streaming with remote experts gives line operators, maintenance crews, and others access to live support and advice.

When information and expert advice is available on-demand, the AR solution delivers the right knowledge, at the right time, and at the exact location the work is happening. Hazard communication improves. This approach also enables on-demand training, and targeted, intense training for high-volume or high-risk activities. Competency development and retention increases, along with better legal and internal standards compliance. The result is a safer workforce, higher productivity, and more reliable operations.

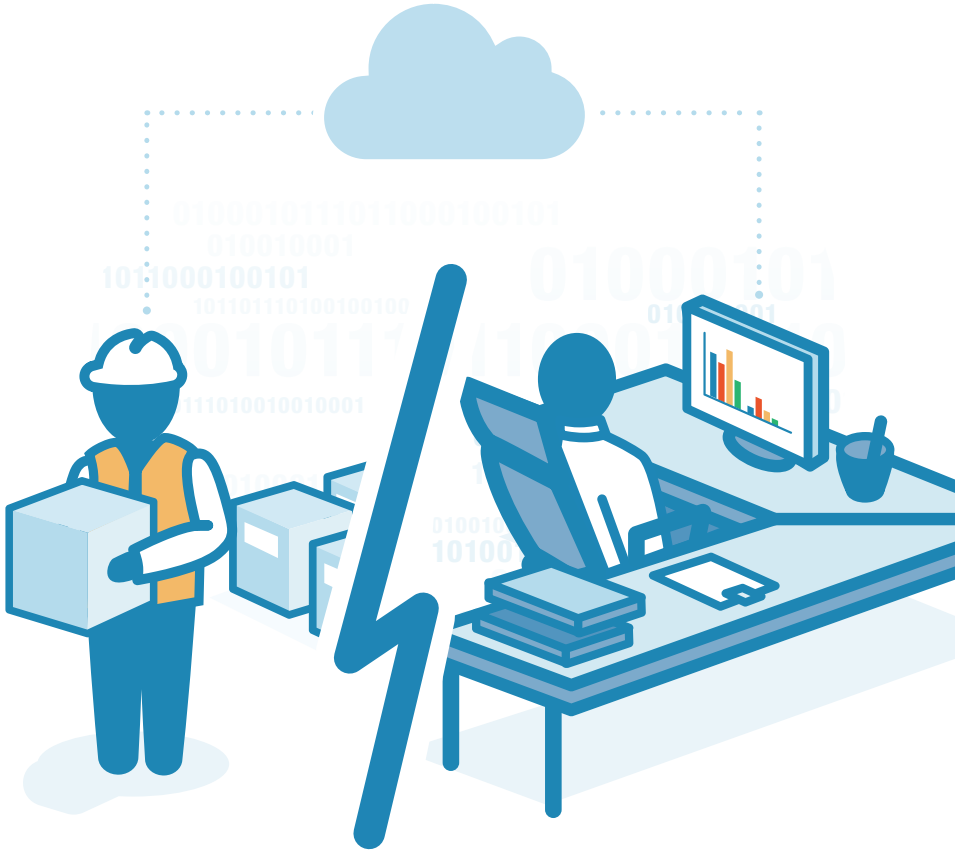
DIGITAL INNOVATION	TECHNOLOGY ENABLERS	EXAMPLES
		• Receive context-specific hazard communication • Access operating and safe work procedures • Complete on-demand and immersive training • Develop competencies and ensure retention

USE CASE #2 | Intelligent Wearables Mitigate Ergonomic Risk

Ergonomic hazards that cause musculoskeletal disorders are among the most common and costly category of occupational injury. These hazards are common in material handling activities and are prevalent across many industry sectors including manufacturing, energy, retail, and transportation. Traditional ergonomic risk assessment methods involve an ergonomist drawing conclusions based on observing individual workers as they perform tasks. This approach is not conducive to fast, accurate risk assessments needed in dynamic operating environments.

