

Entering the Era of

# IRM 4.0



[ DATA PROTECTION ]



The dawn of a new decade is here, and with it enters an unprecedented opportunity to mitigate risk. It's called **Integrated Risk Management 4.0**, and it will bring about a sea change in how companies can reduce risk in their organizations, their contract work and even in their communities in areas ranging from technology to sustainability among many other types of risk.

IRM 4.0 tackles the challenge of taking the siloed datapoints generated from Industry 4.0 technologies and integrating them into one data-driven view of organizational risk.

CEOs and business leaders have a new way of looking at risk-related data that includes a historical view as well as real-time insights and intelligence. Digital transformation continues to change the way companies do business on every level. Nowhere more so than for highly complex global industries where management of risks around safety, property and the environment impacts revenue, brand reputation and stakeholders.

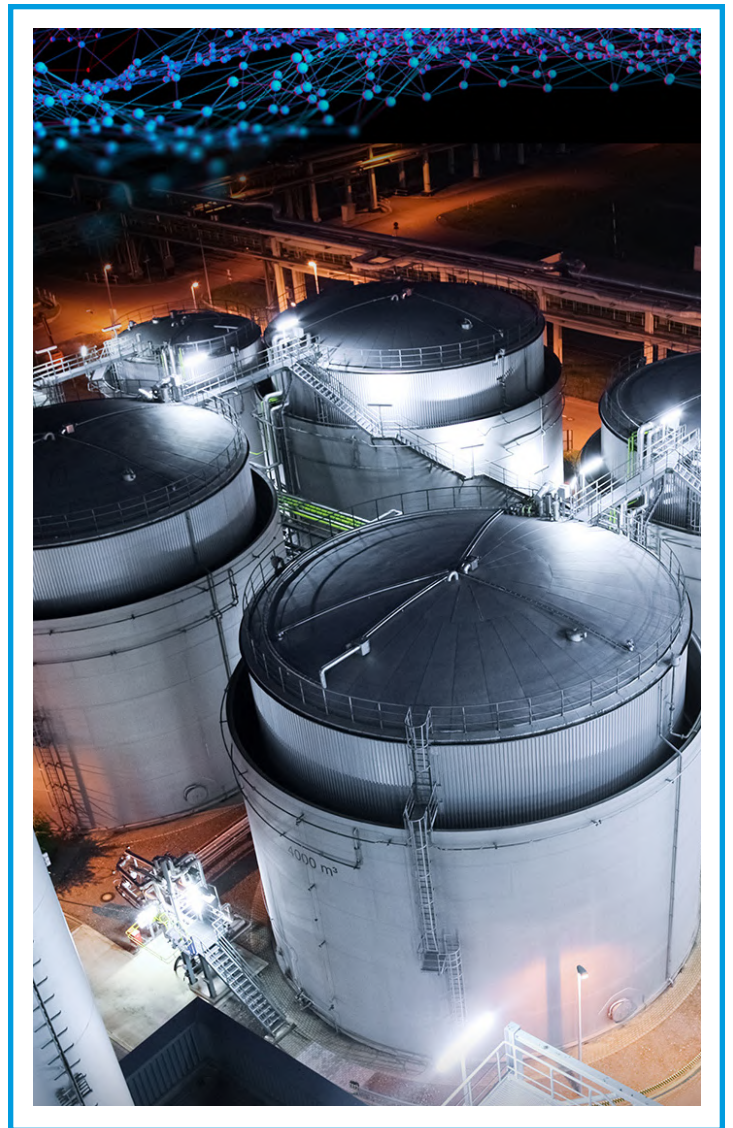
With the inflow of massive amounts of data from embedded sensors and devices to record performance down to the second—or even millisecond—dramatic shifts have occurred in how industrial organizations handle risks of all kinds, but especially Environmental, Social & Governance (ESG). The emergence of technologies to crunch these huge datasets can deliver more than compliance reports but go beyond to predict events and even prescribe solutions proactively.



*“The integration of digital information from many different sources and locations can drive the physical act of doing business in an ongoing cycle.”*

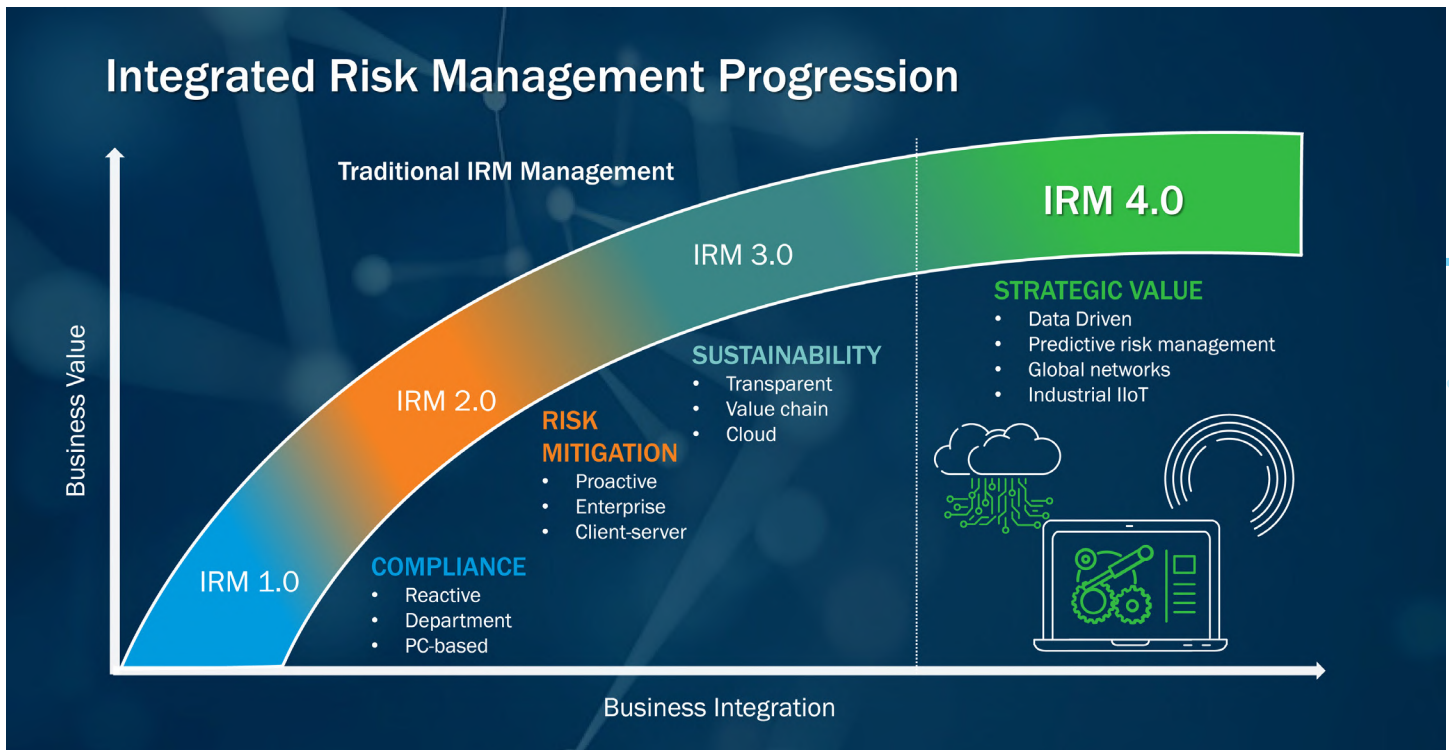
– Deloitte 2017 “Forces of Change: Industry 4.0”

With all the technology in the marketplace, there’s a paradigm shift taking place with respect to data, integration, insights and decisions. Data has been going from nondigital to digital. Integration is going from silos of information to truly connected data available across an enterprise to get the right information to the right people at the right time. It’s going from difficult manual information-gathering from reports to easily digestible insights. And lastly, decisions are agile and nimble because you have all the information you need to mitigate risk.