Digital technologies enable industrial companies to measure, analyze and control ergonomic risk more efficiently and effectively. Sensor-equipped vests worn by workers gather large volumes of data about biomechanical parameters during work activities. Big Data analytics identify patterns, trends, and correlations to predict risk and aid companies as they develop corrective and preventive actions such as training and engineering controls.

Companies that use this approach better manage risk in fast-changing operations. Their risk assessments are more accurate and scalable, and because they have precise data, intervention is more accurate. Plant and safety managers have real-time visibility to risk and safety information at the worker level. The enterprise uses the data to target the highest risk and impact areas for corrective and preventive actions. Industrial companies use intelligent wearables to reduce injuries and the associated costs and increase productivity.



DIGITAL INNOVATION	TECHNOLOGY ENABLERS	EXAMPLES
		• Mitigate ergonomic risk • Evaluate and reduce worker fatigue • Monitor worker status during high-risk activities

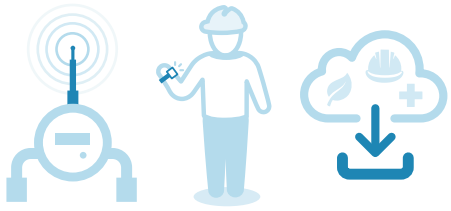
USE CASE #3 | IIoT-Enabled Gas Monitoring and Response Management

Potential worker exposure to toxic gases is inherent in industries such as oil and gas, chemicals, and mining. For example, exposure to hydrogen sulfide, carbon monoxide, chlorine and oxygen-deficient environments pose an immediate threat to life or the risk of explosion. Traditional monitoring with personal and area detectors is useful but doesn't provide any visibility beyond the immediate work area, which limits companies' ability to make timely risk mitigation decisions.

Smart connected gas monitoring systems powered by IIoT technologies provide greater real-time visibility to potential hazards and enable faster response to threats. Such networked systems include permanent wireless infrastructure, wireless portable gas detectors, and cloud-based software for remote monitoring and analytics. Real-time data includes readings from each gas detector, alarm and detector status, and worker location and condition.

Real-time visibility to gas levels and worker status across plant operations provides many benefits over traditional monitoring methods. Companies can identify potentially hazardous conditions much earlier and execute preventive actions sooner. Plant workers can discover and address minor issues immediately and before they become crises. Emergency response is faster and more precise, including response to critical man-down situations. Organizations that apply advanced analytics to identify anomalies, trends, and patterns equip themselves for proactive risk mitigation and to deploy lessons learned across the organization.

Centralized, real-time gas monitoring provides critical data for predictive and preventive risk management. The net result is better worker safety, higher productivity and more operational continuity.

DIGITAL INNOVATION	TECHNOLOGY ENABLERS	EXAMPLES
		• Evaluate and analyze emissions • Monitor remote work sites/locations for hazards • Measure confined space entry conditions

SECTION 6

Recommendations

Recommendations

Companies should view implementation of digital innovations as a journey. Determining the right starting point is often challenging and connected worker capabilities is no exception. Environment, health and safety leaders should get educated and engage to benefit from digital innovations that enable the connected worker.

1. **Focus on a specific problem.** Identify a pain point and the business value of addressing it. Connected worker use cases are often well-suited for limited-scope, low-cost pilot projects that deliver value relatively quickly.

2. **Leverage enterprise Digital Transformation initiatives.** Learn about your organization's digitalization initiatives and capabilities. Look for opportunities to incorporate connected worker projects into the mix.

3. **Consider foundational capabilities.** Readiness for a connected worker project will depend on current capabilities, including technology. Integrated scenarios that extend enterprise Cloud-based software applications with mobile applications deliver the greatest value.

4. **Address privacy and data security up front.** Stay cognizant of the data privacy and security issues related to people-related data; legal requirements vary by country. Many organizations have a policy to govern data. Data privacy and security is manageable when addressed proactively before going too far.

Author:

Peter Bussey, *Research Analyst*
peter.bussey@lns-global.com

Presented by:

LNS research

License to distribute this research report has been granted to:

Gensuite

Connect:

lnsresearch.com

ACRONYM QUICK REFERENCE
VIEW ON BLOG