If Industry 4.0 is about implementing technologies—and those are vital—IRM 4.0 is about integrating disparate data points into comprehensive, real-time visibility of an organization’s total global risk footprint. In other words, CEOs and other organizational decision-makers will be able to boldly go where no organizational leaders have gone before in terms of evaluating their risk exposure. They’ll get a real-time view of their organization’s operational risk from anywhere in the world to help them better understand potential impacts on people, equipment, the environment and processes. And they’ll be able to make better strategic decisions based on the analytics available at their fingertips.

# Integrated Risk Management Progression

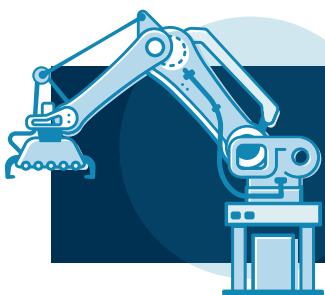


## WHY IRM 4.0?

The early days of Integrated Risk Management (IRM 1.0) were PC-based and focused mainly on **compliance**. Decision-making was reactive after an incident or near-miss took place. The next phase, IRM 2.0, moved organizations into **risk mitigation**. It was proactive, enterprisewide software available on a client's server. The next iteration, IRM 3.0, focused on **sustainability** through transparency, value chain and cloud capabilities. In 2020, we are moving into new territory with IRM 4.0, which offers **strategic** value. IRM 4.0 is data-driven and offers predictive and prescriptive capabilities thanks to the millions of data points generated by Industrial Internet of Things technology, and it can be used on global networks.

With the evolution of cloud, mobile, sensors and other IoT technologies, the Digital Transformation has changed the way companies do business—and risk management is no exception.

IRM 4.0 is the intersection of process, progress and performance. It uses state-of-the-art technologies to gather and analyze data from a host of sources across an organization so companies can make more-informed, strategic business decisions to manage their risk while saving money in the process by eliminating time-consuming, inefficient data collection and ensuring machinery runs smoothly and efficiently among other things.

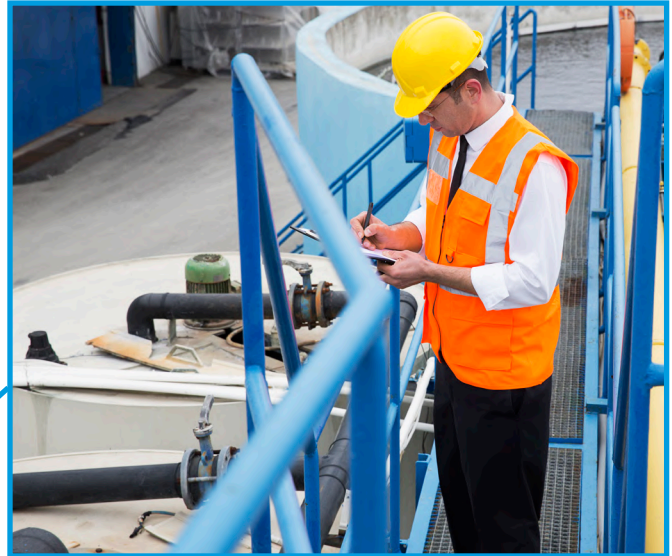


### What's behind IRM 4.0 and how will it impact your business?

This e-book will explore the technologies and the impact those technologies can have on productivity, agility, profitability and industrial safety.

## The Path to Operational Excellence Leads to IRM 4.0

The sustainable organization of the 21st century must balance process and product throughout the value chain, which includes: Keeping employees and communities safe by using sustainable materials; protecting employees throughout operations; monitoring the emissions that come from the production process; ensuring the quality of products and monitoring the raw materials used in their production; and understanding and monitoring a product's impact on the environment throughout their lifecycle.



# ENABLING THE DIGITAL TRANSFORMATION OF INDUSTRY 4.0

The abundance of information out there is why Industry 4.0, Industrial Internet of Things, smart factories, intelligent factories or whatever moniker you prefer have revolutionized the way companies do business. It uses the data supplied from the sensors and inputs derived from Internet of Things technologies that can be used for both predictive and prescriptive purposes as well as typical compliance data-gathering ones as well. Whether it's an Oil & Gas company able to track emissions, a

manufacturing company knowing when a machine or part is likely to fail, a food company having insight into when to order more supplies or a fire department being able to better predict the path of a blaze from a wildfire, technology is changing the game through Internet of Things, mobile and cloud, artificial intelligence, machine and deep learning, augmented reality, virtual reality, robotics and more.



Industrial Internet of Things



Mobile



Data & Analytics



Augmented Reality



Cloud



Machine Learning / AI



Convergence of EHS  
Operations and Workflows



Smart Sensors



Digital Twin

# Let's look at the **nine key elements** of Industry 4.0 and how these technologies play a role in mitigating risk.

# 1

**Augmented Reality:** Organizations need information to be accessible wherever they are and whenever they need it. Imagine being able to focus a camera on a Safety Data Sheet or box to learn more about the risks of transporting or storing inventory and any potential hazards. Data comes to life in AR, and is a key component of the future of IRM 4.0.



# 2

**Cloud:** Some organizations choose to have their files saved on a Software as a Service (SaaS) platform for easy access to data and so that they can see that data on multiple devices, i.e., the right information to the right people at the right time.



# 3

**Convergence of EHS&S Operations and Workflows:** Organizations want to improve interaction and collaboration across the organization to drive Operational Excellence, and a connected workplace is a safer workplace from prescriptive and predictive capabilities.



# 4

**Data and Analytics:** Organizations need to be able to do more than just collect information—they need to be able to use it, slice it and dice it to their organizational and competitive advantage.



# 5

**Digital Twin:** In the industrial spaces, Digital Twin technologies are typically considered and primarily used for monitoring and managing equipment health; however, digitalizing operations with Digital Twins can embrace new value that will maximize efficiencies, improve safety and help operators achieve Operational Excellence across their workforce.



# 6

**Industrial Internet of Things (IIoT):** Organizations understand the power of connectivity. While Internet of Things (IoT) refers to a network of computers, devices, objects, etc., that work in tandem to collect and digitalize information, IIoT targets the manufacturing industry specifically, which allows companies to track copious amounts of data.



# 7

**Machine Learning/Artificial Intelligence:** Organizations must be able to crunch numbers automatically, and through Machine Learning and AI, companies can access predictive and prescriptive tools to help mitigate risk by letting technology offer strategies for humans to employ.



# 8

**Mobile:** Organizations want employees to be able to communicate and access risk-related information on the go to help them mitigate risk.



# 9

**Smart Sensors:** Organizations can track the copious amounts of data from IIoT technologies through sensors, which are becoming ubiquitous in industry to track and log data.





“**Digitalization** is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.”

—[Gartner IT Glossary](#)

## GETTING THERE

David Metcalfe is the CEO and co-founder of Verdantix, an independent research and consulting firm based in London and New York.

“What’s happening is, historically, we had separate teams and technology stacks for different risks,” Metcalfe told [Spark](#). “So the EHS team would manage the safety risk related to workers and then you would have maintenance and asset reliability looking at all the risks, equipment failures, posed to the production process. Now what we’re seeing is, especially with the rise of edge devices and real-time risk analytics, that you can put those two datasets together. So that’s a huge prize. It’s going to be a long journey to get there, but that’s definitely what the more sophisticated organizations are trying to do.”

In terms of the predictive applications, he explained that human behavior is not as predictable as, say, equipment failures. “You’ve got a much more controlled system than the human being—or multiple human beings,” Metcalfe said. “You’ve got much

higher levels of predictability, and therefore you can have machine learning, artificial intelligence approaches to them prescribing what actions should be—and optimizing things like maintenance activities.”





# Focus on Industry 4.0 Digitalization

**90%**

Agree digital transformation accelerates the ability to achieve sustainable operational excellence.

**73%**

Improve operational efficiency.

**55%**

Reduce or manage operational risk.

**55%**

Improve asset availability and uptime.

**BUT...**



Say companies are only just starting or are currently implementing digital transformation projects.



Say companies are still trying to figure out what 'digital transformation' means to them.

## DIGITAL INSIGHTS WILL BECOME THE FEEDSTOCK OF OPERATIONAL EXCELLENCE OF THE FUTURE

**75%**



Enable new insight-driven business processes across functions.

**70%**



Enable Digital Twin modelling to simulate what/if scenarios.

**69%**



Connect disparate data & systems to create actionable insights.

**65%**



Provide advanced analytics to better understand where to make operational improvements.

## GREATEST POTENTIAL – THE ANTICIPATED RATE OF GROWTH IN ADOPTION

**440%**

Digital twins

**363%**

IIoT platforms

**211%**

Predictive analytics

Source: 2018/2019 Operational Excellence & Digital Transformation (OEI) Industry Report

In other words, we're only human after all, but machines are not.

According to Sphera's 2018/2019 Operational Excellence & Digital Transformation [report](#), most leaders agree (**90%**) that a Digital Transformation strategy accelerates the ability to achieve sustainable Operational Excellence, and **75%** believe the digitalization will enable new insight-driven business processes across functions, **70%** say it will enable Digital Twin modeling. And more than two-thirds of respondents (**69%**) said it will connect disparate data and systems to create actionable insights.

Piggybacking on what Metcalfe said, AI will play a big part in the future of IRM 4.0. At Sphera, one of the people who will play a key role in that evolution is Jerry Shaughnessy, Sphera's chief architect.

"We're just taking some of that human interaction that used to be necessary to make some of those decisions. We're augmenting that; we're not replacing it."

A 2017 Gartner report, for example, says that there will be more than 20 billion connected "things" by

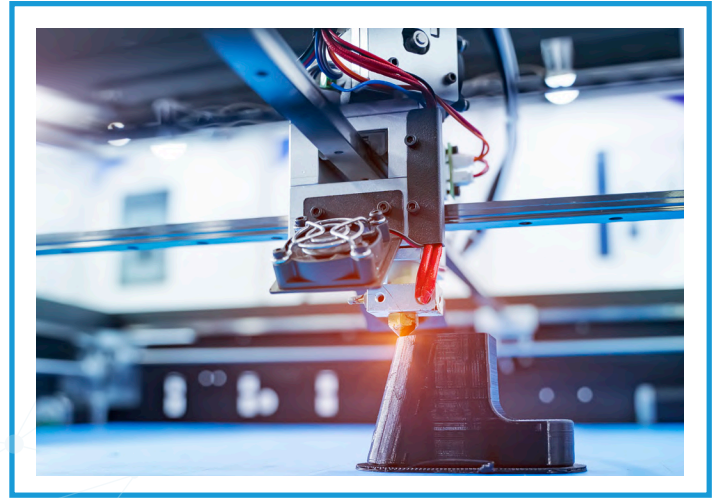
2020, and in 2018 Juniper Research predicted that there will be more than 50 billion combined IoT devices and sensors by 2022.

## Connectivity Equals Opportunity

One area that is ripe for an "augmented" risk mitigation process thanks to the number of sensors and connected things is Maintenance, Repair & Operations (MRO), which is part of Master Data Management. Think about it: Every component of every machine used by every company has a finite life cycle. It may be one year, it may be five years, it may be 25 years or more, but eventually every part will fail. Being able to use the massive amount of information at hand to predict when that might occur is not only a boon for safety but also productivity as well. Changing parts can be done strategically instead of reactively that way. As more and more sensors and Internet of Things devices enter the workplace, there is more opportunity to extract the data to maintain equipment and parts.

Perhaps one day, you'll even see your machines order their own parts or even print them out on location via a 3-D printer so no need to wait for

days for a delivery or pay a premium to get the part sooner than that. Even though companies often store parts in house, Murphy's law cannot be ruled out: There's always that one part that a worker desperately needs and that just isn't available. For older machinery, it might not be that easy to find Original Equipment Manufacturer parts at all, so 3-D printing could be a faster and more-effective way to get the exact part you need in those situations. But until that day comes, it's reassuring to be able to have a better understanding of when a part is likely to fail.



## DEEPER DIVE INTO THE DATA

Data can be used in many areas of risk mitigation through machine learning and deep learning as well as other technologies. Machine learning is basically a way for the technology to “learn” how you want to complete a process. Deep learning, on the other hand, is where software would consider every possible combination to figure out the best way to complete that process.

Another area primed for risk mitigation performance is block chain. Shipping companies, for instance, employ lots of IoT sensors that can be used for moment-by-moment recordkeeping. When a container arrives in a port, the receiver can look at the blockchain data to ensure, for example, that an item was stored at the proper temperature during its journey, etc.

For risk mitigation, one way that Sphera's Shaughnessy sees as a potential outlet for data collection

that you might already use at home is Alexa. He foresees that not only would you be able to use the virtual assistant to document incidents and near-misses, but you'd also be able to pull up safety-related information on the spot as well by saying things like, “How many incidents occurred in the northeast region where someone was actually injured?” he explained.

This type of usage could also be used for not only documenting risks but also for calling emergency personnel as well, e.g., “Alexa, there has been an accident. Call 911.” And Alexa could ask a series of questions about what happened and then everything gets documented—and analyzed—along the way. Since actor Samuel L. Jackson recently signed a deal to be a celebrity voice for Alexa, just imagine the possibilities there.

# MORE INPUT FROM WEARABLES

People use wearables to monitor more than just their vital signs, such as heart rate, blood pressure, respiration rate, etc. The technology is often also designed to detect and alert users if there are any abnormalities, such as whether there is CO<sub>2</sub> gas in the air.

These devices offer “physiolytic” capabilities, as H. James Wilson called it in a 2013 Harvard Business Review article. This means they can link wearable technology with “data analysis and quantified feedback to improve performance.”

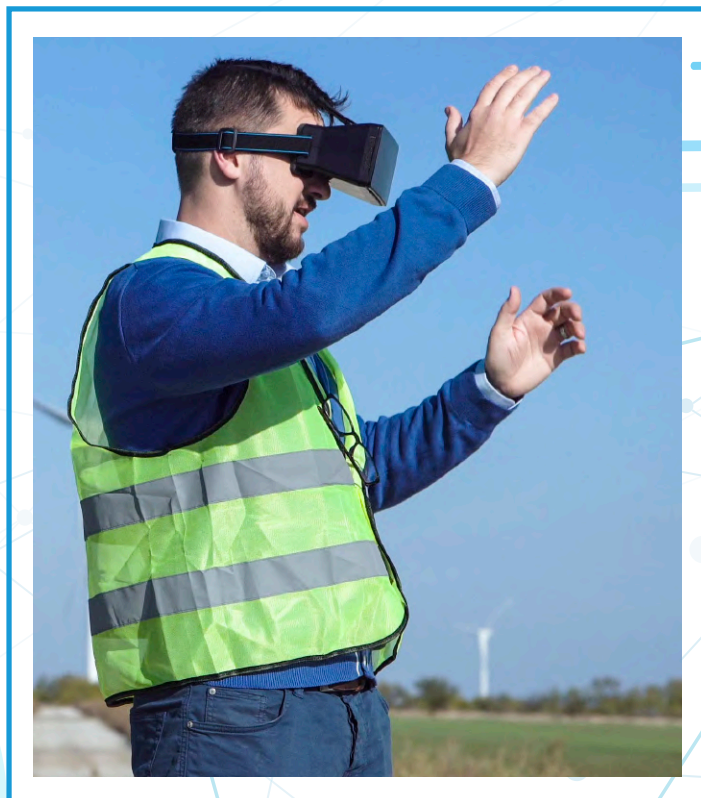
It’s that intersection of technology and data where IRM 4.0 really comes to play.

The more data input opportunities a company has, the more capabilities emerge for using the data for predictive and prescriptive means.

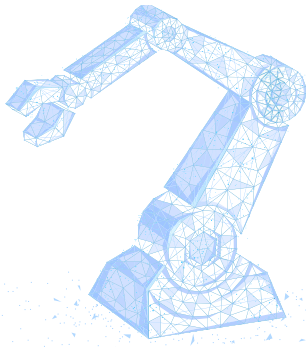
For Operational Risk Management, that could be sensors that monitor heart rate and other vital signs to ensure workers who are in extreme environments aren’t being pushed too far.

For Product Stewardship, that could be a scenario where a sensor on a product or package tells companies when certain chemical hazard thresholds are approached or surpassed, or it could even be a sensor that alerts people working with chemical hazards if they’re not wearing the right personal protective equipment. There are many possibilities.

For EHS&S, it could mean sensors to measure emissions from coal-fired powerplants on a smokestack or a way to track Corporate Sustainability Reporting.



## Contractor Safety in the IRM 4.0 Era



Every industry is affected by the safety practices of its contractors, but the ones that typically face the most scrutiny are in the Oil & Gas, refining, petrochemicals, mining, transportation, warehousing, waste management and construction fields.

Oil & Gas and construction are particularly noteworthy in this regard. These companies employ the most contractors. The construction sector is also significant because almost every business, barring a few service organizations, deals with construction activity related to building, converting, extending or demolishing workplace areas of their business. Contractors often have different cultures, perspectives, approaches, maturities and attitudes toward safety, but companies cannot allow contractors' differing safety opinions and protocols from compromising the business initiatives of the organization using the contractor. Not doing so could lead to costly, unplanned shutdowns; spills; undesired expenses; injuries; loss of productivity and income; and a slew of other unwelcome possibilities.

To protect the business, companies must initiate a rigorous Contractor Safety program that includes prequalification, pre-job assessment, monitoring, post-job evaluation, effective policy, procedures and training to minimize losses and incidents. Contractor activities and the full contractor life cycle management workflow must be integrated seamlessly with a company's overall Environment, Health, Safety & Sustainability processes. Job safety analysis (JSA), hazard and operability (HAZOP) studies, Control of Work, environmental considerations and incident reporting are just a few of the elements that contractors should be trained to handle to help prevent injuries and even casualties. There have been numerous instances where contracted work has resulted in injuries because of lack of: Using a platform that allows the proponent organization to manage the data and workflows associated with contractor vetting makes it possible to not only select the right contractor but also allow the proponent organization to communicate their standards, which makes the relationship stronger and more productive.

A holistic EHS platform should provide Contractor Safety modules as integrated components of the EHS platform. It should also perform online self-assessments, tag incidents and near-misses, maintain a dossier of contractor performance, manage workflow reporting and keep a database of contractors.

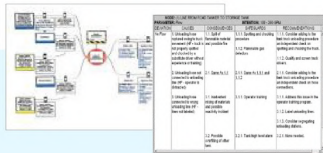
A robust, integrated solution helps build maturity of risk and compliance processes, and lays a strong foundation for collaboration with multiple buyers of contractor services. Contractors are best served with a platform that can help them execute tasks: productively (efficiently and profitably), safely, with a high degree of quality, sustainably and satisfactorily for their customers' wants/needs.



# FROM DRONES TO DIGITAL TWIN

## Dynamic Real-Time View of Plant Risk Status

Policies and procedures



Complex operating environment



Operators trying to connect the dots

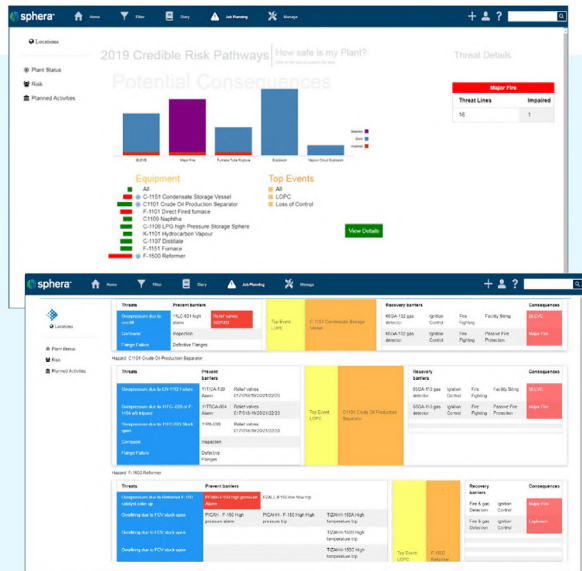


Real-time capture of risk related data



Intelligent translation & mapping

Real Time View of Safeguarding Barrier Status



Emerging Risk Pathways allow for early intervention

For EHS&S and ORM in particular, there is enormous potential for drones to capture data while performing tasks that humans can't do or shouldn't do.

A recent study from the University of Kentucky, partially titled "Monitoring Tropospheric Gases with Small Unmanned Aerial Systems," used drones to monitor trace atmospheric gases. According to the study, small unmanned aerial systems (sUAS) "can be effectively employed in the petroleum industry, e.g., to constrain leaking regions of hydrocarbons from long gasoducts," which are natural gas pipelines. The report goes on to say that current greenhouse gas (GHG) emissions estimates are "incomplete" and "[r]educing the uncertainty of low-altitude (<100 m) trace gas emissions is critical to fully understanding emission processes and implementing sustainable industrial practices."

Besides being able to collect GHG emissions data, drones are also very good at tracking GPS

coordinates—latitudinally and longitudinally—and taking videos.

Oil & Gas and utility companies are using drones to monitor miles and miles of pipeline for leaks, and some drones include thermal imaging cameras that can detect leaks based on temperature differences—or for assessing storm damage or other incidents in the field.

Of course, Verdantix's Metcalfe cautions not to get too far ahead of ourselves. "Drones obviously are very interesting," he said. "They're just another way of picking up specific types of data, which previously were hard to acquire. Definitely you're going to see more digital sensors deployed on equipment. We're starting to see more trials of digital PPE wearables in terms of workers. However, I think at the moment 90% of data is really being collected from operator rounds or human observation, so I think we need to be careful not to get too carried away with the new technologies."




Fair enough, but how about current technologies, such as Digital Twins, a recent concept that traces its roots back to a critical time in NASA history when Apollo 13 was in trouble. You've heard it over and over, "Houston, we've had a problem here." NASA had to find a way for the three astronauts to fix the space vessel quickly before they ran out of oxygen. The team in Houston had to find a way to visualize the exact issue based on the description that the team in space relayed to them from the vessel, and then they had to find a way to help the team in space fix the problem so the astronauts at risk could return to earth safely.

Today Digital Twin for Operational Risk Management can give companies a bird's-eye view of their risk exposure.

Using all the information available from the individual sensors and equipment, Digital Twin

draws a virtual picture of what the real-life plant status is and then can overlay that information on what human interactions need to happen in the plant to get a better picture of what the true operational reality of the plant is.

With all this information, Digital Twin software can be used to predict what's going to happen to an asset, simulate the changes and offer prescriptive behavior to minimize the chances of a disaster occurring.

The dawn of IRM 4.0 is here, and it will offer the opportunity for a safer future for everyone who adopts and embraces it. 

## About Sphera

Sphera is the leading global provider of Integrated Risk Management software and information services with a focus on Environment, Health, Safety & Sustainability (EHS&S), Operational Risk Management and Product Stewardship. Sphera has advanced Operational Excellence for more than 30 years, serving companies and customers across the globe to create a safer, more sustainable and productive world.



[www.sphera.com](http://www.sphera.com)

For more information contact us at:  
<https://sphera.com/contact-us>

©2020 Sphera. All Rights Reserved.

